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CIBJO/Laboratories

CIBJO/GEMMOLOGICAL COMMISSION

The Gemmological Laboratory Book

A Guide for the Management and Technical Operations
of Gemmological Laboratories

Table of Contents

FOREWORD.....	III
INTRODUCTION.....	V
1. SCOPE.....	6
2. NORMATIVE REFERENCES.....	6
3. TERMS AND DEFINITIONS.....	7
3.1. AUDIT.....	7
3.2. CALIBRATION.....	7
3.3. CERTIFICATE.....	7
3.4. CERTIFIED REFERENCE MATERIALS — CRMs.....	7
3.5. COMPETENT SUBCONTRACTOR.....	7
3.6. GEM MATERIALS.....	7
3.7. GEMMOLOGICAL LABORATORY.....	8
3.8. GEMMOLOGY.....	8
3.9. GEMMOLOGICAL LABORATORY.....	8
3.10. GEMOLOGY.....	8
3.11. GRADING.....	8
3.12. INTERNAL AUDIT.....	8
3.13. INTERNAL CALIBRATIONS.....	8
3.14. LABORATORY / LAB.....	8
3.15. QUALITY AND TECHNICAL RECORD.....	8
3.16. REFERENCE STANDARDS AND REFERENCE MATERIALS.....	8
3.17. REPORT.....	9
3.18. SAMPLING.....	9
3.19. SI UNITS — INTERNATIONAL SYSTEM OF UNITS.....	9
3.20. SUBCONTRACT.....	9
3.21. TEST.....	9
3.22. TRACEABILITY.....	9
3.23. REPRODUCIBILITY OF RESULTS.....	9
4. MANAGEMENT REQUIREMENTS.....	9
4.1. ORGANISATION.....	9
4.2. MANAGEMENT SYSTEMS.....	10
4.3. DOCUMENT CONTROL.....	10
4.4. REVIEW OF CUSTOMER REQUESTS.....	11
4.5. SUBCONTRACTING OF TESTS.....	11
4.7. COMPLAINTS.....	11
4.8. CORRECTIVE ACTION.....	12
4.9. ADDITIONAL AUDITS.....	12
4.10. CONTROL OF RECORDS.....	12
4.11. INTERNAL AUDITS.....	12
4.12. MANAGEMENT REVIEWS.....	12
5. TECHNICAL REQUIREMENTS.....	13
5.1. PERSONNEL.....	13
5.2. ACCOMMODATION AND ENVIRONMENTAL CONDITIONS.....	13
5.3. EQUIPMENT.....	14
5.4. TESTING AND GRADING.....	14
5.5. REFERENCE STANDARDS AND REFERENCE MATERIALS.....	14
5.6. SAMPLING.....	15
5.7. ASSURING THE QUALITY OF TEST AND GRADING RESULTS.....	15
5.8. REPORTING THE RESULTS.....	15
5.9. AMENDMENTS TO TEST REPORTS.....	16
6. TEST METHOD PROTOCOL.....	16
6.1. TEST METHODS GEMSTONES.....	16
6.2. TEST METHODS PEARLS AND ORGANIC GEM MATERIALS.....	55
6.3. TEST METHODS DEFINITIONS.....	64
6.4. TEST METHODS REFERENCES.....	68
INDEX.....	209

Foreword

CIBJO is the French acronym for the **Confédération Internationale de la Bijouterie, Joaillerie, Orfèvrerie, des Diamants, Perles et Pierres**, which translates as the International Confederation of Jewellery, Silverware, Diamonds, Pearls and Stones (normally shortened to the International Jewellery Confederation). Founded in 1926 as BIBOAH, a European organisation whose mission was to represent and advance the interests of the jewellery trade in Europe, it was reorganised in 1961 and renamed CIBJO, in 2009 it was once again reorganised and officially named “CIBJO, The World Jewellery Confederation”. Today CIBJO, which is domiciled in Switzerland, is a non-profit confederation of national and international trade associations including commercial organisations involved in the jewellery supply chain. It now has members from countries representing all five continents of the world. CIBJO printed its first deliberations on terminology and trade practices in 1968.

It is the task of CIBJO to record the accepted trade practices and nomenclature for the industry throughout the world. The records of the trade practices complement existing fair trade legislation of a nation or in the absence of relevant national laws they can be considered as trading standards. In countries where laws or norms exist, which conflict with the laws, norms or trade practices in other countries, CIBJO will support the national trade organisations to prevent trade barriers developing. The purpose of CIBJO is to encourage harmonisation, promote international co-operation within the jewellery industry, consider issues which are of concern to the trade worldwide and to communicate proactively with members. Foremost amongst these the aim is to protect consumer confidence in the industry. CIBJO pursues all of these objectives through informed deliberation and by reaching decisions in accordance with its Statutes. CIBJO relies upon the initiative of its members to support and implement its standards, and to protect the trust of the public in the industry.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The work of CIBJO is accomplished through Committees, Commissions and Sectors. Committees and Commissions consider standards for use in the jewellery supply chain. Sectors represent levels of trade in the jewellery industry. Sectors and commissions advise the Executive Committee on current trade practices and issues that affect the jewellery industry.

Three independent sectors exist within the confederation:

Sector A — The Products Sector

Sector B — The Supply Chain Sector

Sector C — The Service Sector

The Executive Committee may appoint Commissions that consider detailed issues. At present these are:

Coloured Stone

Coral

Diamond

Ethics

Gemmological

Pearl

Marketing & Education

Precious Metals

World Jewellers Vigilance

The Commissions for Diamonds, Gemstones, Pearls and Precious Metals have collated the guidelines, which present the accepted trade practices for applying descriptions to these materials. It is in the best interest of all those concerned to be aware of them.

The Sectors and Commissions will propose changes in the standards, also known as the Blue Books, to the Executive Committee. After review the Executive Committee will submit the accepted proposals for adoption to the Board of Directors and if approved they will notify the assembly of delegates of the changes at the annual congress. Furthermore, it is our mutual responsibility to support these recommendations, which concern all professional people connected with diamonds, gemstones, pearls and precious metals. CIBJO Standards are subject to government regulations in the respective jurisdictions of CIBJO members.

The national umbrella organisation for each country represents, in principle, all the national trade organisations involved in the sectors mentioned above. This democratic structure, which has contributed to CIBJO's world-wide recognition also includes international trade and commercial organisations, it provides an international forum for the trade to collectively draw attention to issues and implement resulting decisions.

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Introduction

The CIBJO Gemmological Laboratory Book is intended as a source of information and recommendations for gemmological laboratories on which they may choose to base their activities in order to ensure proper quality control and accountability within their Gemmological Laboratory.

The work of a Gemmological Laboratory and the test results it produces are reliant upon good practices throughout the Gemmological Laboratory's operation, from the first to the last interaction with the Customer.

The following definitions apply in understanding how to implement a CIBJO standard and normative references (Blue Books, PAS).

- “shall” indicates a requirement;
- “should” indicates a recommendation;
- “may” is used to indicate that something is permitted;
- “can” is used to indicate that something is possible.

The Gemmological Commission strongly recommends that all Gemmological Laboratories aspire to achieve the highest possible level of accountability throughout their operations and that the best practices recommended in the CIBJO Gemmological Laboratory Book are followed as a minimum. However, ideally all Gemmological Laboratories should also consider the application of ISO/IEC 17025.

The Gemmological Commission

October 2016

CIBJO Guidelines for Gemmological Laboratories

This book takes its concept from ISO/IEC 17025, an International Standard for which it is recommended that all Gemmological Laboratories seriously consider compliance.

Disclaimer — CIBJO recommends the best practices but is not responsible for gemmological reports issued by a Laboratory.

1. Scope

This CIBJO Gemmological Laboratory Book suggests best practices and general requirements for the competence to carry out tests, grading and/or internal calibrations, on instruments, coloured gemstones, diamonds and pearls within gemmological laboratories. The clauses herein are a guide only and shall not be regarded or considered as rules of application, laws, or statutes that govern the operation of gemmological laboratories.

The CIBJO Gemmological Laboratory Book suggests best practices for testing, grading and internal calibration performed using those methods both typically used and within gemmological laboratories as well as those uniquely developed. The suggestions are pertinent to the operations of all gemmological laboratories that issue test results regardless of whether or not these are part of a service that is paid for by a customer. They are also pertinent regardless of a gemmological laboratory's size and scope.

When a gemmological laboratory does not undertake one or more of the activities covered by this CIBJO Gemmological Laboratory Book, the suggestions stated in those clauses may not apply.

This CIBJO Gemmological Laboratory Book is for use by gemmological laboratories in developing their management system for quality, administrative and technical operations. It is not intended nor should it be considered as a guarantee for the quality of results issued by the laboratories.

Gemmological laboratories should refer to the appropriate International standards when organising compliance with safety requirements for the operation of gemmological laboratories: these are not covered in the CIBJO Gemmological Laboratory Book.

2. Normative references

The following referenced documents are recommended readings. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

International Standard, ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories ISO/IEC 17025:2005(E) Case postale 56 • CH-1211 Geneva 20, Web www.iso.org.

The Coral Book, CIBJO, International Confederation of Jewellery, Silverware, Diamonds, Pearls and Stones, the World Jewellery Confederation, Viale Berengario,19, 20149 Milano, Italy. cibjo@cibjo.org

The Diamond Book, *CIBJO*, International Confederation of Jewellery, Silverware, Diamonds, Pearls and Stones), the World Jewellery Confederation, Viale Berengario, 19, 20149 Milano, Italy cibjo@cibjo.org.

The Gemstone Book, *CIBJO* (International Confederation of Jewellery, Silverware, Diamonds, Pearls and Stones), the World Jewellery Confederation, Viale Berengario, 19, 20149 Milano, Italy cibjo@cibjo.org.

The Pearl Book, *CIBJO* (International Confederation of Jewellery, Silverware, Diamonds, Pearls and Stones), the World Jewellery Confederation, Viale Berengario, 19, 20149 Milano, Italy cibjo@cibjo.org.

The Precious Metals Book, *CIBJO* (International Confederation of Jewellery, Silverware, Diamonds, Pearls and Stones), the World Jewellery Confederation, Viale Berengario, 19, 20149 Milano, Italy cibjo@cibjo.org.

PAS 1048, Grading polished diamonds, Part 1: Terminology and classification — Part 2: Test methods (2005), Beuth Verlag GmbH, Berlin. <http://www.natdiamond.com/pas1048>

3. Terms and definitions

3.1. Audit

examination of the quality, state, efficiency of an organisation, system, process, project or product to ascertain its validity and reliability.

3.2. Calibration

a set of graded measurements that show position or values to mark or correct the units of measurements of an instrument.

3.3. Certificate

a document of a legal standing.

3.4. Certified reference materials — CRMs

reference materials, accompanied by documentation issued by an authoritative body and providing one or more specified property values with associated uncertainties and traceability, using valid procedures.

3.5. Competent subcontractor

a contractor of the primary contractor, in this case the laboratory, who by virtue of their knowledge, experience and equipment is competent to do the work.

3.6. Gem materials

those materials listed in the *CIBJO*, *Diamond*, *Pearl*, and *Gemstones Books* (see 2, Normative References).

3.7. Gemmological laboratory

an establishment that provides controlled conditions in which the identification, authentication and grading of gem materials may be performed; scientific research, experiments and measurements may be carried on as well with the aim of a better knowledge of gem materials.

3.8. Gemmology

the science, art and profession of identifying, authenticating, researching and grading gem materials.

3.9. Gemological laboratory

an alternative (American English) spelling for gemmological laboratory.

3.10. Gemology

an alternative (American English) spelling for gemmology

3.11. Grading

the classification of technical/commercial characteristics of gem materials

3.12. Internal audit

control of the Laboratory's quality system, to ensure that the activities carried out in the Laboratory are in conformity with the established policies and procedures of the management system, with the aim of correcting any non-conformities and introducing improvements. The final outcome is to minimize the percentage of errors and give valid, consistent and reliable results and services.

3.13. Internal calibrations

calibrations done in a Centre on its own instruments, to check their validity and consistency with the Standards.

3.14. Laboratory / Lab

trade short form for a gemmological laboratory, see 3.7 and 3.9.

3.15. Quality and technical record

written notes on facts related to quality and/or to technical items so that they can be remembered or referred to in the future.

3.16. Reference standards and reference materials

references calibrated by a body that can provide traceability, used to establish, by comparison, the value of physical or chemical properties.

3.17. Report

a description of technical/commercial characteristics of gem materials in accordance with the rules relative to CIBJO international agreements.

3.18. Sampling

a defined procedure whereby a part of a substance, a material, a product or a lot is taken to provide for testing of a representative sample of a whole. Sampling procedures describe the selection, sampling plan, withdrawal and preparation of a sample or samples from a substance, material, product or a lot, to yield the required information.

3.19. SI units – International System of Units

an internationally agreed system of measurement that uses seven base units (length, mass, time, electric current, thermodynamic temperature, luminous intensity and amount of substance) with two supplementary units (plane angle and solid angle).

3.20. Subcontract

a contract that assigns some of the obligations of a prior contract to another party.

3.21. Test

a procedure in which technical characteristics of gem materials are observed, measured, analysed and established.

3.22. Traceability

completeness of the information about every step in a process chain.

3.23. Reproducibility of results

ability of a gemmological laboratory to get the same results when repeating tests, using the same reference samples and standards.

4. Management requirements

4.1. Organisation

4.1.1. The gemmological laboratory, the organisation, or commercial company of which it is part shall be legally responsible for the activities of the gemmological laboratory. The management system shall cover work carried out by the gemmological laboratory whether inside or outside the political/administrative borders of its registration.

4.1.2. In order to make clear any implied or potential conflicts of interest, if a gemmological laboratory is entirely or partly owned by, or has investors within a gem material (loose or mounted) trade organisation or a commercial company that trades in gem materials (loose or mounted), in particular where traders or potential customers are on a board(s) and may play a role in, or have an influence upon the testing and/or reporting activities of the

gemmological laboratory; the responsibilities of key personnel in the organisation that have such involvement or influence shall be clearly defined, and openly declared to the Laboratory's clients.

- 4.1.3. A gemmological laboratory should be able to demonstrate that it is impartial and that it and its personnel are free from any undue commercial, financial and other pressures which might influence their technical judgement. The gemmological laboratory should not engage in any activities that may endanger the trust in its independence of judgement and integrity in relation to its testing or internal calibration activities.
- 4.1.4. The gemmological laboratory management system shall ensure that gemmological laboratory personnel are free from any internal and external pressures and influences that may interfere with the quality of their work; the performance of tests, grading and/or instrument calibrations. The management system shall have personnel in-place that monitor such influences and when necessary have the power to take corrective action.
- 4.1.5. The management system shall be clearly defined to staff and customers through an effective means of communication.
- 4.1.6. Testing and internal calibrations shall be properly supervised by technically qualified managers that have overall responsibility and authority over technical staff and the work they carry out, and reports that are issued.
- 4.1.7. A member of the technical staff shall be appointed to manage the quality of the work carried out in the gemmological laboratory. This manager shall ensure that all test protocols are adhered to, that quality systems are followed at all times that the staff is aware of their quality related responsibilities at all times.

4.2. Management systems

- 4.2.1. A system of protocols that ensure the quality of the work carried out by the gemmological laboratory shall be available to the staff and that the contents are effectively communicated. These protocols shall cover all aspects of the gemmological laboratory functions, including but not limited to, receipting of goods, weights and measures, inventory control, work distribution, instrument maintenance and operation, results analysis and report nomenclature.
- 4.2.2. All management systems shall be reviewed at least annually and a written quality statement issued by top management. This statement shall commit management to the observation of best practices in the identification and reporting on gem materials and the quality of services given to customers. The statements should also indicate management's commitment to compliance with the Gemmological Laboratory Book and / or ISO/IEC 17025.

4.3. Document Control

- 4.3.1. A full list of approved documents and their current status shall be established and shall be readily available to preclude the use of out of date versions. All approved documents shall be available in and to all locations.
- 4.3.2. All altered or new document text shall be identified in the document or the appropriate attachments.
- 4.3.3. There shall be clear procedures to describe how changes in documents are made and controlled.
- 4.3.4. Documents must include the list of related attachments.

4.4. Review of customer requests

- 4.4.1. Requirements and or requests shall be clearly established upon receiving gem materials from a customer.
- 4.4.2. All test methods shall be adequately defined and be clearly understood by the gemmological laboratory.
- 4.4.3. The gemmological laboratory shall have the capability and resources to meet the customer's requirements and/or requests.
- 4.4.4. Any differences in understanding between the customer and the gemmological laboratory shall be resolved prior to any work being carried out.
- 4.4.5. Records shall be kept of any discussions with customers.

4.5. Subcontracting of tests

- 4.5.1. When a gemmological laboratory subcontracts work, this work shall be placed with a competent subcontractor.
- 4.5.2. If customer's work is subcontracted the gemmological laboratory shall advise customers of the circumstances, including the acknowledgement of their continued responsibility for the gem materials submitted.

4.6. Service to the customer

- 4.6.1. Within the limitations set by security requirements, the gemmological laboratory shall agree to any customer request for the monitoring of performance related to the work performed, provided also that the gemmological laboratory ensures confidentiality to other customers.
- 4.6.2. The gemmological laboratory shall seek feedback from its customers. This feedback shall be used to improve the management system, testing and internal calibration activities and customer services.

4.7. Complaints

4.7.1. The gemmological laboratory shall have a policy and procedure for the resolution of complaints received from customers or other parties. Records shall be maintained of all complaints and of the investigations and corrective actions taken by the gemmological laboratory.

4.7.2. A secondary customer should make any complaints through the primary customer. Responses to complaints shall be given to the primary customer only.

4.8. Corrective action

4.8.1. The gemmological laboratory shall establish a policy and a procedure and shall designate appropriate authorities for implementing corrective action when departures from the policies and procedures in the management system or technical operations have been identified.

4.9. Additional audits

4.9.1. Where the identification of departures casts doubts on the gemmological laboratory's compliance with its own policies and procedures, or on its compliance with this CIBJO Gemmological Laboratory Book, the gemmological laboratory shall ensure that the appropriate areas of activity are audited as soon as possible.

4.10. Control of records

4.10.1. The gemmological laboratory shall establish and maintain procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records. Quality records shall include reports from internal audits and management reviews as well as records of corrective and preventive actions.

4.11. Internal audits

4.11.1. The gemmological laboratory shall periodically conduct internal audits of its activities to verify that its operations continue to comply with the requirements of the management system and this CIBJO Gemmological Laboratory Book. Such audits shall be carried out by trained and qualified personnel who are, wherever resources permit, independent of the activity to be audited.

4.12. Management reviews

4.12.1. The gemmological laboratory's top management shall periodically conduct a review of the gemmological laboratory's management system and testing and/or internal calibration activities to ensure their continuing suitability and effectiveness, and to introduce necessary changes or improvements. The review shall take account of

- the suitability of policies and procedures;
- reports from managerial and supervisory personnel;
- the outcome of recent internal audits;
- corrective and preventive actions;

- assessments by external bodies;
- the results of inter laboratory comparisons or proficiency tests;
- changes in the volume and type of the work;
- customer feedback;
- complaints;
- recommendations for improvement;
- other relevant factors, such as quality control activities, resources and staff training.

A typical period for conducting a management review is once every 12 months. Results should be fed into the laboratory planning system and should include the goals, objectives and action plans for the coming year.

A management review includes consideration of related subjects at regular management meetings.

5. Technical requirements

Many factors determine the correctness and reliability of the tests, grading and/or internal calibrations performed by a gemmological laboratory. These factors include contributions from:

- human factors;
- accommodation and environmental conditions;
- test and calibration methods and method validation;
- equipment;
- measurement traceability;
- samples;
- the handling of test and calibration items.

5.1. Personnel

5.1.1. The gemmological laboratory management shall ensure the competence of all who operate specific equipment, perform tests and/or internal calibrations, evaluate results, and sign test reports. When using staff that are undergoing training, appropriate supervision shall be provided. Personnel performing specific tasks shall be qualified on the basis of appropriate education, training, experience and/or demonstrated skills, as required. The gemmological laboratory shall maintain current anonymous job descriptions for managerial, technical and key support personnel involved in tests and/or internal calibrations.

5.1.2. The gemmological laboratory should count on the presence of a minimum of three persons as defined in 5.1.1.

5.2. Accommodation and environmental conditions

5.2.1. Gemmological laboratory facilities for testing and/or grading and internal calibration shall be such as to facilitate correct performance of the tests and/or grading and in line with international agreements. The gemmological laboratory shall ensure that the environmental conditions do not invalidate the

results or adversely affect the required quality of any measurement. The technical requirements for accommodation and environmental conditions that can affect the results of tests and grading shall be documented.

5.3. Equipment

5.3.1. The gemmological laboratory shall be furnished with all items of equipment required for the correct performance of the tests and/or grading and internal calibration. See also CIBJO Application Document for Laboratories (www.cibjo.org). In those cases where the gemmological laboratory needs to use equipment outside its permanent control, it shall ensure that the requirements of this CIBJO Gemmological Laboratory Book are met.

5.3.2. Equipment shall be operated by authorised personnel. Up-to-date instructions on the use and maintenance of equipment shall be readily available for use by the appropriate gemmological laboratory personnel.

5.3.3. Records shall be maintained of each item of equipment and its software significant to the tests, grading and/or internal calibrations performed. The records shall include at least the following:

- date of purchase
- the identity of the item of equipment and its software;
- the manufacturer's and distributors name, type identification, and serial number or other unique identification;
- checks that equipment complies with the specification;
- the current location, where appropriate;
- the manufacturer's instructions, if available, or reference to their location;
- dates, results and copies of reports of all calibrations, adjustments, acceptance criteria and the due date of next calibration;
- the maintenance plan, where appropriate, and maintenance carried out to date;
- any damage, malfunction, modification or repair to the equipment.

5.4. Testing and grading

5.4.1. Where traceability of measurements to SI units is not possible and/or not relevant, the same requirements for traceability to, for example, certified reference materials, agreed methods (see under 6.) and/or consensus standards, are required.

5.5. Reference standards and reference materials

5.5.1. The gemmological laboratory shall have a programme and procedure for the calibration of its reference standards. Reference standards shall be calibrated by a body that can provide traceability. Such reference standards held by the gemmological laboratory shall be used for calibration only and for no other purpose, unless it can be shown that their performance as reference standards would not be invalidated.

5.6. Sampling

- 5.6.1.** The gemmological laboratory shall have a sampling plan and procedures for sampling when batch testing. The sampling plan as well as the sampling procedure shall be available at the location where sampling is undertaken. Sampling plans shall, whenever reasonable, be based on appropriate statistical methods.
- 5.6.2.** Where the customer requires deviations, additions or exclusions from the documented sampling procedure, these shall be recorded in detail with the appropriate sampling data and shall be included in all documents containing test and/or calibration results, and shall be communicated to the appropriate personnel.

5.7. Assuring the quality of test and grading results

- 5.7.1.** The gemmological laboratory shall have quality control procedures for monitoring the validity and results reproducibility of tests, grading and internal calibrations undertaken. The resulting data shall be recorded in such a way that trends are detectable and, where practicable, statistical techniques shall be applied to the reviewing of the results.

5.8. Reporting the results

- 5.8.1.** Each test report shall include at least the following information, unless the gemmological laboratory has valid reasons for not doing so:
- a title (e.g. “Test Report”);
 - the name and address of the gemmological laboratory, and the location where the tests were carried out, if different from the address of the gemmological laboratory;
 - unique identification of the test report (such as the serial number), and on each page an identification in order to ensure that the page is recognised as a part of the test report, and a clear identification of the end of the test report;
 - the name and address of the customer (client optional);
 - a description of, the condition of, and unambiguous identification of the item(s) tested;
 - the date of receipt of the test item(s) where this is critical to the validity and application of the results, and the date(s) of performance of the test;
 - the test or grading results with, where appropriate, the units of measurement;
 - opinions and interpretations where appropriate and needed; in many cases it may be appropriate to communicate the opinions and interpretations by direct dialogue with the customer : such dialogue should be written down.
 - additional information which may be required by specific methods, customers or groups of customers;
 - the name(s), function(s) and signature(s) or equivalent identification of person(s) authorising the test report or the name of the legal entity.

- 5.8.2.** In the case of transmission of test results by telephone, telex, facsimile or other electronic or electromagnetic means, the guidelines of this CIBJO Gemmological Laboratory Book shall be met.
- 5.8.3.** The format of the report shall be designed to accommodate each result obtained and to minimise the possibility of misunderstanding or misuse. The headings should be standardized as far as possible.
- 5.8.4.** The report should have suitable security measures, such as a hologram or embossed seal, to minimise potential for fraud.
- 5.8.5.** Copies of reports, working notes, etc. shall be retained in a secure manner for at least 10 years, or longer if local regulations require.

5.9. Amendments to test reports

- 5.9.1.** Material amendments to a test report after issue shall be made only in the form of a further document, or data transfer, which includes the statement: "Supplement to Test Report, serial number ... or an equivalent form of wording. When it is necessary to issue a complete new report, this shall be uniquely identified and shall contain a reference to the original that it replaces.

6. Test method protocol

Required test methods are listed, which shall be applied to correctly identify the gem material stated. The listed test method is mandatory, unless a remark indicates otherwise. Definitions of the test methods are listed under 6.3. and the indicated key references on which the protocol is based, are given under 6.4.

6.1. Test methods gemstones

6.1.1. Actinolite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
<i>References</i>	
Burns and Greaves (1971); Crowningshield (1969); Fryer (1993a); Hietanen (1971); Ishida et al. (2002); Lucas (1974); Mustard (1992); Pough (1987); Skogby and Annersten (1985); Smelik et al. (1991); Washington and Merwin (1923)	

Special attention: dye

6.1.2. Alexandrite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye, colour-change
Refractometer (refractive index)	
Spectroscope	
FTIR(-NIR) spectroscopy	
Colour call	Clear colour-change
Clarity enhancement check/extent	
References	
Anderson (1950); Andres et al. (1962); Bank F.H. et al. (1988); Bank (1964, 1967, 1971, 1974, 1987); Bank H. et al. (1988a,b), Bank and Okrusch (1967); Beaume et al. (1997); Benson (1959a, b), Bevan and Downes (1997), Brown and Kelly (1985), Bukin et al. (1981), Cassedane and Roditi (1993), Crowningshield (1963a, 1964, 1970b, 1979); Currie (1994), de Oliveira and Leite (1987), Du Toit (1996), Eppler (1974), Fryer, (1983a, b, 1986, 1987, 1988a, b, 1992, 1993b); Galia (1990); Godovikov and Bulgak (1989); Gravender (1935); Grum-Grzhimailo (1949); Gübelin and Schmetzer (1980); Gübelin (1976a,b,c,d); Guo et al. (1987); Hassan and El-Rakhawy (1974); Henn (1985); Henn and Bank (1992); Horiuchi (1979); Hysl and Quintens (1999), Johnson and Kammerling (1995), Kammerling and Fryer (1995a,b,c); Kane (1987); Koivula (1984, 1987); Koivula and Fritsch (1993b,c); Koivula et al. (1988a); Koivula and Kammerling (1988b, 1991c, 1992a); Koivula et al. (1992b); Koivula et al., 1995; Leckebusch (1976); Leithner (1980); Liddicoat (1972b, 1974b, 1976a); Liu and Fry (2006); Machida and Yoshihara (1980); Malley (1988); Panjikar and Ramchandran (1997); Payne (1956); Powers (1993); Proctor (1988); Scarratt (1988, 1992a,b); Schmetzer et al. (1996, 1997a); Stockton and Kane (1988); Trossarelli (1986); Webster (1938)	

Special attention: clarity enhancement, synthetics, clear colour-change

6.1.3. Amblygonite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	
XRD	If other tests are inconclusive
References	
Angino (1964); Berman and Gonyer (1930); Cerna et al., (1973), Chikayama (1981), Crowningshield (1959, 1960, 1962), Fransolet and Tarte (1977), Greiner and Bloss (1987), Groat et al.(1990), Gubelin (1955), Heinrich and Corey (1955), Koivula (1986), Liddicoat (1963), Loh and Wise (1976), London (1984), London et al. (2001), Moss et al. (1969), Murdoch (1955), Nel (1946), Palache et al. (1943), Weibel (1956), Winchell (1926)	

6.1.4. Ammonite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
References	

Chikayama (1981), Koivula and Kammerling (1991), Wight (1981), Zakrevskaya (1995)

Special attention: coating, impregnation

6.1.5. Anatase

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
EDXRF chemistry	
Raman spectroscopy	
XRD	If other tests are inconclusive
<i>References</i>	
Banfield, et al. (1991), Chesnokov (1960), Garmo (1989), Liu and Mernagh (1992), Millette, et al. (1993), Parker (1923), Pough (1987), Schuiling and Vink (1967), Wehr, et al. (2008).	

6.1.6. Andalusite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Dichroscope (pleochroism)	
Spectroscope	
XRD	If other tests are inconclusive
<i>References</i>	
Abs-Wurmbach, et al. (1977), Ahn, et al. (1988), Anderson (1967), Aryal, et al. (2008), Austen (1941), Bank (1972), (1981a, b, c.) Baron (1981), Bastos (1984), Berger (1997), Bohlen, et al. (1991), Bridges (1982), Brightman (1982), Carlson and Rossman (1988), Cassedanne, J. (1985), Cassedanne, J.P. and Cassedanne (1980), Crowningshield (1959a, b, c.) (1960a, b, c.) (1961a, b.) (1970a, b.) Deen (1984), Dharmaratne (1998), Dowty (1976), Dunn (1976), Faye and Harris (1969), Finger and Prince (1972), Fryer (1986), (1990), Garsche, et al. (1991), Grapes (1987), Gunter and Bloss (1982), Harlov and Newton (1993), Heinrich and Corey (1959), Hemingway, et al. (1991), Heung, et al. (1994), Hietanen (1956), Holdaway and Mukhopadhyay (1993), Iishi, et al. (1979), Johnson and Koivula (1998), Kai, et al. (1980), Koivula (1980), (1984), Koivula and Kammerling (1991b), Langer (1979), Macdonald and Merriam (1938), Mitchell (1986), Murdoch (1936), Pearson and Shaw (1960), Peck (1924), Pinet, et al. (1992), Pough (1964), (1988), Ramsey (1988), Richmond (1940), Roger (1987), Rose (1957), Roy (1954), Ruplinger (1983), Schnellrath (1990), Smith (1977), Smith, et al. (1982), Theye and Fransolet (1994), Webb (1943), Weill (1963), Wilkins and Sabine (1973), Winkler and Buehrer (1990), Winkler, et al. (1991), Zoysa (1991), Zwaan (1955)	

6.1.7. Apatite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye, colour-change
Refractometer (refractive index)	
Hydrostatic weighing	

(specific gravity)	
Spectroscope	
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
References	
Anderson (1972), Audeon (1991), Bank (1975, 1976a, 1988), Bank et al. (1988, 1989, 1990), Barbarand and Pagel (2001); Barot et al., 1995; Baumer and Argiolas (1981); Boyd and Wight (1981); Bridges (1982); Brown et al. (1989); Burrigato et al. (1982); Cario (1989); Cooray (1970); Crowningshield (1959, 1960a,b, 1961, 1963a,b,c, 1965a,b, 1966a,b, 1972, 1973); Deen (1984); Dharmaratne (2002), Dunn (1977); Field (1948), Fryer (1982), Gubelin and Schmetzer (1982), Gubelin (1967a), Hyrsi and Petrov (1998), Johnson and Koivula (1999), Koivula (1980), Koivula and Fritsch (1993, 1994a, 1995a, 1995b), Koivula and Kammerling (1990a,b, 1991, 1992a,b), Landes (1938), Leventouri et al. (2001), Liddicoat (1962a,b, 1963a,b, 1965a,b, 1971), O'Donoghue (1976), Payne (1995), Poirot (1983), Randriamanga (1994), Remaut and Vochten (1985, 1986), Rosasco and Roedder (1979), Rutland (1954), Szenics (1967), Teng et al. (2006), Trzciński et al. (1974), Whitlock (1925), Zharinov et al. (2008), Zwaan (1965, 1981, 2015a)	

6.1.8. Aquamarine

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	If RI not possible (rough)
Dichroscope	
Spectroscope	
EDXRF chemistry	If synthetic or irradiation is suspected
Colour call	
Clarity enhancement check/extent	
References	
Algier (2007), Bank et al. (2001), Bank and Henn (1990), Bank et al. (1989), Barot et al. (1995), Bastos (1964), Brown (1985), Crowningshield (1972, 1980), de Goutiere (1993), Duroc-Danner (1989), Eppler (1962), Farn (1973), Fryer (1981, 1984, 1985), Groat et al. (2008), Hänni (1992), Henn (1999a,b), Henn and Bank (1992), Jacobson (1993), Johnson and Koivula (1998), Kammerling et al. (1991), Koivula (1985a), Koivula and Kammerling (1989a,b,d, 1990), Koivula et al. (1992b), Letson (1980), Li (2001), Liccini (1998), Lind et al. (1986), Lindner and Rolff (1967), Middlemiss and Parshad (1918), Milisenda and Bank (2005), Monistier (2006), Moses et al. (1997), Nassau (1977, 1987), Natkaniec-Nowak (2008), Panjikar (1994), Petsch (1990), Phukan (1966), Scarratt (1989a,b), Schmetzer (1989), Segura and Fritsch (2003), Zeitner (1988), Zwaan and Zoysa (2008)	

Special attention: heat treatment, irradiation (Maxixe), clarity enhancement, coatings, synthetics

6.1.9. Aragonite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	

XRD	If other tests are inconclusive
References	
Alder and Kerr (1962), Anderson (1978), Barik et al. (2004), Belcher et al. (1996), Bischoff (1969), Brink and van der Berg (2005), Chateigner et al. (2000), Chave and Schmalz (1966), Checa et al. (2006), Clark and Lutz (1980), Compere and Bates (1973), Cuif (1992), Cuif et al. (1993), Dal Negro and Ungaretti (1971), de Villiers (1971), Falini et al. (1996), Faust (1950), Gauthier et al. (1994, 1997), Giles et al. (1995), Gregor et al. (1996), Hattan et al. (2001), Hyrsl (1996), Koivula and Fritsch (1993), Koivula et al. (1992), Komatsu et al. (1993), Konishi and Saki (1972), Korago et al. (1978), Low and Ziera (1972), Ma et al. (2007), MacDonald (1956), Makovicky and Karup-Moller (2006), McTigue and Wenk (1985), Narasimulu and Rao (2000), Pinet et al. (1992), Pough (1988), Ronneberg et al. (1979b), Sen et al. (1994), Soldati et al. (2008), Steinen (1982), Urmos et al. (1991), Watabe (1955), Webster (1973), Zhang C. et al. (2006), Zhang W.A. et al. (2007), Zhou et al. (2009)	

Special attention: dye

6.1.10. Axinite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Dichroscope (pleochroism)	
Spectroscope	
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
References	
Andreozzi et al. (2000a,b), Cassedanne and Cassedanne (1977), Cassedanne et al. (1983), Crowley (1983), Crowningshield (1960, 1963), Cummings (1983), Deen (1984), French and Fahey (1972), Frost et al. (2006), Hänni (1982), Jobbins et al. (1975), Kalachev (1993), Koivula and Kammerling (1992), Lumpkin and Ribbe (1979), Peacock (1937, 1938), Pinet et al. (1992), Pohl et al. (1982), Pough (1988), Sanero and Gottardi (1968), Schmetzer (1978), Sinkankas (1965, 1998)	

6.1.11. Benitoite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	Higher index may exceed limit refractometer
Hydrostatic weighing (specific gravity)	
Dichroscope (pleochroism)	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
Raman spectroscopy	If other tests are inconclusive
References	
Benson (1960), Brown (1997), Crowningshield (1960a,b), Frazier and Frazier (1990a), Gaft et al. (2004, 2005), Gray (1992, 1994), Hawthorne (1987), Hlawatsch (1909), Laird and Albee (1972), Launer (1952), Laurs et al. (1997), Liddicoat (1963, 1967a, 1968), Louderback (1907), Mitchell (1980), Pinet et al. (1992), Rase and Roy (1955), Zachariasen (1930).	

6.1.12. Beryl (yellow, colourless, pink, red)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Dichroscope (pleochroism)	
Clarity enhancement check/extent	
References	
Anonymous (1999, 2000c), Austin (2002), Baker et al. (2002), Barres et al. (2003), Bekker and Barz (2007), Christenson and Austin (1999), Demianets et al. (2006), Dharmaratne (1999, 2002), Federman (2000a), Fumagalli et al. (2003), Hänni and Krzemnicki (2003a,b, 2004), Henn and Milisenda (1999a,b), Jones (2005), Kleismantas (2003), Kopchikov and Shelementiev (2004), Li (2001), Mathew et al. (1998), Monistier (2006), Moroz et al. (1999b), Moses et al. (1998a,d), Natkaniec-Nowak (2008), Pezzotta (2005a), Qi (2002), Schmetzer et al. (2008), Thompson et al. (2002), White (2005)	

Special attention: clarity enhancement, synthetics

6.1.13. Beryllonite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
References	
Bank et al. (1994), Cerna et al. (2002), Crowningshield (1960), Dunn (1975), Henn and Bank (1994), Koivula and Kammerling (1991), Liddicoat (1962), Pinet et al. (1992)	

6.1.14. Brazilianite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
References	
Bookstone (1964), Cassedanne (1981, 1983), Chikayama (1981), Crowningshield (1960, 1962a,b), Dillon (1982), Frondel and Lindberg (1948), Hurlbut and Weichel (1946), Hyrsl (1997), Liddicoat (1971), Pinet et al. (1992), Pough and Henderson (1945), Reeve (1972), Swoboda (1947)	

6.1.15. Calcite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing	

(specific gravity)	
FTIR(-NIR)	If other tests are inconclusive
Raman spectroscopy	If other tests are inconclusive
References	
Alder and Kerr (1962), Alfonso et al. (1999), Bischoff et al. (1983), Borodin and Nefedova (2005), Chave and Schmalz (1966), Compere and Bates (1973), Crowningshield (1959, 1975), Cuif (1992), Cuif et al. (1993), Falini et al. (1996), Faust (1950), Fryer (1981, 1986, 1987, 1989a, 1990b), Gauthier et al. (1994, 1997), Gillet and Madon (1982), Guse (1982), Hassan (1978), Huang and Kerr (1960), Hurlbut and Francis (1984), Jacob et al. (2008), Kammerling et al. (1991, 1995), Koivula and Johnson (1996), Koivula and Kammerling (1990a,b), Liddicoat (1963, 1967), Low et al. (1972), Mason (1997, 1998), Mayerson (2001), Moses et al. (1998), Pinet et al. (1992), Rosenholtz and Smith (1950), Sabatier (1953), Sikes et al. (2000), Vo-Thanh and Hung (1985), Walker (1985).	

Special attention: fragile, dye, coatings

6.1.16. Chalcedony

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Chelsea Colour Filter	
Spectroscope	Green variety
EDXRF chemistry	Green variety
Raman spectroscopy	If other tests are inconclusive
References	
Carr and Fyfe (1958), Cassedanne (1982b), Crowningshield, (1964, 1967, 1969, 1970, 1973, 1975), Du toit (1997), Fryer (1986, 1987, 1988, 1989a,b, 1991, 1997), Guman, 1976, Halford-Watkins (1941), Hänni et al. (2001), Heflik et al. (1993), Hyrsi (1999), Ibragimov (1996), James (1994), Jayaraman (1953), Jobbins (1981), Johnson and Koivula (1996, 1998a,b, 1999), Jones (1952), Kammerling and Koivula (1991), Koivula (1986), Koivula and Fritsch (1993a,b), Koivula and Johnson (1996a,b), Koivula and Kammerling (1989, 1990a,b,c, 1992a,b), Koivula et al. (1992c), Liddicoat (1965a,b, 1966, 1967a,b), McLean (1967), Nuckles (1984), Pabian (1980), Pelto (1956), Sax (1996), Shaub (1979), Shigley and Koivula (1985), Spendlove (1987), Sukow (1987, 1990), Webster (1971), Willing and Stöcklmayer (2003)	

Special attention: dye

6.1.17. Charoite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
References	
Akimov (1991), Bennett (1992), Biryukov and Bernikov (1993), Chikayama (1981), Demenge (1994), Dobrovolksya et al. (1980), Evdokimov (1995), Greenspan (1978), Jobbins et al. (1978), Johnson et al. (1999), Koivula and Fritsch (1993), Koivula et al. (1992), Konev et al. (1993), Kraeff et al. (1980), Lazebnik and Nikishova (1992).	

6.1.18. Chrysoberyl

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye (colour change (alexandrite cat's-eye))
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Spectroscope	
FTIR(-NIR)	
Raman spectroscopy	If other tests are inconclusive
Colour call	In case of potential colour change
Clarity enhancement check/extent	
References	
Anonymous (1997, 1998), Bank et al. (1997a, 1988c), Bergman (1997), Brown (1985), Cassedanne (1984a,b), Cassedanne and Roditi (1993), Crowningshield (1980b,c), DeMaggio (1997), Dillon (1983), Downes and Bevan (2002), Farn (1978), Fryer (1983b, 1989, 1990), Hayashi (1994), Henn (1985, 1987, 1992, 1994, 1995), Horn (1987), Isogami et al. (1986), Jarrell (1997), Johnson and Koivula (1996, 1997a,b,c,d,e, 1999), Jones (1996), Koivula (1984a,b,c), Koivula and Fritsch (1993c), Koivula and Kammerling (1988c, 1989b, 1991a,b, 1992a), Liyanage (1997), Looock (1987), McLean (1997), Moses et al. (1998), Nassau (1980, 1987, 1990), Nassau and Nassau (1980), Ohguchi (1981), Okrusch (1971), Ouyang (1997), Panjikar and Ramchandran (1997b), Pinet et al. (1992), Proctor (1988), Scarratt (1994), Schmetzer (1985a), Schmetzer (1985a,b), Solntsev et al. (2004), Soman and Nair (1985), Tang and Sun (1998), Zoysa (1987)	

Special attention: irradiation, synthetics

6.1.19. Chrysocolla

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Within other minerals
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
UV-Visible(-NIR) spectroscopy	
EDXRF chemistry	
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
References	
Bracewell and Brown (1984), Einfalt and Sujatmiko (2006), Jones (1979), Koivula and Fritsch (1994), Koivula and Johnson (1996), Koivula and Kammerling (1992), Liddicoat (1969), McCondra (1998), Robertson (1981), Shen et al. (2006), Sun (1963), Zwaan (2015d)	

Special attention: dyed (with Cu)

6.1.20. Clinohumite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	

Hydrostatic weighing (specific gravity)	
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
References	
Anderson (1983), Bank (1983), Bank et al. (1990), Choudhary and Golecha (2007), Dungler (1991), Friedrich et al. (2001), Fryer (1986, 1988), Fujino and Takéuchi (1978), Gaspar (1992), Heinrich (193), Henn et al. (2001), Jones (1969), Jones et al. (1969), Kocman and Rucklidge (1973), Koivula and Kammerling (1991), Koivula et al. (1988), Kolesnikova (1980), Langer et al. (2002), Larsen (1928), Mitchell (1978), Ribbe (1979), Robinson et al. (1973), Scarratt (1984), White and Hyde (1982)	

6.1.21. Danburite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Long-wave UV fluorescence	
Raman spectroscopy	If other tests are inconclusive
References	
Anderson and Payne (1939), Bank (1982), Cook (2003), Crowningshield (1960a,b,c,d, 1963), Dharmaratne (1999, 2002), Fryer (1986), Holzhey (1998), Hyrsl (1997), Johnson and Koivula (1998), Koivula (1984), Koivula and Kammerling (1992)	

6.1.22. Diamond (colourless) — identification only

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Spectroscope	
Polariscope	
Long-wave UV fluorescence	
Long-wave UV phosphorescence	
Short-wave UV fluorescence	
Short-wave UV phosphorescence	
Diamondview	Possibly synthetic
FTIR(-NIR) spectroscopy	
EDXRF chemistry	As needed
PL spectroscopy	
References	
Anthony et al. (2002), Chalain (1995), Chalain et al. (1999, 2000a,b), Collins (2001a,b, 2003), Collins and Dahwich (2003, 2004), Collins et al. (2000), Collins and Ly (2002), Davies et al. (2007), De Weerd (2001a,b), De Weerd and Collins (2003), De Weerd et al. (2004), De Weerd and Van Royen (2000a,b), Diamond (1995), Dunaigre (1996), Erel (2007), Fizgeer et al. (2001), Fritsch et al. (2001), Frunze et al. (2000), Fryer (1997), Gippius et al. (2003), Grampp (1999), Hemley et al. (2006), Horikawa (2001), Hunt et al. (2000), Iakoubovski (2006), Johnson and Kammerling (1995), Johnson and Koivula (1999), Jungnickel et al. (1996), Kammerling and Fryer (1995b,c), Kammerling and Koivula (1995e), Kammerling et al. (1995f,g,h, 1996), Kiefert et al. (2000), Kiflawi et al. (1997), King et al. 2008; King et al. 2006; Koivula and Fritsch (1995), Kupriyanov et al. (2008), Linares and Doering (2007a), Maeta et al. (2006), Maitrallet (1996), Maki et al. (2007), Manfredotti et al. (2006, 2007), Mankelevich et al. (2008), Marcczewska et al. (2007), May et al. (2008b), McClure (2000), McClure et al. 2000; McClure and Kammerling (1995),	

Meguro et al (2006), Moses et al. (1997a,b,c 1998a,b,c, 1999, 2004), Nelson (1995), Nesladek et al. (2008), Neves et al. (1999), Newton et al. (2002), Novkov et al. (2003), Prins (2001, 2003), Qi et al (2001), Qian et al (2001), Scarratt and Shor (2006), Schmetzer (1999, 2000, 2001, 2002), Shuster (1998), Van Bockstael (1996), Yan (1998).

Special attention: irradiation, HP-HT, coatings, clarity enhancement, synthetics For diamond grading, see the PAS document

6.1.23. Diamond (coloured)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Polariscope	
Long-wave UV fluorescence	
Long-wave UV phosphorescence	
Diamondview	
UV-Visible(-NIR) spectroscopy	Low temperature
FTIR(-NIR) spectroscopy	
EDXRF chemistry	As needed
PL spectroscopy	
Geiger counter	Green and black diamonds
Clarity enhancement check	
<i>References</i>	
Anonymous 1992; Achard et al. (2007a), Allers et al. (1998), Amosov et al. (2000), Barberini et al. (2000), Barnard (2000), Bosshart (1999), Bosshart and Smith (2001), Brauner (2007), Chalain (1995, 2003), Chalain et al. (1999, 2000a), Chao et al. (2007), Charles et al. (2003), Choi et al. 2009; Collins (2001a,b, 2003), Collins and Dahwich (2003, 2004), Collins et al. (2000), Collins and Ly (2002), Davies et al. (2007), De Weerd (2001a), De Weerd and Van Royen (2000a,b), Diamond (1995), Dutov et al. (2003), Edmonds et al. (2008), Ekomov et al. (2006), Fritsch et al. (2001), Fritsch et al. 2007a; Fritsch et al. 2007b; Fritsch et al. 2007c; Fryer (1992c, 1997), Gaillou et al. 2010; Grampp (1999), Hainschwang et al. 2005a,b; Hainschwang and Notari 2011; Hainschwang et al. 2006; Hainschwang et al. 2008; Hainschwang et al. 2009; Henn and Bank 1992b; Hodgkinson (2000), Horikawa (2001), Johnson and Kammerling (1995), Johnson and Koivula (1997, 1999), Kammerling and Fryer (1995b,c,d), Kammerling and Koivula (1995e), Kammerling et al. (1990, 1995a,f,h,i, 1996), Karkin et al., (2008), Katrussha et al. (2004a,b), Kiefert et al. (2000), Kiflawi et al (1997), King 1991; King et al. (1994, 1995, 1998, 2002, 2003, 2005), Koivula and Fritsch (1995), Lason et al. (1996), Liddicoat 1972c, 1975a; Linares (2006), Maitrallet (1996), Marinelli et al. (2006), Massi et al. 2005; May et al (2008b), McClure (2000), McClure and Kammerling (1995), Mita (1996), Moses et al. (1997a,b, 1998a,b,c, 1999, 2002), Notari 2002; Sautter et al. 2010; Scandella 1989; Scarratt (2001), Schmetzer (1999, 2000), Shida (1998a,b), Van Bockstael and Joppen (1996), Van Bockstael (1998a, 1996), VanderBogert et al. 2009; Vins (2002a,b), Vins and Konokov (2003), Titkov et al. 2003; Willems et al. 2004; Williams et al. 2002; Yamamoto et al. (1995), Yuan (1998), Zaiser et al. (2000), Zaitsev (2008), Zakharov et al. (1997)	

Special attention: HP-HT, coatings, clarity enhancement, synthetics

6.1.24. Diaspore

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Colour-change
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Spectroscope	

FTIR	If other tests are inconclusive
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
Colour call	Colour change
<i>References</i>	
Bank (1981), Bariac (1979), Baric (1963), Duroc-Danner (1987), Fryer (1983, 1987), Gosse (1962), Gout and Verdes (1992), Koivula (1985), Koivula and Fritsch (1994, 1995), Ruan et al (2001), Scarratt (1980), Schmetzer (1987), Schmetzer and Bartelke (1979), Wight (1997)	

6.1.25. Diopside

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye, star
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Spectroscope	
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
<i>References</i>	
Anderson (1978), Andrut et al. (2007), Bank (1972, 1976, 1977, 1987), Bank et al. (1996), Bromiley et al. (2004), Calrk (1957), Crowningshield (1960, 1962, 1963a,b, 1964a,b, 1965), Eppler (1967), Field (1948), Fryer (1984), Gadiyatov (1996), Gasparik (1990), Gübelin (1981), Hänni et al (1996), Hietanen (1971), Ito (1987), Jackson (1985), Kammerling and Fryer (1994), Kent and Webster (1973), Koivula and Johnson (1996), Koivula and Kammerling (1989, 1990, 1992a), Koivula et al. (1992b), Liddicoat (1965a,b, 1972, 1973), Naito (1990), Nimis (1998), Ponahlo (1968), Robinson (1973), Schmetzer (1978), Schmetzer (1982), Schmetzer and Krupp (1979a), Schmetzer and Medenbach (1974), Schmetzer and Ottemann (1979b), Schrader (1984, 1985), Schramm (1987), Schreiber (1977), Skogby et al. (1990), White and Keester (1966), White et al. (1971), Wight (1990)	

6.1.26. Dioptase

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Spectroscope	
EDXRF chemistry	If other tests are inconclusive
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
<i>References</i>	
Bank et al. (1990), Breuer and Eysel (1988), Breuer et al. (1989), Cook (2002), Crowningshield (1960), Eysel and Breuer (1981), Galbraith and Kuhn (1940), Gebhard (1982), Heide et al. (1955), Lhoest et al. (1991), Palfi (2005), Ribbe et al. (1977), Schubnel (1992)	

6.1.27. Dolomite

<i>Required Test method</i>	<i>Remark</i>
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Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
FTIR(-NIR) spectroscopy	
EDXRF chemistry	If other tests are inconclusive
Raman spectroscopy	
XRD	If other tests are inconclusive
<i>References</i>	
Barber and Wenk (1979), Chai and Navrotsky (1996), Douglas (1999), Fryer (1992), Gauthier and Delines (1999), Gem trade lab notes (1998), Koivula and Fritsch (1994), Medlin (1959), Moses et al. (1998), Pinet et al. 1992), Searl (1989)	

Special attention: dye

6.1.28. Dumortierite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	
XRD	If other tests are inconclusive
<i>References</i>	
Alexander et al. (1986), Applin and Hicks (1987), Bank (1979), Beukes et al. (1987), Cassedanne and Franco (1966), Corwningshield (1964), Goreva et al. (2001), Koivula et al. (1992), Ostwald (1964)	

6.1.29. Ekanite

<i>Required Test method</i>	<i>Remark</i>
Geiger counter or dosimeter ($\mu\text{S/h}$)	
Safe storage	
Microscope	
Phenomena	Star
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	
XRD	If other tests are inconclusive
<i>References</i>	
Anderson (1974), Arps (1987), Bank (1981a,b), Bank et al. (1989), Chikayama (1981), Deen (1984), Dharmaratne (1998), Fryer (1986), Gauthier and Fumey (1988), Gübelin (1961, 1962a,b, 1964), Johnson et al. (1999), Koivula and Kammerling (1988), Liddicoat (1962b, 1977), Mitchell (1961)	

Special attention: radioactive

6.1.30. Emerald

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Star, Cat's-eye, trapiche
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	If loose and other tests inconclusive
Chelsea colour filter	
Spectroscope	
Long-wave UV fluorescence	
UV-Visible(-NIR) spectroscopy	Origin
FTIR(-NIR) spectroscopy	Synthetic/natural and filler ID
EDXRF chemistry	Origin
Raman spectroscopy	Only for filler ID
LA-ICP-MS spectroscopy	If necessary for origin
Colour call	
Clarity enhancement check/extent	
References	
Amstutz and Bank (1977), Anderson (1935, 1950, 1966, 1969, 1976, 1978), Attanasio et al. (1989), Bank (1960, 1964, 1969, 1973, 1974a,b,c, 1976, 1980, 1981b,c, 1982, 1989), Bank and Henn (1989a, 1990a), Bank et al. (1989b), Bastos (1981), Becker (1991), Benson (1959), Bosshart (1990a,b, 1991a,b,c,d), Bowersox et al. (1991), Bowersox and Anwar (1989), Briggs (1935), Brown (1984), Brown et al. (1989), Brown and Snow (1984, 1988), Calligaro et al. (2000), Cambell (1973, 1974, 1978, 1991), Caplan (1968), Carbonnel (1976), Cassedanne (1972, 1985), Cassedanne and Cassedanne (1974), Cassedanne and Sauer (1982, 1984), Chatham (1982), Clements (1941), Cook (2007), Cotton (1970), Crowningshield (1958, 1961a,b, 1964a,b,c,d,e, 1965a,b,c, 1967a,c, 1968, 1970b,c,d,e, 1971a,b, 1972a,b, 1974, 1980), Devouard (1990), Diehl (1977), Dillon (1981), Draper (1963), Duyk (1963, 1965), Eppler (1958, 1960, 1961, 1962, 1963, 1968), Epstein (1989), Farn (1964, 1980), Fryer (1981b,c,d, 1982a,b,c,d,e,f, 1983a,b, 1984b,c,d, 1988, 1989, 1990a,b, 1991), Fryer et al. (1983), Giuliani et al. (1990a,b), Graindorge (1974), Graziani et al. (1983), Graziani and Lucchesi (1979), Griesbach (1892), Groat et al. (2008), Grubessi et al. (1990), Gübelin and Shipley (1941), Gübelin (1940, 1941, 1944, 1947, 1950, 1956a,b, 1958a,b,c, 1959, 1960, 1961, 1962, 1964a,b, 1968, 1974, 1976, 1981a,b, 1982a,b, 1984), Gübelin and Chudoba (1956), Gübelinand Gysler-Sanz (1991), Hänni (1981, 1982, 1983, 1988), Hänni and Kerez (1983a), Hänni and Klein (1982, 1983b), Henderson (1945), Henn (1988), Henn and Bank (1991), Henn et al. (1984), Hodgkinson (1988), Holmes and Crowningshield (1960), Hosaka (1990), Johnson (1959, 1961a,b), Kammerling and Koivula (1990, 1991a), Kammerling et al. (1991b), Kane (1979, 1980a,b), Kane et al. (1989), Kanis et al. (1991), Kazmi and Snee (1989), Keeling (1991), Keller (1981), Koivula (1982, 1984a,b,c), Koivula and Kammerling (1988, 1989b,c,d,e, 1990a,b,c,d,e, 1991a,b,c,d,e,f), Koivula et al. (1990f), Lefever et al. (1962), Liddicoat (1963, 1964a,b,c, 1965b,c,d, 1967a,b, 1968, 1969a,b,d,e,f,g,h, 1970b,c,d,e,f, 1971b, 1972a,b, 1976, 1977b), Mac Fadden (1934), Mayers (1958a,b), McKague (1964), Metson and Taylor (1977), Mitchell (1981), Nassau (1977, 1980, 1981, 1982, 1990, 1991), Nassau and Jackson (1970), Nassau and Nassau (1980), O'Donoghue (1979, 1981, 1971, 1975), Oppenheim (1948), Pough (1965a,b, 1970, 1971), Rainier (1931), Ringsrud (1983, 1988), Robert et al. (1990), Rogers and Sperisen (1942), Scaratt (1984b, 1987a,b,c,d, 1988a,b, 1989a,b,c), Schlossmacher (1935), Schmetzer (1982, 1988a,b, 1989a,b, 1990a,b, 1991), Schmetzer and Bank (1980, 1981a, 1982), Schmetzer et al. (1981b,c, 1991, 2007), Schmetzer and Brezina (1975), Schmetzer and Kiefert (1990), Schmetzer and Krupp (1979), Schrader (1981, 1983, 1988a,b), Schubnel and Zarka (1971), Schwarz (1987, 1989a,b, 1990a,b,c, 1991a,b,c,d), Schwarz et al. (1988a,b,c,d, 1990), Schwarz and Eidt (1989), Seifert et al. (2004), Shipley (1942), Stockton (1984, 1987), Sunagawa (1964), Tenhagen (1972, 1973), Webster (1950, 1955, 1964), Wild (1935), Zwaan (2006), Zwaan et al. (2012, 2005, 2004, 2000, 1998, 1997)	

Special attention: clarity enhancement (also cavity and wide fracture filling), synthetics, coating and dye

6.1.31. Enstatite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Star, Cat's-eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	If loose and other tests inconclusive
Spectroscope	
Raman spectroscopy	
XRD	If other tests inconclusive
References	
Bank (1974, 1984), Beran and Zemmann (1986), Crowningshield (1959, 1960, 1964, 1965a,b, 1967a,b), Dharmaratne (1998), Dunn (1978), Eppler (1967), Fryer (1984), Greer and Weber (1969), Harding et al. (1982), Koivula et al. (1988), Liddicoat (1962a,b, 1963), Mitchell (1952, 1954), Morimoto (1989), Schemter and Krupp (1982), Washington and Merwin (1923), Wehr et al. (2008), Zoysa (1985), Zwaan (1996)	

6.1.32. Epidote

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	If loose and other tests inconclusive
Spectroscope	
Raman spectroscopy	If other tests inconclusive
XRD	If other tests inconclusive
References	
Armbruster (2006), Bank (1976), Bank et al. (1989), Cook (2002), Crowningshield (1960, 1963), Dollase (1971), Fisher (1977), Fleet and Pan (1995), Grapes (1981), Griffith (1987), Gübelin (1979), Henn and Bank (1991), Hörmann and Raith (1971), Ito (1947), Janeczek and Sachanbinski (1992), Jimenez and Velilla (1993), Kumskova and Khvostova (1964), Langer and Raith (1974), Lapham (1957), Liddicoat (1963), Pinet et al. (1992), Pough (1965), Seemann (1986), Seki (1959), Wehr et al. (2008).	

6.1.33. Feldspar – orthoclase, moonstone, microcline, albite, oligoclase, bytownite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye, adularescence, aventurescence
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	If loose and other tests inconclusive
EDXRF chemistry	
LA-ICP-MS or SEM-EDS chemistry	If needed for variety separation
Raman spectroscopy	If other tests inconclusive
XRD	If other tests inconclusive

<i>References</i>
Bank (1967, 1973a,b, 1974), Bank and Henn (1989a), Barth (1934, 1931,1965b), Bassett (1953), Boyd and Wight (1981), Bracewell and Brown (1985), Bridges et al. (1984, 1989), Brown (1984), Brown and Bracewell (1985), Chalmers (1972), Clewlow (1977), Copley and Gay (1982), Crowningshield (1960, 1962b, 1963b,c, 1964a,b), Fenn (1977), Foster (1955), Fryer (1985, 1991), Gübelin (1987, 1992a), Hofmeister and Rossmann (1985a,b,c, 1986), Koivula (1986a,b, 1987a), Koivula and Kammerling (1988, 1989a, 1990a,b), Liddicoat (1963a, 1964, 1967), Raman and Jayaraman (1950a), Raman et al. (1950b), Umegaki (1966), Vance (1961), Webster (1949, 1952), Zoya (1985)

6.1.34. Feldspar – labradorite, andesine

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Labradorescence, aventurescence
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	If loose and other tests inconclusive
EDXRF chemistry	
LA-ICP-MS chemistry	
Raman spectroscopy	If other tests inconclusive
XRD	If other tests inconclusive
<i>References</i>	
http://www.giathai.net/Red_Feldspar_Special_Report.php , http://www.gia.edu/research-resources/news-from-research/index.html , Bank and Henn (1989a), Bank et al. (1988, 1989b), Fontaine et al. (2010), Henn (2005), Liddicoat (1967a,b), Muir (1955), Rossmann (2011)	

Special attention: heat, Cu-diffusion

6.1.35. Fluorite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Colour-change
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	If loose and other tests inconclusive
Polariscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
Raman spectroscopy	If other tests inconclusive
XRD	If other tests inconclusive
<i>References</i>	
Allen (1952), Appiani (2007), Bank et al. (1996, 1989), Bariand (1986), Baumer et al. (1990), Berman (1957), Bill and Calas (1978), Bill et al. (1967), Blasse and Dirksen (1980), Bontinck (1958), Calas (1972b), Crowningshield (1962a,b, 1968), Duyk (1971), Elwell (1988), Fisher (2004), Forster (1995), Fryer (1985), Gübelin and Koivula (1987), Gübelin and Schmetzer (1980), Henn (2002), Hyrsl and Milisenda (2003), Kammerling and koivula (1991), Koivula and Elen (1998), Koivula and Fritsch (1995), Koivula and Kammerling (1993c, 1990), Liddicoat (1970a,c, 1972), Lieber (1994), Linley-Shaw (1975), MacFall (1982), Moroshinkin (1996), O'Donoghue (1978), Pinet et al. (1992), Redmann et al. (1990), Robbins (1996), Schmetzer and Bank (1980), Zwaan (2014c)	

Special attention: fragile, easy cleavage

6.1.36. Forsterite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
dichroscope	
spectroscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
FTIR(-NIR) spectroscopy	
EDXRF chemistry	
Raman spectroscopy	
References	
Basso et al. (1980), Benstock et al. (1997), Bershov et al. (1983), Chopelas (1991), Duffy et al. (1995), Durben et al. (1993), Fan et al. (2007), Ferry (2001), Francis (1985), Francis and Ribbe (1980), Freund et al. (1980), Gaite and Hafner (1984), Gasparik and Litvin (1997), Green and Walker (1985), Henn (1999), Hofmeister (1987), Iishi (1978), Imae et al. (1993), Jaoul et al. (1979), Johnson and Koivula (1999), Jordan and Naughton (1964), Kanazawa et al. (2007), Koivula and Fryer (1990), Libowitzky and Beran (1995), Liu (1987), Luttge et al. (1992), Martin et al. (1992), Mohanan et al. (1993), Morin et al. (1977), Mossman and Pawson (1976), Nassau (1994), Rager (1977), Rager et al. (1988), Rao et al. (1987), Shankland and Hemmenway (1963), Smyth and Tafto (1982), Stebbins (1996), Steele et al. (1985), Wang et al. (1993), Weeks et al. (1974), Wentzcovitch and Stixrude (1997), Zambonini and Garobbi (1932)	

*Special attention: synthetic***6.1.37. Gahnospinel**

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	May be outside upper range
Hydrostatic weighing (specific gravity)	
EDXRF chemistry	
Raman spectroscopy	
XRD	If other tests are inconclusive
References	
Anderson (1964, 1974), Anderson and Payne (1938), Bank (1983), Burford (1997), Crowningshield (1963), Flinter (1963), Frenzel et al. (1986), Schmetzer and Bank (1985a,b, 1986), Schmetzer et al. (1989), Zoysa (1995)	

6.1.38. Garnet – Pyrope, Almandine, Spessartine, Grossular (hessonite, tsavorite), Andradite (demantoid), Uvarovite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Colour-change, star
Refractometer (refractive index)	May be outside upper range
Hydrostatic weighing (specific gravity)	
EDXRF chemistry	

Raman spectroscopy	
XRD	If other tests are inconclusive
References	
Agee (1965), Anderson (1945, 1946, 1947, 1959), Benson (1960), Crowingshield (1960, 1963a,b, 1964, 1966, 1967, 1969a,b,c,d, 1970a,b,c,d), Eliezri and Almor (1996), Gübelin (1945), Hidden and Pratt (1898), Hummel (1950), Ingerson and Barksdale (1943), Johnson and Koivula (1998a,b, 1999a), Johnson et al. (1999b,c,d), Koivula and Fritsch (1995), Lee (1962), Liddicoat (1966, 1967a,b, 1970), Manning (1967), Manson and Stockton (1982), Martin (1970), Pezzotta et al. (2011), Stephenson and Kouznetsov (2009), Webster (1963), Zwaan (2014a).	

Special attention: heat treatment (demantoid)

6.1.39. Gypsum

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Satin spar, cat's-eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	
XRD	If other tests are inconclusive
References	
Bosbach et al. (1994, 1995), Cody and Cody (1989), Crowningshield (1960, 1963), Iishi (1979), Kondo and Ahrens (1983), Mann et al. (1993), Pinet et al. (1992), Robbins (1996), Sasowsky (1998), Zeitner (1980)	

Special attention: soft material, easy cleavage

6.1.40. Hauyn

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Long-wave UV fluorescence	
Raman spectroscopy	
XRD	If other tests are inconclusive
References	
Barth (1932), Hassan and Grundy (1989b, 1991), Henderson et al. (2000), Henn and Bank (1990), Jahn (2007), Linde (1998), Mertens (1984), Scarratt (1986)	

6.1.41. Hematite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Magnet (magnetic reaction)	
Hydrostatic weighing (specific gravity)	
EDXRF chemistry	

Raman spectroscopy	
XRD	If other tests are inconclusive
References	
Dietrich and Saadi (1969), Fryer (1984), Koivula and Fritsch (1993, 1995a), Koivula and Kammerling (1991), Lu and Sunagawa (1987), Mappin (1946), Ogawa et al. (1999), Pinet et al. (1992), Scarratt (1985a,b), Schmetzer and Bank (1984a)	

*Special attention: various imitations, non-magnetic and magnetic.
It may not be possible to separate from manufactured material.*

6.1.42. Idocrase (Vesuvianite)

Required Test method	Remark
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Spectroscope	
Raman spectroscopy	If other tests are inconclusive
XRD	If other tests are inconclusive
References	
Allen and Burnham (1992), Arem (1973), Bank et al. (1989), Crowningshield (1960, 1965a,b, 1969b,c), Dillon (1983), Ito and Arem (1970), Koivula and Kammerling (1989, 1991), Liddicoat (1970), Scarratt (1986), Wight and Grice (1983)	

6.1.43. Iolite (Cordierite)

Required Test method	Remark
Microscope	
Phenomena	Cat's-eye, bloodshot
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Dichroscope	
References	
Brown and Bracewell (1990), Dharmaratne (1999), Faye et al. (1968), Fryer (1982, 1991), Henn (1990), Johnson and Koivula (1998, 1999), Kammerling and Koivula (1991), Koivula and Fritsch (1993, 1995a,b), Koivula and Kammerling (1990, 1992), Liddicoat (1967), Pough (1987), Wight (1999b)	

6.1.44. Jadeite – green, white, black, lavender

Required Test method	Remark
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	When possible
Chelsea colour filter	
Spectroscope	
Long-wave UV fluorescence	

FTIR(-NIR) spectroscopy	
EDXRF chemistry	
Raman spectroscopy	
<i>References</i>	
Adams (1953), Albright (1981), Anderson (1871), Barber (1954), Battesti and Schubnel (1993), Bauer (1895, 1896), Bergstein (1964), Bishop (1906), Bleeck (1908), Brown (1993a), Cavey (1987), Chuanyi et al. (1988), Crowningshield (1957, 1959, 1961, 1962a,b, 1963a,b,c,d, 1964, 1972, 1973a, 1974), Deer et al. (1963, 1992), Desautels (1986), DeVries and Fleischer (1984), Ehrmann (1958a,b), Fritsch (1993a,b, 1994), Fritsch et al. (1993, 1992), Fryer (1983, 1984, 1985, 1986, 1987a,b, 1988a,b, 1989, 1992a,b, 1993, 1996a,b), Gübelin (1978), Halford-Watkins (1932), Harlow (1994), Healey and Yu (1983), Hertz (1912), Hobbs (1982), Hodgkinson (1993, 1996), Htein and Naing (1994, 1995), Johnson et al. (1995a,b), Kammerling and Fryer (1994a,b,c,d, 1995a,b,c,d,e), Kammerling and Koivula (1990a,b), Koivula (1982a,b), Koivula and Fritsch (1993, 1994), Koivula and Johnson (1996), Koivula and Kammerling (1989, 1990, 1991a,b), Koivula et al. (1992, 1995), Lasnier et al. (1992), Liddicoat (1963b,c, 1971, 1972, 1974, 1975c), Manaka (1994), Meen (1966), Mével and Kienast (1986), Mok (1993), Nassau and Shigley (1987), Ou Yang (1993a,b, 1994, 1996c), Pough (1985), Prewitt and Burnham (1966), Rossman (1974), Scarratt (1986), Shida (1991), Ten (1989b), Yu et al. (1996).	

Special attention: other jadeite-like minerals or rocks, omphacite, dye, resin, impregnation, wax, plastic coating

6.1.45. Jasper

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	If other tests are inconclusive
<i>References</i>	
Cassedanne (1971), Davidson (2000), Demenge (1994), Druzhinina (2000), Fritsch and Ivey (2015), Fryer (1989), Heflik et al. (1993), Henig and Collins (2001), Johnson and Koivula (1999), Koivula and Johnson (1996), Rossman (1994)	

6.1.46. Jeremejevite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	If other tests are inconclusive
<i>References</i>	
Bank (1986), Bank and Becker (1977), Blass and Graf (1999), Chikayama (1981), de Ascencio-Guedes (2007), Foord and Cunningham (1978a), Foord et al. (1981), Foord and Mills (1978b), Herting and Strunz (1978), Hochleitner and Weiss (2000), Konovalenko et al. (1983), Künzel (1989), Kyi and Thu (2006), Liddicoat (1973a,b, 1976a,b), Liddicoat and Fryer (1974), Rondorf and Rondorf (1988), Stachowiak and Schreyer (1998), Strunz and Wilk (1974), Wilson et al. (2002), Zolotarev et al. (2000)	

6.1.47. Kornerupine

<i>Required Test method</i>	<i>Remark</i>
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Microscope	
Phenomena	Cat's eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	Small 2V angle
Raman spectroscopy	If other tests are inconclusive
References	
Ackermann et al. (1984), Anderson (1974), Bank and Berdesinski (1974, 1975), Barot et al. (1995), Benson (1960), Crowningshield (1962a,b, 1965b, 1965c, 1974a,b, 1975a,b), Fryer (1982), Henn (1985), Koivula and Kammerling (1992a,b), Korevaar and Zwaan (1977), Liddicoat (1966), Moore and Bennett (1968), Payne (1954), Schmetzer (1978b), Schmetzer et al. (1978, 1979), Trumper (1949), Webster (1974), Zwaan (1992b)	

6.1.48. Kyanite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's eye, colour change
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Dichroscope	
Raman spectroscopy	If other tests are inconclusive
References	
Barot et al. (1995), Bosshart et al. (1982), Chadwick and Rossmann (2009), Crowningshield (1959, 1966a,b), Delor and Leyreloup (1986), Ghera et al. (1986a, 1988), Gübelin and Schmetzer (1982), Hänni (1983), Hyrsl (1997), Hyrsl and Milisenda (1996), Ito (1986), Johnson and Koivula (1999), Key and Ochieng (1991), Langer and Abu-Eid (1977), Liddicoat (1973), Males (1974), Neiva (1984), Renfro and Shen (2013), Saul et al. (1991), Zwaan (2014b)	

6.1.49. Lapis Lazuli

<i>Required Test method</i>	<i>Remark</i>
Microscope	Thermal reaction test, acetone
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Long-wave UV fluorescence	
Raman spectroscopy	Selective components
XRD	If other tests are inconclusive
References	
Anderson (1954), Banerjee (1990), Bank (1970), Bank and Platen (1988), Bariand (1979), Bennett (1992), Brown (1985, 1993a,b), Crowningshield (1967a,b,c, 1974), Dillon (1981), Emmett (1985), Fryer (1981, 1982, 1983, 1985a,b, 1986a,b,c,d, 1988, 1989a, 1992, 1993), Heflik and Natkaniec-Nowak (2003), Johnson and Koivula (1998), Koivula and Fritsch (1993), Koivula and Kammerling (1988, 1991, 1992a), Koivula et al. (1992b,c), Liddicoat (1963a,b), Mitchell (1982), Mok (1991), Nassau (1980, 1982), Scarratt (1983, 1987), Schmetzer (1983, 1985), Webster (1958, 1971), Weerth (1994), Wyart et al. (1981)	

Special attention: dye, coatings, impregnation, wax, 'synthetics', imitations

6.1.50. Magnesite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Long-wave UV fluorescence	
FTIR(-NIR) spectroscopy	
EDXRF chemistry	
Raman spectroscopy	
XRD	If other tests are inconclusive
References	
Bank et al. (1988a), Bank and Platen (1988b), Fryer (1985), Gillet (1993), Koivula (1986), Superchi (1997)	

Special attention: crystalline variety very soft, massive variety often used with dye

6.1.51. Malachite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
EDXRF chemistry	If other tests are inconclusive
Raman spectroscopy	
XRD	If other tests are inconclusive
References	
Balitsky and Bublikova (1990), Balitsky et al. (1987a,b), Bank et al. (1998), Bennett (1992), Chernenko and Melnikov (2003), Collyer et al. (1991), Cook (2001), Fedorov (2002), Fryer (1981), Goga (2000), Hen and scheider (1994), Hosaka (1990), Kammerling and Fryer (1994), Koivula and Fritsch (1995), Koivula and Kammerling (1989), Nassau (1990), Pinet et al. (1992), Strack (1996), Webster (1958)	

Special attention: reconstructed, impregnated, wax, synthetic

6.1.52. Maw-sit-sit

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	Selective components
References	
Anonymous (1997), Gübelin (1964-65), Gübelin (1965a,b,c, 1978), Lacroix (1930), Ou Yang (1984),	

6.1.53. Moldavite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
FTIR(-NIR) spectroscopy	
EDXRF chemistry	
References	
Artemieva et al. (2002), Banerjee and Hager (1993), Blum and Chamberlain (1992), Bouska et al. (1985), Bouska and Rost (1972), de Goutiere (1995), Du Toit (1996), Frazier and Frazier (1991a,b), Horn (1985), Hrabanek and Malley (1988), Hurtig (2005), Koivula and Kammerling (1992), Konta and Saul (1976), Liddicoat (1975), Reban (1984), Rejl (1977), Saul (1987), Skalichy (1975), Trnka and Houzar (2002), Webster (1949), Zook (1974)	

Special attention: artificial glass

6.1.54. Nephrite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	
References	
Bancroft (1983), Bank (1975), Beck (1984), Crowningshield (1965), Fryer (1984), Kammerling and Fryer (1995), Koivula and Kammerling (1988), Liddicoat (1969), Nieder (1982), Ruff (1950), Sun (2005), Yarmack (1964)	

Special attention: dye

6.1.55. Obsidian

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
FTIR(-NIR) spectroscopy	
EDXRF chemistry	
References	
Acquafredda et al., 1999; Baugh and Nelson, 1987; Bavay et al., 2000; Bellot-Gurlet et al., 2008; Bellot-Gurlet et al., 2005; Bigazzi et al., 1992; Bigazzi et al., 1986; Biró, 2004; Bunney, 1985; Calligaro, 2008; Cohen, 1958; Craig et al., 2010; Craig et al., 2007; Crowningshield, 1975; Faulques et al., 2001; Glascock, 2002; Henn, 1995; Holzhay, 1996; Hughes, 1982; Hyrsl and Žáček, 1999; Johnson and Koivula, 1997, 1998; Kelloway et al., 2010; Koivula and Fritsch, 1993a, b; Miller, 2006; Millhauser et al., 2011; Moses et al., 1998; O'Keefe, 1984; Pereira et al., 2001; Poupeau et al., 2010; Rosen et al., 2005; Rozsa et al., 2006; Sheppard et al., 2011; Sinkankas, 1996; Spriggs et al., 2011; Webster, 1949; Weiner, 1983; Williams-Thorpe, 1995; Zook, 1973	

Special attention: artificial glass

6.1.56. Opal

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Play of colour, Cat's-eye (rare), Star (rare)
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Long-wave UV fluorescence	
Long-wave UV phosphorescence	
Short-wave UV fluorescence	
Short-wave UV phosphorescence	
UV-Visible(-NIR) spectroscopy	If dye is suspected
FTIR(-NIR) spectroscopy	

References

Adamo et al. (2010), Adams et al. (1991), Bardosova et al. (2003), Bartoli et al. (1990), Baryshev et al. (2002, 2003), Birdsall (1986), Brajkovic et al. (2007), Brown et al. (2003), Brown et al. (2004), Brown et al. (2002), Cady et al. (1996), caucia et al. (2009), Caucia et al. (2008), Chen et al. (2004), Clarke (2003), Davies (2005), Deelman (1986), de Jong et al. (1987), Einfalt (2007), Eliseev et al. (2009), Elzea et al. (1994), Elzea and Rice (1996), Erel et al. (2003), Esenli et al. (2001, 2003), Flörke et al. (1991), Fritsch et al. (2002, 2003, 2004, 2006), Gaillou et al. (2008a,b), Gauthier et al. (2004), Graetsch (1994), Graetsch et al. (1985, 1987, 1990,1994), Guthrie et al. (1995), Harder (1995), Hatipoglu (2009), Heylmun (1987), Holgado et al. (1999), Hoover et al. (1996), Horton (2002), Ilieva et al. (2007), Kalinin et al. (1998, 2002, 2003, 2004), Kalinin and Serdobintseva (2003), Karpov et al. (2005), Kavtrev et al. (2007), Kuznetsova et al. (2003), Li et al. (1994), Livstrand (1987), Mazzero et al. (2010), McOrist and Smallwood (1997), Meseguer et al. (2002), Nagase and Akizuki (1997), Nassau (1989), Ni et al. (2001), Ostrooumov (2007), Ostrooumov et al. (1999), Ostrooumov and Talay (2000), Palacios-Lidon et al. (2005), Paris et al. (2007), Pearson (1985), Pechar (1985), Pecover (2007), Pewkliang et al. (2008), Potapov and Kamashev (2006), Rice et al. (1995), Rondeau et al. (2004), Rondeau et al. (2010), Salgueirino-Maceira et al. (2003), Schellnegger (2002), Senior (1996), Serdobintseva and Kalinin (2000, 2001), Simonton et al. (1986), Smallwood (1997), Smallwood et al. (1997a,b), Thomas et al. (2006, 2007, 2008), Viti and Gemmi (2009), Vysotsky et al. (2010), Webb and Finlayson (1987), Williams and Crerar (1985), Williams et al. (1985), Wollaert et al. (1990), Zwaan (2015b)

Special attention: sugar and smoke treatments, dye, impregnation, synthetics

6.1.57. Pectolite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's eye (rare)
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Long-wave UV fluorescence	
Long-wave UV phosphorescence	
Short-wave UV fluorescence	
Short-wave UV phosphorescence	
EDXRF chemistry	
Raman spectroscopy	If other tests are inconclusive

References

Anderson 1989; Bank et al. 2000; Bente et al. 1991; Dunn 1978; Fuetes Marcuello and Garcia Guinea 1990; Koivula 1986b, a; Koivula and Kammerling 1990, 1992; Koivula et al. 1992; Liddicoat 1976a, b; Liebau 1980; Lizzadro 1987; Peacock 1935; Pough 1997; Schaller 1955; Schmetzer 1984; Steiner 1996; Sullasi et al. 2010; Vaughan et al. 1921; Woodruff 1986, 1987; Woodruff and Fritsch 1989

6.1.58. Peridot

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Spectroscope	
References	
Aboosally 1999; Adamo et al. 2009; Agrell et al. 1998; Austin 1991; Bancroft 1981; Bank 1995; Bank et al. 1994; Beard 1995; Benson 1960; Bocchio et al. 1986; Braunwart 1993; Brown and Bracewell 1982; Burford and Gunasekara 2000; Crowningshield 1962, 1973, 1975b; Cruse 2007; Dick 1993; Dill et al. 2006; Dillon 1981; Drucker 1998; Dupuy et al. 1991; Dyar et al. 1998; Dyar et al. 2009; Eppler 1960; Fan et al. 2007; Farrell and Newnham 1965; Federman 1995; Fischer 1985; Frazier and Frazier 1992, 1997; Fryer 1987; Fuhrbach 1992, 1997, 1998; Gübelin 1980, 1981a, b, 1986; Gübelin and Peretti 1996; Gunawardene 1985; Henn 1999; Henn et al. 1994; Henn and Becker 1992; Henn and Milisenda 1997; Hyrs 2011; Kammerling et al. 1995; Kammerling and Koivula 1991, 1995a, b; Kammerling et al. 1994; Kanazawa et al. 2007; Kane 2004; Koivula 1980, 1981, 1992; Koivula and Fritsch 1993b, d, e, f, 1994a, b, c, d; Koivula and Fryer 1986, 1987; Koivula and Kammerling 1990b, 1991, 1992b; Koivula et al. 1995; Kurat et al. 1982; Leelawathanasuk et al. 2011; Lepold and Schramm 1989; Libowitzky and Beran 1995; Liddicoat 1968, 1969, 1970a, b; Lieber 1976; Mao 1990; Mattice 1995; Milisenda et al. 1995; Moses et al. 1999; Mouri and Enami 2008; Nassau 1994; Peretti and Gübelin 1996; Poeter 1999; Pough 1986, 1997b; Sinkankas et al. 1992; Snee and Ahrens 1975; Sokolov et al. 2002; Stockton and Manson 1983; Taylor 1971; Van Pelt 1938; Walmstedt 1825; Webb 1993; Wilson et al. 1974; Wilson 2007; Wilson 1976; Yang 1993; Zeitner 1990; Zolotaryov et al. 2003; Zook 1972	

Special attention: may be damaged by acids

6.1.59. Petalite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Raman spectroscopy	
References	
Bank 1971; Cassedanne and Cassedanne 1978; Cerny and Ferguson 1972; Cerny and London 1983; Charoy et al. 2001; Crowningshield 1963; Fryer 1986; Heinrich 1975; Ito 1986; Karfunkel et al. 2002; Leal-Gomes and Dias 2009; Liddicoat 1976b; Lindner 1967; Nel 1946; Pough 1966, 1998; Selway et al. 2002; Wight 1990; Win and Themelis 2003; Zemann-Hedlik and Zemann 1955	

6.1.60. Phenakite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing	

(specific gravity)	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
Raman spectroscopy	
References	
Anonymous 1911, 1913; Balginita et al. 1988; Bank 1987, 1988; Bank et al. 1996; Bank et al. 1988; Barton 1986; Bastos 1972; Bayle 2010; Beran 1990; Billings 1927; Bulnaev 2006; Cario 1989; Cassedanne 1985; Chaves et al. 1998; Clark et al. 1986; Cook 2009; Crowningshield 1960, 1970; Dunn 1974; Gübelin 1979; Hazen and Au 1986; Hazen and Finger 1987; Hofmeister et al. 1987; Hyrsl and Quintens 1999; Jacobson 1979; Koivula and Fritsch 1994b, f; Lee and Erd 1963; Liddicoat 1963a, b, 1969b, c; Lottermoser 1986; Marcos-Pascual and Moreiras 1997; Melby and Taylor 1983; Niedermayr 1978; O'Donoghue 1976; Pinet et al. 1992; Pough 1935, 1936, 1966b, 1972, 1997c; Remeshilo and Vovk 1973; Shein et al. 2008; Spencer 1906, 1934; Tomaz-Filho et al. 2005; Tsinober et al. 1986	

6.1.61. Phosphophyllite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Short-wave UV fluorescence	
EDXRF chemistry	
Raman spectroscopy	
References	
Bank 1975; Fryer 1989; Hill 1977; Hyrsl and Petrov 1998; Kleber et al. 1961; Liddicoat 1969c, 1971; Pough 1997d; Wilson and Petrov 1999	

6.1.62. Plastic

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
FTIR(-NIR) spectroscopy	
References	
Alam and Stanton 1994; Anonymous 1958, 1959, 1980; Benson 1960b; Brown 1991, 1993; Bubshait and Sturman 1996; Chaki and Li 1984; Crowningshield 1964, 1969a, b, 1974; Evans and Crook 1997; Farn 1978; Foreman 1997; Foreman et al. 1996; Fryer 1981, 1983, 1984, 1985a, b, 1987a, 1989a, 1990, 1997; Gunawardene 1983; Gunawardene and Mertens 1983; Henn 2008; Hofmeister 1992; Horiuchi 1982; Hughes 1987; Hurwit 2002; Kammerling and Fryer 1995; Kammerling and Koivula 1989; Kammerling et al. 1995b; Koivula 1987; Koivula and Fritsch 1993c, 1995; Koivula and Kammerling 1988, 1989a, b, 1990c, 1991b, c; Koivula et al. 1992b, 1995a; Koivula et al. 1990; Liddicoat 1963a, 1966; Manson 1978; Mark 1984; Milisenda 1996; Nassau 1980, 1982, 1986; Ou Yang 1993; Scarratt 1981, 1984, 1987, 1992; Scarratt et al. 1993; Schmetzer and Bank 1983; Smith 1994; Tinney et al. 1996; Webster 1939, 1949b; Yost and Weidenhamer 2008	

6.1.63. Prehnite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Raman spectroscopy	
<i>References</i>	
Akizuki 1987; Bank 1975a; Beattie and Brown 1985; Bracewell 1989; Brown and Snow 1981; Crowningshield 1963a, b; Currier and Pohl 2011; Howard 1997; Huber 1975; Liou 1971; Nazarova et al. 1990; Pan et al. 2009; Papike and Zoltai 1967; Pough 1966b, 1997e; Roger 1987; Rohn 1998; van Houten 1971	

6.1.64. Pyrite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	
XRD	If other tests are inconclusive
<i>References</i>	
Abraitis et al. 2004; Annamoe and Alpatov 2001; Bartlett 1997; Blount 1993; Buckley and Woods 1987; Costagliola et al. 1997; Craig and Vokes 1993; Craig et al. 1998; Descostes et al. 2004; Dódony et al. 1996; Frondel 1936; Fryer 1988; Gunawardene 1983b; Howie 1992; Hu et al. 2006; http://ruff.info/Marcasite ; http://ruff.info/Pyrite ; Hyde and O'Keeffe 1996; Johnson and Koivula 1997a; Karguppikar and Vedeshwar 1988; Koivula and Kammerling 1991b; Lennie and Vaughan 1992; Liddicoat 1972; Luther 1991; Moses and Herman 1991; Moses et al. 1987; Murowchick 1992; Murowchick and Barnes 1987; Nickel 1968; Pough 1996; Rimstidt and Vaughan 2003; Russell et al. 1990; Sawłowicz 1993; Schmetzer 1983; Wilkin and Barnes 1997; Zakrevskaya 1995; Zhu and Wadsworth 1994; Zilbershteyn 1985	

Special attention: marcasite (misnomer), steel imitation

6.1.65. Quartz (amethyst, citrine, rock crystal, smoky, rose, aventurine, etc.)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Star
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	If loose
Polariscope	
Immersion	In water
Long-wave UV fluorescence	
Short-wave UV fluorescence	
FTIR(-NIR) spectroscopy	

References

Abdukadyrova (2004), Adekeye and Cohen (1986), Aines and Rossmann (1986), Antao et al. (2008), Bachheimer (2000), Bahadur (2006), Bailey (2001), Balitsky and Balitskaya (1986), Balitsky and Balitskaya (2009), Balitsky et al. (1998, 1999, 2000, 2001, 2004), Baran et al. (1987), Bettiol et al. (1997), Blatt H. (1987), Bons (2001), Botis et al. (2005), Bulur et al. (2000), Cassedanne and Roditi (1991), Cherniak et al. (2007), Cohen (1985), Cohen and Makar (1985), Commin-Fischer et al. (2009), Cordier and Doukhan (1991), Dedushenko et al. (2004), de Miranda-Pinto et al. (2011), Demars et al. (1996), Demazeau et al. (1994), Di Benedetto et al. (2009), Dolino (1990), Donaldson and Borm (1998), Donovan et al. (2011), Dotto and Isotani (1991), Duarte et al. (2011, 2009), Duttine et al. (2002), Epstein (1988), Ericksen (2001a,b), Farver and Yund (1991), Fast (2008), Ferreira de Souza (2010), Flem et al. (2002), Garland (2004), Gilg et al. (2003), Goreva and Rossman (2001), Götze et al. (2011), Götze (1997, 2009), Götze and Plötze (1997), Götze et al. (2001, 2004, 2005), Gunter (1999), Hartmann et al. (2010), Heaney and Veblen (1991a,b), Hebert and Rossman (2008), Henn and Güttler (2009), Hickel et al. (2000), Hyrsl (2006), Ihinger and Zink (2000), Iwasaki and Iwasaki (2002), Jaek et al. (2003), Karampelas et al. (2005), Kibar et al. (2007), Killingback (2008), Kronenberg (1994), Kurosawa et al. (2003), Landmann (1999), Landtwin and Pettke (2005), Lehmann et al. (2009), Lin et al. (1994), Lu and Sunagawa (1990), Lu et al. (1990), Ma et al. (2002), Manning (1994), Marko et al. (2006), Marler (1988), McArthur et al. (1993), McConnell (1995), Monecke et al. (2000), Moore (1986), Moore (2007), Morteani et al. (2010), Muller et al. (2003), Murray and Olley (2002), Muto et al. (2004), Neumann and Schmetzer (1985), Notari et al. (2001), Ontiveros et al. (2004), Ostapenko and Mitsyuk (2006), Owen (1988), Pagonis et al. (2010, 2011), Pan et al. (2008, 2009), Pankrath an Flörke (1994), Partlow and Cohen (1986), Paterson (1986), Perry et al. (1992), Philippot et al. (1996), Proust and Fontaine (2007a,b), Rakov (2003), Rakov and Krylova (2001), Rakov and Shuriga (2009), Ramseyer et al. (1988), Ream (1991), Richards (1990), Rosa et al. (2005), Rossman (1994), Rusk et al. (2011), Sawakuchi and Okuno (2005), Schmetzer (1987, 1988, 1989), Schmetzer and Glas (2003), Schmetzer and Krzemnicki (2006), Schultz-Güttler et al. (2008), Seifert et al. (2011), SivaRamaiah et al. (2011), Spicuzza et al. (1998), Stegger and Lehmann (1989), Stenina (2004), Stevens-Kalceff (2009), Subedi et al. (2011), Sunagawa (1999), Sunagawa and Balitsky (1990), Suzuki and Nakashima (1999), Swanson and Fenn (1986), Tajika and Hashimoto (2006), Thomas et al. (2000), Trossarelli (1985), Umari et al. (2001), Vasconcelos et al. (1994), Wenrich and Christensen (1996), White and Cook (1990), Wilson (1999), Wintle and Murray (1997), Zhang et al. (1994), Zolensky et al. (1988).

Special attention: synthetics, coatings, irradiation, heat treatment, dyed and impregnated (quartzite)

6.1.66. Rhodochrosite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	Upper limit outside range
Spectroscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
EDXRF chemistry	If other tests are inconclusive
Raman spectroscopy	If other tests are inconclusive
References	
Auzat 1992; Bank 1975c; Bank and Becker 1977; Bartos et al. 2007; Birch 1986; Boettcher et al. 1992; Brusentsova et al. 2010; Cassedanne 1997, 1998; Cory 1991; Crowningshield 1962a; da Cunha 1993; de Brodtkorb and de Brodtkorb 1979; Dillon 1981a; Fedorov 2002; Frost et al. 2006; Galloni 1950; Hyrsl 1997, 2001; Jones 1997; Knox and Lees 1997; Koivula and Fritsch 1993h; Koivula and Kammerling 1990b; Kosnar 1979; Kuck and Saaid 1998; Lees et al. 1998; Liddicoat 1963d, 1967; Miller 1971; Petsch 1990; Pinet et al. 1992; Saadi 1988; Saadi and Carlos 1992; Sala et al. 1973; Schmetzer and Berdesinski 1974; Sinkankas 1955, 1977; Sutherland 1997; Sutthirat et al. 2011; Von Bezing et al. 1991; Wilson and Dunn 1978a, b; Zwaan 2015d	

Special attention: easy cleavage single crystal material

6.1.67. Rhodonite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Spectroscope	
EDXRF chemistry	If other tests are inconclusive
Raman spectroscopy	If other tests are inconclusive
References	
Millsted 2006; Millsted et al. 2005; Nelson and Griffen 2005; O'Neill 1986; Ohashi and Finger 1975; Ohashi et al. 1975; Paião and Watanabe 2008; Peacor and Niizeki 1963; Peacor et al. 1978; Pinet et al. 1992; Pirsson 1890; Pough 1966c; Sapountzis and Christofides 1982; Simandl et al. 2001; Smith et al. 1981; Suhner 1979; Takei and Hosoya 1985; Thurm 1973; Zhao et al. 1986; Zigovecki-Gobac et al. 2010	

6.1.68. Ruby

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Star
Immersion	Be diffusion, synthetic
Refractometer (refractive index)	
Spectroscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
DiamondView	Glass filling
UV-Visible(-NIR) spectroscopy	If necessary for origin
FTIR(-NIR) spectroscopy	
EDXRF chemistry	
LA-ICP-MS chemistry	Be test heated stones, if necessary for origin
Residue check and extent	Flux healing
Colour call	
Clarity enhancement check and extent	Glass filling
References	
Abduriyim and Kitawaki 2008; Abduriyim et al. 2012; Achiwawanich et al. 2006; American Gemological Laboratories 1982a, b; Anderson 1980a, b; Anderson 1981; Arem 1987; Arkhangelskii et al. 1969; Arrouas 1993; Balmer et al. 2009; Bancroft 1988; Banerjee et al. 1985; Bank 1963, 1971b, 1974, 1975d, 1978; Bank et al. 1988a; Bank and Henn 1988, 1989; Bank et al. 1988b; Bank and Okrusch 1976; Barthem et al. 1982; Bassett 1997; Basun et al. 2007; Belt 1967; Berrangé and Jobbins 1976; Bessonova et al. 1981; Bessonova and Stanislavskii 1981; Bosshart 1982, 1983; Bosshart and Schmetzer 1986; Bowersox et al. 2000; Brown 1981, 1992a, b; Brown and Beatti 1992; Butcher and White 1964; Calligaro et al. 1998; Calligaro et al. 1999; Cartier 2011; Chaiwong et al. 2005; Chalaïn 1995; Christie Manson and Woods 1990; Clark 1992, 1993; Cockayne et al. 1969; Coenraads 1992; Coldham 2009; Cozar 1995; Crowningshield 1966, 1969b, 1974a; Currie 1988; Davison and Houghton 2007; Delé-Dubois et al. 1993; Dele et al. 1997; Devouard 1989; Dill 2005; Duroc-Danner 1988, 2002, 2003; Emmett et al. 2003; Emmett 1999; Frederic 1994; Fryer 1987c, 1992, 1996a, b, 1997b; Galia 1987; Galibert and Hughes 1995; Garcia-Lastra et al. 2005; Garnier et al. 2008; Garnier et al. 2002; Geisler 1976; Geranicheva et al. 1975; Giuliani et al. 2005; Giuliani et al. 2012; Grapes and Palmer 1996; Grapes and Hoskin 2004; Grubessi 1990; Grundmann and Morteani 1995; Gübelin 1966, 1979a, 1981a, 1982, 1985–86; Gübelin and Knischka 1980; Gunawardene 1984; Hager 2007; Hager et al. 2010; Hamid et al. 1999; Hänni 1992, 1993, 1994, 2001a, b; Hänni and Krzemnicki 2009; Hänni et al. 2001; Hänni and Schmetzer 1991; Hänni et al. 1994; Hänni and Stern 1982; Harding and Jobbins 1984; Harding and Scarratt 1986; Henn 1991, 1994; Henn and Bank 1991a, b, 1993a, b; Henn et al. 1990a; Henn et al. 1990b; Henn and Milisenda 1994; Hintze 2010; Hoang et al. 1999; Holzapfel	

2003; Hughes and Galibert 1997; Hughes 1992, 1996a, b, 1997; Hughes and Galibert 1998; Inamori Jewelry Division 1980; Jobbins and Berrangé 1981; Johnson and Koivula 1997b, 1998a; Johnson et al. 1999a, b; Joseph et al. 2000; Kammerling et al. 1995a; Kammerling and Koivula 1994; Kammerling et al. 1995c; Kane 1983, 1985, 1997; Kane et al. 1991; Kawano 2009; Keller 1983; Kiefert and Schmetzer 1991; Kissin 1994; Knischka and Gübelin 1980; Koivula and Fritsch 1993b, i, 1994b, f, h, 1995a; Koivula and Johnson 1996; Koivula and Kammerling 1988a, c, 1991b, 1992b, c; Koivula et al. 1992a, b, 1995c; Koivula et al. 1995d; Krzemnicki 2011; Krzemnicki and Hänni 2008; Lee and Hoggard 1990; Leelawathanasuk-Pavaro et al. 2008; Leelawathanasuk et al. 2009; Leonyuk et al. 2005; Li et al. 2011; Liccario et al. 2005; Liddicoat 1962, 1969d, 1970a; Linares 1965; Lu and Shigley 1998; McClure et al. 1993; McClure et al. 2006; Mercier et al. 1999; Milisenda et al. 2005; Muhlmeister et al. 1998; Mullenmeister and Zang 1995; Nassau 1969, 1981, 1990; Nguy et al. 2006; Oishi et al. 2004; Pardieu 2007; Pardieu et al. 2009; Peretti 1993; Peretti et al. 1995; Peretti and Smith 1993; Pham et al. 2004a; Pham et al. 2004b; Pongkrapan et al. 2010; Qi 1996; Qi et al. 1999; Rakontondrazafy et al. 2008; Ribeiro and Zanatta 2003; Saminpanya and Sutherland 2011; Sanchez et al. 2001; Sanchez et al. 1997; Scarratt 1985, 1994; Schmetzer 1985, 1986, 1999; Schmetzer and Peretti 1999; Schmetzer et al. 2009, 2010; Schmetzer and Schwarz 2007; Schwarz et al. 2008; Schwarz and Schmetzer 2001; Shida 1996; Smith 1992, 1995, 1996, 1998; Smith and Bosshart 1993; Smith et al. 1997; Sun 1992; Sun and Guang 1999; Sunagawa et al. 1999; Superchi and Rolandi 1980; Sutherland et al. 2009; Sutherland et al. 2006; Sutherland and Schwarz 2001; Syassen 2008; Tang et al. 1989; Teshima et al. 2005; Themelis 1992, 2003, 2005; Verneuil 1891, 1892, 1903; Wang et al. 2007; Wanthanachaisaeng et al. 2006; Webb 1997; Webster et al. 1939; Winotai et al. 2004; Winotai et al. 2000; Yui et al. 2008

Special attention: heat treatment, residues, diffusion, (lead) glass filling, dye, synthetics

6.1.69. Sapphire

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Star, colour change
Immersion	Synthetic, Be diffusion
Refractometer (refractive index)	
Spectroscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
DiamondView	Glass filling
UV-Visible(-NIR) spectroscopy	Be diffusion, if necessary for origin
FTIR(-NIR) spectroscopy	
EDXRF chemistry	
LA-ICP-MS chemistry	Be test heated stones, if necessary for origin
Residue check and extent	Flux healing
Colour call	e.g., Padparadscha

References

Anderson et al. 1958; Anderson and Payne 1948; Anderson et al. 1981; Atkinson and Kothavala 1983, 1985; Bank 1970, 1995b; Bank et al. 1972; Bank and Henn 1989b; Bank et al. 1997, 1999; Bank et al. 1991; Bank et al. 1978; Barot et al. 1989; Barot and Harding 1994; Beesley 1982; Berg 2004; Berg and Dahy 2002; Berger and Berg 2006; Berrangé and Jobbins 1976; Birch 2008; Blauwet 2006; Borodin 2008; Bottrill 1996; Bowersox et al. 2000; Brown 1990, 1991a; Brown et al. 1985; Brown 1956, 1958; Brownlow and Komorowski 1988; Bunoiiu et al. 2010; Burch 1987; Cartier 2009; Cartier 2011; Chaiwong et al. 2005; Chapoulie et al. 1999; Chatham 1982; Coenraads 1992, 1994, 2012; Coenraads and Laird 2000; Coenraads et al. 1990; Coldham 1986; Coldham 1973, 1992; Crowningshield 1959, 1961, 1962a, 1969d, 1970a, 1971, 1974c, 1979a, b, 1983; Crowningshield and Nassau 1981; David and Fritsch 2001; Dele-Dubois et al. 1980; Dirlam et al. 1992; Dobrovinskaya et al. 1980; Du Toit 1995; Duroc-Danner 1985, 1988, 2002b; Duroc-Danner 2011; Ediriweera 1991; Ediriweera and Perera 1989; Eigenmann and Gunthard 1971, 1972; Eigenmann et al. 1972; Elen and Fritsch 1999; Emmett 2002; Emmett et al. 2003; Emmett

1999; Emmett and Douthit 1993; Engineering and Mining Journal 1890; Epstein et al. 1994; Faye 1971; Federman 1992; Ferguson and Fielding 1971, 1972; Field 1992; Flamini et al. 1987; Fontana et al. 2008; Fontana et al. 2009; Francis et al. 2003; Fritsch and Mercer 1993; Fritsch and Rossman 1990; Fryer 1981a, c, 1982a, b, c, d, 1983b, 1984b, 1985c, 1986b, 1987d, e, 1990b, 1992b, c, 1996a; Furui 1988; Gaines 1951; Galibert and Hughes 1995; Garland 2002; Garnier et al. 2005; Giuliani et al. 2009; Giuliani et al. 2007; Giuliani et al. 2005; Giuliani et al. 2012; Grossman et al. 2001; Gübelin 1983, 1998; Gübelin et al. 1989; Gübelin and Peretti 1997; Gunaratne 1981; Gunawardene 1983c, 1984a, 1985a; Gunawardene and Chawla 1985; Guo et al. 1996; Guo et al. 1992; Gutierrez et al. 2010; Häger et al. 2003; Hainschwang 2008; Halford-Watkins 1935, 1936; Hamid et al. 1999; Hänni 1990, 2002; Hänni and Pettke 2002; Harutunyan et al. 1999; Hauzenberger et al. 2003; Heilmann and Henn 1986; Henn 1986; Henn and Bank 1990, 1992; Henn et al. 1989; Henn and Milisenda 2005; Henn et al. 1999; Henn and Petsch 2000; Hughes 1988, 1997; Hughes and Vock 2000; Hughes and Win 1995; Jackson 1984; Jobbins 1971; Jobbins and Berrangé 1981; Johnson and Koivula 1997c, d; Johnson et al. 1999a; Johnson et al. 1995; Jones et al. 2003; Joseph et al. 2000; Kammerling et al. 1996; Kammerling et al. 1994a; Kammerling and Koivula 1995b; Kammerling et al. 1994b; Kane 1982, 1985, 2010; Kane and Kammerling 1992; Kane et al. 1990; Kane et al. 1991; Keller and Keller 1986; Keller 1982; Keller et al. 1985; Khanchuk et al. 2003; Kiefert 1987; Kiefert and Schmetzer 1987a, b, 1988, 1991b; Kiefert et al. 1996; Koivula 1986a; Koivula and Fritsch 1995a, c; Koivula and Kammerling 1992d, e; Koivula et al. 1995e, f; Krzemnicki et al. 1996; Krzemnicki et al. 2004; Kurlov and Theodore 1999; Kvapil et al. 1973; Kyi et al. 1999; La Touche 1890; Lee et al. 1999; Levinson and Cook 1994; Liddicoat 1962b, 1972a, 1975a, b; Lin et al. 1998; Linton 1997; Malikova 1999; Malyukin et al. 2000; Massi 2005; McCallum and Morpeth 1999; McClure and Moses 2002; McClure 2002, 2005; Meyer and Mitchell 1988; Milisenda and Henn 1996; Mogilevsky et al. 2009; Moine et al. 1998; Moon and Phillips 1986, 1991; Morita et al. 1993; Morpeth et al. 2001; Moses 2002a, b; Nassau 1981, 1982b, 1991, 1996; Nassau and Valente 1987; Nechaev et al. 2009; Notari 1997; Notari et al. 2003; O'Donoghue 1983; Pakhomova et al. 2011; Palanza et al. 2010; Pechar 1985; Peretti and Günther 2002; Peretti et al. 2003; Peretti et al. 1990; Peretti et al. 1997; Peucat et al. 2007; Pisutha-Armond et al. 2006; Pisutha-Armond et al. 2009; Ponalho 1990, 1995; Pough 1972a; Rakontondrazafy et al. 2008; Ramdohr and Milisenda 2006; Roberts et al. 2004; Rupasinghe et al. 1993; Saito et al. 1991; Sakkaravej et al. 2006; Scarratt 1977, 1984a, b, 2002; Scarratt and Charoensrithanakul 1994; Scarratt et al. 1994; Schmetzer 1977, 1987, 1990, 2007; Schmetzer and Bank 1980, 1981; Schmetzer et al. 1983; Schmetzer and Kiefert 1990; Schmetzer and Kiefert 1987; Schmetzer and Peretti 1999, 2000; Schmetzer et al. 2010; Schmetzer and Schwarz 2004, 2005, 2007; Schwarz et al. 2000; Schwarz et al. 2008; Schwarz et al. 1996; Schwieger 1990; Seifert and Hyrsl 1999; Shida 1990, 1996; Smith 1998; Smith et al. 1997; Smith et al. 1995; Superchi et al. 1997; Sutherland 1994, 1996; Sutherland et al. 2002; Sutherland et al. 2009a; Sutherland et al. 2006; Sutherland et al. 2009b; Tay et al. 2012; Themelis 1992, 2003; Tombs 1974, 1978; Tombs 1982; Troup et al. 1992; Verneuil 1911; Wang et al. 2009; Wang and Yang 1992; Wang 1988; Wang et al. 2006; Wanthanachaisaeng et al. 2006; Wathanakul and Atichat 2001; Wathanakul et al. 2010; Webb 1997; Willard 1981; Yang et al. 2005; Zoysa and Rahuman 2012; Zwaan 2015b; Zwaan 1974

Special attention: heat treatment, diffusion, (lead, cobalt) glass filling, Synthetics

6.1.70. Sapphirine

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Dichroscope	
Raman spectroscopy	
<i>References</i>	
Bank et al. 1989; Christy and Grew 2004; Deer et al. 1978; Francis and Matsueda 2004; Fryer 1985c, 1987c; Grew et al. 2008; Haapala et al. 1971; Harding and Zoysa 1990; Henn 2001; Horrocks 1983; Janardhanan and Leake 1974; Koivula 1996; Koivula and Fryer 1987b; Koivula and Kammerling 1988d; Langer et al. 1994; McColl and Warren 1984; McKie 1963; Moore 1969; Moses et al. 1998b; Ostwald 1964; Saul et al. 1991; Scarratt 1987b, c; Segnit 1957; Steffen et al.	

1984; Su et al. 2012; Sutherland and Coenraads 1996; Wight 1990b; Wilson and Hudson 1967; Zeitner 1986; Zoysa 1995

6.1.71. Saussurite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	
<i>References</i>	
Jobbins and Rutland 1974; Scarratt 1987c, e	

6.1.72. Scapolite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
FTIR(-NIR) spectroscopy	
Raman spectroscopy	If other results are inconclusive
<i>References</i>	
Antao and Hassan (2002, 2008a,b, 2011a,b), Antao et al. (2008), Baker (1994), Chamberlain et al. (1985), Comodi et al. (1990), Couper (1991), De Grave et al. (1986), Hassan and Buseck (1988), Hawthorne and Sokolova (2008), Hazen and Sharp (1988), Henn (2005), Moecher and Essene (1991), Moecher et al. (1994), Pan and Dong (2003), Seto et al. (2004), Sherriff et al. (1987, 1998, 2000), Sidike et al. (2008), Sokolova and Hawthorne (2008), Sokolova et al. (1996), Stolz (1987), Superchi et al. (2010), Teertstra and Sherriff (1996), Vassilikou-Dova (1991), Vochten et al. (1986), Zhang (1992), Zolotarev (1993), Zolotarev et al. (2003), Zwaan (1986, 1996)	

6.1.73. Serpentine – bowenite, williamsite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
FTIR(-NIR) spectroscopy	
Raman spectroscopy	
<i>References</i>	
Auzende et al. 2004; Baese et al. 2010; Bank and Berdesinski 1975; Baronnet and Devouard 1996; Brown and Bracewell 1995; Chen and Menu 2010; Choudhary 2011; Crowningshield 1959a, 1961b, c, 1962c, 1972, 1973b, 1975a; Dódony and Buseck 2004; Ferguson 1977; Fryer 1983b, 1987e; Groppo et al. 2006; Harlow and Sorensen 2005; Hoyer 1997; Johnson and Koivula 1998a; Kammerling and Fryer 1995a; Kammerling et al. 1991; Kammerling et al. 1995d; Kim 1998; Kim	

and Cho 1998; Koivula and Kammerling 1989a; Krstanovic 1997; Liddicoat 1962c, 1965, 1967b, 1972b; McMahon 1890; Miura et al. 2011; Schreur 1982; Segnit 1985; Wang and Zhang 2011; Webster 1958, 1967; Zalishchak et al. 2007; Zeitner 1980

Special attention: dye

6.1.74. Sinhalite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Polariscope	
Spectroscope	
FTIR(-NIR) spectroscopy	
Raman spectroscopy	If other tests are inconclusive
<i>References</i>	
Anderson 1952a, b, 1974; Bank 1977; Bauernhansl and Beran 1997; Bowden et al. 1969; Claringbull and Hey 1952; Crowningshield 1958, 1960; Deen 1984; Dharmaratne 1998, 1999; Fang and Newnham 1965; Hayward et al. 1994; Henn 1985; Koivula and Fritsch 1993j; Liddicoat 1970d, 1976c; Moore et al. 1989; Payne 1952, 1958; Pinet et al. 1992; Pitman et al. 1995; Pough 1964; Werding et al. 1981; Wight 2000; Zeitner 1986; Zwaan 1955	

6.1.75. Sillimanite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
FTIR(-NIR) spectroscopy	
Raman spectroscopy	If other tests are inconclusive
<i>References</i>	
(Althaus 1967; Bank 1974a; Bank et al. 1978a; Beran et al. 1983; Burnham 1963; Crowningshield 1957; Dharmaratne 1999; Fernandes 1993; Fleet and Arima 1985; Fryer 1981d, 1987b; Fyfe 1967; Gamini Zoysa 1985; Gübelin et al. 1986; Hanson 1956; Hayashi and Manaka 1994; Karanth et al. 1999; Kempe 1967; Koivula and Fritsch 1993d, 1994b; Mernagh and Liu 1991; Milisenda and Henn 2006; Pinet et al. 1992; Randriamanga 1994; Rossman et al. 1982; Saini et al. 1995; Scarratt 1986a, b; Spencer 1920; Yan et al. 1995; Zoysa 1995; Zwaan 1982	

Special attention: single crystal has easy cleavage

6.1.76. Sodalite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Dichroscope	
Spectroscope	
Long-wave UV fluorescence	
Raman spectroscopy	

References

Anonymous 1824; Balassone et al. 2012; Ballentyne and Bye 1970; Ballirano et al. 1991; Bank 1974b; Brandstatter et al. 1997; Brousse et al. 1969; Brown 1998; Cano et al. 2010; Cassedanne and Cassedanne 1980; Denisov et al. 1977; Denks et al. 1974; Depmeier 2005; Field 1948; Fijal and Tokarz 1981; Frazier and Frazier 1997b; Friis 2011; Fryer 1990c; Hassan and Grundy 1984; Henn and Bank 1990b; Henn et al. 1994b; Hyrsi and Petrov 1999; Kirk 1955; Koivula and Kammerling 1989b, e; Koivula et al. 1992a; Kondo and Beaton 2009; Liddicoat 1974; Liu 1982, 1991; Naqvi et al. 1991; Paulin 1979; Peterson 1983; Petrov 2009; Pinet et al. 1992; Pizani et al. 1985; Webster 1958; Weerth and Hammer 2000; Wight 1993, 1996; Zilio and Bagnato 1984

Special attention: dye

6.1.77. Spheue (Titanite)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
FTIR(-NIR) spectroscopy	
Raman spectroscopy	If other tests are inconclusive
References	
Aleksandrov and Troneva (2007), Angel et al. (1999), Beirau et al. (2010), Bernau and Franz (1987), Bismayer et al. (1992, 1999), Blasse et al. (1988), Carswell et al. (1996), Cherniak (1993, 1995, 2006, 2010), Cherniak and Watson (2011), Chrosch et al. (1997, 1998), Crowe et al. (1986), Enami et al. (1993), Enkelmann et al. (2005), Farges (1997), Fliegel et al. (2010), Frost et al. (2001), Gaft et al. (2003), Ghose et al. (1991), Green and Pearson (1986), Hawthorne et al. (1991), Hayden et al. (2008), Hayward et al. (2000), Heyns et al. (2000), Holenyi and Annersten (1987), House et al. (2000), Hughes et al. (1997), Kek et al. (1997), Kennedy et al. (2010), Knoche et al. (1998), Kunz et al. (1996, 2000), Liferovich and Mitchell (2005a,b, 2006a,b), Lucassen et al. (2010), Lumpkin et al. (1991), Lussier et al. (2009), Malcherek et al. (1999, 2001), Marks et al. (2008), Mazdab (2009), Meyer et al. (1996, 1998), Morishita et al. (1996), Mukhopadhyay et al. (1992), Oberti et al. (1991), Pan et al. (1993), Paterson and Stephens (1992), Paulmann et al. (2000), Perseil and Smith (1995), Pezzotta (2005), Piuzeana et al. (2008), Prowatke and Klemme (2005, 2006), Reiners and Farley (1999), Robinson and Wight (1997), Russell et al. (1994), Salje et al. (1993, 2000, 2011), Seifert (2005), Simonetti et al. (2006), Steiner (2010), Storey et al. (2006), Tanaka et al. (1988), Tiepolo et al. (2002), Tilley and Eggleton (2005), Troitzsch et al. (1999), Tropper and Manning (2008), Vance and Metson (1985), Van Heurck et al. (1991), Vassilikou-Dova and Lehmann (1988), Willigers et al. (2002), Xirouchakis et al. (1997), Xirouchakis and Lindsley (1998), Zhang et al. (1995, 2000, 2002, 2003, 2006)	

6.1.78. Spinel

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Star, colour change
Refractometer (refractive index)	
Polariscope	
Spectroscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
UV-Visible(-NIR) spectroscopy	
Raman/PL spectroscopy	

References

Andreozzi (1999), Andreozzi et al. (2000, 2001), Andreozzi and Princivalle (2002), Arai (1992), Barnes and Roeder (2001), Belykh et al. (2005), Blauwet (2006), Bodinier et al. (1996), Bouchard and Gambardella (2010), Brigida et al. (2007), Bromiley et al. (2010), Carbonin et al. (1996), Chopelas and Hofmeister (1991), Cynn et al. (1992), Czaja (2001), Czaja and Mazurak (1993), Daneu et al. (2007), Dekkers and Woensdregt (2002), Della Giusta et al. (1986), Deren et al. (1996), Dezsai et al. (2000), Finger et al. (1986), Foley et al. (2001), Fregola et al. (2005), Fregola and Scandale (2007), Fregola et al. (2000), Garcia-Lastra et al. (2008), Gobbi et al. (1985), Gritsyna et al. (2004), Hålenius et al. (2010), Harder (1986), Harding and Wall (1987), Harrison et al. (1999), Hlaing (1989), Jouini et al. (2006), Kamenetsky et al. (2001), Kamperman et al. (1996), Kashii et al. (1999), Kumaratilake (1998), King (2004), Krokhin et al. (1998), Kurazhkovskaya et al. (2000), Larsson (1995), Lavina et al. (2002, 2003), Lavrentiev et al. (2003), Lee (1999), Lenaz et al. (2008), Libowitzky (1994), Liermann and Ganguly (2002), Lucchesi and Della Giusta (1994), Lucchesi et al. (1997, 1998), Maekawa et al. (1997), Malsy and Klemm (2010), Martignago et al. (2003), Millard et al. (1992), Muhlmeister et al. (1993), Nakatsuka et al. (2004), Notari and Grobon (2003), Paktunc and Cbri (1995), Palin and Harrison (2007), Princivalle et al. (2006), Richter et al. (2006), Rinaudo and Trossarelli (1997), Rubie and Ross (1994), Sack and Ghiorso (1991), Salviolo et al. (1999), Schmetzer et al. (1989), Shannon and Rossman (1991), Sickafus et al. (1999), Slotznick and Shim (2008), Spry (1987), Strek et al. (1988), Sutherland and Coenraads (1996), Talanov (1986), Taran et al. (2005, 2009), Thy (1995), Uchida et al. (2005), Vilissov et al. (2002), Wang et al. (2006), Warren et al. (2000), Watson and Price (2002), Wdowik et al. (2006), Wyon and Aubert (1986),

Special attention: synthetics, heat-treatment

6.1.79. Spinel (cobalt)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Chelsea Colour Filter	
Polariscope	
Spectroscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
UV-Visible(-NIR) spectroscopy	
LA-ICP-MS Chemistry	
References	
Dharmaratne (1993), Fryer (1982, 1986, 1990, 1991), Guo et al. (1994), Ivchinova and Zhelyazkova-Panaitova (1969), Koivula and Fritsch (1994), Koivula and Kammerling (1990), Mitchell (1976), Shannon (1923), Shigley and Stockton (1984)	

Special attention: synthetics

6.1.80. Spodumene

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
References	

Anderson and McCarron (2011), Bartkowska et al. (1998), Bobos et al. (2007), Camara et al. (2003), Chandrasekhar and White (1992), Charoy et al. (1992, 2001), Cook (1997), De Lima et al. (2008, 2009), Diego-Gatta et al. (2005), Filip et al. (2006), Gaité et al. (1985), Gód (1989), Gordiyenko et al. (1988), Isotani et al. (2007), Ito and Isotani (1991), Karfunkel et al. (2002), Khomenko and Platonov (1985), Kuznetsova (2009), Kuznetsova and Prokofev (2009), Lagache and Sebastian (1991), Lipatov et al. (2007), London and Burt (1982), Makagon (2009), Mauthner (2011a,b), Natkaniec-Nowak (2007), Nunes and Gomes (1994), Pimeta-Romeiro and Pedrosa-Soares (2005), Pommier et al. (2003), Prencipe et al. (2003), Salis (1995), Singhe and Gilkes (1993), Skogby et al. (1990), Souza et al. (2007, 2009), Tacker (2010), Tribaudino et al. (2003), Walker et al. (1997), Weselucha-Birczynska et al. (2011), Wise (2009), Wise and Anderson (2006), Wood and Williams-Jones (1993)

Special attention: easy cleavage, irradiation: blue-green will fade

6.1.81. Sugilite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Spectroscope	
Raman spectroscopy	
<i>References</i>	
Armbruster and Oberhänsli 1988; Boardman 1964; Chikayama 1981; Clark et al. 1980; de Villiers 1983; Dillon 1981b; Dixon 1985; Dunn et al. 1980; Fritsch and Shigley 1994; Fryer 1981e, 1982e; Henn 1986b; Kammerling and Koivula 1990; Kawachi et al. 1994; Kleyenstuber 1996; Koivula and Fritsch 1995b; Koivula and Kammerling 1990a, 1992a; Moore et al. 2011; Moses et al. 1998b; Murakami et al. 1976; Olivier et al. 1983; Ponalho 1991; Shigley et al. 1987; Taggart et al. 1994; Wilson and Dunn 1978a; Zeitner 1982	

6.1.82. Taaffeite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Polariscope	
Raman spectroscopy	
<i>References</i>	
Abduriyim et al. 2008; Anderson 1952b, 1967, 1968; Anderson et al. 1951; Anderson et al. 1952; Bank and Henn 1989a; Crowningshield 1974a; Demartin et al. 2004; Demartin et al. 1993; Dillon 1983; Fernando et al. 2005; Fernando and Hofmeister 2000; Fryer 1982f, 1987b, 1988b; Gübelin 1981c; Gunawardene 1984c; Hudson et al. 1967; Jayakody 1983; Johnson and Koivula 1996; Kampf 1991; Kiefert and Schmetzer 1998; Koivula 1986d; Koivula and Kammerling 1991b; Koivula et al. 1992d; Liddicoat 1967a; Moses et al. 1999a; Ponalho 1993; Scarratt 1986c; Schmetzer et al. 1999; Schmetzer et al. 2000; Schmetzer et al. 2006; Schmetzer et al. 2005; Schmetzer et al. 2007; Zoysa 1995	

Special attention: Taaffeite is a synonym of Magnesiotaafeite-2N'2S, Musgravite is a synonym of Magnesiotaafeite- 6N'3S.

6.1.83. Tektite

<i>Required Test method</i>	<i>Remark</i>
Microscope	

Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
FTIR(-NIR) spectroscopy	
Raman spectroscopy	If other tests are inconclusive
<i>References</i>	
Albin 1997; Aramu et al. 1994; Artemieva et al. 2002; Baker 1940, 1960, 1961, 1962; Banerjee and Hager 1993; Bentor 1986; Blum and Chamberlain 1992; Bouska 1997; Cohen 1958; de Goutiere 1995; Delano et al. 1986; Delano et al. 1992; Dunlap 1997; Dunlap et al. 1998; Dunlap and Sibley 2004; Faulques et al. 2001; Fenner 1939; Fudali et al. 1987; Futrell 1999a; Futrell 1999b; Ganapathy and Larimer 1984; Giuli et al. 2010; Heide et al. 2001; Jacobs 1997; Kim and Kim 2006; Kinnunen 1990; Koeberl 1990, 1992, 1994; Koivula et al. 1995d; Lee et al. 2004; Neuville et al. 2010; Pinter 1999; Rauch et al. 1992; Reban 1984; Taylor 1962, 1973; Volovetsky et al. 2008; Vrana 1988; Wasson 1991; Zook 1974	

6.1.84. Thomsonite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
<i>References</i>	
Almquist 1987; Anderson 1978; Wise 1978	

*Special attention: characteristic appearance***6.1.85. Topaz**

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Dichroscope	
<i>References</i>	
Abbott (1990), Albuquerque et al. (1988), Beny and Periou (1987), Cairncross (2005), Cassedanne (1989), Christiansen et al. (1986), da Costa et al. (2000), Dantas et al. (2006), da Silva et al. (2005), Dewonck et al. (1998), Diego-Gatta et al. (2006), Frazier and Frazier (1990), Frindt et al. (2004), Gabasch et al. (2008), Gaft et al. (2003), Gübelin et al. (1986), Haapala et al. (2007), Hervig et al. (1987), Holzhey (1997), Jackson et al. (2002), Jackson and Valerio (2004), Jones (2006), Komatsu et al. (2003), Krambrock et al. (2007), Leal et al. (2007), Leithner (2008), Leroy et al. (2002), Lyckberg et al. (2009), Marques et al. (2000, 2002), Mizuno et al. (2006), Morteani et al. (2002), Morteani and Voropaev (2007), Nassau (1985), Northrup and Reeder (1994, 1995), Pinheiro et al. (2002), Raines (2001), Rohn (2005), Rojas et al. (2009), Sabioni et al. (2003), Sauer et al. (1996), Schmetzer (1987, 2008), Schott et al. (2003), Shinoda and Aikawa (1994), Song and Yuan (2009), Souza et al. (1995, 2002, 2004, 2006), Spengler (1985), Struth et al. (1999), Taran et al. (2003), Tarashchan et al. (2006), Taylor and Fallick (1997), Watenphul et al. (2010), Watenphul and Wunder (2010), Wise (1995), Wunder et al. (1999), Yukihiro et al. (1996, 2002), Yukihiro and Okuno (1998)	

Special attention: coatings, irradiation and heat treatment

6.1.86. Tourmaline

<i>Required Test method</i>	<i>Remark</i>
Microscope	Fracture filling
Phenomena	Cat's-eye, colour change
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Dichroscope	
Spectroscope	
UV-Visible(-NIR) spectroscopy	
EDXRF chemistry	For Paraiba
Colour call	
References	
Abduriyim et al. (2006), Akizuki et al. (2001), Andreozzi et al. (2008), Arif et al. (2010), Aurisicchio et al. (1999), Babinska et al. (2008), Balen and Broska (2011), Benard et al. (1985), Benesch and Wöhrmann (1985), Beurlen et al. (2011), Bilal et al. (1998), Bloodaxe et al. (1999), Bosi (2008, 2010, 2011), Bosi et al. (2004, 2005), Bosi and Lucchesi (2004, 2007), Bueno de Camargo and Isotani (1988), Buettner (2005), Burns et al. (1994), Camara et al. (2002), Cassedanne and Roditi (1996), Castaneda et al. (2000, 2006), Choi and Hawthorne (2002), Clark (2007), Clark et al. (2008), de Oliveira et al. (2002), Dias and Wilson (2000), Dietrich (1985), Dirlam et al. (2002), Ertl (2008), Ertl et al. (2006), Ertl et al. (2003, 2007, 2008, 2010), Federico et al. (1998), Fisher (2011), Fisher et al. (1998), Foit (1989), Foord et al. (1989), Foord et al. (1986), Francis (1985), Fritsch et al. (1990), Furuya (2007), Gasharova et al. (1997), Gonzalez-Carreno et al. (1988), Grice and Ercit (1993), Hawkins et al. (1995), Hawthorne (1996), Hawthorne and Henry (1999), Hawthorne et al. (1993), Henn and Bank (1990), Henry and Dutrow (1990, 1992, 2011), Henry and Guidotti (1985), Henry et al. (2008, 2011), Hughes et al. (2001), Jiang (1998), Jiang and Palmer (1998), Jolliff et al. (1986), Johnson et al. (1997), Jones (2005), Karfunkel and Wegner (1996), Kihara et al. (2007), King (2000), King et al. (1988), Kraczka et al. (1986), Krambrock et al. (2002, 2004, 2009), Laurs et al. (2007, 2008, 2009), London (1986, 2011), Ludwig et al. (2011), Lussier et al. (2008, 2009, 2011), Lussier and Hawthorne (2011), Lyckberg (2011), MacDonald and Hawthorne (1995), Maloney et al. (2008), Marschall et al. (2009), Mashkovtsev et al. (2006), Mattson and Rossman (1987), Milisenda (2005), Milisenda and Henn (2001), Milisenda et al. (2000, 2006), Novak and Povondra (1995), Ottolini and Hawthorne (1999), Peretyazhko et al. (2004), Perugini and Poli (2007), Pesquera et al. (2008), Pieczka (1999, 2000), Pough (1987), Povondra and Novak (1986), Proctor (1985a,b), Reinitz and Rossman (1988), Rosenberg and Foit (1985), Rosenberg et al. (1986), Rossman et al. (1991), Rossman and Mattson (1986), Schmetzer and Bank (1985), Schmetzer et al. (2007), Selway et al. (1998), Setkova et al. (2009, 2010), Shabaga et al. (2010), Shigley et al. (2001), Shtukenberg et al. (2007), Simmons et al. (2001, 2005, 2011), Simonet (2000), Soares et al. (2008), Taran et al. (1993, 1998), Trumbull et al. (2008, 2009), van Hinsberg (2011), van Hinsberg and Marschall (2007), van Hinsberg et al. (2011), Van Hinsberg and Schumacher (2007, 2009), von Goerne and Franz (2000), von Goerne et al. (1999, 2001, 2011), Vorbach (1989), Wilson (1989, 2002, 2007), Zagoroski et al. (1989), Zagorsky (2010), Zagorsky and Peretyazhko (1996), Zolotarev et al. (2007), Zwaan (2015c)	

6.1.87. Tugtupite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Long-wave UV fluorescence	
Short-wave UV fluorescence	
PL spectroscopy	

References

Antao et al. 2004; Armstrong and Weller 2006; Chikayama 1981; Danø 1966; Dragsted 1970; Gaft et al. 2009; Jensen and Petersen 1982; Mitchell 1996; Newsome 1976; Petersen 1978; Petersen and Secher 1993; Povarennykh et al. 1971; Sorensen et al. 1971; Tunzi and Pearson 2008; Werner and Plech 1995; Xu and Sherriff 1994

6.1.88. Turquoise

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
FTIR(-NIR) spectroscopy	
EDXRF chemistry	Zachery treatment
Raman spectroscopy	If other tests are inconclusive
References	
Crespo-Feo et al. (2010), Dill and Henn (2005), Foord and Taggart (1998), Frazier and Frazier (1999), Fritsch et al. (1999), Frost et al. (2006), Henn and Milisenda (2005), Hull et al. (2008), Jones (2000, 2005), King (2002), Kolitsch and Giester (2000), Mathien (2001), Mirnejad et al. (2010), Pavese et al. (2005), Qi et al. (1998), Reddy et al. (2006), Sharma et al. (1988), Sklavounos et al. (1992), Taki and Hosaka (1988), Taniguchi et al. (2002), Voynick (1999), Yang et al. (2003), Zeitner (1990)	

Special attention: impregnation, dye, composites, imitation matrix, synthetics

6.1.89. Ulexite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	
References	
Crowningshield 1957; Garlick and Kamb 1991; Ghose 1978; Sinkankas 1955	

Special attention: very soft

6.1.90. Variscite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Spectroscope	
FTIR(-NIR) spectroscopy	
Raman spectroscopy	If other tests are inconclusive
References	

Arribas et al. 1970; Barwood 1997; Brown 1990b; Calas et al. 2005; Camprubi et al. 2003; Crowningshield 1960a; Dill et al. 1991; Elton 1996; Garcia-Guinea et al. 2008; Koivula 1986b; Larsen 1942; Liddicoat 1975c; Mertens 1988; Murray 1968; Nickel et al. 2008; Novak 1982; Odriozola et al. 2010; Pepperberg 1911; Pinet et al. 1992; Querre et al. 2008; Schaller 1912; Smith-Gharet 1999; Willing et al. 2008; Wilson 2010; Zeitner 1987

6.1.91. Zircon

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Phenomena	Cat's-eye
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Polariscope	
Spectroscope	
References	
Akhtar and Waseem (2001), Aines and Rossman (1986), Amelin (2004), Balan et al. (2001), Belousova et al. (1998, 2002), Biagini et al. (1997), Black et al. (2003, 2004), Capitani et al. (2000), Caruba et al. (1985), Chakoumakos et al. (1987, 1991), Chang et al. (2006), Chen et al. (2011), Cherniak et al. (1997), Cherniak and Watson (2003), Claoué-Long et al. (1991), Colombo et al. (1999), Cook (2007), Corfu et al. (2003), Crocombette (1999), Crocombette and Ghaleb (1998, 2001), Ellsworth et al. (1994), Evans et al. (2005), Ewing et al. (1988), Ewing et al. (2003), Farges (1994), Farges and Calas (1991), Farnan and Salje (2001), Faulkner and Shigley (1989), Fedo et al. (2003), Fedotova et al. (2008), Feng et al. (1993), Ferry and Watson (2007), Finch and Hanchar (2003), Finch et al. (2001), Fowler et al. (2002), Friis et al. (2010), Gaft et al. (2000, 2002), Gagnevin et al. (2009), Geisler (2002), Geisler et al. (2001, 2002, 2003, 2007), Gerdes and Zeh (2009), Grimes et al. (2007), Halden and Hawthorne (1993), Hanchar et al. (2001), Hanchar and Miller (1993), Hanchar and Rudnick (1995), Hanchar and Watson (2003), Hänni and Weibel (1988), Harley and Kelly (2007), Harley et al. (2007), Hinton and Upton (1991), Hirata and Nesbitt (1995), Hoskin (2000), Hoskin and Ireland (2000), Hoskin and Schaltegger (2003), Iizuka and Hirata (2005), Ireland and Williams (2003), Ireland and Wlotzka (1992), Jackson et al. (2004), Jain et al. (2001), King (2008), Kinny and Meyer (1994), Kolesov et al. (2001), Koschek (1993), Kosler and Sylvester (2003), Lee and Tromp (1995), Makishima and Nakamura (1994), Marks et al. (2008), Mattinson (2005), McLaren et al. (1994), Meldrum et al. (1998, 1999), Menneken et al. (2007), Mezger and Krogstad (1997), Murukami et al. (1986, 1991), Mursic et al. (1992), Nasdala et al. (1995, 1996, 2001, 2005, 2008), Page et al. (2007), Palenik et al. (2003), Payette and Pearson (2011), Pidgeon (1992), Radlinski et al. (2003), Rahn et al. (2004), Reiners (2005), Rignanes et al. (2001), Rimsa et al. (2007), Rios et al. (2000), Rubatto (2002), Rubatto and Hermann (2007), Rupasinghe (1985), Rupasinghe and Senaratne (1986, 1996), Salje et al. (1999), Schärer et al. (2011), Scheepers et al. (1999), Scherer et al. (2007), Simonetti et al. (2005, 2006), Sinha et al. (1992), Siyanbola et al. (2005), Slama et al. (2008), Stern and Amelin (2003), Sturm (1999), Tanner et al. (2004), Tennant et al. (2004), Tiepolo (2003), Tiepolo et al. (2003), Trachenko et al. (2002), Trocellier and Delmas (2001), Valley (2003), Valley et al. (1994, 1998, 2005), Vavra (1990), Wang et al. (1991), Wang and Ewing (1992), Watson and Cherniak (1997), Watson et al. (1997, 2006), Watson and Harrison (2005), Wayne and Sinha (1988), Weber (1990), Weber et al. (1994), Wiedenbeck et al. (2007), Woodhead et al. (2004), Woodhead et al. (1991), Wu and Zheng (2004), Yada et al. (1987), Yuan et al. (2004), Zhang and Salje (2001, 2003), Zhang et al. (2000, 2004)	

Special attention: heat treatment

6.1.92. Zoisite

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Dichroscope	
Polariscope	
EDXRF chemistry	Cobalt coating

References

Alemany et al. (2000), Armbruster et al. (2006), Barot and Boehm (1992), Blauer (1996), Comodi and Zanazzi (1997), Czaja et al. (1995), Dörsam et al. (2007), Feineman et al. (2007), Franz and Selverstone (1992), Gottschalk (2004), Grevel et al. (2000), Javier-Ccallata et al. (2011), Jenkins et al. (1985), Koziarska et al. (1994), Langer et al. (2002), Liebscher et al. (2002), Liu et al. (1995), Malisa (2003a,b, 2005), Malisa and Kinabo (2005), McClure and Shen (2008), Muhongo et al. (1999), Notari et al. (2001), Pardieu et al. (2009), Pearson (2008), Poli and Schmidt (1998), Reddy et al. (2011), Schroeder (2010), Smith et al. (1987), Srinivasulu et al. (1992), Wilson et al. (2009), Winkler et al. (1989)

Special attention: heat treatment, clarity enhancement, coating

6.2. Test methods pearls and organic gem materials

6.2.1. Amber

<i>Required Test method</i>	<i>Remark</i>
Microscope	Acetone reaction, thermal reaction test
Polariscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
FTIR(-NIR) spectroscopy	
References	
Alexandrowicz and Kwiecinska (1977), Anderson (2001, 2006), Anderson and Bray (2006), Anderson and Muntean (2000), Angelini and Bellintani (2005), Azar (2007), Beck et al. (1965), Beck (1982b), Beck et al. (1964), Benson (1961a), Brodzinsky (1985), Brouwer and Brouwer (1980), Brown (1982, 1996a), Brown and Lund (1979), Brown and Snow (1988), Bubshait and Sturman (1993a,b,1996), Cario (1989), Costa (2007), Cox (1953), Crowningshield (1964b, 1977a), Delclos et al. (2007), Dierick et al. (2007), Faibisovich and Bordovskaya (1996), Farrington (1923), Feist et al. (2007), Field (1947), Francis (1988), Fraquet (1982, 1989), Fryer (1983, 1985, 1986, 1987a,b, 1988, 1991, 1993a,b), Grimaldi et al. (1994), Gübelin (1978), Gübelin and Koivula (1986), Helm (1892, 1893, 1894), Hernandez (1980), Hillmer (1999), Hlaing (1999), Hollick (1905), Johnson and Koivula (1997a,b), Kennedy (2002), Koivula and Fritsch (1993a,b,c), Koivula and Kammerling (1992a), Koivula et al. (1992b,c, 1993d, 1995a,b), Kosmowska (1990), Langenheim and Beck (1965), Liddicoat (1970), Liebert (1996), Mills et al. (1984), Mukerjee (1997), Pedersen (2008), Peng and Zhu (2006), Poinar et al. (1999), Poirot (1992), Ragazzi et al. (2003), Rice (1979, 1981b), Safar and Sturman (1998), Scarratt (1986a,b, 1989a,b,c,d), Webster (1951)	

Special attention: clarity enhanced, dyed, heated (with pressure), pressed, reconstructed (encased in plastics), faked insects, recent resins

6.2.2. Bone

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
References	
Arnould and Poirot (1975), Brown and Lund (1979), Cognet et al. (2003), Lesh (1980), Mann and Brown (2008), Pewkliang et al. (2008), Scarratt (1992), Webster (1948)	

Special attention: dye, impregnation

6.2.3. Copal

<i>Required Test method</i>	<i>Remark</i>
Microscope	Acetone reaction, thermal reaction test
Polariscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
FTIR(-NIR) spectroscopy	
References	
Clery (2002), Winkler et al. (2001)	

6.2.4. Coral

<i>Required Test method</i>	<i>Remark</i>
Microscope	Thermal reaction test
Refractometer (refractive index)	If possible
Hydrostatic weighing (specific gravity)	
FTIR(-NIR) spectroscopy	If other tests are inconclusive
Raman spectroscopy	If other tests are inconclusive
References	
Akagi et al. 2004; Alamaru et al. 2009; Aliprandi et al. 1983; Allison 1996; Anderson, 2008; Bayer 1996; Beger et al. 2003; Benson 1959; Bocchio et al. 2006; Böhm et al. 2006; Bramanti et al. 2005; Brown 1977, 1978, 1979, 1985; Brown 1996; Brown and Lund 1979; Bubshait and Sturman 1993; Calcinai et al. 2002; Cicogna and Cattaneo-Vietti, 1993; Cohen and McConaughy 2003; Connell et al. 1997; Crowningshield 1960a, 1975a; de Villiers et al. 1994; Dele-Dubois et al. 1981; Deng et al. 2010; Douglas 2003; Emms 1997; Fritsch and Karamelas 2008a, b; Fryer 1981a, 1984a, 1990a; Gao and Zhang 2002; Gauthier and Karamelas 2009; Greigor et al. 1997; Grigg 1993, 2001, 2004; Grigg and Brown 1991; Grottoli and Eakin 2007; Hakomori and Seto 1951; Henn 2006; Johnson and Koivula 1998a; Karamelas et al. 2009; Kiefert et al. 2000; Koivula and Kammerling 1990a; Leverette et al. 2008; Liddicoat 1974a; Linares et al. (2010); Love et al. 2007; MacFall 1974; Merlin and Dele-Dubois 1986; Nassau 1979a, b; Opresko 1996; Peres and Picard (1964), Pienaar 1981; Roger 1991; Rolandi et al. 2005; Santangelo et al. (1993), Scarratt 1984a, d; Scarratt 1996; Shirai et al. 2008; Sholkovitz and Shen 1995; Sinkankas 1996; Smith et al. 2007; Taki and Hosaka 1988; Torrents et al. 2005; Ugalde et al. 2004; Webster 1954, 1958a, 1973; Wei and Qiu 2004; Weldon 1996	

6.2.5. Horn

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Raman spectroscopy	If other tests are inconclusive
References	
Brown (1976), Liddicoat (1970), Webster (1973)	

Special attention: dye, imitations

6.2.6. Ivory – elephant, mammoth/mastodon, hippopotamus, walrus, narwhal

<i>Required Test method</i>	<i>Remark</i>
Microscope	Growth structures
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Long-wave UV fluorescence	
Raman spectroscopy	
X-Ray CT scan	In some cases to view growth structures
<i>References</i>	
Boone (1986), Brown (1978, 1990, 1996), Brown and Lund (1979), Brown and Mann (2007), Brown and Moule (1982), Carra (1970), Crowningshield (1970a,b, 1979), Cuadra (1994), Edwards et al. (1996), Fryer (1981, 1988, 1997), Kunz (1916), Lee (1991), Lesh (1980), Liddicoat (1969a,b), Scarratt (1992), Strack (1975), Webster (1948, 1973)	

Special attention: dye, imitations, CITES issues.

6.2.7. Ivory - vegetable

<i>Required Test method</i>	<i>Remark</i>
Microscope	Growth structures
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
<i>References</i>	
Brown (1996), Scarratt (1992), Webster (1949)	

6.2.8. Pearl (*Abalone Species*)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	
<i>References</i>	
(Aboosally 1998; Anonymous 2000; Bostwick 1938; Brown 1994, 2006; Cropp 1997; Crowningshield 1961a, 1965; Day et al. 2000; Edwards 1913; Fankboner 1991; Fankboner 1995, 2001, 2002; Fryer 1984a, 1993, 1996c, d; Johnson and Koivula 1996a; Kammerling and Fryer 1994; Kelly and Brown 2003; Landman et al. (2001), Li and Zhang 2001; Liu et al. (2002), Luckow 1989; Miyashita and Takagi 2011; Strack (2006), Verma et al. 2006; Wentzell 1998, 2004; Yao et al. 2006; Zaremba et al. 1996)	

Special attention: blister versus cyst, damage by acids

6.2.9. Pearl (*Cassis species*)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	
<i>References</i>	
Landman et al. (2001), Strack (2006)	

Special attention: possible similarity with Melo pearls and other orange porcellaneous pearls, damage by acids, shell imitations

6.2.10. Pearl (*Lobatus gigas*/ *Strombus gigas* – Conch)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	
<i>References</i>	
Anonymous (1977), Acosta-Salmon and Davis 2007; Davis et al. 1986; Farn (1977, 1979a,b, 1986), Fritsch and Misiorowski (1987), Kamat et al. (2000), Komatsu et al. 1993; Kornitzer (1937), Landman et al. (2001), Mikkelsen (2003), Moses (2001), Sciaguato (2004), Stoner and Ray 1996; Strack (2006)	

Special attention: X-ray discolouration to pink samples, possible similarity to other porcellaneous pearls when not the usual pink colour (i.e., white, orange to purplish), damage by acids, shell imitations

6.2.11. Pearl (*Hyriopsis cummingi* and other freshwater mussels)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	Off-white (stronger than light tones) samples only
EDXRF chemistry	
Raman spectroscopy	
LA-ICP-MS chemistry	If EDXRF is inconclusive
X-Ray CT scan	Difficult cases
<i>References</i>	
Akamatsu et al. (2001), Anonymous (2005a,b), Bai et al. 2012; Farn (1986), Hänni (2000), Howells (2005), Izumida et al. 2011; Jobbins et al. (1993), Karampelas et al. 2007; Landman et al. (2001), Mikkelsen (2003), Scarratt et al. (2000), Sweeny and Latendresse (1982), Strack (2006); Wen et al. 2007; Zhang et al. 2002	

Special attention: natural versus non-beaded cultured, blister versus cyst, bleaching, irradiation, dyes, Maeshori treatment, damage by acids.

6.2.12. Pearl (Imitation)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
Raman spectroscopy	If other tests are inconclusive
References	
Bubshait and Sturman 1996; Farn 1976, 1978, 1979, 1986; Fryer 1984c, d, e, 1986b; Hänni 1996; Johnson and Koivula 1997c, 1999; Kammerling and Fryer 1995a; Kennedy et al. 1988; Koivula et al. 1992a; Mayerson 2001; Poirot 1987; Pough 1965; Scarratt 1984e, 1985b, 1986a, 1992c; Strack (2006), Tan et al. 2005; Webster 1958b, 1966, 1973; Wentzell 2004b	

Special attention: mixed into items with nacreous samples. When applying microradiography, some solid plastic imitations may appear similar to nacreous pearls with a tight structure.

6.2.13. Pearl (*Lambis* species)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	
References	
Landman et al. (2001), Strack (2006)	

Special attention: possible similarity to other brownish or near-white porcelaneous pearls, damage by acids.

6.2.14. Pearl (*Melo* species)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	
References	
Landman et al. (2001), Poppe (1992), Scarratt 1992d, 1994b; Sciaguato 2004; Strack (2006); Traub 1997; Traub et al. 1999	

Special attention: X-ray discolouration to orange samples, possible similarity to other orange porcellaneous pearls, damage by acids, check for shaped examples, shell imitations

6.2.15. Pearl (*Mercenaria mercenaria*)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	

References

Hill (2004), Landman et al. (2001), Strack (2006)

Special attention: possible similarity to other purplish or even white non-nacreous pearls, damage by acids.

6.2.16. Pearl (*Mytilus* species)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	
References	
Caceres-Martinez and Vasquez-Yeomans 1999; Landman et al. (2001), Narasimhulu and Rao 2000; Strack (2006); Vander Putten et al. 2000; Wentzell and Elen 2004	

Special attention: possible similarity to other dark hued or purplish nacreous pearls, damage by acids.

6.2.17. Pearl (*Pinctada fucata*)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	Off-white pearls only
EDXRF chemistry	
Raman spectroscopy	
References	
Farn (1986), Hänni (2006), Hurwit (2001), Landman et al. (2001), Mikkelsen (2003), Shirai (1994), Shouguo and Lingyum (2001), Strack (2006), Traub et al. (1999), Walker and Mayerson (2001)	

Special attention: possible similarity to other nacreous pearls, blister versus cyst, coatings, irradiated bead nuclei in bead cultured pearls, damage by acids.

6.2.18. Pearl (*Pinctada margaritifera*)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
EDXRF chemistry	
Raman spectroscopy	
References	
Ellis and Haws 1999; Farn (1986), Hänni (2006), Hodgkinson 2002; Iwahashi and Akamatsu 1994; Karampelas et al. 2011; Landman et al. (2001), Liu et al. 1999; Mikkelsen (2003), Miyoshi et al. 1987; Pouvreau and Prasil 2001; Rousseau and Rollion-Bard 2012, Sanchez (2004), Shirai (1994), Shouguo and Lingyum (2001), Strack (2006), Wentzel et al. (2000)	

Special attention: possible similarity to other nacreous pearls, blister versus cyst, dye, bleaching (“Chocolate pearls”), coatings, damage by acids.

6.2.19. Pearl (*Pinctada maxima*)

Required Test method	Remark
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	Off-white (stronger than light tones) samples only
EDXRF chemistry	
Raman spectroscopy	
LA-ICP-MS chemistry	If EDXRF is inconclusive
X-Ray CT scan	Difficult cases
References	
Elen (2001, 2002), Ellen and Wentzell (2003), Fam (1986), Hänni (2006), Landman et al. (2001), Mikkelsen (2003), Scarratt (1992, 2001), Scarratt et al. (2012), Shirai (1994), Shouguo and Lingyuan (2001), Strack (2006), Traub et al. (1999), Wentzel et al. (2000)	

Special attention: natural versus non-beaded cultured, possible similarity to other nacreous pearls, blister versus cyst, dye, bleaching, coatings, Maeshori treatment, damage by acids.

6.2.20. Pearl (*Pinctada mazatlanica*)

Required Test method	Remark
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
EDXRF chemistry	
Raman spectroscopy	
References	
Hurwit (2000), Landman et al. (2001), McLaurin (2002), Mikkelsen (2003), McLaurin and Arizmendi (2002), Strack (2006)	

Special attention: possible similarity to other nacreous pearls, blister versus cyst, dye, bleaching (“Chocolate pearls”), coatings, damage by acids.

6.2.21. Pearl (*Pinctada radiata*)

Required Test method	Remark
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	Off-white (stronger than light tones) samples only
EDXRF chemistry	
Raman spectroscopy	
X-Ray CT scan	Difficult cases

References

Farn (1986), Landman et al. (2001), Mikkelsen (2003), Shirai (1994), Shouguo and Lingyum (2001), Strack (2006), Traub et al. (1999)

Special attention: natural versus non-beaded cultured, possible similarity to other nacreous pearls, blister versus cyst, dye, bleaching, coatings, damage by acids.

6.2.22. Pearl (*Pinna* species [including *Atrina* species])

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
EDXRF chemistry	
Raman spectroscopy	
References	
Landman et al. (2001), Gauthier et al. (1997), Karampelas et al. (2009), Sturman (2014), Strack (2006), Wentzel and Elen (2005)	

Special attention: possible similarity to other dark hued nacreous and non-nacreous pearls, durability of heavily cracked samples, damage by acids.

6.2.23. Pearl (*Pleuropoca* species)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	
References	
Landman et al. (2001), Strack (2006)	

Special attention: possible similarity to other yellowish to brown porcellaneous pearls, damage by acids

6.2.24. Pearl (*Pteria* species)

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
EDXRF chemistry	
PL spectroscopy	Helps with mollusc identification in some cases
Raman spectroscopy	
References	

Hurwitt (2003), Landman et al. (2001), Mao et al. (2004), Strack (2006)

Special attention: natural versus non-beaded cultured, a-typical bead nuclei, possible similarity to other nacreous pearls, blister versus cyst, bleaching, dyes, coatings, damage by acids.

6.2.25. Pearl (*Scallop [pectinidae]* species)

Required Test method	Remark
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	
References	
Federman (2004), Landman et al. (2001), Moragat et al. (2001), Scarratt and Hänni (2004), Strack (2006), Wight (2004)	

Special attention: possible similarity to other white to lightly coloured non-nacreous/porcellaneous pearls, damage by acids.

6.2.26. Pearl (*Tridacna [clam]* species)

Required Test method	Remark
Microscope	
Microradiography	
UV-Visible(-NIR) spectroscopy	
Raman spectroscopy	
References	
Hardy (1947), Landman et al. (2001), Strack (2006)	

Special attention: possible similarity to other white to lightly coloured porcellaneous pearls, shell imitations, CITES, damage by acids

6.2.27. Shell

Required Test method	Remark
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
References	
Brown 1986, 1988, 1995; Chateigner et al. 2000; Compere and Bates 1973; Dauphin et al. 2008; Dauphin et al. 2005; Day et al. 2000; Farn 1979; Farre et al. 2007; Fitzpatrick and Boyle 2002; Giridhar and Srivatsa 1999; Hainschwang et al. 2010; Hardy 1959; Hedegaard et al. 2006; Hill and Carmichael 2004; Koivula and Kammerling 1989c, d, 1991b; Koivula et al. 1992a; Lee et al. 2008; Li and Zhang 2001; Li 2007; Lin et al. 2006; Liu et al. 2003a; Liu et al. 2002; Liu et al. 2003b; Liu et al. 1999; Markwitz et al. 2003; Mayerson 2001; Narasimhulu and Rao 2000; Parker 1989; Ren et al. 2009; Saucedo et al. 1998; Suzuki et al. 2011; Tagliamonte 1984; Webster (1966), Wye 1991; Yao et al. 2006	

Special attention: dye, lustre enhancement

6.2.28. Tortoise shell

<i>Required Test method</i>	<i>Remark</i>
Microscope	
Refractometer (refractive index)	
Hydrostatic weighing (specific gravity)	
Short-wave UV phosphorescence	
<i>References</i>	
Brown 1978, 1995b; Brown and Lund 1979; Hainschwang and Leggio 2006; Scarratt 1992a	

Special attention: structure, protein smell (hot point), plastic (common imitation)

6.3. Test methods definitions**6.3.1. Clarity enhancement check/extent**

Detection of filling of fissures and/or wide fractures and cavities with oils, resins, or any other filler, and an estimation of the extent of this treatment (e.g., none/ insignificant, minor, moderate, or significant).

6.3.2. Colour call

Precise colour description is required, for instance to make sure a colour-change is present, or to establish whether a sapphire may be called Padparadscha.

6.3.3. Chelsea colour filter

A filter that only transmits deep red and yellow-green light.

6.3.4. DiamondView

The DiamondView instrument illuminates a diamond with intense short-wave ultra-violet radiation and detects the surface fluorescence that is caused. Fluorescence and Phosphorescence images, showing clear growth patterns, are projected on a computer screen.

6.3.5. Dichroscope

An instrument that allows to detect whether a gemstone shows pleochroism and, if it does, to observe the pleochroic colours side by side, for easy comparison and description.

6.3.6. EDXRF chemistry

Energy-dispersive X-ray fluorescence is a technique whereby a sample is targeted by a high-energy X-ray beam, causing its chemical elements to fluoresce with a spectrum of lower-energy X-rays, each peak being characteristic of a chemical element. The relative concentrations of elements are indicated by the fluorescent X-ray peak intensities.

6.3.7. FTIR(-NIR) spectroscopy

Accurate measurement of absorption or transmission positions, and their relative intensities in the (near-)infrared range of the electromagnetic spectrum. The resulting spectra are measured and digitally recorded by a Fourier Transform Infrared spectrometer. “Fourier Transform” is a mathematical technique used to convert the spectrometer signal into a spectrum plotted as a function of energy. The measurements can be done in different modes, such as e.g., transmission, diffusion reflectance, or by using KBr pellets.

6.3.8. Hydrostatic weighing

The method used to measure the specific gravity (SG) of a gemstone. It is based on the principle of Archimedes, comparing the weight of an object in air (A) with the weight of that object in water (W). The SG can then be calculated:

$$SG = A/(A-W).$$

6.3.9. Immersion

A gemstone is immersed in a liquid with a similar refractive index to observe features that are otherwise not or less visible, for instance colour distribution or zoning.

6.3.10. LA-ICP-MS Chemistry

Laser Ablation Inductively Coupled Plasma Mass Spectrometry is an analytical technology that enables highly sensitive elemental and isotopic analysis to be performed directly on solid samples. LA-ICP-MS begins with a laser beam focused on the sample surface to generate fine particles – a process known as Laser Ablation. The ablated particles are then transported to the secondary excitation source of the ICP-MS instrument for digestion and ionisation of the sampled mass. The excited ions in the plasma torch are subsequently introduced to a mass spectrometer detector for both elemental and isotopic analysis. It is not entirely non-destructive, but can perform ultra-highly sensitive chemical analysis down to ppb (parts per billion) level.

6.3.11. Microradiography

The process of taking a photograph of an object by using X-rays, showing minute internal structure.

6.3.12. Microscope

A gemmological microscope is a stereo binocular microscope with good depth of vision and field of view, with generally magnification varying in between 10x and 80x. Research microscopes with much higher magnification power may be used as well in gemmological laboratories.

6.3.13. Phenomena

Detection of phenomena, such as colour-change of a gemstone, when viewed in different light conditions, play of colour, labradorescence, reflection of light by inclusions causing chatoyancy (Cat's-eye), asterism (Star), aventurescence, adularescence; inclusion patterns causing the trapiche effect, bloodshot effect.

6.3.14. PL spectroscopy

Detection of photoluminescence (light emission) of an object illuminated by a laser. Light emission occurs after the excitation by photons (electromagnetic radiation). Different lasers may be used, for example red (633 nm), green (514 and 532 nm), blue (488 nm) and UV (250 nm) lasers. For diamonds, PL is usually performed at low temperature (-196 °C)

6.3.15. Pleochroism

A property of doubly refractive coloured gemstones of absorbing light to an extent that depends on the vibration direction of the polarised light rays. The effect causes two different colours (*dichroism*) or three different colours (*trichroism*), depending on the type of gemstone. These different colours may be seen when viewing a gemstone from different directions under transmitted light.

6.3.16. Polariscope

A polariscope is an instrument with two polarising filters fitted one above the other in a fixed crossed position, meaning that the transmitted vibration direction of polarisation of the upper filter is at right angles to that of the lower filter. The filters are either fixed on an inbuilt light or placed on a separate light source.

6.3.17. Raman spectroscopy

Detection of an extremely slight shift of energy of the light or radiation scattered on the surface of an object illuminated by a laser. The resulting re-emitted spectrum, or Raman spectrum, is characteristic for different (solid or fluid) substances, and allows rapid identification, also if they are enclosed within another transparent substance. Different lasers may be used, for example near-infrared (780 nm), red (633 nm), green (514 and 532 nm), blue (488 nm) and UV (250 nm) lasers.

6.3.18. Refractometer

The gemmological refractometer is designed to measure the refractive index or indices of a gemstone. It makes use of total internal reflection of monochromatic light, going through an in-built special type of glass, which is in contact with a flat, polished surface of a gemstone.

6.3.19. Refractive index

A simple relationship between the light's angle of incidence and angle of refraction (the amount of bending), when it reaches and enters a gemstone. The slower the light's speed in a material, the greater the bending effect, thus the higher the refractive index. Depending on the structure of the material, light will remain as a single ray or be split into two rays; the effects are called "single refraction" (giving one refractive index), and "double refraction" (giving two refractive indices, with a minimum and maximum value).

6.3.20. Residue check/ extent

Detection of residue in healed fissures and/or filled cavities as a result of heat-treatment, and an estimation of the extent of this treatment (e.g., none/ insignificant, minor, moderate, or significant).

6.3.21. Spectroscope

A spectroscope is essentially a tube with a narrow slit at one end and a lens at the other, with in between an arrangement of optically connected prisms, or a diffraction grating, creating a spectrum - spectral colours of white light that enters the slit and are spread out by the prisms or grating and can be viewed through the lens.

6.3.22. Long-wave UV fluorescence

Emission of visible light by a substance when excited by long-wave ultraviolet radiation (principal wavelength of 365 nm), produced by a UV-lamp.

6.3.23. Long-wave UV phosphorescence

Continued emission of visible light by a substance after excited by long-wave ultraviolet radiation (principal wavelength of 365 nm), produced by a UV-lamp.

6.3.24. SEM-EDS

Scanning Electron Microscopy with Energy Dispersive X-Ray microanalysis is a technique, using an electron beam to scan the surface of an object. Scattered electron reflections are detected at very high magnification which are displayed as black-and-white images on a screen. Elemental analysis and mapping can be obtained, as the electrons also cause the object's chemical elements to emit a spectrum of X-rays, each peak being characteristic of a chemical element.

6.3.25. Short-wave UV fluorescence

Emission of visible light by a substance when excited by short-wave ultraviolet radiation (principal wavelength of 254 nm), produced by a UV-lamp.

6.3.26. Short-wave UV phosphorescence

Continued emission of visible light by a substance after excited by long-wave ultraviolet radiation (principal wavelength of 365 nm), produced by a UV-lamp.

6.3.27. Specific Gravity

The ratio of the weight of a substance to the weight of an equal volume of water.

6.3.28. UV-Visible(-NIR) spectroscopy

Accurate measurement of absorption or transmission positions, and their relative intensities in the UV, Visible light (and near-infrared) range of the electromagnetic spectrum. The resulting spectra are measured and digitally recorded by a UV-Visible(-NIR) spectrometer.

6.3.29. X-Ray CT scan

X-Ray computed tomography makes use of computer-processed combinations of many X-ray images taken from different angles around a single axis of rotation, to produce cross-sectional (tomographic) images (virtual “slices”) of specific areas of a scanned object, allowing the user to see inside the object without cutting. Digital geometry processing is used to generate a three-dimensional image of the inside of the object.

6.3.30. XRD

X-Ray Diffraction is a scattering of X-rays by the atoms of a crystal that produces an interference effect so that the diffraction pattern gives information on the structure of the crystal or the identity of a crystalline substance. One of two primary types of XRD analysis (X-ray powder diffraction and single-crystal XRD) is commonly applied.

6.4. Test methods references

- Abdukadyrova I.K. (2004) Spectroscopic study of a radiation-induced phase transition in quartz crystals. *Journal of Structural Chemistry*, 45, (2), 225-230.
- Abduriyim A., Kitawaki H., Furuya M. and Schwarz D. (2006) "Paraiba"-type copper-bearing tourmalines from Brazil, Nigeria, and Mozambique: Chemical fingerprinting by LA-ICP-MS. *Gems and Gemology*, 42, (1), 4-21.
- Abduriyim, A. and Kitawaki, H. (2008) New geological origin: Ruby from Winza of Tanzania. *Gemmology*, 4-7.
- Abduriyim, A., Kobayashi, T. and Fukuda, C. (2008) Identification of taaffeite and musgravite using a non-destructive single-crystal X-ray diffraction technique with an EDXRF instrument. *Journal of Gemmology* 31, 43-54.
- Abduriyim, A., Sutherland, F.L. and Coldham, T. (2012) Past, present and future of Australian gem corundum. *Australian Gemmologist* 24, 234-242.
- Abosally, S. (1998) Cultured abalone pearl production up. *Jewellery News Asia*, 62-63.
- Abosally, S. (1999) Update on production in Pakistan, Afghanistan. *Jewellery News Asia*, 60, 62-64.
- Abratis, P.K., Patrick, R.A.D. and Vaughan, D.J. (2004) Variations in the compositional, textural and electrical properties of natural pyrite: A review. *International Journal of Mineral Processing* 74, 41-59.
- Abs-Wurmbach, I., K. Langer and E. Tillmanns (1977), Structure and polarized absorption spectra of Mn³⁺-substituted andalusites (viridines), *Naturwissenschaften*, 64, 10, 527-528.
- Achard, J., Silva, F., Brinza, O., Tallaire, A. and Gicquel, A. (2007a) Coupled effect of nitrogen addition and surface temperature on the morphology and kinetics of thick CVD diamond single crystals, *Diamond and Related Materials*, 16, 4/7, 685-689.
- Achiwawanich, S., Brack, N., James, B.D. and Liesegang, J. (2006) Surface analysis of heat-treated Mong Hsu rubies. *Applied Surface Science* 252, 8646-8650.
- Ackermann, D., Herd, R. K. and Windley, B. F. (1984) Kernerupine replacement reactions involving tourmaline, Fiskenaesset region, W Greenland, *Neues Jahrbuch für Mineralogie Monatshefte*, 11, 490-500.
- Acosta-Salmon, H. and Davis, M. (2007) Inducing relaxation in the queen conch *Strombus gigas* (L.) for cultured pearl production. *Aquaculture* 262, 73-77.
- Acquafredda, P., Andriani, T., Lorenzoni, S. and Zanettin, E. (1999) Chemical characterization of obsidians from different Mediterranean sources by non-destructive SEM-EDS analytical method. *Journal of Archaeological Science* 26, 315-325.
- Adamo I., Ghisoli C. and Caucia F. (2010) A contribution to the study of FTIR spectra of opals. *Neues Jahrbuch für Mineralogie Abhandlungen*, 187, (1), 63-68.
- Adamo, I., Bocchio, R., Pavese, A. and Prospero, L. (2009) Characterization of peridot from Sardinia, Italy. *Gems and Gemology* 45, 130-133.
- Adams S.J., Hawkes G.E. and Curzon E.H. (1991) A solid state ²⁹Si nuclear magnetic resonance study of opal and other hydrous silicates. *American Mineralogist*, 76, (11/12), 1863-1871.
- Adams, L. H. (1953) A note on the stability of jadeite, *American Journal of Science*, 251. 4. 299-308

- Adekeye J.I.D. and Cohen A.J. (1986) Correlation of Fe⁴⁺ optical anisotropy, Brazil twinning and channels in the basal plane of amethyst quartz. *Applied Geochemistry*, 1, (1), 153-160.
- Agee, L. M. (1965) Asterism in garnets, *Lapidary Journal*, 19, 8. 910-916
- Agrell, S.O., Charnley, N.R. and Chinner, G.A. (1998) Phosphoran olivine from Pine Canyon, Piute Co., Utah. *Mineralogical Magazine* 62, 265-269.
- Ahn, J. H., D. M. Burt and P. R. Buseck (1988), Alteration of andalusite to sheet silicates in a pegmatite, *American Mineralogist*, 73, 5/6, 559-567.
- Aines R.D. and Rossman G.R. (1986) Relationships between radiation damage and trace water in zircon, quartz, and topaz. *American Mineralogist*, 71, (9/10), 1186-1193.
- Akagi, T., Hashimoto, Y., Fu, F.F., Tsuno, H., Tao, H. and Nakano, Y. (2004) Variation of the distribution coefficients of rare earth elements in modern coral-lattices: Species and site dependencies. *Geochimica et Cosmochimica Acta* 68, 2265-1173.
- Akamatsu, S., Zansheng, T, Moses, T,E, and Scarratt, K. (2001) The Current Status of Chinese Freshwater Cultured Pearls. *Gems & Gemology*, Summer, 96-113.
- Akhtar M.J. and Waseem S. (2001) Atomistic simulation studies of zircon. *Chemical Physics*, 274, (2/3), 109-120.
- Akimov, A. P. (1991) Possibility of finding new natural charoite occurrences, *Doklady Akademii Nauk SSSR*, 316. 2. 452-455
- Akizuki M., Kuribayashi T., Nagase T. and Kitakaze A. (2001) Triclinic liddicoatite and elbaite in growth sectors in tourmaline from Madagascar. *American Mineralogist*, 86, (3), 364-369.
- Akizuki, M. (1987) Al, Si order and the internal texture of prehnite. *Canadian Mineralogist* 25, 707-716.
- Alam, M.K. and Stanton, S.L.H.G.A. (1994) Near-infrared spectroscopy and neural networks for resin identification. *Spectroscopy* 9, 30-40.
- Alamaru, A., Loya, Y., Brokovich, E., Yam, R. and Shemeh, A. (2009) Carbon and nitrogen utilization in two species of Red Sea corals along a depth gradient: Insights from stable isotope analysis of total organic material and lipids. *Geochimica et Cosmochimica Acta* 73, 5333-5342.
- Albin, E.F. (1997) Georgiites: Tektite geochemistry and stratigraphic occurrence in east-central Georgia. *Thesis*.
- Albright, T. (1981) Immortal jade and the Brundage bequest, *Museum*, 2. 1. 74-77
- Alder, H. H. and Kerr, P. F. (1962) Infrared study of aragonite and calcite, *American Mineralogist*, 47. 5/6. 700-717
- Aleksandrov S.M. and Troneva M.A. (2007) Composition, mineral assemblages, and genesis of titanite and malayaite in skarns. *Geochemistry International*, 45, (10), 1012-1024.
- Aleman L.B., Callender R.L., Barron A.R., Steuernagel S., Iuga D. and Kentgens A.P.M. (2000) Single-pulse MAS, selective Hahn echo MAS, and 3QMAS NMR studies of the mineral zoisite at 400, 500, 600 and 800 MHz: Exploring the limits of Al NMR detectability. *Journal of Physical Chemistry B*, 104, (49), 11612-11616.
- Alexander, V. D., Griffen, D. T. and Martin, T. J. (1986) Crystal chemistry of some Fe- and Ti-poor dumortierites, *American Mineralogist*, 71. 5/6. 786-794
- Alexandrowicz, S. and Kwiecinska, B. (1977) Amber from the upper Cretaceous deposits of SW Poland, *Mineralogica Polonica*, 8. 2. 39-45
- Alfonso, S., Dineiro, J. M., Alberdi, C. and Berroguí, M. (1999) Method to optically characterize anisotropic and transparent materials, *Microscope*, 47. 3. 123-127
- Algier, P. (2007) Le colline aux aigues-marines d'Opanayake, Sri Lanka, *Revue de Gemmologie a.f.g.*, 161. 15-21
- Aliprandi, R., Burrigato, F. and Guidi, G. (1983) Natural coral and some substitutes. *Journal of Gemmology* 18, 401-410.
- Allen, F. M. and Burnham, C. W. (1992) A comprehensive structure-model for vesuvianite: Symmetry variations and crystal growth, *Canadian Mineralogist*, 30. 1. 1-18
- Allen, R. D. (1952) Variations in chemical and physical properties of fluorite, *American Mineralogist*, 37. 9/10. 910-930
- Allers, L., Collins, A. T. and Hiscock, J. (1998) The annealing of interstitial-related optical centres in type II natural and CVD diamond, *Diamond and Related Materials*, 7. 2/5. 228-232

- Allison, N. (1996) Comparative determinations of trace and minor elements in coral aragonite by ion microprobe analysis, with preliminary results from Phuket, southern Thailand. *Geochimica et Cosmochimica Acta* 60, 3457-3470.
- Almquist, A. (1987) Minnesota's thomsonite. *Lapidary Journal* 41, 57-62.
- Althaus, E. (1967) The triple point andalusite - sillimanite - kyanite. *Contributions to Mineralogy and Petrology* 16, 29-44.
- Amelin Y. (2004) Sm-Nd systematics in zircon. *Chemical Geology*, 211, (3/4), 375-387.
- American Gemological Laboratories (1982a) Kashan ruby identification study. *Gemline Information Service*.
- American Gemological Laboratories (1982b) Thai (Siam) ruby identification study. *Gemline Information Service*, 1-24.
- American Mineralogist*, 76, (3/4), 361-369.
- Amosov, V. N., Krasilnikov, A. V., Tugarinov, S. N., Frunze, V. V. and Tsutskikh, A. Y. (2000) Annealing of the radiation-induced defects in natural diamond, *Technical Physics Letters*, 26. 6. 464-466
- Amstutz, G. C. and Bank, H. (1977) Geologische, petrographische und mineralogische beobachtungen in einigen Minen von Smaragd, tansanit, tsavorit, und rubin in Tansania und Kenya, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 26. 3. 118-127
- Anderson A.J. and McCarron T. (2011) Three-dimensional textural and chemical characterization of polyphase inclusions in spodumene using a dual focused ion beam - scanning electron microscope (FIB-SEM). *Canadian Mineralogist*, 49, (2), 541-553.
- Anderson, B. W. (1935) Igmerald, *Gems and Gemology*, 1. 10. 284-285
- Anderson, B. W. (1945) Absorption spectra of pyrope garnet and red spinel, *Gems and Gemology*, 5. 2/3. 232-233, 257-258
- Anderson, B. W. (1946) Distinction between pyrope garnet and red spinel, *Gems and Gemology*, 5. 5. 301-302 and 304
- Anderson, B. W. (1947) Pyrandine - a new name for an old garnet, *Journal of Gemmology*, 1. 2. 15-16
- Anderson, B. W. (1950) Gemstones and the spectroscope - the absorption spectra of emerald and alexandrite, *Gems and Gemology*, 6. 9. 263-266
- Anderson, B. W. (1954) A new imitation of lapis lazuli, *Journal of Gemmology*, 4. 7. 281-282
- Anderson, B. W. (1959) Properties and classification of individual garnets, *Journal of Gemmology*, 7. 1. 1-5
- Anderson, B. W. (1964) Three stones for the record, *Journal of Gemmology*, 9. 7. 215-221
- Anderson, B. W. (1966) Chromium as a criterion for emerald, *Journal of Gemmology*, 10. 2. 41-45
- Anderson, B. W. (1967) Notes and news, *Journal of Gemmology*, 10. 6. 198-201
- Anderson, B. W. (1969) Three synthetics for the record, *Journal of Gemmology*, 11. 8. 303-306
- Anderson, B. W. (1972) Spectroscope: An indicator of variation, *Gems and Gemology*, 14. 4. 98-101
- Anderson, B. W. (1974) The pleasures of discovery, *Journal of Gemmology*, 14. 3. 97-113
- Anderson, B. W. and Payne, C. J. (1938) A rare blue spinel, *Gemmologist*, 7. 81. 87-89
- Anderson, B. W. and Payne, C. J. (1939) An exceptional danburite, *Gemmologist*, 8. 90. 105
- Anderson, B.K., Webster, R. and Mitchell, R.K. (1958) No new absorption bands in blue sapphire. *Gemmologist* 27, 143-144.
- Anderson, B.W. (1952a) Sinhalite - Another new gemstone. *Journal of Gemmology* 3, 315-321.
- Anderson, B.W. (1952b) Two new gemstones: Taaffeite and sinhalite. *Gems and Gemology* 7, 171-175.
- Anderson, B.W. (1967) Crystals of taaffeite found in China. *Journal of Gemmology* 10, 148-151.
- Anderson, B.W. (1968) The first two taaffeites: An historical note. *Gems and Gemology* 12, 259-262.
- Anderson, B.W. (1974) The pleasures of discovery. *Journal of Gemmology* 14, 97-113.
- Anderson, B.W. (1980a) How Verneuil pioneered investigations into synthetics. *Retail Jeweller* 18, 18-19.
- Anderson, B.W. (1980b) Verneuil publishes details of his revolutionary process. *Retail Jeweller* 19, 18-19.
- Anderson, B.W. and Payne, C.J. (1948) Absorption of visible and ultra-violet light in natural and artificial corundum. *Gemmologist* 17, 243-247.
- Anderson, B.W., Payne, C.J. and Claringbull, G.F. (1951) Taaffeite, a new beryllium mineral, found as a cut gemstone. *Mineralogical Magazine* 29, 765-772.
- Anderson, B.W., Payne, C.J., Claringbull, G.F. and Hey, M.H. (1952) Taaffeite, a new beryllium mineral, found as a cut gemstone. *Mineralogical Magazine* 29, 765-772.

- Anderson, C.O., Morris, J.A., Hutton, D.R. and Troup, G.J. (1981) Magnetic resonance distinction between synthetic and natural blue sapphire. *Australian Gemmologist* 14, 87–89.
- Anderson, E. (1981) *Kashan Characteristics and Identification*. Kashan, Inc., Austin, TX.
- Anderson, J. (1871), A Report on the Expedition to Western Yunan via Bhamo, *Calcutta*, Office of the Supt. of Govt. Printing, 458 pp., 2 maps,
- Anderson, J. E. (1983) Clinohumite the newest gem, *Lapidary Journal*, 37. 7. 984-987
- Anderson, J.A. (1989) Larimar - "a new stone for a new age". *Pamphlet*.
- Anderson, K. (2008). Coral Jewellery. *Victorian Review* 34(1), 47–52.
- Anderson, K. B. (2001) The nature and fate of natural resins in the geosphere. Part XI. Ruthenium tetroxide oxidation of a mature class Ib amber polymer, *Geochemical Transactions*, (1/4), 111-142.
- Anderson, K. B. (2006) The nature and fate of natural resins in the geosphere. Part XII. Investigation of C-ring aromatic diterpenoids in Raritan amber by pyrolysis-GC-matrix isolation FTIR-MS, *Geochemical Transactions*, 7. 2
- Anderson, K. B. and Bray, W. (2006) The amber of *El Dorado*: Class IB archaeological ambers associated with *Laguna Guatavita*, *Archaeometry*, 48. 4. 633-640
- Anderson, K. B. and Muntean, J. V. (2000) The nature and fate of natural resins in the geosphere. Part X. Structural characteristics of the macromolecular constituents of modern Dammar resin and Class II ambers, *Geochemical Transactions*,
- Anderson, S. (1976) A note on the occurrence of emerald at Mayfield Farm, Fort Victoria, Rhodesia, *Journal of Gemmology*, 15. 2. 80-82
- Anderson, S. M. (1978) Notes on the occurrence and mineralogy of emeralds in Rhodesia, *Journal of Gemmology*, 16. 3. 177-185
- Anderson, V. (1978) Microminerals, *Mineralogical Record*, 9. 4. 247-249
- Andreozzi G.B. (1999) Synthetic spinels in the $(\text{Mg}, \text{Fe}^{2+}, \text{Zn})(\text{Al}, \text{Fe}^{3+})_2\text{O}_4$ system: I. Flux growth of single crystals. *Periodico di Mineralogia*, 68, (1), 43-51.
- Andreozzi G.B. and Princivalle F. (2002) Kinetics of cation ordering in synthetic Mg-Al spinel. *American Mineralogist*, 87, (7), 838-844.
- Andreozzi G.B., Bosi F. and Longo M. (2008) Linking Mössbauer and structural parameters in elbaite-schorl-dravite tourmalines. *American Mineralogist*, 93, (4), 658-666.
- Andreozzi G.B., Lucchesi S., Skogby H. and Della Giusta A. (2001) Compositional dependence of cation distribution in some synthetic $(\text{Mg}, \text{Zn})(\text{Al}, \text{Fe}^{3+})_2\text{O}_4$ spinels. *European Journal of Mineralogy*, 13, (2), 391-402.
- Andreozzi G.B., Princivalle F., Skogby H. and Della Giusta A. (2000) Cation ordering and structural variations with temperature in MgAl_2O_4 spinel: A X-ray single-crystal study. *American Mineralogist*, 85, (9), 1164-1171.
- Andreozzi, G. B., Lucchesi, S. and Graziani, G. (2000a) Structural study of magnesioaxinite and its crystal-chemical relations with axinite-group minerals, *European Journal of Mineralogy*, 12. 6. 1185-1194
- Andreozzi, G. B., Ottolini, L., Lucchesi, S., Graziani, G. and Russo, U. (2000b) Crystal chemistry of the axinite-group minerals: A multi-analytical approach, *American Mineralogist*, 85. 5/6. 698-706
- Andres, F. H., Cripe, D. M. and Gentile, A. L. (1962) The synthesis of emerald, alexandrite, and beryllium oxide single crystals, *Hughes Research Laboratories*,
- Andrut, M., Wildner, M., Ingrin, J. and Beran, A. (2007) Mechanisms of OH defect incorporation in naturally occurring, hydrothermally formed diopside and jadeite, *Physics and Chemistry of Minerals*, 34. 8. 543-549
- Angel R.J., Kunz M., Miletich R., Woodland A.B., Koch M. and Xirouchakis D. (1999) High-pressure phase transition in CaTiOSiO_4 titanite. *Phase Transitions*, 68, (3), 533-543.
- Angelini, I. and Bellintani, P. (2005) Archaeological ambers from Northern Italy: An FTIR-drift study of provenance by comparison with the geological amber database, *Archaeometry*, 47. 2. 441-454
- Angino, E. E. (1964) Some effects of pressure on the thermoluminescence of amblygonite, pectolite, orthoclase, scapolite and wollastonite, *American Mineralogist*, 49. 3/4. 387-394
- Annamoe, B.B. and Alpatov, V.V. (2001) Morphology of pyrite crystals as an indicator of evolution of mineral formation environment. *Crystallogenesi and Mineralogy*, 11-12.
- Anonymous (1824) Effect of light on the colour of sodalite from Greenland. *Edinburgh Journal of Science* 1, 181.
- Anonymous (1911) Gems that resemble diamond. *Journal of Industrial and Engineering Chemistry* 3, 520-521.

- Anonymous (1913) Near-diamonds. *Literary Digest* 46, 824-825.
- Anonymous (1958) Japanese pearlers barred from Broome. *Gemmologist* 27, 158.
- Anonymous (1959) Big drop in pearl shell output. *Gemmologist* 28, 238.
- Anonymous (1977) Clam Pearls are a Rare but Delightful Find. *Marine Resource Bulletin*, 9, 1, 3.
- Anonymous (1980) *Radiography in Modern Industry*, 4th ed. Eastman Kodak Company, Rochester, New York 14650.
- Anonymous (1992) Highly radioactive diamonds reported in Germany. *Israel Diamonds*, 14-15.
- Anonymous (1997) Countries deny being radioactive gem source, *Hong Kong Jewellery Magazine*, 4. 76. 178-179
- Anonymous (1998) Radioactive cat's eyes not a cause for cancer, *Jewellery Review*, 2. 21
- Anonymous (1999) North American beauties - Red beryl, *Jewelers' Circular Keystone Magazine*, 170. 2. 37-42
- Anonymous (2000) New Zealand species yields "blue pearls". *Jewelers' Circular Keystone Magazine*, 44-45.
- Anonymous (2000b) Red beryl - The rarest of all beryls, *Bangkok Gems and Jewellery*, 13. 10. 126-128
- Anonymous (2005a) Threeridge - *Amblema plicata* <http://www.marietta.edu/~biol/mussels/3ridge.html>. 2005, November.
- Anonymous (2005b) Threeridge (*Amblema plicata*) <http://www.nps.gov/miss/features/mussels/musselpages/threeridge.html>. 2005, November.
- Antao S.M. and Hassan I. (2002) Thermal behavior of scapolite $\text{Me}_{79.6}$ and $\text{Me}_{33.3}$. *Canadian Mineralogist*, 40, (5), 1395-1401.
- Antao S.M. and Hassan I. (2008a) Increase in Al-Si and Na-Ca disorder with temperature in scapolite $\text{Me}_{32.9}$. *Canadian Mineralogist*, 46, (6), 1577-1591.
- Antao S.M. and Hassan I. (2008b) Unusual Al-Si ordering in calcic scapolite, $\text{Me}_{79.6}$, with increasing temperature. *American Mineralogist*, 93, (8/9), 1470-1477.
- Antao S.M. and Hassan I. (2011a) Complete Al-Si order in scapolite $\text{Me}_{37.5}$, ideally $\text{Ca}_3\text{Na}_5[\text{Al}_8\text{Si}_{16}\text{O}_{48}]\text{Cl}(\text{CO}_3)$, and implications for antiphase domain boundaries (APBs). *Canadian Mineralogist*, 49, (2), 581-686.
- Antao S.M. and Hassan I. (2011b) The structures of marialite (Me_6) and meionite (Me_{93}) in space groups $P4_2/n$ and $I4/m$, and the absence of phase transitions in the scapolite series. *Powder Diffraction*, 26, (2), 119-125.
- Antao S.M., Hassan I., Wang J., Lee P.L. and Toby B.H. (2008) State-of-the-art high-resolution powder X-ray diffraction (HRPXRD) illustrated with Rietveld structure refinement of quartz, sodalite, tremolite and meionite. *Canadian Mineralogist*, 46, (6), 1501-1509.
- Antao, S.M., Hassan, I. and Parise, J.B. (2004) Tugtupite: High-temperature structures obtained from in situ synchrotron diffraction and Rietveld refinements. *American Mineralogist* 89, 492-497.
- Anthony, T. R., Casey, J. K., Smith, A. C. and Vagarali, S. S. (2002) Method of detection of natural diamonds that have been processed at high pressure and high temperatures, *United States Patent*, US 6377340.
- Appiani, R. (2007) Pink fluorite from an exceptional new find at Chumar Bakhoor, Pakistan, *Mineralogical Record*, 38. 2. 95-100
- Applin, K. R. and Hicks, B. D. (1987) Fibers of dumortierite in quartz, *American Mineralogist*, 72. 1/2. 170-172
- Arai S. (1992) Chemistry of chromian spinel in volcanic rocks as a potential guide to magma chemistry. *Mineralogical Magazine*, 56, (2), 173-184.
- Aramu, F., Brovotto, P., Maxia, V., Salis, M. and Spano, G. (1994) Mössbauer spectroscopy of tektites. *Il Nuovo Cimento D* 16, 621-626.
- Arem, J. E. (1973) Idocrase (vesuvianite) - a 250-year puzzle, *Mineralogical Record*, 4. 4. 164-174
- Arem, J.E. (1987) *Color Encyclopedia of Gemstones*, 2nd edition ed. Van Nostrand Reinhold, New York.
- Arif M., Henry D.J. and Moon C.J. (2010) Cr-bearing tourmaline associated with emerald deposits from Swat, NW Pakistan: Genesis and its exploration significance. *American Mineralogist*, 95, (5/6), 799-809.
- Arkhangelskii, G.E., Morgenshtern, Z.L. and Neustruev, V.B. (1969) Effect of colour centres on the Cr^{3+} spectrum in ruby. *Physica Status Solidi B* 36, 451-475.

- Armbruster T., Bonazzi P., Akasaka M., Bermanec V., Chopin C., Giere R., Heuss-Assbichler S., Liebscher A., Menchetti S., Pan Y. and Pasero M. (2006) Recommended nomenclature of epidote-group minerals. *European Journal of Mineralogy*, 18, (5), 551-567.
- Armbruster, T. and Oberhänsli, R. (1988) Crystal chemistry of double-ring silicates: Structures of sugilite and brannockite. *American Mineralogist* 73, 595-600.
- Armstrong, J.A. and Weller, M.T. (2006) New sodalite frameworks: Synthetic tugtupite and a beryllosilicate framework with a 3:1 Si:Be ratio. *Dalton Transactions*, 2998-3005.
- Arnould, M. and Poirot, J. P. (1975) Spectrographie infrarouge par reflexion de la turquoise et de quelques-uns de ses substituts, *Revue de Gemmologie a.f.g.*, 44, 9-10
- around the world. *InColor*, 11, 16-20.
- Arps, C. E. S. (1987) Observations on gemstones and their source rocks from Sri Lanka, *21st International Gemmological Congress - Transactions*, 63-67
- Arribas, A., Burg, J. and Nicolau, J. (1970) New occurrence of precious variety of variscite in Spain. *Lapidary Journal* 24, 764.
- Arrouas, S. (1993) Rubis du Vietnam, mythe ou réalité. *Revue de Gemmologie a.f.g.*, 7-8.
- Artemieva, N., Pierazzo, E. and Stöffler, D. (2002) Numerical modeling of tektite origin in oblique impacts: Implication to Ries-Moldavites strewn field, *Bulletin of the Czech Geological Survey*, 77, 4, 303-311
- Aryal, S., P. Rulis and W. Y. Ching (2008), Density functional calculations of the electronic structure and optical properties of the aluminosilicate polymorphs (Al₂SiO₅), *American Mineralogist*, 93, 1, 114-123.
- Atkinson, D. and Kothavala, R.Z. (1983) Kashmir sapphire. *Gems and Gemology* 19, 64-76.
- Atkinson, D. and Kothavala, R.Z. (1985) Kaschmir-saphir. *Lapis* 10, 11-22.
- Attanasio, D., Flamini, A., Graziani, G., Martini, M. and Scandale, E. (1989) Further observations on the Lennix synthetic emerald, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 38, 1, 1-10
- Audeon, G. (1991) Le Saphir et ses inclusions, *University of Nantes - Diploma*, 1-89
- Aurisicchio C., Demartin F., Ottolini L. and Pezzotta F. (1999) Homogeneous liddicoatite from Madagascar: A possible reference material? First EMPA, SIMS and SREF data. *European Journal of Mineralogy*, 11, (2), 237-242.
- Austen, R. L. (1941) Ceylon andalusite, *Gemmologist*, 10, 120, 101-104
- Austin, G. (2002) Red beryl company goes belly up, *Colored Stone Magazine*, 15, 2, 14-15
- Austin, G.T. (1991) U.S. Gem production totals \$65.9 million. *Colored Stone Magazine* 4, 37-39.
- Auzat, M. (1992) Rhodochrosite de Capillitas. *Association Gemmologic Quebec - Bulletin* 8, 13-19.
- Auzende, A.L., Daniel, I., Reynard, B., Lemaire, C. and Guyot, F. (2004) High-pressure behaviour of serpentine minerals: A Raman spectroscopic study. *Physics and Chemistry of Minerals* 31, 269-277.
- Azar, D. (2007) Preservation and accumulation of biological inclusions in Lebanese amber and their significance, *Comptus Rendus Palevol*, 6, 1/2, 151-156
- Babińska J., Dyrek K., Pieczka A. and Sojka Z. (2008) X and Q band EPR studies of paramagnetic centres in natural and heated tourmaline. *European Journal of Mineralogy*, 20, (2), 233-240.
- Bachheimer J.P. (2000) Comparative NIR and IR examination of natural, synthetic, and irradiated synthetic quartz. *European Journal of Mineralogy*, 12, (5), 975-986.
- Baese, R., Maresch, W.V., Schenk, V. and Schertl, H.P. (2010) Geochemistry of jadeitites and jadeite-lawsonite rocks in a serpentinite mélange (Rio San Juan Complex, northern Dominican Republic): Constraints on fluid composition in a subduction chanel environment. *Geophysical Research Abstracts*.
- Bahadur H. (2006) Radiation induced modifications of impurity-related point defects in crystalline quartz - A review. *Crystal Research and Technology*, 41, (7), 631-635.
- Bai, Z.Y., Luo, M., Zhu, W.B., Lin, J.Y., Wang, G.L. and Li, J.L. (2012) Multiple paternity in the freshwater pearl mussel *Hyriopsis cumingii* (Lea, 1852). *Journal of Molluscan Studies* 78, 142-146.
- Bailey R.M. (2001) Towards a general kinetic model for optically and thermally stimulated luminescence of quartz. *Radiation Measurements*, 33, (1), 17-45.
- Baker J. (1994) Thermal expansion of scapolite. *American Mineralogist*, 79, (9/10), 878-884.
- Baker, G. (1940) Some australite structures and their origin. *Mineralogical Magazine* 25, 487-494.
- Baker, G. (1960) Origin of tektites. *Nature* 185, 291-294.
- Baker, G. (1961) Einige Erscheinungen des Atzverhaltens der Australite. *Chemie der Erde* 20, 101-117.

- Baker, G. (1962) Volumenbeziehungen von wohl erhaltenen Australie Knöpfen, Linsen und Kernen zu ihren primären Formen. *Chemie der Erde* 21, 269-320.
- Baker, J. M., Keith, J. D., Christiansen, E. H. and Dorais, M. J. (2002) Topaz rhyolite-hosted red beryl of Starvation Canyon, Thomas Range, Utah: Contrasts and comparisons with other red beryl occurrences, *Geological Society of America - Annual Meeting Abstracts*,
- Balan E., Neuville D.R., Trocellier P., Fritsch E., Muller J.P. and Calas G. (2001) Metamictization and chemical durability of detrital zircon. *American Mineralogist*, 86, (9), 1025-1033.
- Balassone, G., Bellatreccia, F., Mormone, A., Biagioni, C., Pasero, M., Petti, C., Mondillo, N. and Fameli, G. (2012) Sodalite-group minerals from the Somma - Vesuvius volcanic complex, Italy: A case study of K-feldspar-rich xenoliths. *Mineralogical Magazine* 76, 191-212.
- Balen D. and Broska I. (2011) Tourmaline nodules: Products of devolatilization within the final evolutionary stage of granitic melt? *Geological Society of London - Special Publication*, 350, 53-68.
- Balginina, L.A., Kalentev, V.A. and Klinov, F.M. (1988) Point defects in neutron-irradiated phenakite. *Journal of Practical Spectroscopy* 49, 860-864.
- Balitsky V.S. and Balitskaya O. (1986) The amethyst-citrine dichromatism in quartz and its origin. *Physics and Chemistry of Minerals*, 13, (6), 415-421.
- Balitsky V.S. and Balitskaya O.V. (2009) The genetic approach for identification of varieties of crystalline and amorphous silica. *Australian Gemmologist*, 23, (11), 500-508.
- Balitsky V.S., Balitsky D.V., Bondarenko G.V., Balitskaya O.V. (2004). The 3543 cm⁻¹ infrared absorption band in natural and synthetic amethyst and its value in identification. *Gems and Gemology*, 40, (2), 146-161.
- Balitsky V.S., Lu T.J., Rossman G.R., Makhina I.B., Marin A.A., Shigley J.E., Elen S. and Dorogovin B.A. (1999) Russian synthetic ametrine. *Gems and Gemology*, 35, (2), 122-134.
- Balitsky V.S., Machina I.B., Marin A.A., Shigley J.E., Rossman G.R. and Lu T. (2000) Industrial growth, morphology and some properties of bi-colored amethyst-citrine quartz (ametrine). *Journal of Crystal Growth*, 212, (1/2), 255-260.
- Balitsky V.S., Makhina I.B., Marina E.A., Rossman G.R., Lu T. and Shigley J.E. (2001)
- Balitsky V.S., Makhina I.B., Prygov V.I., Marin A.A., Emelchenko A.G., Fritsch E., McClure S.F., Lu T.J., DeGhionno D., Koivula J.I. and Shigley J.E. (1998) Russian synthetic pink quartz. *Gems and Gemology*, 34, (1), 34-43.
- Balitsky, V. S. and Bublikova, T. M. (1990) Physico-chemical foundations of malachite synthesis and structural-morphological peculiarities and properties of its man-made jewelry quality varieties, *Progress in Crystal Growth and Characterization*, 21. 139-161
- Balitsky, V. S., Bublikova, T. M., Sorokina, S. L., Balitskaya, L. V. and Shteinberg, A. S. (1987a) Man-made jewelry malachite, *Gems and Gemology*, 23. 3. 152-157
- Balitsky, V. S., Bublikova, T. M., Sorokina, S. L., Balitskaya, L. V. and Shteynberg, A. S. (1987b) Synthetic jewelry-grade and ornamental malachite, *Doklady Akademii Nauk SSSR*, 297. 1. 184-186
- Ballentyne, D.W.G. and Bye, K.L. (1970) The nature of photochromism in chlorosodalites from optical data. *Journal of Physics D: Applied Physics* 3, 1438-1443.
- Ballirano, N.d.P., Maras, A. and Burrigato, F. (1991) Sodalite from Vetralla (Roman potassic province) and Bancroft (Ontario, Canada): Observed and simulated IR spectra. *Rendiconti Lincei* 2, 361-369.
- Balmer, W.A., Sutthirath, C., Hauzenberger, C.A., Pettke, T., Atchat, W. and Krzemnicki, M. (2009) The marble-hosted ruby deposits of Morogoro, Tanzania: A current research report. *31st International Gemmological Congress - Abstracts*, 5-9.
- Bancroft, P. (1981) A great gem and crystal mine - St. John's Island, Egypt. *Lapidary Journal* 34, 2138-2146.
- Bancroft, P. (1983) Australia's black jade, *Lapidary Journal*, 37. 5. 700-709, 714-715
- Bancroft, P. (1988) Rubies of Thailand. *Lapidary Journal* 42, 45-57.
- Banerjee, A. (1990) Erkennungsmöglichkeiten von künstlich gefärbtem Lapislazuli, *Kurzmitteilungen aus dem Institut für Edelsteinforschung*, 5. 1/2. 4-5
- Banerjee, A. and Hager, T. (1993) Characterization of some tektites and silica glasses with IR-Reflectance spectroscopy, *Chemie der Erde*, 53. 4. 289-291
- Banerjee, A., Himmer, J. and Schrader, H.W. (1985) Spectrophotometric measurements of faceted rubies. *Journal of Gemmology* 19, 489-493.
- Banfield, J. F., Veblen, D. R. and Smith, D. J. (1991) The identification of naturally occurring TiO₂ (B) by structure determination using high-resolution electron microscopy, image simulation, and distance-least-squares refinement, *American Mineralogist*, 76. 3/4. 343-353

- Bank, F. H., Bank, H., Gübelin, E. and Henn, U. (1988) Alexandrite von einem neuen vorkommen bei Hematita in Minas Gerais, Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 36. 3/4. 121-131
- Bank, F., Bank, H. and Villa, E. (2001) Santa Maria aquamarine, *Journal of Gemmology*, 27. 5. 257-258
- Bank, H. (1960) Smaragd-vorkommen in Kolumbien, *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 34. 7-23
- Bank, H. (1963) Zoisit-amphibolit mit Rubin aus Tanganjika (Ostafrika). *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 4-11.
- Bank, H. (1964a) Alexandrit-vorkommen in Südrhodesien, *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 47. 11-15
- Bank, H. (1964b) Smaragd-vorkommen in Südrhodesien, *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 48. 14-21
- Bank, H. (1967a) Hellbrauner klar durchsichtiger alkalifeldspat von volkesfeld-eifel, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 61. 50-53
- Bank, H. (1967b) Zur Diagnostik von chrysoberyll - hochlichtbrechender alexandrite, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 61. 54-57
- Bank, H. (1969) Über die lichtbrechungsindizes brasilianischer smaragde, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 18. 1. 15-19
- Bank, H. (1970a) Aus der gemmologischen fragestunde der DGemG neue imitation: Glas-lapislazuli-dublette, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 19. 2. 75-77
- Bank, H. (1970b) Hochlichtbrechender orangefarbiger korund aus Tansania. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 19, 1-3.
- Bank, H. (1971a) Alexandrite aus Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 20. 3. 130-131
- Bank, H. (1971b) Durchsichtiger farblos-weisser bis blassgelblicher petalit aus Brasilien. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 20, 172-174.
- Bank, H. (1971c) Über einige Edelsteine aus Tansania und ihre Vorkommen. *Hessisches-Landesamt für Bodenforschung - Abhandlungen* 60, 203-215.
- Bank, H. (1972a) Diopsid als komponente der paragenese der zoisit-vorkommen der Miralani Hills in Tansania, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 21. 4. 213-215
- Bank, H. (1972b) Hell- und dunkelgrüner durchsichtiger andalusit aus Espirito Santo/Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 21. 2. 124-125
- Bank, H. (1973a) Durchsichtiger albit aus Madagaskar und den Alpen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 22. 2. 53-54
- Bank, H. (1973b) Ein neues smaragd-vorkommen in Zambia (Miku-deposit), *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 22. 2. 60-61
- Bank, H. (1973c) Plagioklas-mischkristall andesin als "Madagaskar-mondstein", *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 22. 2. 55-57
- Bank, H. (1974a) Durchsichtige grüne enstatite aus Tansania, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 23. 3. 192-194
- Bank, H. (1974b) Durchsichtiger farbloser bis bläulicher sillimanit aus Kenya. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 23, 281-282.
- Bank, H. (1974c) Durchsichtiger saphirblauer sodalith aus SW-Afrika (1811 v. Thomson benannt). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 23, 279-280.
- Bank, H. (1974d) Farbloser klar durchsichtiger oligoklas aus Kenya, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 23. 1. 45-48
- Bank, H. (1974e) Smaragd, Alexandrit und Rubin als Komponenten einer Paragenese vom Lake Manyara in Tansania. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 23, 62-63.
- Bank, H. (1974f) The emerald occurrence of Miku, Zambia, *Journal of Gemmology*, 14. 1. 8-15
- Bank, H. (1974g) Über brechungsindizes brasilianischer smaragde, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 23. 3. 297-299
- Bank, H. (1975a) Gelblich-grünlicher durchsichtiger prehnite aus Australien. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 24, 4-7.

- Bank, H. (1975b) Grüner durchsichtiger schleifwürdiger phosphophyllit von Cerro Rico de Potosi/Bolivien. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 24, 10-12.
- Bank, H. (1975c) Grüner edelapatite aus Kanada, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 24. 4. 246-247
- Bank, H. (1975d) Niedrige brechungsindizes und doppelbrechung bei fast durchsichtigem rhodochrosit aus Argentinien. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 24, 160-161.
- Bank, H. (1975e) Rubin-Vorkommen in Kenya. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 24, 96.
- Bank, H. (1975f) Tremolit-, Aktinolith- oder Nephrit-Katzenaugen?, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 24. 3. 167-169
- Bank, H. (1976a) Apatit-Katzenaugen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 25. 1. 40
- Bank, H. (1976b) Mit synthetischem Smaragd überzogene natürliche farblose berylle (nach Lechleitner), *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 25. 2. 107-108
- Bank, H. (1976c) Niedriglichtbrechende schleifwürdige epidote mit niedrige doppelbrechung aus Minas Gerais/Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 25. 1. 48-51
- Bank, H. (1976d) Schleifwürdige grüne diopside aus Minas Gerais/Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 25. 4. 214-216
- Bank, H. (1977) Sinhalit und diopsid aus Ceylon, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 26. 2. 78-79
- Bank, H. (1978) Rubine aus Alipur, Mysore (Indien). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 27, 211.
- Bank, H. (1979) Geschliffene durchsichtige blaue, grüne und blaugrüne dumortierite aus Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 28. 4. 205-206
- Bank, H. (1980) Gefahren der "zerstörungsfreie" gemmologischen Diagnostik, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 29. 1/2. 104-105
- Bank, H. (1981a) Farbloser andalusit aus Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 30. 3/4. 236-237
- Bank, H. (1981b) Gemmological news, *Journal of the Gemmological Society of Japan*, 8. 1/4. 89-96
- Bank, H. (1981c) Natürlicher smaragd aus Sambia mit ausgeprägtem zonarwachstum als smaragd-beryll dublette angesehen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 30. 3/4. 232-233
- Bank, H. (1981d) Über die variation des brechungsindex von ekanit, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 30. 3/4. 234-235
- Bank, H. (1981e) Smaragde aus Sambia mit relativ hoher lichtbrechung und doppelbrechung und starkem eisengehalt, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 30. 3/4. 230-231
- Bank, H. (1981f) Viridinartige andalusite aus Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 30. 3/4. 238-239
- Bank, H. (1982a) Brauner und gelbbrauner danburit aus Madagaskar, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 31. 1/2. 85-86
- Bank, H. (1982b) Geschliffene zonar gebaute smaragde aus dem gebiet der Tokowaja, Ural, UdSSR, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 31. 3. 193-194
- Bank, H. (1983a) Gelber und gelbbrauner klinohumit aus Russland, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 32. 4. 206
- Bank, H. (1983b) Über gahnospinelle und gahnite, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 32. 2/3. 141-142
- Bank, H. (1984) Aus der untersuchungspraxis, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 33. 1/2. 79-83
- Bank, H. (1986) Farbloser jeremejewit aus den pegmatiten des Pamir, UdSSR, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 35. 1/2. 72
- Bank, H. (1987a) Alexandrite from India, *Deutsche Goldschmiede Zeitung*, 3. 116
- Bank, H. (1987b) Grüne diopside aus Ostafrika als grossulare bzw. korerupine angesehen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 36. 1/2. 86-88
- Bank, H. (1987c) Zu den optischen daten von phenakit. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 36, 90-91.

- Bank, H. (1988a) Durchsichtiger, brauner, bestrahlter, phenakit. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 36, 165-166.
- Bank, H. (1988b) Hochlichtbrechender grüner apatit von Rössing, Namibia, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 37. 1/2. 78-79
- Bank, H. (1989) Hochlichtbrechender smaragd aus Sta. Terezinha de Goias, Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 38. 2. 41-43
- Bank, H. (1995a) New olivine deposits in China and in Pakistan. *Gold und Silber*, 53-54.
- Bank, H. (1995b) Precious corundums (rubies and sapphires) and spinels. *Gold und Silber*, 53-54.
- Bank, H. and Becker, G. (1977a) Blauer schleifwürdiger jeremejewit aus SW-Afrika, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 26. 3. 161-165
- Bank, H. and Becker, G. (1977b) Klar durchsichtiger, schleifwürdiger rhodochrosit aus Hotazel in Südafrika. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 26, 157-160.
- Bank, H. and Berdesinski, W. (1974) Stark pleochroitischer durchsichtiger schleifwürdiger kornerupin aus Ostafrika, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 23. 1. 49-51
- Bank, H. and Berdesinski, W. (1975a) Durchscheinender fast durchsichtiger antigorit (serpentin) aus Pakistan. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 24, 157-159.
- Bank, H. and Berdesinski, W. (1975b) Kornerupin-vorkommen in Tansania, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 24. 2. 95
- Bank, H. and Henn, U. (1988) Rubies of cuttable quality from Ngorongoro in Tanzania. *Börsen Bulletin*, 102.
- Bank, H. and Henn, U. (1989a) Andesin-mondstein aus Indien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 38. 1. 43-44
- Bank, H. and Henn, U. (1989b) Changierender Taaffeit aus Sri Lanka. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 38, 89-94.
- Bank, H. and Henn, U. (1989c) Hochlichtbrechender Rubin aus Malawi. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 38, 106-108.
- Bank, H. and Henn, U. (1989d) Synthetische smaragde aus Australien (synthetische, "Pool emeralds"), *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 38. 1. 11-16
- Bank, H. and Henn, U. (1989e) Schleifwürdiger, transparenter, blauer Saphir aus Kenia. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 38, 105-106.
- Bank, H. and Henn, U. (1990a) Physical and chemical data of gem aquamarines from Nigeria, *Canadian Gemmologist*, 11. 1. 8-10
- Bank, H. and Henn, U. (1990b) Further examinations on synthetic emerald overgrowth on colourless beryl seeds from Lechleitner, *Canadian Gemmologist*, 11. 2. 39-41
- Bank, H. and Okrusch, M. (1967) Mineralogische untersuchungen am alexandrite der Novello Claims, Rhodesien, *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 61. 33-49
- Bank, H. and Okrusch, M. (1976) Über Rubin-Vorkommen in Marmoren von Hunza (Pakistan). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 25, 67-85.
- Bank, H. and Platen, H. V. (1988) Blau gefärbter magnesit als lapis lazuli-ersatz angeboten, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 37. 1/2. 75-76
- Bank, H., Berdesinski, W. and Ottemann, J. (1972a) Durchsichtige blaue apatite aus den phosphatpegmatiten in Minas Gerais/Brasilien, *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 21. 2. 128-129
- Bank, H., Berdesinski, W. and Ottemann, J. (1972b) Violette edelkorunde aus dem Umba-Gebiet von Tansania. *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde* 21, 124-125.
- Bank, H., Gübelin, E., Harding, R.R., Henn, U., Scarratt, K. and Schmetzer, K. (1988) An unusual ruby from Nepal. *Journal of Gemmology* 21, 222-226.
- Bank, H., Gübelin, E., Henn, U. and Malley, J. (1988a) Alexandrit: natürlich oder synthetisch?, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 37. 1/2. 49-52
- Bank, H., Gübelin, E., Henn, U. and Malley, J. (1988b) Alexandrite: natural or synthetic?, *Journal of Gemmology*, 21. 4. 215-217
- Bank, H., Henn, U. and Lind, T. (1988b) Rubine aus Malawi. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 37, 113-119.
- Bank, H., Henn, U. and Lind, T. (1989b) Synthetische smaragde aus Australian (synthetische 'Pool emeralds'), *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 38. 11-16

- Bank, H., Henn, U. and Milisenda, C.C. (1994) Laboratory notes, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 2.
- Bank, H., Henn, U. and Milisenda, C.C. (1994) Laboratory notes. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*.
- Bank, H., Henn, U. and Milisenda, C.C. (1996) Laboratory notes, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 45. 3. 97-101
- Bank, H., Henn, U. and Milisenda, C.C. (1996) Laboratory notes. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 45, 97-101.
- Bank, H., Henn, U. and Milisenda, C.C. (1997) Mint-green chrysoberyl from Tanzania, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 46. 2. 63-70
- Bank, H., Henn, U. and Milisenda, C.C. (1997) Sapphires from Madagascar. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 46, 123-128.
- Bank, H., Henn, U. and Milisenda, C.C. (1998) Gemologie Aktuell, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 47. 3. 121-128
- Bank, H., Henn, U. and Milisenda, C.C. (1999) New gemstone occurrences in Madagascar. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 48, 1-8.
- Bank, H., Henn, U. and Milisenda, C.C. (2000) Collector stones from Sri Lanka. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 49, 1-6.
- Bank, H., Lenzen, G. and Henn, U. (1988a) Laboratory notes, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 2. 1-3
- Bank, H., Lenzen, G. and Henn, U. (1988b) Laboratory notes, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 3. 1-4
- Bank, H., Lenzen, G. and Henn, U. (1988c) Laboratory notes, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 4. 1-4
- Bank, H., Lenzen, G. and Henn, U. (1989a) Laboratory notes, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 1. 1-4
- Bank, H., Lenzen, G. and Henn, U. (1989b) Laboratory notes, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 2. 1-4
- Bank, H., Lenzen, G. and Henn, U. (1989c) Laboratory notes, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 3. 1-4
- Bank, H., Lenzen, G. and Henn, U. (1990) Laboratory notes, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 3. 1-4
- Bank, H., Lenzen, G. and Henn, U. (1991) Neue Edelsteinvorkommen - Ostafrika. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*.
- Bank, H., Maes, J. and Dos Santos, A. (1978a) Sillimanit-cabochons in gemischter Ceylon-Partie. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 27, 212-213.
- Bank, H., Platen, H.V. and Amarasinghe, A.G.B. (1989) Gemmologische Kurzinformationen - Saphirblauer, durchsichtiger Sapphirin aus Sri Lanka. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 38, 103-105.
- Bank, H., Schmetzer, K. and Maes, J. (1978b) Durchsichtiger, blau-rot changierender korund aus Kolumbien. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 27, 102-103.
- Baran Z., Godwod K. and Warminski T. (1987) X-ray study of Brazil twins in natural amethyst. *Physica Status Solidi A*, 101, (1), 9-24.
- Barbarand, J. and Pagel, M. (2001) Cathodoluminescence study of apatite crystals, *American Mineralogist*, 86. 4. 473-484
- Barber, D. J. and Wenk, H. R. (1979) Deformation twinning in calcite, dolomite, and other rhombohedral carbonated, *Physics and Chemistry of Minerals*, 5. 2. 141-165
- Barber, R. J. (1954) The nature of jade - Part 1 and 2, *Gems and Gemology*, 8. 2/3. 38-46, 67-77
- Barberini, L., Cadeddu, S., Caria, M. and Murgia, F. (2000) Tests on far UV irradiation of CVD diamond, *Nuclear Instruments and Methods in Physics Research A*, 442. 1/3. 400-403
- Bardosova M., Hodge P., Pach L., Pemble M.E., Smatko V., Tredgold R.H. and Whitehead D. (2003) Synthetic opals made by the Langmuir-Blodgett method. *Thin Solid Films*, 437, (1/2), 276-279.
- Bariac, L. (1979) Diaspor ein ungewöhnlich grosser kristall aus dem dolomit-steinbruch sivec unweit von pilep in Mazedonien, Jugoslawein, *Lapis*, 4. 11. 25-

- Bariand, P. (1979) Lapis-Lazuli von Sar-e-Sang, Afghanistan, *Lapis*, 4. 11. 9-14
- Bariand, P. (1986) La mine du Beix (Puy-de-Dome), *Monde et Mineraux*, 75. 16-17
- Baric, L. (1963) Über die orientierte Verwachsung des Diaspors und des Korunds von Sivec in Mazedonien, *Contributions to Mineralogy and Petrology*, 9. 2. 133–138
- Barik, S. K., Jena, J. K. and Janaki Ram, K. (2004) CaCO₃ crystallization in primary culture of mantle epithelial cells of freshwater pearl mussel, *Current Science*, 86. 5. 730-734
- Barnard, A. S. (2000) NovaDiamond - Color enhanced yellow and yellow-green diamonds, *Australian Gemmologist*, 20. 12. 517-522
- Barnes S.J. and Roeder P.L. (2001) The range of spinel compositions in terrestrial mafic and ultramafic rocks. *Journal of Petrology*, 42, (12), 2279-2302.
- Baron D.H. (1981), Three choice collecting sites for the New England collector, *Lapidary Journal*, 34, 12, 2508-2520.
- Baronnet, A. and Devouard, B. (1996) Topology and crystal growth of natural chrysotile and polygonal serpentine. *Journal of Crystal Growth* 166, 952-960.
- Barot N.R. and Boehm E.W. (1992) Gem-quality green zoisite. *Gems and Gemology*, 28, (1), 4-15.
- Barot, N. R., Graziani, G., Gubelin, E. and Rettighieri, M. (1995) Cat's-eye and asteriated gemstones from East Africa, *Journal of Gemmology*, 24. 8. 569-580
- Barot, N.R. and Harding, R.R. (1994) Pink corundum from Kitui, Kenya. *Journal of Gemmology* 24, 165-172.
- Barot, N.R., Flamini, A., Graziani, G. and Gübelin, E.J. (1989) Star sapphire from Kenya. *Journal of Gemmology* 21, 467-473.
- Barres, O., Sabot, B., Cheilletz, A. and De Donato, P. (2003) Method of determining the authenticity and the geographical origin of gemstones such as beryl, *United States Patent*, 6515738.
- Barth, T. F. (1934) Polymorphic phenomena and crystal structure, Part 1: Definition and classification of polymorphism, *American Journal of Science*, 27. 160. 273-286
- Barth, T. F. W. (1931) Permanent changes in the optical orientation of feldspars exposed to heat, *Norsk Geologisk Tidsskrift*, 12. 57-72
- Barth, T. F. W. (1932) The chemical composition of noselite and haüyne, *American Mineralogist*, 17. 10. 466-471
- Barth, T. F. W. (1965b) Relations between optical orientation and structural state in the system of potassium feldspar, *Indian Mineralogist*, 6. 1/2. 40-47
- Barthem, R.B., Abritta, T., Eichler, J.P.F. and De Souza Barros, F. (1982) Some properties of the fluorescence spectra of heavily doped ruby. *Journal of Luminescence* 27, 231-235.
- Bartkowska J.A., Cisowski J., Voiron J., Heimann J. and Czaja M. (1998) Magnetic properties of coloured varieties of spodumene. *Mineralogia Polonica*, 29, (1), 45-54.
- Bartlett, L. (1997) Fool's gold?... The use of marcasite and pyrite from ancient times, *Journal of Gemmology*, 25. 8. 517-531
- Bartlett, L. (1997) Fool's gold?... The use of marcasite and pyrite from ancient times. *Journal of Gemmology* 25, 517-531.
- Bartoli F., Bittencourt-Rosa D., Doirisse M., Meyer R., Philippy R. and Samama J.C. (1990) Role of aluminum in the structure of Brazilian opals. *European Journal of Mineralogy*, 2, (5), 611-619.
- Barton, M.D. (1986) Phase equilibria and thermodynamic properties of minerals in the BeO-Al₂O₃-SiO₂-H₂O (BASH) system, with petrologic applications. *American Mineralogist* 71, 277-300.
- Bartos, P.J., Nelson, E.P. and Misantoni, D. (2007) The Sweet Home rhodochrosite specimen mine, Alma District, Central Colorado: The porphyry molybdenum-fluorine connection. *Mineralium Deposita* 42, 235-250.
- Barwood, H. (1997) Red and pink variscite from the Wood Mine, Cocke County, Tennessee. *Rocks and Minerals* 72, 268-270.
- Baryshev A.V., Ankudinov A.V., Kaplyanskii A.A., Kosobukin V.A., Limonov M.F., Samusev K.B. and Usvyat D.E. (2002) Optical characterization of synthetic opals. *Physics of the Solid State*, 44, (9), 1648-1655.
- Baryshev A.V., Kaplyanskii A.A., Kosobukin V.A., Limonov M.F., Samusev K.B. and Usvyat D.E. (2003) Bragg diffraction of light in high-quality synthetic opals. *Physica E*, 17, (1), 426-428.
- Bassett, A.M. (1997) Die Rubinminen in Ganesh Himal in Nepal. *Mineralien Welt* 8, 45-60.
- Bassett, H. (1953) The colouring agent in amazon-stone (amazonite), *Geological Survey of Tanganyika - Records*, 3. 97-99

- Basso, R., Cinacchio, M. and Giusta, A. D. (1980) Determination of the forsterite molar fraction in Mg-Fe olivines, *Neues Jahrbuch für Mineralogie Monatshefte*, 9. 408-414
- Bastos, F. M. (1964) A 15.4-pound Brazilian aquamarine, *Gems and Gemology*, 11. 8. 239-241
- Bastos, F. M. (1981) Emeralds from Itabira, Minas Gerais, Brazil, *Lapidary Journal*, 35. 9. 1842-1848
- Bastos, F. M. (1984) Andalusites from Minas Gerais and Espirito Santo, Brazil, *Lapidary Journal*, 38. 2. 308-309
- Bastos, F.M. (1972) Phenakite from Minas Gerais Brazil. *Lapidary Journal* 25, 1427-1428.
- Basun, S.A., Meltzer, R.S. and Imbusch, G.F. (2007) Exchange-coupled chromium ion pairs in ruby revisited. *Journal of Luminescence* 125, 31-39.
- Battesti, T. and Schubnel, H. J. (1993) Jades Impériaux, *Exhibition Guide - Museum National d'Histoire Naturelle - Paris, France*, 1-32
- Bauer, M. (1895) On the jadeite and other rocks from Tawmaw in Upper Burma, *Geological Survey of India - Records*, 28. 3. 91-105
- Bauer, M. (1896) Der Jadeit und die anderen Gesteine der Jadeitlagerstätte von Tawmaw in Ober-Birma, *Neues Jahrbuch für Mineralogie, Geologie und Palaeontologie*, 1.
- Bauer, M. (1906) Weitere Mitteilungen über den Jadeit von Ober-Birma, *Centralblatt für Mineralogie Geologie und Paläontologie*, 7. 97-112
- Bauernhansl, P. and Beran, A. (1997) Trace hydrogen in the olivine-type minerals chrysoberyl, Al_2BeO_4 and sinhalite MgAlBO_4 - A polarized FTIR spectroscopic study. *Schweizerische Mineralogische und Petrographische Mitteilungen* 77, 131-136.
- Baugh, T.G. and Nelson, F.W. (1987) New Mexico obsidian sources and exchange on the Southern Plains. *Journal of Field Archaeology* 14, 313-329.
- Baumer, A. and Argiolas, R. (1981) Synthèses hydrothermales et déterminations RX d'apatites chlorée, fluorée ou hydroxylée, *Neues Jahrbuch für Mineralogie Monatshefte*, 8. 344-348
- Baumer, A., Ohnenstetter, D. and Lapraz, D. (1990) Incorporation of samarium in synthetic hydrothermal fluorite, *Neues Jahrbuch für Mineralogie Monatshefte*, 10. 449-461
- Bavay, L., de Putter, T., Adams, B., Navez, J. and Andre, L. (2000) The origin of obsidian in Predynastic and Early dynastic upper Egypt. *Mitteilungen des Deutschen Archäologischen Instituts - Abteilung Kairo* 56, 5-20.
- Bayer, F.M. (1996) Three new species of precious coral (Anthozoa: Gorgonacea genus *Corallium*) from Pacific waters. *Proceedings of the Biological Society of Washington* 109, 205-228.
- Bayle, L.D. (2010) Le phenakite de Mogok. *Le Règne Minéral*, 59.
- Beard, M. (1995) Pakistan gem trade faces uncertain future. *Colored Stone* 8, 1, 118-122.
- Beattie, R. and Brown, G. (1985) Facetable prehnite. *Australian Gemmologist* 15, 258-259.
- Beaume, J. P., Barriquaud, R., Maitrallet, P. and Sirakian, D. (1997) La découverte de grenats à "effets alexandrite" se poursuit au Sri-Lanka, *Revue de Gemmologie a.f.g.*, 131. 2
- Beck, C. W. (1982b) Physical methods used to determine the geological origin of amber and other fossil resins; some critical remarks: Comment, *Physics and Chemistry of Minerals*, 8. 3. 146-147
- Beck, C. W., Wilbur, E. and Meret, S. (1964) Infra-red spectra and the origin of amber, *Nature*, 201. 4916. 256-257
- Beck, C., Wilbur, E., Meret, S., Kossove, D. and Kermani, K. (1965) The infrared spectra of amber and the identification of Baltic amber, *Archaeometry*, 8. 1. 96-109
- Beck, R. J. (1984), New Zealand Jade, *Wellington*, A.H. and A.W. Reed,
- Becker, G. (1991) Emeralds from Nigeria and olivines from outerspace, *22nd International Gemmological Conference - Abstracts*,
- Beesley, C.R. (1982) Detection of heated sapphire: Some tell-tale signs. *Jewelers' Circular Keystone Magazine*, 106-107.
- Beger, M., Jones, G.P. and Munday, P.L. (2003) Conservation of coral reef biodiversity: A comparison of reserve selection procedures for corals and fishes. *Biological Conservation* 111, 53-62.
- Beirau T., Bismayer U., Mihailova B., Paulmann C. and Groat L. (2010) Structural phenomena of metamict titanite: A synchrotron, X-ray diffraction and vibrational spectroscopic study. *Phase Transitions*, 83, (9), 694-702.
- Bekker, T. B. and Barz, R. U. (2007) Study of growth faces in hydrothermally obtained beryl single crystals using (556)-oriented seeds, *Crystal Growth and Design*, 7. 9. 1898-1903

- Belcher, A. M., Wu, X. H., Christensen, R. J., Hansma, P. K., Stucky, G. D. and Morse, D. E. (1996) Control of crystal phase switching and orientation by soluble mollusc-shell proteins, *Nature*, 381, 6577. 56-58
- Bellot-Gurlet, L., Dorighel, O. and Poupeau, G. (2008) Obsidian provenance studies in Colombia and Ecuador: Obsidian sources revisited. *Journal of Archaeological Science* 35, 272-289.
- Bellot-Gurlet, L., Poupeau, G., Salomon, J., Calligaro, T., Moignard, B., Dran, J.C., Barrat, J.A. and Pichon, L. (2005) Obsidian provenance studies in archaeology: A comparison between PIXE, ICP-AES and ICP-MS. *Nuclear Instruments and Methods in Physics Research B* 240, 583-588.
- Belousova E.A., Griffin W.L. and Pearson N.J. (1998) Trace element composition and cathodoluminescence properties of southern African kimberlitic zircons. *Mineralogical Magazine*, 62, (3), 355-366.
- Belousova E.A., Griffin W.L., O'Reilly S.Y. and Fisher N.I. (2002) Igneous zircon: Trace element composition as an indicator of source rock type. *Contributions to Mineralogy and Petrology*, 143, (5), 602-622.
- Belt, R.F. (1967) Hydrothermal ruby: Infrared spectra and x-ray topography. *Journal of Applied Physics* 38, 2688-2689.
- Belykh G.I., Gritsyna V.T., Lytvynov L.A. and Kolner V.B. (2005) Structural and mechanical characteristics of magnesium-aluminate spinel crystals grown by Verneuil and Czochralski methods. *Functional Materials*, 12, (3), 447-453.
- Benard F., Moutou P. and Pichavant M. (1985) Phase relations of tourmaline leucogranites and the significance of tourmaline in silicic magmas. *Journal of Geology*, 93, (3), 271-291.
- Benesch F. and Wöhrmann B. (1985) Toramalli: A short history of the tourmaline group. *Mineralogical Record*, 16, (5), 331-338.
- Bennett, D. (1992) Imitation lapis lazuli, charoite and azurite-malachite, *Australian Gemmologist*, 18. 3. 83-85
- Benson, L.B. (1959) Black coral. *Gems and Gemology* 9, 337.
- Benson, L.B. (1959a) Alexandrites, *Gems and Gemology*, 9. 9. 264
- Benson, L.B. (1959b) Highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 9. 9. 264-267, 286
- Benson, L.B. (1959c) Synthetic emerald, *Gems and Gemology*, 9. 9. 265
- Benson, L.B. (1959d) Black coral, *Gems and Gemology*, 9. 11. 337
- Benson, L.B. (1960a) Unusual stones, *Gems and Gemology*, 10. 2. 51-52
- Benson, L.B. (1960b) Cat's-eye demantoid, *Gems and Gemology*, 10. 3. 92
- Benson, L.B. (1960c) An unusual benitoite, *Gems and Gemology*, 10. 4. 125
- Benson, L.B. (1960d) Star peridot. *Gems and Gemology* 10, 3.
- Benson, L.B. (1960e) Turquoise. *Gems and Gemology* 10, 51.
- Benson, L.B. (1961) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 10. 5. 143-147
- Benstock, E. J., Buseck, P. R. and Steele, I. M. (1997) Cathodoluminescence of meteoritic and synthetic forsterite at 296 and 77K using TEM, *American Mineralogist*, 82. 3/4. 310-315
- Bente, K., Thum, R. and Wannemacher, J. (1991) Colored pectolites, so-called "Larimar", from Sierra de Baoruco, Barahona Province, southern Dominican Republic. *Neues Jahrbuch für Mineralogie Monatshefte*, 14-22.
- Bentor, Y.K. (1986) A new approach to the problem of tektite glasses. *Earth and Planetary Science Letters* 77, 1-13.
- Beran, A. (1990) The occurrence of OH absorption in phenakite - An IR spectroscopic study. *Mineralogy and Petrology* 41, 73-79.
- Beran, A. and Zemmann, J. (1986) The pleochroism of a gem-quality enstatite in the region of the OH stretching frequency, with a stereochemical interpretation, *Tschermaks Mineralogische und Petrographische Mitteilungen*, 35. 1. 19-25
- Beran, A., Hafner, S. and Zemmann, J. (1983) Untersuchungen über den einbau von hydroxylgruppen im edelstein-sillimanit. *Neues Jahrbuch für Mineralogie Monatshefte*, 219-226.
- Berg, R.B. (2004) Probable bedrock source of sapphires in alluvial deposits north of Butte, Montana. *Nevada Bureau of Mines and Geology - Special Publication*, 23-30.
- Berg, R.B. and Dahy, J.P. (2002) Montana sapphires and speculation on their origin. *Industrial Minerals and Extractive Industry Geology*, 199-204.
- Berger P. (1997), Buyers' guide to andalusite, *Miami Diamonds and Jewelry*, December/January, 5-6.

- Berger, A.L. and Berg, R.B. (2006) The Silver Bow sapphire occurrence, Montana: Evidence for a volcanic bedrock source for Montana's alluvial sapphire deposits. *Economic Geology* 101, 679-684.
- Bergman, J. (1997) Radioactive cat's-eye warning, *Asia Precious*, 5. 12. 18-19
- Bergstein, L. J. (1964) Inclusions in jade, *Lapidary Journal*, 17. 11, 12. 1076–1078; 1080, 1196–1199
- Berman, H. and Gonyer, F. A. (1930) Pegmatite minerals of Poland, Maine, *American Mineralogist*, 15. 8. 375-387
- Berman, R. (1957) Some physical properties of naturally irradiated fluorite, *American Mineralogist*, 42. 3/4. 191-203
- Bernau R. and Franz G. (1987) Crystal chemistry and genesis of Nb-, V-, and Al-rich metamorphic titanite from Egypt and Greece. *Canadian Mineralogist*, 25, (4), 695-705.
- Berrangé, J.P. and Jobbins, E.A. (1976) The geology, gemmology, mining methods and economic potential of the Pailin ruby and sapphire gem-field, Khymer Republic. Institute of Geological Sciences, Overseas Division.
- Bershov, L. V., Gaite, J. M., Hafner, S. S. and Rager, H. (1983) Electron paramagnetic resonance and ENDOR studies of Cr^{3+} - Al^{3+} pairs in forsterite, *Physics and Chemistry of Minerals*, 9. 2. 95-101
- Bessonova, T.S. and Stanislavskii, M.P. (1981) Thermostimulated processes in ruby. *Journal of Applied Spectroscopy* 35, 1201-1204.
- Bessonova, T.S., Ganapolskii, E.M. and Khaimov-Malkov, V.Y. (1981) Nature of optical absorption in ruby induced by ionizing radiation. *Journal of Applied Spectroscopy* 34, 452-454.
- Bettiol A.A., Nugent K.W. and Jamieson D.N. (1997) The characterization of high-grade synthetic quartz, corundum and spinel using ionoluminescence (IL). *Nuclear Instruments and Methods in Physics Research B*, 130, (1/4), 734-739.
- Beukes, G. J., Slabbert, M. J., de Bruijn, H., Botha, B. J. V., Schoch, A. E. and van der Westhuizen, W. A. (1987) Ti-dumortierite from the Keimoes Area, Namaqua Mobile Belt, South Africa, *Neues Jahrbuch für Mineralogie Abhandlungen*, 157. 3. 303-318
- Beurlen H., de Moura O.J.M., Soares D.R., da Silva M.R.R. and Rhede D. (2011) Geochemical and geological controls on the genesis of gem-quality 'Paraiba tourmaline' in granitic pegmatites from northeastern Brazil. *Canadian Mineralogist*, 49, (1), 277-300.
- Bevan, A. and Downes, P. (1997) Alexandrite chrysoberyl from Dowerin, Western Australia: Revisited, *Australian Gemmologist*, 19. 11. 460-463
- Biagini R., Memmi I. and Olmi F. (1997) Radiation damage in zircons. *Neues Jahrbuch für Mineralogie Monatshefte*, (6), 257-270.
- Bigazzi, G., Coltelli, M., Hadler, N.J.C., Osorio-Araya, A.M., Oddone, M. and Salazar, E. (1992) Obsidian-bearing lava flows and pre-Columbian artifacts from the Ecuadorian Andes: First new multidisciplinary data. *Journal of South American Earth Sciences* 6, 21-32.
- Bigazzi, G., Meloni, S., Oddone, M. and Radi, G. (1986) Provenance studies of obsidian artifacts: Trace element analysis and data reduction. *Journal of Radioanalytical and Nuclear Chemistry* 98, 353-363.
- Bilal E., Cesar-Mendes J., Correia-Neves J.M., Nasraout M. and Fuzikawa K. (1998) Chemistry of tourmalines in some pegmatites of Sao José de Safira area, Minas Gerais, Brazil. *Journal of the Czech Mineralogical Society*, 43, (1/2), 31-36.
- Bill, H. and Calas, G. (1978) Color centers, associated rare-earth ions and the origin of coloration in natural fluorites, *Physics and Chemistry of Minerals*, 3. 2. 117-131
- Bill, H., Sierro, J. and Lacroix, R. (1967) Origin of coloration in some fluorites, *American Mineralogist*, 52. 7/8. 1003-1008
- Billings, M.P. (1927) Topaz and phenakite from Baldface Mountain, Chatham, New Hampshire. *American Mineralogist* 12, 173-179.
- Birch, W.D. (1986) Zinc-manganese carbonates from Broken Hill, New South Wales. *Mineralogical Magazine* 50, 49-53.
- Birch, W.D. (2008) Gem corundum from the St. Arnaud district, Western Victoria, Australia. *Australian Journal of Mineralogy* 14, 73-78.
- Birdsall M.C. (1986) Lightning Ridge: Black opal capital of Australia. *Lapidary Journal*, 40, (3), 26-32.
- Biró, K.T. (2004) Carpathian obsidians: Myth and reality. *34th International Symposium on Archaeometry*, 267-277.
- Biryukov, V. M. and Berdnikov, N. V. (1993) The paragenetic relation between charoite mineralization and alkali metasomatism, *International Geology Review*, 35. 7. 585-602

- Bischoff, J. L. (1969) Temperature controls on aragonite-calcite transformation in aqueous solution, *American Mineralogist*, 54, 1/2, 149-155
- Bischoff, W. D., Bishop, F. C. and Mackenzie, F. T. (1983) Biogenically produced magnesian calcite: inhomogeneities in chemical and physical properties; comparison with synthetic phases, *American Mineralogist*, 68, 11/12, 1183-1188
- Bishop, H. R. (1906), Investigations and Studies in Jade, New York, The Bishop Collection,
- Bismayer U., Schmah W., Schmidt C. and Groat L.A. (1992) Linear birefringence and X-ray diffraction studies of the structural phase transition in titanite, CaTiSiO_5 . *Physics and Chemistry of Minerals*, 19, (4), 260-266.
- Bismayer U., Zhang M., Groat L.A., Salje E.K.H. and Meyer H.W. (1999) Beta-gamma phase transition in titanite and the isosymmetric analogue in malayite. *Phase Transitions*, 68, (3), 545-556.
- Black L.P., Kamo S.L., Allen C.M., Aleinikoff J.N., Davis D.W., Korsch R.J. and Foudoulis C. (2003) TEMORA 1: A new zircon standard for Phanerozoic U-Pb geochronology. *Chemical Geology*, 200, (1/2), 155-170.
- Black L.P., Kamo S.L., Allen C.M., Davis D.W., Aleinikoff J.N., Valley J.W., Mundil R., Campbell I.H., Korsch R.J., Williams I.S. and Foudoulis C. (2004) Improved $^{206}\text{Pb}/^{238}\text{U}$ microprobe geochronology by the monitoring of a trace-element-related matrix effect: SHRIMP, ID-TIMS, ELA-ICP-MS and oxygen isotope documentation for a series of zircon standards. *Chemical Geology*, 205, (1/2), 115-140.
- Black L.P., Kamo S.L., Williams I.S., Mundil R., Davis D.W., Korsch R.J., Foudoulis C. (2003) The application of SHRIMP to Phanerozoic geochronology: A critical appraisal of four zircon standards. *Chemical Geology*, 200, (1/2), 171-188.
- Blass, G. and Graf, H. W. (1999) Die wannenköpfe bei ochtendung in der Vulkaneifel und ihre mineralien, *Mineralien Welt*, 10. 6.
- Blasse G., Dirksen G.J., Tanaka I. and Kojima H. (1988) The luminescence of titanite (CaTiSiO_5). *Materials Research Bulletin*, 23, (12), 1727-1730.
- Blasse, G. and Dirksen, G. J. (1980) A simple luminescence experiment suggesting rare earth ion pairing in the fluorite structure, *Journal of the Electrochemical Society*, 27. 4. 978-979
- Blatt H. (1987) Perspectives: Oxygen isotopes and the origin of quartz. *Journal of Sedimentary Research*, 57, (2), 373-377.
- Blauer E. (1996) The politics of mining tanzanite. *Lapidary Journal*, 50, (3), 42-45.
- Blauwet D. (2006) The sapphire and spinel deposit of An Phu, Luc Yen mining district, Yen Bai Province, Vietnam. *Mineralogical Record*, 37, (3), 225-238.
- Bleek, A. W. G. (1908) Jadeite in the Kachin Hills, Upper Burma, *Geological Survey of India - Records*, 36. 4. 254-285, pls. 35-38, 3 figs., reprinted in *Bulletin of the Friends of Jade*, Vol. 9, Jan. 1996, pp. 29-52
- Bloodaxe E.S., Hughes J.M., Dyar M.D., Grew E.S. and Guidotti C.V. (1999) Linking structure and chemistry in the schorl-dravite series. *American Mineralogist*, 84, (5/6), 922-928.
- Blount, A.M. (1993) Nature of the alterations which form on pyrite and marcasite during collection storage. *Collection Forum* 9, 1-16.
- Blum, J.D. and Chamberlain, C.P. (1992) Oxygen isotope constraints on the origin of impact glasses from the Cretaceous-Tertiary boundary. *Science* 257, 1104-1107.
- Boardman, L.G. (1964) Further geological data on the Postmasburg and Kuruman manganese ore deposits, Northern Cape Province. *Geological Society of South Africa*, 415-440.
- Bobos I., Vieillard P., Charoy B. and Noronha F. (2007) Alteration of spodumene to cookeite and its pressure and temperature stability conditions in Li-bearing aplite-pegmatites from northern Portugal. *Clays and Clay Minerals*, 55, (3), 295-310.
- Bocchio, R., Bracco, S., Brajkovic, A., Comotti, A. and Rolandi, V. (2006) Gem corals: X-ray diffraction, solid state NMR, elemental analysis. *Australian Gemmologist* 22, 524-532.
- Bocchio, R., Brajkovic, A. and Pilati, T. (1986) Crystal chemistry of the olivines in the peridotites from the Ivrea-Verbania Zone (Western Italian Alps). *Neues Jahrbuch für Mineralogie Monatshefte*, 313-324.
- Bodinier J.I., Merlet C., Bedini R.M., Simien F., Remaidi M. and Garrido C.J. (1996) Distribution of niobium, tantalum, and other highly incompatible trace elements in the lithospheric mantle: The spinel paradox. *Geochimica et Cosmochimica Acta*, 60, (3), 545-550.
- Boettcher, M.E., Gehlken, P.L. and Usdowski, E. (1992) Infrared spectroscopic investigations of the calcite-rhodochrosite and parts of the calcite-magnesite mineral series. *Contributions to Mineralogy and Petrology* 109, 304-306.

- Bohlen, S.R., A. Montana and D. E. Kerrick (1991), Precise determinations of the equilibria kyanite = sillimanite and kyanite = andalusite and a revised triple point for Al_2SiO_5 polymorphs, *American Mineralogist*, 76, 5/6, 677-680.
- Böhm, F., Gussone, N., Eisenhauer, A., Dullo, W.C., Reynaud, S. and Paytan, A. (2006) Calcium isotope fractionation in modern scleractinian corals. *Geochimica et Cosmochimica Acta* 70, 4452-4462.
- Bons P.D. (2001) The formation of large quartz veins by rapid ascent of fluids in mobile hydrofractures. *Tectonophysics*, 336, (1/4), 1-17.
- Bontinck, W. (1958) Colour centers in synthetic fluorite crystals, *Physica*, 24. 639-649
- Bookstone, H. (1964) A new brazilianite find, *Lapidary Journal*, 18. 9. 1000-1001
- Boone, D. (1986) Ivory - The elegant overbite, *Lapidary Journal*, 40. 2. 57-65
- Borodin, A.V. (2008) Advanced technologies of shaped sapphire fabrication. *Journal of Crystal Growth* 310, 2141-2147.
- Borodin, V. L. and Nefedova, I. V. (2005) Growth and characteristics of calcite single crystals, *Journal of Crystal Growth*, 275. 1/2. e633-e636
- Bosbach, D., Jordan, G. and Rammensee, W. (1994) Investigation of surface processes by scanning force microscopy: crystal growth and dissolution, *USA Microscopy and Analysis*, March. 15-17
- Bosbach, D., Jordan, G. and Rammensee, W. (1995) Crystal growth and dissolution kinetics of gypsum and fluorite: An in-situ scanning force microscope study, *European Journal of Mineralogy*, 7. 2. 267-176
- Bosi F. (2008) Disordering of Fe^{2+} over octahedrally coordinated sites of tourmaline. *American Mineralogist*, 93, (10), 1647-1653.
- Bosi F. (2010) Octahedrally coordinated vacancies in tourmaline: A theoretical approach. *Mineralogical Magazine*, 74, (6), 1037-1044.
- Bosi F. (2011) Stereochemical constraints in tourmaline: From a short-range to a long-range structure. *Canadian Mineralogist*, 49, (1), 17-27.
- Bosi F. and Lucchesi S. (2004) Crystal chemistry of the schorl-dravite series. *European Journal of Mineralogy*, 16, (2), 335-344.
- Bosi F. and Lucchesi S. (2007) Crystal chemical relationships in the tourmaline group: Structural constraints on chemical variability. *American Mineralogist*, 92, (7), 1054-1063.
- Bosi F., Agrosi G., Lucchesi S., Melchiorre G. and Scandale E. (2005) Mn-tourmaline from the Island of Elba (Italy): Crystal chemistry. *American Mineralogist*, 90, (10), 1661-1668.
- Bosi F., Andreozzi G.B., Federico M., Graziani G. and Lucchesi S. (2005) Crystal chemistry of the elbaite-schorl series. *American Mineralogist*, 90, (11/12), 1784-1792.
- Bosi F., Lucchesi S. and Rezitskii L. (2004) Crystal chemistry of the dravite-chromdravite series. *European Journal of Mineralogy*, 16, (2), 345-352.
- Bosshart, G. (1982) Distinction of natural and synthetic rubies by ultraviolet spectrophotometry. *Journal of Gemmology* 18, 145-160.
- Bosshart, G. (1983) Ramaura: Eine neue Rubinsynthese (Erste untersuchungsergebnisse). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 32, 164-171.
- Bosshart, G. (1990a) Les émeraudes de Colombie, *Revue de Gemmologie a.f.g.*, 105. 13-16
- Bosshart, G. (1990b) Smaragde aus Kolumbien, *Deutsche Goldschmiede Zeitung*, 4,6,8. 184-186, 96-102, 68-70
- Bosshart, G. (1991a) Emeralds from Colombia; Part 1, *Journal of Gemmology*, 22. 6. 355-361
- Bosshart, G. (1991b) Emeralds from Colombia: Part 2, *Journal of Gemmology*, 22. 7. 409-425
- Bosshart, G. (1991c) Emeralds from Colombia: Part 3, *Journal of Gemmology*, 22. 8. 500-503
- Bosshart, G. (1991d) Les émeraudes de Colombie, *Revue de Gemmologie a.f.g.*, 105, 106, 107. 13-16, 19,24, 7-10
- Bosshart, G. (1999) Type IIa diamond colour enhanced by General Electric Co, *Singaporean Gemmologist*, 6. 2. 26-28
- Bosshart, G. and Schmetzer, K. (1986) Spectrophotometric measurements of faceted rubies: Critical review of an immersion technique. *Journal of Gemmology* 20, 238-239.
- Bosshart, G. and Smith, C. (2001) Natural and HPHT-annealed pink and blue diamonds, *Jewellery News Asia*, November. 144-145
- Bosshart, G., Frank, E., Hänni, H. A. and Barot, N. (1982) Blue colour-changing kyanite from East Africa, *Journal of Gemmology*, 18. 3. 205-212

- Bostwick, L.P. (1938) Abalones and their pearls. *Gems and Gemology* 2, 187-188.
- Botis S., Nokhrin S.M., Pan Y., Xu Y., Bonli T. and Sopuck V. (2005) Natural radiation-induced damage in quartz, I: Correlations between cathodoluminescence colors and paramagnetic defects. *Canadian Mineralogist*, 43, (5), 1565-1580.
- Bottrill, R.S. (1996) Corundum and sapphire in Tasmania. *Tasmanian Geological Survey*, 1-4.
- Bouchard M. and Gambardella A. (2010) Raman microscopy study of synthetic cobalt blue spinels used in the field of art. *Journal of Raman Spectroscopy*, 41, (11), 1477-1485.
- Bouska, V. (1997) REE in tektites. *Journal of the Czech Geological Society* 42, 32.
- Bouska, V. and Rost, R. (1972) Double moldavites in southern Bohemia, *Science*, 177. 4084. 519-520
- Bouska, V., Frydrych, M. and Turnovec, I. (1985) Moldavites as precious stones, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 34. 3/4. 83-91
- Bowden, P., Von Knorring, O. and Bartholomew, R.W. (1969) Sinhalite and serendibite from Tanzania. *Mineralogical Magazine* 37, 145-147.
- Bowden, P., Von Knorring, O. and Bartholomew, R.W. (1969) Sinhalite and serendibite from Tanzania. *Mineralogical Magazine* 37, 145-147.
- Bowersox, G. W. and Anwar, J. (1989) The Gujar Killi emerald deposit, Northwest Frontier Province, Pakistan, *Gems and Gemology*, 25. 1. 16-24
- Bowersox, G., Snee, L. W., Foord, E. E. and Seal, R. R. (1991) Emeralds of the Panjshir Valley, Afghanistan, *Gems and Gemology*, 27. 1. 26-39
- Bowersox, G.W., Foord, E.E., Laurs, B.M., Shigley, J.E. and Smith, C.P. (2000) Ruby and sapphire from Jegdalek, Afghanistan. *Gems and Gemology* 36, 110-126.
- Boyd, W. F. and Wight, W. (1981) Gemstones of Canada, *Journal of the Gemmological Society of Japan*, 8. 1/4. 27-39
- Bracewell, H. (1989) Wave Hill prehnite. *Australian Gemmologist* 17, 127-128.
- Bracewell, H. and Brown, G. (1984) Turquoise or chrysocola from the Jervois Area, Northern Territory, *Australian Gemmologist*, 15. 6. 189-195
- Bracewell, H. and Brown, G. (1985) Amazonite from the Koppio District - South Australia, *Australian Gemmologist*, 15. 11. 404-408
- Brajkovic A., Rolandi V., Vignola P. and Grizzetti R. (2007) Blue and pink opals from Acari, Peru: Their optical, structural and spectroscopic features. *Australian Gemmologist*, 23, (1), 3-15.
- Bramanti, L., Magagnini, G., De Maio, L. and Santangelo, G. (2005) Recruitment, early survival and growth of the Mediterranean red coral *Corallium rubrum* (L 1758): A four-year study. *Journal of Experimental Marine Biology and Ecology* 314, 69-78.
- Brandstatter, F., Melchart, W. and Niedermayr, G. (1997) Zwei angeblich römische Gemmen aus chalcedon bzw. aus sodalith aus dem ehemaligen Jugoslawien (Chalcedony and sodalite cameos from the former Yugoslavia purportedly of Roman origin). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 46, 93-98.
- Brauner, Z. (2007) Point de vue général d'un diamantaire sur le diamant, les diamants synthétiques et ses imitations, *Revue de Gemmologie a.f.g.*, 161. 9-13
- Braunwart, E. (1993) Peridot leads gemstone production in the United States. *International Colored Stone Association - Gazette*, 10-11.
- Breuer, K. H. and Eysel, W. (1988) Structural and chemical varieties of diopside, $\text{Cu}_6[\text{Si}_6\text{O}_{18}]\cdot 6\text{H}_2\text{O}$. I. Thermal properties, *Zeitschrift für Kristallographie*, 184. 1. 1-11
- Breuer, K. H., Eysel, W. and Müller, R. (1989) Structural and chemical varieties of diopside, $\text{Cu}_6[\text{Si}_6\text{O}_{18}]\cdot 6\text{H}_2\text{O}$. II. Structural properties, *Zeitschrift für Kristallographie*, 187. 1. 15-23
- Bridges C. (1982), Gems of East Africa, *International Gemmological Symposium*, 266-275.
- Bridges, C. R., Graziani, G. and Gübelin, E. (1984) Ein neuer edelstein aus der feldspat-familie, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 33. 3/4. 104-113
- Bridges, C. R., Graziani, G. and Gübelin, E. (1989) A Kenyan gemstone from the feldspar family: Further observations, *Australian Gemmologist*, 17. 5. 177-183
- Briggs, H. E. (1935) A coated "emerald", *Gems and Gemology*, 1. 9. 254
- Brightman R. (1982), Stones seen - Viridine with a low R.I, *Australian Gemmologist*, 14, 12, 322-323.
- Brigida C., Poli S. and Valle M. (2007) High-temperature phase relations and topological constraints in the quaternary system $\text{MgO-Al}_2\text{O}_3\text{-SiO}_2\text{-Cr}_2\text{O}_3$: An experimental study. *American Mineralogist*, 92, (5/6), 735-747.

- Brink, D. J. and van der Berg, N. G. (2005) An investigation of green iridescence on the mollusc *Patella granatina*, *Journal of Physics D: Applied Physics*, 38, 2. 338-343
- Brodzinsky, J. (1985) Fossils in Dominican amber, *Fossils Quarterly*, 3, 3/4. 29-40
- Bromiley G.D., Nestola F., Redfern S.A.T. and Zhang M. (2010) Water incorporation in synthetic and natural MgAl_2O_4 spinel. *Geochimica et Cosmochimica Acta*, 74, (12), 705-718.
- Bromiley, G. D., Keppler, H., McCammon, C., Bromiley, F. A. and Jacobsen, S. D. (2004) Hydrogen solubility and speciation in natural, gem-quality chromian diopside, *American Mineralogist*, 89, 7. 941-949
- Brousse, R., Varet, J. and Bizouard, H. (1969) Iron in the minerals of the sodalite group. *Contributions to Mineralogy and Petrology* 22, 169-184.
- Brouwer, S. B. and Brouwer, P. A. (1980) Geologia de la región ambarífera oriental de la Republica Dominicana, *9th Caribbean Geological Conference - Proceedings*, 303-322
- Brown L.D., Ray A.S. and Thomas P.S. (2003) ^{29}Si and ^{27}Al NMR study of amorphous and paracrystalline opals from Australia. *Journal of Non-Crystalline Solids*, 332, (1/3), 242-248.
- Brown L.D., Ray A.S. and Thomas P.S. (2004) Elemental analysis of Australian amorphous banded opals by laser-ablation ICP-MS. *Neues Jahrbuch für Mineralogie Monatshefte*, (9), 411-424.
- Brown L.D., Ray A.S., Thomas P.S. and Guerbos J.P. (2002) Thermal characteristics of Australian sedimentary opals. *Journal of Thermal Analysis and Calorimetry*, 68, (1), 31-36.
- Brown, G. (1976) Horn - Some aspects of interest to the gemmologist, *Australian Gemmologist*, 12, 11. 331-338
- Brown, G. (1977) Deux nouvelles varietes de coral d'Hawaii, *Revue de Gemmologie a.f.g.*, 53, 3-5
- Brown, G. (1978) The identification of some rare organic gem materials, *Australian Gemmologist*, 13, 7. 238-239
- Brown, G. (1979) Gold corals - Some thoughts on their discrimination. *Gems and Gemology* 16, 240-244.
- Brown, G. (1981) The Kashan synthetic ruby: An attempt to sift fact from fiction. *Jeweller, Watchmaker & Giftware* 66, 45-49.
- Brown, G. (1982) An interesting amber imitation, *Australian Gemmologist*, 14, 10. 272-273
- Brown, G. (1984a) Australia's first emeralds, *Journal of Gemmology*, 19, 4. 320-335
- Brown, G. (1984b) Gem feldspars, *Wahroonga News*, 18, 4.
- Brown, G. (1985) Aquamarine from Mt. Surprise, Queensland, Australia, *Journal of Gemmology*, 19, 8. 707-722
- Brown, G. (1985) Identifying Gilson's polycrystalline lapidary materials, *Australian Gemmologist*, 15, 11. 413-417
- Brown, G. (1985) Seiko synthetics, *Australian Gemmologist*, 15, 11. 418-420
- Brown, G. (1986) The gemmology of the shell cameo. *Australian Gemmologist* 16, 153-161.
- Brown, G. (1988) Paua shell: New Zealand's distinctive organic gem. *Australian Gemmologist* 16, 367-370.
- Brown, G. (1990) Some rare ivories, *Australian Gemmologist*, 17, 7. 256-262
- Brown, G. (1990a) Diffusion coated synthetic sapphire. *International Colored Stone Association - Laboratory Alert*, 2 pp.
- Brown, G. (1990b) Gemmology study club lab reports. *Australian Gemmologist* 17, 221-230.
- Brown, G. (1991a) A new surface diffusion-treated sapphire. *Australian Gemmologist* 17, 457-459.
- Brown, G. (1991b) Vulcanite or gutta-percha? That is a question. *Journal of Gemmology* 22, 292-297.
- Brown, G. (1992a) Knischka-created rubies. *Journal of the Gemmological Association of Hong Kong* 15, 40-47.
- Brown, G. (1992b) Vietnamese ruby: A discriminatory problem for gemmologists. *Australian Gemmologist* 18, 43-46.
- Brown, G. (1993a) Fluorescence excitation-emission spectra of chromium-containing gems: An explanation for the effectiveness of the crossed filter method, *Australian Gemmologist*, 18, 6. 182-187
- Brown, G. (1993b) Lapis Lazuli, *Journal of the Gemmological Association of Hong Kong*, 16. 88-93
- Brown, G. (1993c) Lapis lazuli - A long used gemstone, *South African Gemmologist*, 7, 3. 14-18
- Brown, G. (1993d) Value-enhanced jadeite: A necessary update. *Jewellery World*, 40, 42.
- Brown, G. (1994) *Gemmology of the abalone and other gastropod pearls [abstract]*. Pearls '94, Journal of Shellfish Research, Honolulu, Hawaii, 332

- Brown, G. (1995a) Shell. *Wahroongai News*, 5-7.
- Brown, G. (1995b) Tortoise-shell. *Wahroongai News*, 26-27.
- Brown, G. (1996a) An alternative African source of vegetable ivory, *Wahroongai News*, July. 21
- Brown, G. (1996b) Beware of treated amber!, *Jewellery World*, November/December. 26-28
- Brown, G. (1996c) Pearls and Corals from Australia, in: Superchi, M. (Ed.), *Gemmologia Europa VI*, Milan, pp. 28-69.
- Brown, G. (1997) Benitoite - official gemstone of the state of California, *Australian Jeweller*, April. 51
- Brown, G. (1998) Sodalite. *Wahroongai News* 32, 20-22.
- Brown, G. (2006) The abalone and its pearls. *Journal of the Gemmological Association of Hong Kong* 27, 9-11.
- Brown, G. and Beatti, R. (1992) Vietnamese ruby fakes: A problem requiring urgent resolution. *Australian Gemmologist* 18, 108-114.
- Brown, G. and Bracewell, H. (1982) Chudleigh Park peridot. *Australian Gemmologist* 14, 253-256.
- Brown, G. and Bracewell, H. (1985) Harts Range sunstone, *Australian Gemmologist*, 15. 8. 263-274
- Brown, G. and Bracewell, H. (1990) Mt. Philip adventurescent iolite, *Australian Gemmologist*, 17. 6. 231-234
- Brown, G. and Bracewell, H. (1995) The gemmology of Pilbara jade. *Journal of the Gemmological Association of Hong Kong* 18, 20-23.
- Brown, G. and Kelly, S. M. B. (1985) Alexandrite-chrysoberyl from Zimbabwe, *Australian Gemmologist*, 15. 8. 275-278
- Brown, G. and Lund, D. (1979) Organic gem materials - What to look for?, *Australian Gemmologist*, 13. 11. 352-353
- Brown, G. and Mann, B. (2007) Elk canines - An unusual source of ivory, *Journal of the Gemmological Association of Hong Kong*, 28. 7-10
- Brown, G. and Moule, A. J. (1982) Hornbill ivory, *Journal of Gemmology*, 18. 1. 8-19
- Brown, G. and Snow, J. (1981) Examination of a prehnite cat's eye. *Australian Gemmologist* 14, 93-96.
- Brown, G. and Snow, J. (1984) Inclusions in Biron synthetic emeralds, *Australian Gemmologist*, 15. 5. 167-171
- Brown, G. and Snow, J. (1988a) Is it amber?, *Australian Gemmologist*, 16. 11. 409-416
- Brown, G. and Snow, J. (1988b) The Pool emerald, *Australian Gemmologist*, 16. 12. 443-449
- Brown, G., Bracewell, H. and Snow, J. (1989) Gems of the Mud Tank carbonatites, *Australian Gemmologist*, 17. 2. 52-57
- Brown, G., Hamid, D. and Kelly, S.M.B. (1985) Some information on the Kashmir sapphire. *Australian Gemmologist* 15, 448-449.
- Brown, G., Kelly, S. M. B. and Snow, J. (1989) Russian hydrothermally-grown emerald, *Australian Gemmologist*, 17. 3. 103-106
- Brown, J.C. (1956) Sapphires of India and Kashmir. *Gemmologist* 25, 78-80; 97-100; 129-132.
- Brown, J.C. (1958) Sapphires of Burma. *Gemmologist* 27, 1-6, 24-27, 41,44.
- Brownlow, A.H. and Komorowski, J.-C. (1988) Geology and origin of the Yogo sapphire deposit, Montana. *Economic Geology* 83, 875-880.
- Brusentsova, T.N., Peale, R.E., Maukonen, D., Harlow, G.E., Boesenberg, J.S. and Ebel, D. (2010) Far infrared spectroscopy of carbonate minerals. *American Mineralogist* 95, 1515-1522.
- Bubshait, A. and Sturman, N. (1996) Notes from the Gem and Pearl Testing Laboratory - Bahrain - 5, *Journal of Gemmology*, 25. 1. 3-19
- Bubshait, A. and Sturman, N. P. G. (1993a) Pressed amber, *Journal of Gemmology*, 23. 7. 398
- Bubshait, A. and Sturman, N. P. G. (1993b) Surface colour enhanced amber, *Journal of Gemmology*, 23. 7. 398-399
- Bubshait, A. and Sturman, N.P.G. (1993c) Waxed filled cavities in coral. *Journal of Gemmology* 23, 400.
- Buckley, A.N. and Woods, R. (1987) The surface oxidation of pyrite. *Applied Surface Science* 27, 437-452.
- Bueno de Camargo M. and Isotani S. (1988) Optical absorption spectroscopy of natural and irradiated pink tourmaline. *American Mineralogist*, 73, (1/2), 172-180.
- Buettner S.H. (2005) Deformation-controlled cation diffusion in compositionally zoned tourmalines. *Mineralogical Magazine*, 69, (4), 471-489.

- Bukin, G. V., Matrosov, V. N., Orekhova, V. P., Remigailo, Y. L., Sevastyanov, B. K., Syomin, E. G., Solntsev, V. P. and Tsvetkov, E. G. (1981) Growth of alexandrite crystals and investigation of their properties, *Journal of Crystal Growth*, 52. 2. 537-541
- Bulnaev, K.B. (2006) Fluorine-beryllium deposits of the Vitim Highland, western Transbaikalian region: Mineral types, localization conditions, magmatism and age. *Geology of Ore Deposits* 48, 277-289.
- Bulur E., Bøtter-Jensen L. and Murray A.S. (2000) Optically stimulated luminescence from quartz measured using the linear modulation technique. *Radiation Measurements*, 32, (5/6), 407-411.
- Bunney, S. (1985) Ancient trade routes for obsidian. *New Scientist*, 25.
- Bunoiu, O.M., Duffar, T. and Nicoara, I. (2010) Gas bubbles in shaped sapphire. *Progress in Crystal Growth and Characterization of Materials* 56, 123-145.
- Burch, C.R. (1987) Metallic inclusions in Chatham synthetic corundums. *Journal of Gemmology* 20, 267-269.
- Burford, M. (1997) Two zirconian rarities, *Canadian Gemmologist*, 18. 4. 108-110
- Burford, M. and Gunasekara, D.P. (2000) An unusual olivine group gemstone from the Kolonne area, Sri Lanka. *Canadian Gemmologist* 21, 84-90.
- Burnham, C.W. (1963) Refinement of the crystal structure of sillimanite. *Zeitschrift für Kristallographie* 118, 127-148.
- Burns P.C., MacDonald D.J. and Hawthorne F.C. (1994) The crystal chemistry of manganese-bearing elbaite. *Canadian Mineralogist*, 32, (1), 31-41.
- Burns, R. G. and Greaves, C. (1971) Correlations of infrared and Mössbauer site population measurements of actinolites, *American Mineralogist*, 56. 11/12. 2010-2033
- Burrigato, F., Giardini, G. and Guidi, C. G. (1982) On a new green apatite from Latium volcano, *Neues Jahrbuch für Mineralogie Monatshefte*, 9. 407-416
- Butcher, J. and White, E.A.D. (1964) A study of the hydrothermal growth of ruby. *Mineralogical Magazine* 33, 974-985.
- Caceres-Martinez, J. and Vasquez-Yeomans, R. (1999) Metazoan parasites and pearls in coexisting mussel species: *Mytilus californianus*, *Mytilus galloprovincialis*, and *Septifer bifurcatus*, from an exposed rocky shore in Baja California, Northwestern Mexico. *Veliger* 42, 10-16.
- Cady S.L., Wenk H.R. and Downing K.H. (1996) HRTEM of microcrystalline opal in chert and porcelainite from the Monterey Formation, California. *American Mineralogist*, 81, (11/12), 1380-1395.
- Calas, G. (1972b) On the blue colour of natural banded fluorites, *Mineralogical Magazine*, 38. 300. 977-979
- Calas, G., Galois, L. and Kiratisin, A. (2005) The origin of the green color of variscite. *American Mineralogist* 90, 984-990.
- Calcinai, B., Cerrano, C. and Bavestrello, G. (2002) A new species of *Scantiletta* (Demospongiae, Clionaidae) from the Mediterranean precious red coral with some remarks on the genus. *Bulletin of Marine Science* 70, 919-926.
- Calligaro T., Dran J.C., Poirot J.P., Querre G., Salomon J., Zwaan J.C. 2000. PIXE/PIGE characterisation of emeralds using an external micro-beam. *Nuclear Instruments & Methods in Physics Research Section B-Beam Interactions with Materials and Atoms* 161: 769-774.
- Calligaro, T. (2008) PIXE in the study of archaeological and historical glass. *X-ray Spectrometry* 37, 169-177.
- Calligaro, T., Mossman, A., Poirot, J.P. and Querre, G. (1998) Provenance study of rubies from a Parthian statuette by PIXE analysis. *Nuclear Instruments and Methods in Physics Research B* 136/138, 846-850.
- Calligaro, T., Poirot, J.P. and Querre, G. (1999) Trace element fingerprinting of jewellery rubies by external beam PIXE. *Nuclear Instruments and Methods in Physics Research B* 150, 628-634.
- Camara F., Iezzi G. and Oberti R. (2003) HT-XRD study of synthetic ferrian magnesian spodumene: The effect of site dimension on the $P2_1/c \rightarrow C2/c$ phase transition. *Physics and Chemistry of Minerals*, 30, (1), 20-30.
- Camara F., Ottolini L., and Hawthorne F.C. (2002) Crystal chemistry of three tourmalines by SREF, EMPA, and SIMS. *American Mineralogist*, 87, (10), 1437-1442.
- Cambell, C. C. (1974) Where is the dividing line between emerald and green beryl?, *Journal of Gemmology*, 14. 4. 177-180
- Campbell, I. C. C. (1973) Emeralds reputed to be of Zambian origin, *Journal of Gemmology*, 13. 5. 169-179
- Campbell, I. C. C. (1978) Study of emeralds from an unsubstantiated African source of origin, *Journal of Gemmology*, 16. 2. 93-108

- Campbell, I. C. C. (1991) A report on one of a number of emeralds from Madagascar, *South African Gemmologist*, 5. 1. 8-15
- Camprubi, A., Melgarejo, J.C., Proenza, J.A., Costa, F., Bosch, J., Estrada, A., Borell, F., Yushkin, N.P. and Andreichev, V.L. (2003) Mining and geological knowledge during the Neolithic: A geological study on the variscite mines at Gava, Catalonia. *Episodes* 26, 295-301.
- Cano, N.F., Blak, A.R. and Watanabe, S. (2010) Correlation between electron paramagnetic resonance and thermoluminescence in natural sodalite. *Physics and Chemistry of Minerals* 37, 57-64.
- Capitani G.C., Leroux H., Doukhan J.C., Rios S., Zhang M. and Salje E.K.H. (2000) A TEM investigation of natural metamict zircons: Structure and recovery of amorphous domains. *Physics and Chemistry of Minerals*, 27, (8), 545-556.
- Caplan, A. (1968) An important carved emerald from the Mogul period of India, *Lapidary Journal*, 21. 11. 1336-1337
- Carbonin S., Russo U. and Della Giusta A. (1996) Cation distribution in some natural spinels from X-ray diffraction and Mössbauer spectroscopy. *Mineralogical Magazine*, 60, (399), 355-368.
- Carbonnel, J. P. (1976) A visit to the Mingaora emerald mine, Swat, Pakistan, *Lapidary Journal*, 30. 5. 1236-1238
- Cario, P. (1989) The present gemological resources of Madagascar based on the evolution of gemology in Madagascar between 1979 and 1986. *University of Nantes - Diploma*, 1-94.
- Carlson, W. D. and Rossman, G. R. (1988) Vanadium- and chromium-bearing andalusite: Occurrence and optical-absorption spectroscopy, *American Mineralogist*, 73. 11/12. 1366-1369
- Carr, R. M. and Fyfe, W. S. (1958) Some observations on the crystallization of amorphous silica, *American Mineralogist*, 43. 9/10. 908-916
- Carrà, M. (1970), *Ivories of the West*, London, Hamlyn, 159 pp., 6003448024,
- Carswell D.A., Wilson R.N. and Zhai M. (1996) Ultra-high pressure aluminous titanites in carbonate-bearing eclogites at Shuanghe in Dabieshan, central China. *Mineralogical Magazine*, 60, (3), 461-471.
- Cartier, L. (2009) Rubies and sapphires from Marosely, Madagascar. *Gems and Jewellery* 18, 25.
- Cartier, L.E. (2011) Rubis et saphirs de Marosely, Madagascar. *Revue de Gemmologie a.f.g.*, 9-13.
- Caruba R., Baumer A., Ganteaume M. and Iacconi P. (1985) An experimental study of hydroxyl groups and water in synthetic and natural zircons: A model of the metamict state. *American Mineralogist*, 70, (11/12), 1224-1231.
- Cassedane J.P. and J. O. Cassedanne (1980), Notes sur l'andalousite gemmes del al Chapada Diamantina, *Revue de Gemmologie a.f.g.*, 63, 15-17.
- Cassedanne J.P. and Roditi M. (1991) Crystallized and massive rose quartz deposits in Brazil. *Journal of Gemmology*, 22, (5), 273-286.
- Cassedanne J.P. and Roditi M. (1996) The location, geology and mineralogy of gem tourmalines in Brazil. *Journal of Gemmology*, 25, (4), 263-298.
- Cassedanne, J. (1971) Geologia da ocorrência de jaspe vermelho de cabeça enchada, *Boletim de Geologia - Instituto de Geociencias Universidade Federal do Rio de Janeiro*, 6. 23-26
- Cassedanne, J. (1972) Le béryl au Brésil (aigue-marine, émeraude, héliodore & morganite), *Revue de Gemmologie a.f.g.*, 30. 10-12
- Cassedanne, J. (1984a) Le chrysobéryl au Brésil, *Revue de Gemmologie a.f.g.*, 80. 7-14
- Cassedanne, J. (1985) Andalousite et scapolite de Espirito Santo (Bésil), *Revue de Gemmologie a.f.g.*, 82. 21-25
- Cassedanne, J. (1985) Au pays des émeraudes, *Monde et Minéraux*, 66. 16-20
- Cassedanne, J. (1998) La rhodocrosite de Capillitas, Argentine. *Le Règne Minéral*, 5-14.
- Cassedanne, J. and Roditi, M. (1993) The location, geology, mineralogy and gem deposits of alexandrite, cat's-eye and chrysoberyl in Brazil, *Journal of Gemmology*, 23. 6. 333-354
- Cassedanne, J. P. (1981) Note sur la brazilianite et ses gisements bresiliens, *Revue de Gemmologie a.f.g.*, 68. 14-17
- Cassedanne, J. P. (1982b) Les agates de type Umbu, *Revue de Gemmologie a.f.g.*, 73. 5-8
- Cassedanne, J. P. (1983) Famous mineral localities: The Córrego Frio mine and vicinity, Minas Gerais, Brazil, *Mineralogical Record*, 14. 4. 227-237
- Cassedanne, J. P. (1984b) Les gisements bresiliens de chrysobéryl, *Noveno Congreso Geológico Argentino*, 5. 390-405

- Cassedanne, J. P. and Cassedanne, J. O. (1974) Note sur la mine d'émeraude de Carnaíba, *Revue de Gemmologie a.f.g.*, 40. 4-8
- Cassedanne, J. P. and Cassedanne, J. O. (1977) Axinite, hydromagnesite, amethyst and other minerals from near Vitória de Conquista (Brazil), *Mineralogical Record*, 8. 5. 382-387
- Cassedanne, J. P. and Franco, R. R. (1966) Indices de dumortierite de la Serra da Vereda, *Anais da Academia Brasileira de Ciencias*, 38. 1. 47-52
- Cassedanne, J. P. and Sauer, D. A. (1982) Les émeraudes de Santa Terezinha (Goias), *Revue de Gemmologie a.f.g.*, 71. 4-8
- Cassedanne, J. P. and Sauer, D. A. (1984) The Santa Terezinha De Goiás emerald deposit, *Gems and Gemology*, 20. 1. 4-13
- Cassedanne, J. P., Cassedanne, J. O. and Vachey, H. (1983) L'axinite de la Lagona da Tabua (District de Lagona Réal, Etat de Bahia - Brésil), *Anais da Academia Brasileira de Ciencias*, 55. 1. 93-103
- Cassedanne, J.P. (1985) Recent discoveries of phenakite in Brazil. *Mineralogical Record* 16, 107-109.
- Cassedanne, J.P. and Cassedanne, J.O. (1978) La pétalite de Itinga (Minas Gerais). *Revue de Gemmologie a.f.g.*, 14-16.
- Cassedanne, J.P. and Cassedanne, J.O. (1980) Note sur deux gites de sodalite. *Revue de Gemmologie a.f.g.*, 4-7.
- Castañeda C., Eeckhout S.G., Magela da Costa G., Botelho N.F. and de Grave E. (2006) Effect of heat treatment on tourmaline from Brazil. *Physics and Chemistry of Minerals*, 33, (3), 207-216.
- Castañeda C., Oliveira E.F., Gomes N. and Soares A.C.P. (2000) Infrared study of OH sites in tourmaline from the elbaite-schorl series. *American Mineralogist*, 85, (10), 1503-1507.
- Caucia F., Ghisoli C. and Adamo I. (2009) A study of the characteristics of some C- and CT-opals from Brazil. *Neues Jahrbuch für Mineralogie Abhandlungen*, 185, (3), 289-296.
- Caucia F., Ghisoli C., Adamo I. and Boiocchi M. (2008) Opal-C, opal-CT and opal-T from Acari, Peru. *Australian Gemmologist*, 23, (6), 266-271.
- Cavey, C. R. (1987) Some colour variation in jadeite, *Journal of Gemmology*, 20. 6. 376
- Cerná, I., Cerny, P. and Ferguson, R. B. (1973) The fluorine content and some physical properties of the amblygonite-montebasite minerals, *American Mineralogist*, 58. 3/4. 291-301
- Cerna, I., Cerny, P., Selway, J. B. and Chapman, R. (2002) Paragenesis and origin of secondary beryllophosphates: Beryllonite and hydroxylherderite from the BEP granitic pegmatite, southeastern Manitoba, Canada, *Canadian Mineralogist*, 40. 5. 1339-1345
- Cerny, P. and Ferguson, R.B. (1972) The Tanco pegmatite at Bernic Lake, Manitoba. IV. Petalite and spoumene relations. *Canadian Mineralogist* 11, 660-678.
- Cerny, P. and London, D. (1983) Crystal chemistry and stability of petalite. *Tschermaks Mineralogische und Petrographische Mitteilungen* 31, 81-96.
- Chadwick, K. M. and Rossman, G. R. (2009) Orange kyanite from Tanzania. *Gems and Gemology*, 45. 2. 146-147.
- Chai, L. and Navrotsky, A. (1996) Synthesis, characterization, and energetics of solid solution along the dolomite-ankerite join, and implications for the stability of ordered $\text{CaFe}(\text{CO}_3)_2$, *American Mineralogist*, 81. 9/10. 1141-1147
- Chaiwong, C., Yu, L.D., Schinarakis, K. and Vilaithong, T. (2005) Optical property modification of ruby and sapphire by N-ion implantation. *Surface and Coatings Technology* 196, 108-112.
- Chaki, T.K. and Li, J.C.M. (1984) Latent hardening in high-density polyethylene. *Journal of Applied Physics* 56, 2392-2395.
- Chakoumakos B.C., Murakami T., Lumpkin G.R. and Ewing R.C. (1987) Alpha-decay-induced fracturing in zircon: The transition from the crystalline to the metamict state.
- Chakoumakos B.C., Oliver W.C., Lumpkin G.R. and Ewing R.C. (1991) Hardness and elastic modulus of zircon as a function of heavy-particle irradiation dose: I. In-situ alpha-decay event damage. *Radiation Effects and Defects in Solids*, 118, (4), 393-403.
- Chakoumakosi B.C., Murakami T., Lumpkin G.R. Ewing R.C. (1987). Alpha-decay - induced fracturing in Zircon: the transition from the crystalline to the metamict state. *Science*, 236, (4808), 1556-1559.
- Chalain, J. P. (1995) Treatments of fissures in emeralds, corundum and diamonds, *Antwerp Facets*, 39-44
- Chalain, J. P. (2003) Spectroscopic study of a yellowish green HPHT synthetic diamond, *Journal of the Gemmological Association of Hong Kong*, 24. 61-67

- Chalain, J. P., Fritsch, E. and Hanni, H. A. (1999) Detection of GE POL diamonds: A first stage, *Revue de Gemmologie a.f.g.*, 138/139. 2-11 (8-11 in English)
- Chalain, J. P., Fritsch, E. and Hanni, H. A. (2000a) Identification of GE POL diamonds: A second step, *Journal of Gemmology*, 27. 2. 73-78
- Chalain, J. P., Fritsch, E. and Hanni, H. A. (2000b) On the identification of GE POL diamonds: preliminary results, *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 49. 1. 19-30
- Chalain, J.P. (1995) Treatments of fissures in emeralds, corundum and diamonds. *Antwerp Facets*, 39-44.
- Chalmers, R. O. (1972) New occurrences of gem minerals in Australia, *Lapidary Journal*, 26. 1. 14-16
- Chamberlain C.P., Docka J.A., Post J.E. and Burnham C.W. (1985) Scapolite: Alkali atom configurations, antiphase domains, and compositional variations. *American Mineralogist*, 70, (1/2), 134-140.
- Chandrasekhar B.K. and White W.B. (1992) Polarized luminescence spectra of kunzite. *Physics and Chemistry of Minerals*, 18, (7), 433-440.
- Chang Z.S., Vervoort J.D., McClelland W.C. and Knaack C. (2006) U-Pb dating of zircon by LA-ICP-MS. *Geochemistry, Geophysics, Geosystems*, 7, Q05009.
- Chao, C. L., Fan, W. H., Chou, W. C., Chien, C. Y., Lin, H. Y. and Duduch, J. G. (2007) Research of quick polishing of CVD diamond films, *Key Engineering Materials*, 364/366. 668-673
- Chapoulie, R., Capdupuy, C., Schvoerer, M. and Bechtel, F. (1999) Cathodoluminescence and crystal growth of sapphire. *Physica Status Solidi A* 171, 613-621.
- Charles, S. J., Steeds, J. W., Butler, J. E. and Evans, J. F. (2003) Optical centers introduced in boron-doped synthetic diamond by near-threshold electron irradiation, *Journal of Applied Physics*, 94. 5. 3091-3100
- Charoy B., Lhote F. and Dusauso Y. (1992) The crystal chemistry of spodumene in some granitic aplite-pegmatite of northern Portugal. *Canadian Mineralogist*, 30, (3), 639-651.
- Charoy B., Noronha F. and Lima A. (2001) Spodumene – petalite – eucryptite: Mutual relationships and pattern of alteration in Li-rich pegmatite-aplite dykes from northern Portugal. *Canadian Mineralogist*, 39, (3), 729-746.
- Charoy, B., Noronha, F. and Lima, A. (2001) Spodumene - petalite - eucryptite: Mutual relationships and patterns of alteration in Li-rich aplite-pegmatite dykes from northern Portugal. *Canadian Mineralogist* 39, 729-746.
- Chateigner, D., Hedegaard, C. and Wenk, H. R. (2000) Mollusc shell microstructures and crystallographic textures, *Journal of Structural Geology*, 22. 11/12. 1723-1735
- Chatham, C.F. (1982) Little known facts in the art of growing gem crystals. *International Gemmological Symposium - Proceedings*, 153-156.
- Chave, K. E. and Schmalz, R. F. (1966) Carbonate-seawater interactions, *Geochimica et Cosmochimica Acta*, 30. 10. 1037-1048
- Chaves, M.L.S.C., Karfunkel, J. and Hoover, D.B. (1998) Rare gem minerals in Brazil - Part 1: Euclase and phenakite. *Australian Gemmologist* 20, 80-86.
- Checa, A. G., Okamoto, T. and Ramizez, J. (2006) Organisation pattern of nacre in Pteriidae (Bivalvia: Mollusca) explained by crystal competition, *Proceedings of the Royal Society of London B*, 273. 1592. 1329-1337
- Chemical Geology*, 182, (2/4), 237-247.
- Chen C.N., Lin H.P., Tsai C.P. and Tang C.Y. (2004) Synthesis of artificial opals with uniform mesoporous silica spheres. *Chemistry Letters*, 33, (7), 838-839.
- Chen T., Ai H., Yang M.X., Zheng S. and Liu Y.G. (2011) Brownish red zircon from Muling, China. *Gems and Gemology*, 47, (1), 36-41.
- Chen, T.H. and Menu, M. (2010) Heating effect on serpentine jades. *22nd International Conference on Raman Spectroscopy*.
- Chernenko, T. V. and Melnikov, E. P. (2003) Properties and diagnostics of natural and synthetic malachite (in Russian), *Gemmological Bulletin*, 8 and 9. 11-27 and 31-35
- Cherniak D.J. (1993) Lead diffusion in titanite and preliminary results on the effects of radiation damage on Pb transport. *Chemical Geology*, 110, (1/3), 177-194.
- Cherniak D.J. (1995) Sr and Nd diffusion in titanite. *Chemical Geology*, 125, (3/4), 219-232.
- Cherniak D.J. (2006) Zr diffusion in titanite. *Contributions to Mineralogy and Petrology*, 152, (5), 639-647.
- Cherniak D.J. (2010) Diffusion in accessory minerals: Zircon, titanite, apatite, monazite and xenotime. *Reviews in Mineralogy and Geochemistry*, 72, (1), 827-869.

- Cherniak D.J. and Watson E.B. (2003) Diffusion in zircon. *Reviews in Mineralogy and Geochemistry*, 53, (1), 113-143.
- Cherniak D.J. and Watson E.B. (2011) Helium diffusion in rutile and titanite, and consideration of the origin and implications of diffusional anisotropy. *Chemical Geology*, 288, (3/4), 149-161.
- Cherniak D.J., Hanchar J.M. and Watson E.B. (1997) Diffusion of tetravalent cations in zircon. *Contributions to Mineralogy and Petrology*, 127, (4), 383-390.
- Cherniak D.J., Watson E.B. and Wark D.A. (2007) Ti diffusion in quartz. *Chemical Geology*, 236, (1/2), 65-74.
- Chesnokov, B. V. (1960) Spectral absorption curves of certain minerals colored by titanium, *Doklady Akademii Nauk SSSR - Earth Science Section*, 129. 1163-1164
- Chikayama, A. (1981) New gemstones, *Journal of Mineralogical Society of Japan*, 15. 3. 163-168
- Choi J.B. and Hawthorne F.C. (2002) Characterization of tourmaline crystals by Rietveld and single-crystal structure refinement: A comparative study. *Geosciences Journal*, 6, (3), 237-243.
- Choi, H.M., Kim, Y.C., Kim, S.K. and Park, J.W. (2009) Study of black diamond made by nitrogen ion-implantation, and irradiated green diamond. *Gemmology*, 2-6.
- Chopelas A. and Hofmeister A.M. (1991) Vibrational spectroscopy of aluminate spinels at 1 atm and of MgAl_2O_4 to over 200 kbar. *Physics and Chemistry of Minerals*, 18, (5), 279-293.
- Chopelas, A. (1991) Single crystal Raman spectra of forsterite, fayalite, and monticellite, *American Mineralogist*, 76. 7/8. 1101-1109
- Choudhary, G. (2011) Serpentine crystal with purple-red transmission. *Australian Gemmologist* 24, 164-166.
- Choudhary, G. and Golecha, C. (2007) A remarkably large clinohumite, *Journal of Gemmology*, 30. 5/6. 303-306
- Christenson, C. and Austin, G. (1999) Red beryl, *Gems and Gemology*, 35. 3. 140
- Christie Manson and Woods (1990) *A Highly Important Ruby*, Features 29.95 ct Burma ruby ed. Christie, Manson & Woods, London.
- Christy, A.G. and Grew, E.S. (2004) Synthesis of beryllian sapphirine in the system $\text{MgO} - \text{BeO} - \text{Al}_2\text{O}_3 - \text{SiO}_2 - \text{H}_2\text{O}$ and comparison to naturally occurring beryllian sapphirine and khmaralite, Part 2: A chemographic study of Be content as a function of P, T, assemblage and FeMg-1 exchange. *American Mineralogist* 89, 327-338.
- Chrosch J., Bismayer U. and Salje E.K.H. (1997) Anti-phase boundaries and phase transitions in titanite: An X-ray diffraction study. *American Mineralogist*, 82, (7/8), 677-681.
- Chrosch J., Colombo M., Malcherek T., Salje E.K.H., Groat L.A. and Bismayer U. (1998) Thermal annealing of radiation damaged titanite. *American Mineralogist*, 83, (9/10), 1083-1091.
- Chuanyi, L., Hebao, Z., Zhuming, W., Hongsen, X., Yueming, Z. and Huigang, X. (1988) Optical absorption spectra and colors of jadeites and diopsides (in Chinese), *Acta Mineralogica Sinica*, 8. 3. 193-199
- Cicogna, F. & Cattaneo-Vietti, R. (1993). *Red corals in the Mediterranean Sea: Art, history and science*. Rome, Italy: Massa Lubrense. 263 pp.
- Claoué-Long J.C., Sobolev N.V., Shatsky V.S. and Sobolev A.V. (1991) Zircon response to diamond-pressure metamorphism in the Kokchetav massif, USSR. *Geology*, 19, (7), 710-713.
- Claringbull, G.F. and Hey, M.H. (1952) Sinhalite (MgAlBO_4), a new mineral. *Mineralogical Magazine* 29, 841-849.
- Clark C.M. (2007) Tourmaline: Structural formula calculations. *Canadian Mineralogist*, 45, (2), 229-237.
- Clark C.M., Wadoski E.R. and Freeman E.D. (2008) Tourmaline chemistry and the ^{11}B site. *American Mineralogist*, 93, (2/3), 409-413.
- Clark, A.M., Couper, A.G., Embrey, P.G. and Fejer, E.E. (1986) Cathodoluminescence of phenakite. *Mineralogical Magazine* 50, 733-734.
- Clark, A.M., Fejer, E.E., Couper, A.G., Bearne, G.S. and Din, V.K. (1980) Additional data on sugilite. *Mineralogical Magazine* 43, 947-949.
- Clark, C. (1992) The Vietnam challenge: Can the Burma ruby stay on top?, *JewelSiam*, p. 48.
- Clark, C. (1993) Thai cooking class - today's recipe: Mong Hsu rubies. *JewelSiam*, 57.
- Clark, G. R. and Lutz, R. A. (1980) Pyritization in the shells of living bivalves, *Geology*, 8. 6. 268-271
- Clark, S. P. (1957) Absorption spectra of some silicates in the visible and near infrared, *American Mineralogist*, 42. 11/12. 732-742

- Clarke J. (2003) The occurrence and significance of biogenic opal in the regolith. *Earth Science Reviews*, 60, (3/4), 175-194.
- Clements, T. (1941) The emerald mines of Muzo, Colombia, South America, *Gems and Gemology*, 3. 9. 130-134
- Clery, R. (2002) Fragrant adventures in Madagascar The analysis of fragrant resin from *Canarium madagascariense*. Swift, Karl A.d. *Advances In Flavours And Fragrances: From The Sensation To The Synthesis*: 92-98
- Clewlow, A. J. (1977) Anomalous optical characteristics seen in calcic plagioclase feldspars, *Journal of Gemmology*, 15. 6. 308-315
- Cockayne, B., Chesswas, M. and Gasson, D.B. (1969) Facetting and optical perfection of Czochralski grown garnets and ruby. *Journal of Materials Science* 4, 450-456.
- Cody, A. M. and Cody, R. D. (1989) Evidence for micro-biological induction of {101} Montmartre twinning in gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), *Journal of Crystal Growth*, 98. 4. 721-730
- Coenraads, R.R. (1992) Sapphires and rubies associated with volcanic provinces: Inclusions and surface features shed light on their origin. *Australian Gemmologist* 18, 70-89, 90.
- Coenraads, R.R. (1994) Evaluation of the potential sapphire source rocks with the catchments of the Kings Plains Creek and Swan Brook, near Inverell, New South Wales. *Records of the Australian Museum* 46, 5-24.
- Coenraads, R.R. (2012) Gemstones of eastern Australia's ancient oceans and volcanoes. *Australian Gemmologist* 24, 251.
- Coenraads, R.R. and Laird, J.W. (2000) The Slocan Valley sapphire deposit, Nelson, British Columbia, Canada. *Australian Gemmologist* 20, 410-415.
- Coenraads, R.R., Sutherland, F.L. and Kinny, P.D. (1990) The origin of sapphires: U-Pb dating of zircon inclusions sheds new light. *Mineralogical Magazine* 54, 113-122.
- Cognet, J. M., Fricain, J. C., Reau, A. F., Lavignolle, B., Baquey, C. and Lepeticorps, Y. (2003) *La nacre Pinctada margaritifera*: Caracterisation physico-chimique proprietes biomecaniques et cytocompatibilite in vitro, *Revue de Chirurgie Orthopedique*, 89. 346-352
- Cohen A.J. (1985) Amethyst color in quartz, the result of radiation protection involving iron. *American Mineralogist*, 70, (11/12), 1180-1185.
- Cohen A.J. and Makar L.N. (1985) Dynamic biaxial absorption spectra of Ti^{3+} and Fe^{2+} in a natural rose quartz crystal. *Mineralogical Magazine*, 49, (354), 709-715.
- Cohen, A.J. (1958) The absorption spectra of tektites and other natural glasses. *Geochimica et Cosmochimica Acta* 14, 279-286.
- Cohen, A.L. and McConnaughey, T.A. (2003) Geochemical perspectives on coral mineralization. *Reviews in Mineralogy and Geochemistry* 54, 151-187.
- Coldham, T. (1986) Inclusions in Australian sapphire before and after heat treatment. *Australian Gemmologist* 16, 122-125.
- Coldham, T.S. (1973) Sapphire mining in Northern N.S.W. *Australian Gemmologist* 11, 14-19.
- Coldham, T.S. (1992) The Australian sapphire industry. *Australian Gemmologist* 18, 104-107.
- Coldham, T.S. (2009) Ruby deposits in marble, Yuan Jian, Yunnan Province, Peoples Republic of China. *31st International Gemmological Congress - Abstracts*, 13-14.
- Collins, A. T. (2001a) The colour of diamond and how it can be changed, *Journal of Gemmology*, 27. 6. 341-359
- Collins, A. T. (2001b) High-temperature annealing of colour centres in diamond, *6th Applied Diamond Conference - Proceedings*, 223-231
- Collins, A. T. (2003) The detection of colour-enhanced and synthetic gem diamonds by optical spectroscopy, *Diamond and Related Materials*, 12. 10/11. 1976-1983
- Collins, A. T. and Dahwich, A. (2003) The production of vacancies in type Ib diamond, *Journal of Physics: Condensed Matter*, 15. 37. L591-L596
- Collins, A. T. and Dahwich, A. (2004) The annealing of interstitial-related optical centres in type Ib diamond, *Diamond and Related Materials*, 13. 11/12. 1959-1962
- Collins, A. T. and Ly, C. H. (2002) Misidentification of nitrogen-vacancy absorption in diamond, *Journal of Physics: Condensed Matter*, 14. 25. L467-L471
- Collins, A. T., Kanda, H. and Kitawaki, H. (2000) Colour changes produced in natural brown diamonds by high-pressure, high-temperature treatment, *Diamond and Related Materials*, 9. 2. 113-122

- Collyer, T., Rodrigues, E. G. and Machado, J. I. L. (1991) Das Malachitvorkommen der Serra Verde, Curionopolis, Para, Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 40. 2/3. 99-102
- Colombo M., Chrosch J., Biagini R. and Memmi I. (1999) An IR analysis of the role of SiO_4 tetrahedra in thermally altered ZrSiO_4 . *Neues Jahrbuch für Mineralogie Monatshefte*, (3), 113-122.
- Commin-Fischer A., Berger G., Polvé M., Dubois M., Sardini P., Beaufort D. and Formoso M. (2009) Petrography and chemistry of SiO_2 filling phases in the amethyst geodes from the Serra Geral formation deposit, Rio Grande do Sul, Brazil. *Journal of South American Earth Sciences*, 29, (3), 751-760.
- Comodi P. and Zanazzi P.F. (1997) The pressure behavior of clinozoisite and zoisite: An X-ray diffraction study. *American Mineralogist*, 82, (1/2), 61-68.
- Comodi P., Mellini M. and Zanazzi P.F. (1990) Scapolites: Variation of structure with pressure and possible role in the storage of fluids. *European Journal of Mineralogy*, 2, (2), 195-202.
- Compere, E. L. and Bates, J. M. (1973) Determination of calcite:aragonite ratios in mollusc shells by infrared spectra, *Limnology and Oceanography*, 18. 2. 326-331
- Connell, J.H., Hughes, T.P. and Wallace, C.C. (1997) A 30-year study of coral abundance, recruitment, and disturbance at several scales in space and time. *Ecological Monographs* 67, 461-488.
- Cook R.B. (1997) Connoisseur's choice: Spodumene variety kunzite – Nuristan, Afghanistan. *Rocks and Minerals*, 72, (5), 340-343.
- Cook R.B. (2007) Zircon - Helen Hunt Falls, El Paso County, Colorado. *Rocks and Minerals*, 82, (4), 310-317.
- Cook, R. B. (2001) Malachite - Shaba Region, Democratic Republic of Congo, *Rocks and Minerals*, 76. 5. 326-330
- Cook, R. B. (2002) Dioptase - Tsumeb, Namibia, *Rocks and Minerals*, 77. 3. 176-180
- Cook, R. B. (2002) Epidote - Knappenwand, Untersulzbachtal, Salzburg, Austria, *Rocks and Minerals*, 77. 3. 328-332
- Cook, R. B. (2003) Danburite - Charcas, San Luis Potosi, Mexico, *Rocks and Minerals*, 78. 6. 400-403
- Cook, R. B. (2007) Mining for emeralds in Hiddenite, Alexander County, North Carolina, *Rocks and Minerals*, 82. 2. 149-150
- Cook, R.B. (2009) Phenakite - Mount Antero, Chaffee Country, Colorado. *Rocks and Minerals* 84, 338-344.
- Cooray, P. G. (1970) A carbonate-bearing fluor-chlor-hydroxyapatite from Matale, Ceylon, *American Mineralogist*, 55. 11/12. 2038-2041
- Copley, P. A. and Gay, P. (1982) The heat treatment of some Norwegian aventurinized feldspars, *Mineralogical Magazine*, 45. 337. 107-110
- Cordier P. and Doukhan J.C. (1991) Water speciation in quartz: A near-infrared study.
- Corfu F., Hanchar J.M., Hoskin P.W.O. and Kinny P. (2003) Atlas of zircon textures. *Reviews in Mineralogy and Geochemistry*, 53, (1), 469-500.
- Cory, P. (1991) Get ready for rhodochrosite. *Lapidary Journal* 45, 25-30.
- Costa, A. B. (2007) L'ambre Dominicain, *Revue de Gemmologie a.f.g.*, 162. 15-16
- Costagliola, P., Cipriani, C. and Manganelli Del Fa, C. (1997) Pyrite oxidation: Protection using synthetic resins. *European Journal of Mineralogy* 9, 167-174.
- Cotton, W. L. (1970) A trip to the Carnaiba emerald mines of Brazil, *Lapidary Journal*, 23. 10. 1360-1362
- Couper A.G. (1991) Colour as a guide to the composition of scapolite from Burma.
- Cox, H. H. (1953) Amber - gem of the ages, *Lapidary Journal*, 7. 2, 3. 100-108, 196-204
- Cozar, J.S. (1995) New treatment of natural ruby (rubies with fissures and cavities filled with aluminum and sodium phosphate glass - Update. *International Colored Stone Association - Laboratory Alert* 86.
- Craig, J.R. and Vokes, F.M. (1993) The metamorphism of pyrite and pyritic ores: An overview. *Mineralogical Magazine* 57, 3-18.
- Craig, J.R., Vokes, F.M. and Solberg, T.N. (1998) Pyrite: Physical and chemical textures. *Mineralium Deposita* 34, 82-101.
- Craig, N., Speakman, J.C., Popelka-Filcoff, R.S., Aldenderfer, M., Blanco, L.F., Vega, M.B., Glascock, M.D. and Stanish, C. (2010) Macusani obsidian from southern Peru: A characterization of its element composition with a demonstration of its ancient use. *Journal of Archaeological Science* 37, 569-576.
- Craig, N., Speakman, R.J., Popelka-Filcoff, R.S., Glascock, M.D., Robertson, J.D., Shackley, M.S. and Aldenderfer, M.S. (2007) Comparison of XRF and PXRF for analysis of archaeological obsidian from southern Peru. *Journal of Archaeological Science* 34, 2012-2024.

- Crespo-Feo E., Garcia-Guinea J., Correcher V. and Prado-Herrero P. (2010) Luminescence behaviour of turquoise $[\text{CuAl}_6(\text{PO}_4)_4(\text{OH})_8 \cdot 4\text{H}_2\text{O}]$. *Radiation Measurements*, 45, (3/6), 749-752.
- Crocombette J.P. (1999) Theoretical study of point defects in crystalline zircon. *Physics and Chemistry of Minerals*, 27, (2), 138-143.
- Crocombette J.P. and Ghaleb D. (1998) Modeling the structure of zircon (ZrSiO_4): Empirical potentials, ab initio electronic structure. *Journal of Nuclear Materials*, 257, (3), 282-286.
- Crocombette J.P. and Ghaleb D. (2001) Molecular dynamics modeling of irradiation damage in pure and uranium-doped zircon. *Journal of Nuclear Materials*, 295, (2/3), 167-178.
- Cropp, D. (1997) Abalone pearls from Bass Strait. *Australian Gemmologist* 19, 375-379.
- Crowe M.C., Greedan J.E., Garrett J.D., Burke N.A., Vance E.R. and George I.M. (1986) Melt-grown sphene (CaTiSiO_5) crystals. *Journal of Materials Science Letters*, 5, (10), 979-980.
- Crowley, J. A. (1983) Axinite-old and new, *Lapidary Journal*, 37. 3. 444-448
- Crowningshield, G. R. (1957) New or unusual gem materials encountered in the Institute's Gem Trade Laboratories, *Gems and Gemology*, 9. 2. 35-37, 61-62
- Crowningshield, G. R. (1957) New or unusual gem materials encountered in the Institute's Gem Trade Laboratories. *Gems and Gemology* 9, 35-37, 61-62.
- Crowningshield, G. R. (1958a) Sinhalite. *Gems and Gemology* 9, 228.
- Crowningshield, G. R. (1958b) Synthetic emerald testing, *Gems and Gemology*, 9. 8. 228
- Crowningshield, G. R. (1959a) Andalusite, *Gems and Gemology*, 9. 10. 292
- Crowningshield, G. R. (1959a) Jade imitations. *Gems and Gemology* 9, 269.
- Crowningshield, G. R. (1959b) Highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 9. 10. 291-294
- Crowningshield, G. R. (1959c) Sapphires losing their color. *Gems and Gemology* 9, 294.
- Crowningshield, G. R. (1959d) Unusual gemstones, *Gems and Gemology*, 9. 12. 359-360
- Crowningshield, G. R. (1960a) Andalusite, *Gems and Gemology*, 10. 4. 121
- Crowningshield, G. R. (1960b) Black coral, *Gems and Gemology*, 10. 3. 72-74
- Crowningshield, G. R. (1960c) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 10. 3. 67-74, 92
- Crowningshield, G. R. (1960c) Unusual gemstones. *Gems and Gemology* 10, 10, 31.
- Crowningshield, G. R. (1960d) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 10. 4. 114-123
- Crowningshield, G. R. (1960e) Hessonite garnet, *Gems and Gemology*, 10. 3. 72
- Crowningshield, G. R. (1960f) Idocrase cameo, *Gems and Gemology*, 10. 4. 121
- Crowningshield, G. R. (1960g) Pink danburite, *Gems and Gemology*, 10. 3. 71
- Crowningshield, G. R. (1960h) Unusual gemstones, *Gems and Gemology*, 10. 1. 10, 31
- Crowningshield, G. R. (1960i) Unusual stones, *Gems and Gemology*, 10. 2. 61-62
- Crowningshield, G. R. (1960j) Translucent variscite. *Gems and Gemology* 10, 121.
- Crowningshield, G. R. (1961a) Abalone pearl. *Gems and Gemology* 10, 220-221.
- Crowningshield, G. R. (1961b) Andalusite, *Gems and Gemology*, 10. 6. 185-186
- Crowningshield, G. R. (1961c) Brazilian pegmatite emerald, *Gems and Gemology*, 10. 8. 244
- Crowningshield, G. R. (1961d) Sapphire with color change. *Gems and Gemology* 10, 246.
- Crowningshield, G. R. (1961e) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 10. 6. 180-186, 191
- Crowningshield, G. R. (1961f) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 10. 8. 242-246
- Crowningshield, G. R. (1961g) Serpentine. *Gems and Gemology* 10, 242.
- Crowningshield, G. R. (1961h) Williamsite. *Gems and Gemology* 10, 183.
- Crowningshield, G. R. (1961i) Rare minerals, *Gems and Gemology*, 10. 6. 186
- Crowningshield, G. R. (1961j) "Yunnan jade", *Gems and Gemology*, 10. 8. 242
- Crowningshield, G. R. (1962a) 3-phase inclusions in fluorite, *Gems and Gemology*, 10. 12. 376

- Crowningshield, G. R. (1962b) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 10. 9. 281-283
- Crowningshield, G. R. (1962c) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 10. 12. 376-383
- Crowningshield, G. R. (1962d) Odd-color sapphires and rubies. *Gems and Gemology* 10, 340.
- Crowningshield, G. R. (1962e) Rare blue jadeite, *Gems and Gemology*, 10. 9. 283
- Crowningshield, G. R. (1962f) Serpentine. *Gems and Gemology* 10, 307.
- Crowningshield, G. R. (1962g) Unusual inclusions in peridot and sinhalite. *Gems and Gemology* 10, 376-378.
- Crowningshield, G. R. (1962h) Unusual gem materials, *Gems and Gemology*, 10. 10. 307
- Crowningshield, G. R. (1962i) Unusual stones, *Gems and Gemology*, 10. 11. 339
- Crowningshield, G. R. (1962j) Yellow-orthoclase spectrum, *Gems and Gemology*, 10. 12. 381-382
- Crowningshield, G. R. (1963a) Alexandrite cat's-eye, *Gems and Gemology*, 11. 4. 104
- Crowningshield, G. R. (1963b) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 11. 2. 38-44
- Crowningshield, G. R. (1963c) Prehnite. *Gems and Gemology* 11, 38.
- Crowningshield, G. R. (1963d) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 11. 3. 80-87
- Crowningshield, G. R. (1963e) Pink grossularite garnet, *Gems and Gemology*, 11. 1. 23-24
- Crowningshield, G. R. (1963f) Rare cat's-eyes, *Gems and Gemology*, 11. 4. 104
- Crowningshield, G. R. (1963g) Orthoclase cat's-eye, *Gems and Gemology*, 11. 1. 23
- Crowningshield, G. R. (1963h) Star almandite, *Gems and Gemology*, 11. 2. 40
- Crowningshield, G. R. (1963i) Unusual gemstones, *Gems and Gemology*, 11. 3. 86
- Crowningshield, G. R. (1963j) Unusual stones, *Gems and Gemology*, 11. 2. 44
- Crowningshield, G. R. (1963k) Faded dyed jadeite, *Gems and Gemology*, 11. 4. 100-101
- Crowningshield, G. R. (1963l) Treated amazonite, *Gems and Gemology*, 11. 4. 102
- Crowningshield, G. R. (1963m) Yellow cat's-eye apatite, *Gems and Gemology*, 11. 2. 44
- Crowningshield, G. R. (1963n) Lavender-dyed jadeite, *Gems and Gemology*, 11. 3. 82
- Crowningshield, G. R. (1964a) Bytownite, *Gems and Gemology*, 11. 6. 181
- Crowningshield, G. R. (1964b) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 11. 6. 180-184
- Crowningshield, G. R. (1964c) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 11. 8. 242-246
- Crowningshield, G. R. (1964d) Dumortierite-quartz, *Gems and Gemology*, 11. 6. 182
- Crowningshield, G. R. (1964e) Fine-green enstatite, *Gems and Gemology*, 11. 6. 183
- Crowningshield, G. R. (1964f) Green-dyed chalcedony, *Gems and Gemology*, 11. 6. 180
- Crowningshield, G. R. (1964g) Linde synthetic emerald, *Gems and Gemology*, 11. 6. 183
- Crowningshield, G. R. (1964h) Multicolored grossularites, *Gems and Gemology*, 11. 7. 216-218
- Crowningshield, G. R. (1964i) Plastic-coated and dyed jadeite, *Gems and Gemology*, 11. 6. 182
- Crowningshield, G. R. (1964j) Pressed amber, *Gems and Gemology*, 11. 8. 243-244
- Crowningshield, G. R. (1964k) Seldom-seen diopside cat's-eye, *Gems and Gemology*, 11. 8. 245
- Crowningshield, G. R. (1964l) Superb amazonite, *Gems and Gemology*, 11. 7. 215-216
- Crowningshield, G. R. (1964m) Symerald, *Gems and Gemology*, 11. 7. 218
- Crowningshield, G. R. (1964n) Synthetic alexandrite, *Gems and Gemology*, 11. 7. 216
- Crowningshield, G. R. (1964o) Synthetic-emerald overgrowth, *Gems and Gemology*, 11. 6. 180
- Crowningshield, G. R. (1964p) Unusual chromeless emerald, *Gems and Gemology*, 11. 8. 244
- Crowningshield, G. R. (1965a) Apatite cat's-eyes, *Gems and Gemology*, 11. 10. 309
- Crowningshield, G. R. (1965b) Button-shaped abalone pearls. *Gems and Gemology* 11, 333.
- Crowningshield, G. R. (1965c) Californite, *Gems and Gemology*, 11. 11. 336
- Crowningshield, G. R. (1965d) Colorless-topped natural emerald, *Gems and Gemology*, 11. 9. 269

- Crowningshield, G. R. (1965e) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 11. 11. 331-338
- Crowningshield, G. R. (1965f) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 11. 9. 265-272
- Crowningshield, G. R. (1965g) Dyed nephrite jade, *Gems and Gemology*, 11. 12. 363-364
- Crowningshield, G. R. (1965h) Enstenite!, *Gems and Gemology*, 11. 11. 334
- Crowningshield, G. R. (1965i) Fluorescent idocrase, *Gems and Gemology*, 11. 12. 366
- Crowningshield, G. R. (1965j) Gray-blue kornepurine, *Gems and Gemology*, 11. 10. 309
- Crowningshield, G. R. (1965k) Trapiche emeralds, *Gems and Gemology*, 11. 9. 265
- Crowningshield, G. R. (1965l) Unusual stones, *Gems and Gemology*, 11. 9. 272
- Crowningshield, G. R. (1966a) Cat's-eye apatite, *Gems and Gemology*, 12. 2. 46
- Crowningshield, G. R. (1966b) Chatham synthetic ruby. *Gems and Gemology* 12, 110-112.
- Crowningshield, G. R. (1966c) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 12. 1. 20-23
- Crowningshield, G. R. (1966d) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 12. 2. 43-48, 62
- Crowningshield, G. R. (1966e) Tanzanian blue kyanite, *Gems and Gemology*, 12. 1. 20
- Crowningshield, G. R. (1966f) Uvarovite garnet, *Gems and Gemology*, 12. 4. 113-114
- Crowningshield, G. R. (1967a) A new synthetic emerald?, *Gems and Gemology*, 12. 8. 242
- Crowningshield, G. R. (1967b) Another jade substitute, *Gems and Gemology*, 12. 6. 182
- Crowningshield, G. R. (1967c) Black-core emerald crystals, *Gems and Gemology*, 12. 7. 199-200
- Crowningshield, G. R. (1967d) Chrome-pyrope garnet, *Gems and Gemology*, 12. 9. 279
- Crowningshield, G. R. (1967e) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 12. 6. 179-182
- Crowningshield, G. R. (1967f) Developments and highlights at the Gem Trade Lab in New York, *Gems and Gemology*, 12. 7. 199-211
- Crowningshield, G. R. (1967g) Dyed lapis-lazuli, *Gems and Gemology*, 12. 6. 180-181
- Crowningshield, G. R. (1967h) Lapis-lazuli mystery solved?, *Gems and Gemology*, 12. 9. 278
- Crowningshield, G. R. (1967i) Star enstatite, *Gems and Gemology*, 12. 7. 200-201
- Crowningshield, G. R. (1968a) Synthetic absorption spectra, *Gems and Gemology*, 12. 12. 373-374
- Crowningshield, G. R. (1968b) Synthetic-emerald inclusions, *Gems and Gemology*, 12. 11. 337
- Crowningshield, G. R. (1969a) "Chrome chrysoprase", *Gems and Gemology*, 13. 4. 121-122
- Crowningshield, G. R. (1969b) Chrome-green grossularite, *Gems and Gemology*, 13. 3. 92-93
- Crowningshield, G. R. (1969c) Dyed, plastic-treated turquoise. *Gems and Gemology* 13, 118.
- Crowningshield, G. R. (1969d) Emerald-green grossularite, *Gems and Gemology*, 13. 2. 58
- Crowningshield, G. R. (1969e) Flux-grown synthetic rubies. *Gems and Gemology* 13, 92.
- Crowningshield, G. R. (1969f) Hydrogrossular, *Gems and Gemology*, 13. 2. 60
- Crowningshield, G. R. (1969g) Jadelike idocrase, *Gems and Gemology*, 13. 4. 119
- Crowningshield, G. R. (1969h) Rare, transparent actinolite, *Gems and Gemology*, 13. 3. 89
- Crowningshield, G. R. (1969i) Tanzania garnets, *Gems and Gemology*, 13. 1. 15-16
- Crowningshield, G. R. (1969j) Unusual idocrase, *Gems and Gemology*, 13. 2. 59-60
- Crowningshield, G. R. (1969k) X-ray bombarded sapphires. *Gems and Gemology* 13, 57.
- Crowningshield, G. R. (1970a) Alexandrite-like garnet, *Gems and Gemology*, 13. 5. 162
- Crowningshield, G. R. (1970b) A rare alexandrite garnet from Tanzania, *Gems and Gemology*, 13. 6. 174-177
- Crowningshield, G. R. (1970c) Chrome aventurine, *Gems and Gemology*, 13. 5. 158
- Crowningshield, G. R. (1970d) Developments and highlights at GIA's Lab in New York, *Gems and Gemology*, 13. 5. 156-164
- Crowningshield, G. R. (1970e) Developments and highlights at GIA's Lab in New York, *Gems and Gemology*, 13. 6. 192-201

- Crowningshield, G. R. (1970f) Developments and highlights at GIA's Lab in New York, *Gems and Gemology*, 13. 7. 221-229
- Crowningshield, G. R. (1970g) Hydrothermal pink sapphire. *Gems and Gemology* 13, 156.
- Crowningshield, G. R. (1970h) Mammoth ivory?, *Gems and Gemology*, 13. 5. 159-160
- Crowningshield, G. R. (1970i) North Carolina emerald, *Gems and Gemology*, 13. 8. 251-252
- Crowningshield, G. R. (1970j) Spessartite spectrum, *Gems and Gemology*, 13. 6. 197-198
- Crowningshield, G. R. (1970k) Transparent colorless grossularite, *Gems and Gemology*, 13. 7. 227-228
- Crowningshield, G. R. (1970l) Transparent lazulite and green andalusite, *Gems and Gemology*, 13. 7. 221-222
- Crowningshield, G. R. (1970m) Trapiche emerald, *Gems and Gemology*, 13. 6. 195
- Crowningshield, G. R. (1970n) World's largest phenakite. *Gems and Gemology* 13, 178-181.
- Crowningshield, G. R. (1970o) Zeffass synthetic emerald, *Gems and Gemology*, 13. 5. 162
- Crowningshield, G. R. (1971a) America's largest faceted emerald, *Lapidary Journal*, 25. 1. 40-42
- Crowningshield, G. R. (1971b) Doublets of natural and synthetic corundum. *Gems and Gemology* 13, 374-375.
- Crowningshield, G. R. (1971c) Natural emerald - yes or no!, *Gems and Gemology*, 13. 12. 379-380
- Crowningshield, G. R. (1972a) Apatite cat's-eye, *Gems and Gemology*, 14. 4. 114
- Crowningshield, G. R. (1972b) Dark-blue aquamarine, *Gems and Gemology*, 14. 4. 111-112
- Crowningshield, G. R. (1972c) Jadelike minerals. *Gems and Gemology* 14, 50-52.
- Crowningshield, G. R. (1972d) Paraffin...its pros and cons, *Gems and Gemology*, 14. 3. 84-85
- Crowningshield, G. R. (1972e) Nonfluorescent-synthetic emerald, *Gems and Gemology*, 14. 1. 10-11
- Crowningshield, G. R. (1972e) Recent emerald find, *Gems and Gemology*, 14. 2. 52-53
- Crowningshield, G. R. (1973a) Dark blue apatite, *Gems and Gemology*, 14. 8. 236
- Crowningshield, G. R. (1973b) Fire agate, *Gems and Gemology*, 14. 6. 177
- Crowningshield, G. R. (1973c) More about lavender jadeite, *Gems and Gemology*, 14. 7. 214-215
- Crowningshield, G. R. (1973d) Temperature effects. *Gems and Gemology* 14, 234.
- Crowningshield, G. R. (1973e) Unusual serpentine. *Gems and Gemology* 14, 178.
- Crowningshield, G. R. (1974a) Another taaffeite record. *Gems and Gemology* 14, 298.
- Crowningshield, G. R. (1974b) A first look at rubies from Kenya. *Gems and Gemology* 14, 334-336.
- Crowningshield, G. R. (1974c) Developments and highlights at GIA's Lab in New York, *Gems and Gemology*, 14. 10. 298-305
- Crowningshield, G. R. (1974d) Emerald imitations, *Gems and Gemology*, 14. 10. 300-303
- Crowningshield, G. R. (1974e) Imitation lapis-lazuli, *Gems and Gemology*, 14. 11. 327-330
- Crowningshield, G. R. (1974f) Other rarities, *Gems and Gemology*, 14. 10. 299
- Crowningshield, G. R. (1974g) Surface stained and plastic coated turquoise. *Gems and Gemology* 14, 330-331.
- Crowningshield, G. R. (1974h) Synthetic dark green and yellow sapphires. *Gems and Gemology* 14, 299-300.
- Crowningshield, G. R. (1974i) Unusual jades identified, *Gems and Gemology*, 14. 10. 303
- Crowningshield, G. R. (1975) Selective dyeing of calcite, *Gems and Gemology*, 15. 1. 12
- Crowningshield, G. R. (1975a) Black is popular, *Gems and Gemology*, 15. 3. 90-91
- Crowningshield, G. R. (1975b) Damage or shattering experiences. *Gems and Gemology* 15, 14-15.
- Crowningshield, G. R. (1975c) Kornerupine, *Gems and Gemology*, 15. 3. 92-93
- Crowningshield, G. R. (1975d) Developments and highlights at GIA's Lab in New York, *Gems and Gemology*, 15. 3. 89-94
- Crowningshield, G. R. (1977) Amber from the Dominican Republic, *Gems and Gemology*, 15. 12. 367-368
- Crowningshield, G. R. (1979a) Alexandrite oddities, *Gems and Gemology*, 16. 5. 148
- Crowningshield, G. R. (1979b) Black star observation. *Gems and Gemology* 16, 196.
- Crowningshield, G. R. (1979c) Some new imitations, *Gems and Gemology*, 16. 7. 200
- Crowningshield, G. R. (1979d) Treated blue sapphires. *Gems and Gemology* 16, 147.

- Crowningshield, G. R. (1980a) Blue-green beryl + emerald, *Gems and Gemology*, 16, 9. 321-322
- Crowningshield, G. R. (1980b) A giant chrysoberyl crystal, *Gems and Gemology*, 16, 9. 320
- Crowningshield, G. R. (1980c) Red cat's-eye chrysoberyl, *Gems and Gemology*, 16, 9. 322
- Crowningshield, G. R. (1983) Padparadscha: What's in a name? *Gems and Gemology* 19, 30-36.
- Crowningshield, G.R. and Nassau, K. (1981) The heat and diffusion treatment of natural and synthetic sapphires. *Journal of Gemmology* 17, 528-541.
- Cruse, B. (2007) Facettierte minerale der Eifel. *Der Aufschluss*.
- Cuadra, C. (1994) Polymer clay simulations ivory and turquoise, *Ornament*, 17, 3. 84-89
- Cuif, J. P. (1992) Données actuelles concernant la structure et la composition de la nacre et des perles, *Bulletin de la Institut Oceanographique*, 8. 77-87
- Cuif, J. P., Dauphin, Y., Stoppa, C. and Beeck, S. (1993) Forme, structure et couleurs des perles de Polynésie, *Revue de Gemmologie a.f.g.*, 114, 115. 3-6, 9-11
- Cummings, W. (1983) Ferroaxinite from Bridgeville, New Jersey, *Mineralogical Record*, 14, 1. 43-44
- Currie, S. J. A. (1994) Notes on alexandrite chrysoberyl, *Australian Gemmologist*, 18, 10. 326-328
- Currie, S.J.A. (1988) Some aspects of the heat treatment of ruby. *Australian Gemmologist* 16, 417-418.
- Currier, R. and Pohl, D. (2011) Mineral collecting in Mali. *Mineralogical Record* 42, 231-250.
- Cynn H., Sharma S.K., Cooney T.F. and Nicol M. (1992) High-temperature Raman investigation of order-disorder behavior in the MgAl_2O_4 spinel. *Physical Review B*, 45, (1), 500-502.
- Czaja M. (2001) Spectroscopic properties of coloured synthetic corundums and spinels produced in Skawina. *Mineralogia Polonica*, 31, (1), 55-69.
- Czaja M. and Mazurak Z. (1993) Vibrational structure of luminescence spectrum of Cr^{3+} in MgAl_2O_4 . *Physics and Chemistry of Minerals*, 20, (2), 120-122.
- Czaja M., Mazurak Z., Godlewski M. and Suchocki A. (1995) Crystal-field analysis of the Cr^{3+} at monoclinic symmetry (Cs) in $\text{Ca}_2\text{Al}_3\text{Si}_3\text{O}_{12}(\text{OH})$ zoisite from Tanzania. *Journal of Applied Spectroscopy*, 62, (4), 643-647.
- da Cunha, C. (1993) Etonnantes rhodochrosites. *Revue de Gemmologie a.f.g.*, 12-14.
- Dal Negro, A. and Ungaretti, L. (1971) Refinement of the crystal structure of aragonite, *American Mineralogist*, 56. 5/6. 768-772
- Daneu N., Rečnik A., Yamazaki T. and Dolenec T. (2007) Structure and chemistry of (111) twin boundaries in MgAl_2O_4 spinel crystals from Mogok. *Physics and Chemistry of Minerals*, 34, (4), 233-247.
- Danø, M. (1966) The crystal structure of tugtupite - a new mineral, $\text{Na}_8\text{Al}_2\text{Be}_2\text{Si}_8\text{O}_{24}(\text{Cl},\text{S})_2$. *Acta Crystallographica* 20, 812-816.
- Dauphin, Y., Ball, A.D., Cotte, M., Cuif, J.P., Meibom, A., Salome, M., Susini, J. and Williams, C.T. (2008) Structure and composition of the nacre-prisms transition in the shell of *Pinctada margaritifera* (Mollusca, Bivalvia). *Analytical and Bioanalytical Chemistry* 390, 1659-1699.
- Dauphin, Y., Cuif, J.P., Salome, M. and Susini, J. (2005) Speciation and distribution of sulfur in a mollusk shell as revealed by in situ maps using X-ray absorption near-edge structure (XANES) spectroscopy at the K-edge. *American Mineralogist* 90, 1748-1758.
- David, C. and Fritsch, E. (2001) Identification du traitement thermique a haute temperature des corindons par spectrometrie infra-rouge. *Revue de Gemmologie a.f.g.*, 27-31.
- Davidson, P. (2000) Scottish jasper, *Gemmology Queensland*, 1. 5. 21-22
- Davies, G. J., Chapman, R. A., Hedges, L. K., Nailer, S. G. and Moore, M. (2007) Novel synthetic diamond structures and shapes, *Industrial Diamond Review*, 3. 58-62
- Davies, R.J. (2005) Differential compaction and a subsidence in sedimentary basins due to silica diagenesis: A case study. *Geological Society of America Bulletin*, 117, (9/10), 1146-1155.
- Davis, M., Hess, C. and Hodgkins, G. (1986) Commercial hatchery produced queen conch, *Strombus gigas*, seed for the research and grow-out market. *Gulf and Caribbean Fisheries Institute - Proceedings* 38, 1-18.
- Davison, G. and Houghton, N. (2007) Greenland ruby: An exciting new source. *InColor*, 25-27.
- Day, R.W., Hawkes, G.P. and Gomelyuck, V. (2000) Are abalone shell layers deposited annually? - Validation using manganese vital staining. *4th International Abalone Symposium*.
- de Ascencao-Guedes, R. (2007) A vos loupes no 3! Un borate: la jeremejevite, *Le Règne Minéral*, 73. 31-33
- de Brodtkorb, A. and de Brodtkorb, M. (1979) Rhodochrosit aus Argentinien. *Lapis* 4, 19-22.
- de Goutiere, A. (1993) Unusual inclusion in an aquamarine, *Journal of Gemmology*, 23. 5. 286-287

- de Goutiere, A. (1995) Photogenic inclusions in moldavite, *Journal of Gemmology*, 24, 6. 415-419
- De Grave E., Vochten R., Zwaan P.C. and Craenen J. (1986) Characterization of some scapolite, corundum and spinel crystals from Kochipadana and Amarawewa, Kataragama area, Sri Lanka. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 35, (1/2), 47-57.
- de Jong B.H.W.S., van Hoek J., Veeman W.S. and Manson D.V. (1987) X-ray diffraction and Si magic-angle-spinning NMR of opals: Incoherent long- and short-range order in opal-CT. *American Mineralogist*, 72, (11/12), 1195-1203.
- de Lima A.F., Souza S.O. and Lalic M.V. (2008) Electronic and optical properties of spodumene gemstone: A theoretical study. *Optical Materials*, 30, (7), 1048-1051.
- de Lima A.F., Souza S.O. and Lalic M.V. (2009) Theoretical analysis of optical characteristics of the alpha spodumene in ultraviolet region. *Optical Materials*, 31, (10), 1478-1482.
- de Miranda-Pinto L.C.B., Righi A., Lameiras F.S., de Silva-Araujo F.G. and Krambrock K. (2011) Origin of color in cobalt-doped quartz. *Physics and Chemistry of Minerals*, 38, (8), 623-629.
- de Oliveira E.F., Castañeda C., Eeckhout S.G., Gilmar M.M., Kwitko R.R., de Grave E. and Botelho N.F. (2002) Infrared and Mössbauer study of Brazilian tourmalines from different geological environments. *American Mineralogist*, 87, (8/9), 1154-1163.
- de Oliveria, S. D. and Leite, W. M. (1987) The new Brazilian alexandrite, *21st International Gemmological Congress - Transactions*, 129-130
- de Villiers, J. P. R. (1971) Crystal structures of aragonite, strontianite, and witherite, *American Mineralogist*, 56, 5/6. 758-767
- de Villiers, J.E. (1983) The manganese deposits of Griqualand West, South Africa: Some mineralogic aspects. *Economic Geology* 78, 1108-1118.
- de Villiers, S., Shen, G.T. and Nelson, B.K. (1994) The Sr/Ca-temperature relationship in coralline aragonite: Influence of variability in (Sr/Ca)_{seawater} and skeletal growth parameters. *Geochimica et Cosmochimica Acta* 58, 197-208.
- De Weerd, F. (2001a) Defect aggregation and dissociation in diamonds during annealing under HPHT conditions, *6th Applied Diamond Conference - Proceedings*, 232-236
- De Weerd, F. (2001b) Synthetic gem quality diamonds - Historical overview and developments, *Antwerp Facets*, 37, 6-14
- De Weerd, F. and Collins, A. T. (2003) The influence of pressure on high-pressure, high-temperature annealing of type Ia diamond, *Diamond and Related Materials*, 12, 3/7. 507-510
- De Weerd, F. and Van Royen, J. (2000a) HPHT treated diamonds, *Antwerp Facets*, 34, 36-37
- De Weerd, F. and Van Royen, J. (2000b) Investigation of seven diamonds HPHT treated by Nova Diamond, *Journal of Gemmology*, 27, 4. 201-208
- De Weerd, F., Galloway, R. and Anthonis, A. (2004) Defect aggregation and dissociation in brown type Ia diamonds by annealing at high pressure and high temperature (HPHT), *Defect and Diffusion Forum*, 226/228. 49-60
- Dedushenko S.K., Makhina I.B., Marin A.A., Mukhanov V.A. and Perfiliev Y.D. (2004) What oxidation state of iron determines the amethyst color? *Hyperfine Interactions*, 156/157, (1/4), 417-422.
- Deelman J.C. (1986) Opal-CT in bamboo. *Neues Jahrbuch für Mineralogie Monatshefte*, (9), 407-415.
- Deen, M. N. (1984) Rare gemstones of Sri Lanka, *Lapidary Journal*, 38, 1. 238-240
- Deer, W. A., Howie, R. A. and Zussman, J. (1963), *Rock-forming Minerals*, London, Longmans, Vol. 2, Chain Silicates,
- Deer, W. A., Howie, R. A. and Zussman, J. (1992), *An Introduction to Rock-Forming Minerals*, Harlow, UK, Longman Scientific & Technical, 696 pp., 0-582-30094-0,
- Deer, W.A., Howie, R.A. and Zussman, J. (1978) Sapphirine. *Rock-Forming Minerals - Single-Chain Silicates* 2A, 614-639.
- Dekkers R. and Woensdregt C.F. (2002) Crystal structural control on surface topology and crystal morphology of normal spinel (MgAl₂O₄). *Journal of Crystal Growth*, 236, (1/3), 441-454.
- Delano, J.W., Bouska, V. and Fernandez, M.M. (1986) Chemical variations among the moldavite tektites: Major-element data. *17th Lunar and Planetary Science Conference*, 170-171.
- Delano, J.W., Liu, Y.G., Schmitt, R.A. and Bouska, V. (1992) Geochemistry and origin of moldavite tektites. *23rd Lunar and Planetary Science Conference*, 305-306.

- Delclos, X., Arillo, A., Penalver, E., Barron, E., Soriano, C., Del Valle, R. L., Bernardez, E., Corral, C. and Ortuno, V. M. (2007) Fossiliferous amber deposits from the Cretaceous (Albian) of Spain, *Comptus Rendus Palevol*, 6, 1/2, 135-149
- Dele, M.L., Dhamelincourt, P., Poirot, J.P., Dereppe, J.M. and Moreaux, C. (1997) Use of spectroscopic techniques for the study of natural and synthetic gems: Applications to rubies. *Journal of Raman Spectroscopy* 28, 673-676.
- Dele-Dubois, M.L., Dhamelincourt, P. and Schubnel, H.J. (1980) Etude par spectroscopie Raman d'inclusions dans les diamants, saphirs et émeraudes part 1 and 2. *Revue de Gemmologie a.f.g.*, 11-14 and 13-16.
- Delé-Dubois, M.L., Fournier, J. and Peretti, A. (1993) Rubis du Vietnam—Etude comparative avec les rubis de Birmanie et d'autres provenances. *Revue de Gemmologie a.f.g.*, 7–10.
- Dele-Dubois, M.L., Merlin, J.C. and Piorot, J.P. (1981) Pigment's determination of the calcareous exoskeleton of corals by mean of Raman spectra. *Journal of the Gemmological Society of Japan* 8, 161-168.
- Della Giusta A., Princivale F. and Carbonin S. (1986) Crystal chemistry of a suite of natural Cr-bearing spinels with $0.15 < Cr < 1.07$. *Neues Jahrbuch für Mineralogie Abhandlungen*, 155, (3), 319-330.
- Delor, C. P. and Leyreloup, A. F. (1986) Chromium-rich kyanite in an eclogite from the Rouergue area, French Massif Central, *Mineralogical Magazine*, 50, 357, 535-537
- DeMaggio, M. (1997) A brief review of cat's-eye chrysoberyl, *News on Minerals*, 12, 70, 28-29
- Demars C., Pagel M., Deloule E. and Blanc P. (1996) Cathodoluminescence of quartz from sandstones: Interpretation of the UV range by determination of trace element distributions and fluid-inclusion P-T-X properties in authigenic quartz. *American Mineralogist*, 81, (7/8), 891-901.
- Demartin, F., Donini, A., Gambini, E., Muzzioli, D. and Superchi, M. (2004) More on taaffeite and musgravite faceted gemstones. *32nd International Geological Congress - Abstracts*.
- Demartin, F., Pilati, T., Gramaccioli, C.M. and de Michele, V. (1993) The first occurrence of musgravite as a faceted gemstone. *Journal of Gemmology* 23, 482-485.
- Demazeau G., Lafon F., Curtet J. and Largeteau A. (1994) The hydrothermal crystal growth of quartz: New developments. *High Pressure Research*, 12, (4/6), 329-335.
- Demenge, J. D. (1994) Utilisation des Roches Ornementales en Gemmologie, *University of Nantes - Diploma*, 1-75
- Demenge, J. D. (1994) Utilisation des Roches Ornementales en Gemmologie, *University of Nantes - Diploma*, 1-75
- Demianets, L. N., Ivanov-Shitz, A. K. and Gainutdinov, R. V. (2006) Hydrothermal growth of beryl single crystals and morphology of their singular faces, *Inorganic Materials*, 42, 9, 989-995
- Deng, W.F., Liu, Y., Wei, G.J., Li, X.H., Tu, X.L., Xie, L.H., Zhang, H. and Sun, W.D. (2010) High-precision analysis of Sr/Ca and Mg/Ca ratios in corals by laser ablation inductively coupled plasma optical emission spectrometry. *Journal of Analytical Atomic Spectrometry* 25, 84-87.
- Denisov, R.A., Denks, V.P., Dudelzak, A.E., Osminin, V.S. and Ruus, T.V. (1977) Optical destructible coloring and luminescence of sodalites. *Journal of Practical Spectroscopy* 27, 934-937.
- Denks, V.P., Dudelzak, A.E., Lushcik, C.B., Ruus, T.V., Soshchin, N.P. and Trofimova, T.I. (1974) Recombination luminescence and color centers of cathodochromic sodalite. *Journal of Practical Spectroscopy* 24, 23-28.
- Depmeier, W. (2005) The sodalite family - A simple but versatile framework structure. *Reviews in Mineralogy and Geochemistry* 57, 203-240.
- Deren P.J., Malinowski M. and Strek W. (1996) Site selection spectroscopy of Cr^{3+} in $MgAl_2O_4$ green spinel. *Journal of Luminescence*, 68, (2/4), 91-103.
- Desautels, P. E. (1986), *The Jade Kingdom*, New York, Van Nostrand Reinhold, 118 pp.,
- Descostes, M., Vitorge, P. and Beaucaire, C. (2004) Pyrite dissolution in acidic media. *Geochimica et Cosmochimica Acta* 68, 4559-4569.
- Devouard, B. (1989) Prospecting and study of a ruby deposit in Madagascar. *Project report - ENSG-Nancy-France*, 1-26.
- Devouard, B. (1990) Cristallographie de l'émeraude analyse des expériences 1989, *University of Nantes - Diploma*,
- DeVries, R. C. and Fleischer, J. F. (1984) Synthesis of jadeite for jewelry, *Materials Research Society - Symposium Proceedings*, 22, 203-207

- Dezsi I., Szucs I. and Svab E. (2000) Mössbauer spectroscopy of spinels. *Journal of Radioanalytical and Nuclear Chemistry*, 246, (1), 15-19.
- Dharmaratne, P. G. R. (1993) Gemmological examination of a colour changing cobalt spinel, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 42. 1. 47-50
- Dharmaratne, P. G. R. (1998) Some greenish brown gemstones from Sri Lanka, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 47. 3. 167-169
- Dharmaratne, P. G. R. (1999) Identification of some colourless gemstones from Sri Lanka, *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 48. 2. 105-109
- Dharmaratne, P. G. R. (2002) Identification of some yellow-orange gemstones from Sri Lanka, *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 51. 1. 41-46
- Dharmaratne, P.G.R. (1998) Some greenish brown gemstones from Sri Lanka. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 47, 167-169.
- Dharmaratne, P.G.R. (1999) Identification of some colourless gemstones from Sri Lanka. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 48, 105-109.
- Di Benedetto F., D'Acapito F., Fornaciai G., Innocenti M., Montegrossi G., Pardi L.A., Tesi S. and Romanelli M. (2009) A Fe K-edge XAS study of amethyst. *Physics and Chemistry of Minerals*, 37, (5), 283-289.
- Diamond, S. L. (1995) GIA explains fracture filled mysteries, *National Jeweler's Basel Fair Newspaper*,
- Dias M.B. and Wilson W.E. (2000) Famous mineral localities: The Alto Ligonha pegmatites, Mozambique. *Mineralogical Record*, 31, (6), 459-497.
- Dick, G. (1993) Gem mining dig it! *American Jewelry Manufacturer* 38, 26-34.
- Diego-Gatta G., Ballaran T.B. and Iezzi G. (2005) High-pressure X-ray and Raman study of a ferrian magnesian spodumene. *Physics and Chemistry of Minerals*, 32, (2), 132-139.
- Diehl, R. (1977) Neues zum thema "synthetischer smaragd": Besuch bei Pierre Gilson, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 26. 2. 61-75
- Dierick, M., Cnudde, V., Masschaele, B., Vlassenbroeck, J., Van Hoorebeke, L. and Jacobs, P. (2007) Micro-CT of fossils preserved in amber, *Nuclear Instruments and Methods in Physics Research A*, 580. 1. 641-643
- Dietrich R.V. (1985) The tourmaline group: A résumé. *Mineralogical Record*, 16, (5), 339-351.
- Dietrich, J. E. and Saadi, M. (1969) Les gemmes et les pierres ornementales du Maroc, *Revue de Gemmologie a.f.g.*, 19. 10-14
- Dill H.G. and Henn U. (2005) Gemmologisch-lagerstättenkundliche Untersuchungen an Türkisen aus magmatischen und sedimentären Kupfererzvorkommen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 54, (2/3), 85-96.
- Dill, H.G. (2005) Geologie und petrographie des Saphir- und Rubinvorkommens von Chimwadzulu Hill, (W-Malawi). *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 54, 7-20.
- Dill, H.G., Busch, K. and Blum, N. (1991) Chemistry and origin of vein-like phosphate mineralization, Nuba Mountains (Sudan). *Ore Geology Reviews* 6, 9-24.
- Dill, H.G., Khishigsuren, S., Majigsuren, Y., Myagmarsuren, S., Bulgamaa, J. and Hongor, O. (2006) A review of the non-metallic industrial minerals of Mongolia: The impact of geological and geographical factors on their formation and use. *International Geology Review* 48, 129-173.
- Dillon, S. (1981a) Afghanistan situation, *Gems and Gemology*, 17. 1. 56
- Dillon, S. (1981b) Argentine rhodochrosite. *Gems and Gemology* 17, 117.
- Dillon, S. (1981c) Emerald, *Gems and Gemology*, 17. 2. 117
- Dillon, S. (1981d) Sugilite - A new gem material. *Gems and Gemology* 17, 57.
- Dillon, S. (1981e) U.S. peridot. *Gems and Gemology* 17, 118.
- Dillon, S. (1982) Colored stones - Brazil, *Gems and Gemology*, 18. 3. 183
- Dillon, S. (1983a) Colored stones - cat's-eye chrysoberyl, *Gems and Gemology*, 19. 1. 60
- Dillon, S. (1983b) Colored stones - idocrase, *Gems and Gemology*, 19. 3. 186
- Dillon, S. (1983c) Colored stones - taaffeite. *Gems and Gemology* 19, 60.
- Dirlam D.M., Laurs B.M., Pezzotta F. and Simmons W.B. (2002) Liddicoatite tourmaline from Anjanabonoina, Madagascar. *Gems and Gemology*, 38, (1), 28-53.
- Dirlam, D.M., Misiorowski, E.B., Tozer, R., Stark, K.B. and Bassett, A.M. (1992) Gem wealth of Tanzania. *Gems and Gemology* 28, 80-102.

- Dixon, R.D. (1985) Sugilite and associated minerals from the Wessels Mine, Kalahari manganese field. *Geological Society of South Africa - Transactions* 88, 11-17.
- Dobrovinskaya, E.R., Litvinov, L.A. and Pishchik, V.V. (1980) Morphology and structural perfection of shaped sapphire. *Journal of Crystal Growth* 50, 341-344.
- Dobrovolskaya, M. G., Rogova, V. P., Tsepina, A. I. and Malov, V. S. (1980) Sulphide mineralization in charoite rocks (Murun Massif) (in Russian), *Mineralogical Journal*, 2. 6. 13
- Dódony I, Pósfai M, Buseck P R (1996) Structural relationship between pyrite and marcasite, *American Mineralogist*, 81, 119-125
- Dódony, I. and Buseck, P.R. (2004) Serpentine close-up and intimate: An HRTEM view. *International Geology Review* 46, 507-527.
- Dódony, I., Pósfai, M. and Buseck, P.R. (1996) Structural relationships between pyrite and marcasite. *American Mineralogist* 81, 119-125.
- Dolino G. (1990) The α -inc- β transitions of quartz: A century of research on displacive phase transitions. *Phase Transitions*, 21, (1), 59-72.
- Dollase, W. A. (1971) Refinement of the crystal structures of epidote, allanite and hancockite, *American Mineralogist*, 56. 3/4. 447-464
- Donaldson K. and Borm P.J.A. (1998) The quartz hazard: A variable entity. *Annals of Occupational Hygiene*, 42, (5), 287-294.
- Donovan J.J., Lowers H.A. and Rush B.G. (2011) Improved electron probe microanalysis of trace elements in quartz. *American Mineralogist*, 96, (2/3), 274-282.
- Dörsam G., Liebscher A., Wunder B., Franz G. and Gottschalk M. (2007) Crystal chemistry of synthetic $\text{Ca}_2\text{Al}_3\text{Si}_3\text{O}_{12}\text{OH}$ - $\text{Sr}_2\text{Al}_3\text{Si}_3\text{O}_{12}\text{OH}$ solid-solution series of zoisite and clinozoisite. *American Mineralogist*, 92, (7), 1133-1147.
- Dotto C.T. and Isotani S. (1991) Irradiation and heating effects in amethyst crystals from Brazil. *Radiation Effects and Defects in Solids*, 117, (4), 355-361.
- Douglas, A.E. (2003) Coral bleaching - How and why? *Marine Pollution Bulletin* 46, 385-392.
- Douglas, D. L. (1999) Cobaltoan calcites and dolomites from Katanga, *Mineralogical Record*, 30. 4. 269-273
- Downes, P. J. and Bevan, A. W. R. (2002) Chrysoberyl, beryl and zincian spinel mineralization in granulite-facies Archaean rocks at Dowerin, Western Australia, *Mineralogical Magazine*, 66. 6. 985-1002
- Dowty E. (1976), Crystal structure and crystal growth: I. The influence of internal structure on morphology - part 1 and 2, *American Mineralogist*, 61, 5/6, 448-459 and 460-469.
- Dragsted, O. (1970) Tugtupite. *Journal of Gemmology* 12, 10-11.
- Draper, T. (1963) A new source of emeralds in Brazil, *Gems and Gemology*, 11. 4. 111-113 and 124-125
- Drucker, R.B. (1998) Green stones beyond emerald and peridot. *Jewelers' Circular Keystone Magazine* 169, 82-85.
- Druzhinina, N. M. (2000) New data on the genesis of jaspers in the Eastern Urals, *Doklady Earth Sciences*, 375A. 9. 1359-1361
- Du Toit, G. (1995) Hydrothermal synthetic sapphire. *Jewel/Siam* June-July, 56-61.
- Du Toit, G. (1996a) Alexandrite, *Jewel/Siam*, February/March. 76-79
- Du Toit, G. (1996b) Moldavite, *Jewel/Siam*, December/January. 80-81
- Du Toit, G. (1997) Unusual agates, *Jewel/Siam*, December/January. 58-62
- Duarte L.C., Hartmann L.A., Ronchi L.H., Berner Z., Theye T. and Massone H.J. (2011) Stable isotope and mineralogical investigation of the genesis of amethyst geodes in the Los Catalanes gemological district, Uruguay, southernmost Paraná volcanic province. *Mineralium Deposita*, 46, (3), 239-255.
- Duarte L.C., Hartmann L.A., Vasconcellos M.A.Z., Medeiros J.T.N. and Theye T. (2009) Epigenetic formation of amethyst-bearing geodes from Los Catalanes gemological district, Artigas, Uruguay, southern Paraná magmatic province. *Journal of Volcanology and Geothermal Research*, 184, (3/4), 427-436.
- Duffy, T. S., Zha, C. S., Downs, R. T., Mao, H. K. and Hemley, R. J. (1995) Elasticity of forsterite to 16 GPa and the composition of the upper mantle, *Nature*, 378. 6553. 170-173
- Dunaigre, C. (1996) Detection of fracture filling in diamonds, *Jewel/Siam*, December/January. 58-59
- Dungler, P. (1991) Gemmes de collection, *Revue de Gemmologie a.f.g.*, 109. 24
- Dunlap, R.A. (1997) An investigation of Fe oxidation states and site distributions in a Tibetan tektite. *Hyperfine Interactions* 110, 217-225.

- Dunlap, R.A. and Sibley, A.D.E. (2004) A Mössbauer effect study of Fe-site occupancy in Australasian tektites. *Journal of Non-Crystalline Solids* 337, 36-41.
- Dunlap, R.A., Eelman, D.A. and MacKay, G.R. (1998) A Mössbauer effect investigation of correlated hyperfine parameters in natural glasses (tektites). *Journal of Non-Crystalline Solids* 223, 141-146.
- Dunn, P. J. (1975) Inclusions in beryllonite from Stoneham, Maine, U.S.A, *Journal of Gemmology*, 14. 5. 208-212
- Dunn, P. J. (1976) Gems notes, *Gems and Gemology*, 15. 7. 199-202
- Dunn, P. J. (1977) Apatite, *Mineralogical Record*, 8. 2. 78-79
- Dunn, P. J. (1978) Gem peridot and enstatite with spinel inclusions from Chihuahua, Mexico, *Journal of Gemmology*, 16. 4. 236-238
- Dunn, P.J. (1974) Inclusions of albite and phenakite in gem topaz from the Tarryall Mountains, Colo. *Gems and Gemology* 14, 337-339.
- Dunn, P.J. (1978) Blue pectolite from Santo Domingo. *Journal of Gemmology* 16, 93.
- Dunn, P.J., Brummer, J.J. and Belsky, H. (1980) Sugilite, a second occurrence: Wessels Mine, Kalahari Manganese Field, Republic of South Africa. *Canadian Mineralogist* 18, 37-39.
- Dupuy, C., Mével, C., Bodinier, J.L. and Savoyant, L. (1991) Zabargad peridotite: Evidence for multistage metasomatism during Red Sea rifting. *Geology* 19, 722-725.
- Durben, D. J., McMillan, P. F. and Wolf, G. H. (1993) Raman study of the high-pressure behavior of forsterite (Mg_2SiO_4) crystal and glass, *American Mineralogist*, 78. 11/12. 1143-1148
- Duroc-Danner, J. M. (1987) Diaspore, a rare faceted gem, *Journal of Gemmology*, 20. 6. 371-375
- Duroc-Danner, J. M. (1989) Medium-dark blue aquamarines from Tongafeno, Madagascar, with high physical and optical properties, and showing three-phase inclusions, *Journal of Gemmology*, 21. 7. 423-430
- Duroc-Danner, J.M. (1985) Polysynthetic twin lamellae in synthetic verneuil sapphire. *Journal of Gemmology* 19, 479-483.
- Duroc-Danner, J.M. (1988) A doublet made of a natural green sapphire crown and a Verneuil synthetic ruby pavilion. *Journal of Gemmology* 21, 12-14.
- Duroc-Danner, J.M. (2002a) A comparison between a flux grown synthetic ruby and an untreated natural ruby. *Journal of Gemmology* 28, 137-142.
- Duroc-Danner, J.M. (2002b) Verneuil synthetic sapphire showing an iron absorption spectrum. *Journal of Gemmology* 28, 227-230.
- Duroc-Danner, J.M. (2003) A Verneuil synthetic ruby showing diverse veil-like "fingerprints". *Journal of Gemmology* 28, 483-488.
- Duroc-Danner, J.M. (2011) Untreated yellowish orange sapphire exhibiting its natural colour. *Journal of Gemmology* 32, 174-178.
- Dutov, A. G., Shipilo, V. B., Komar, V. A., Azarko, I. I. and Shipilo, N. V. (2003) Effect of low neutron doses on the properties of synthetic diamond crystals, *Inorganic Materials*, 39. 4. 349-352
- Duttine M., Villeneuve G., Bechtel F. and Demazeau G. (2002) Carat³/isation par resonance paramagnétique électronique (RPE) de quartz naturels issus de différentes sources. *Comptes Rendus Geoscience*, 334, (13), 949-955.
- Duyk, F. (1963) New-type inclusions in Chatham synthetic emeralds, *Journal of Gemmology*, 9. 4. 130-131
- Duyk, F. (1965) The Gilson synthetic emerald process, *Journal of Gemmology*, 9. 11. 369-371
- Duyk, F. (1971) Synthesis of fluorite, *Journal of Gemmology*, 12. 6. 209-211
- Dyar, M.D., Delaney, J.S., Sutton, S.R. and Schaefer, M.W. (1998) Fe^{3+} distribution in oxidized olivine: A synchrotron micro-XANES study. *American Mineralogist* 83, 1361-1365.
- Dyar, M.D., Sklute, E.C., Menzies, O.N., Bland, P.A., Lindsley, D., Glotch, T., Lane, M.D., Schaeffer, M.W., Wopenka, B., Klima, R., Bishop, J.L., Hiroi, T., Pieters, C. and Sunshine, J. (2009) Spectroscopic characteristics of synthetic olivine: An integrated multi-wavelength and multi-technique approach. *American Mineralogist* 94, 883-898.
- Ediriweera, R.N. (1991) Scientific aspects of Geuda beneficiation. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 40, 149-154.
- Ediriweera, R.N. and Perera, S.I. (1989) Heat treatment of geuda stones: Spectral investigation. *Journal of Gemmology* 21, 403-404.
- Edmonds, A. M., Newton, M. E., Martineau, P. M., Twitchen, D. J. and Williams, S. D. (2008) Electron paramagnetic resonance studies of silicon-related defects in diamond, *Physical Review B*, 77. 24. 245205

- Edwards, C.L. (1913) The abalones of California. *Popular Science Monthly* 82, 533-550.
- Edwards, H. G. M., Farwell, D. W., Holder, J. M. and Lawson, E. E. (1996) Fourier transform Raman spectroscopy of ivory: A non-destructive diagnostic technique, *Studies in Conservation*, 43. 1. 1-8
- Ehrmann, M. L. (1958a) How to color jadeite, *Lapidary Journal*, 12. 5. 646-647
- Ehrmann, M. L. (1958b) A new look in jade, *Gems and Gemology*, 9. 5. 134-135, 158
- Eigenmann, K. and Günthard, H.H. (1971) Hydrogen incorporation in doped α -Al₂O₃ by high temperature redox reactions. *Chemical Physics Letters* 12, 12-15.
- Eigenmann, K. and Günthard, H.H. (1972) Valence states, redox reactions and biparticle formation of Fe and Ti doped sapphire. *Chemical Physics Letters* 13, 58-61.
- Eigenmann, K., Kurtz, K. and Günthard, H.H. (1972) Solid state reactions and defects in doped Verneuil sapphire. *Helvetica Physica Acta* 45, 453-480.
- Einfalt H.C. (2007) Some observations on the composition and origin of opals from Java. *Journal of Gemmology*, 30, (7/8), 383-398.
- Einfalt, H. C. and Sujatmiko, H. (2006) Chrysocolla quartz from the Bacan archipelago, South Halmahera Regency, North Maluku Province, Indonesia, *Journal of Gemmology*, 30. 3/4. 155-168
- Ekimov, E. A., Sidorov, V. A., Rakhmanina, A. V., Melnik, E. A., Timofeev, M. A. and Sadykov, R. A. (2006) Synthesis, structure and physical properties of boron-doped diamond, *Inorganic Materials*, 42. 11. 1198-1204
- Elen, S. (2001) Spectral Reflectance and Fluorescence Characteristics of Natural-Color and Heat-Treated "Golden" South Sea Cultured Pearls. *Gems & Gemology*, Summer, 114-123.
- Elen, S. (2002) Update on the Identification of Treated "Golden" South Sea Cultured Pearls. *Gems & Gemology*, 38, 2, 156-159.
- Elen, S. and Fritsch, E. (1999) The separation of natural from synthetic colorless sapphire. *Gems and Gemology* 35, 30-41.
- Elen, S., Wentzell, C. (2003) Lab Notes - Treated Color "Golden" South Sea Cultured Pearl. *Gems & Gemology*, 39, 3, 217.
- Eliezri, I. Z. and Almor, Y. (1996) Mandarin garnet, *Antwerp Facets*, 75-77
- Eliseev A.A., Gorozhankin D.F., Napolskii K.S., Petukhov A.V., Sapozhetova N.A., Vasilieva A.V., Grigoryeva N.A., Mistonov A.A., Byelov D.V., Bouwman W.G., Kvashnina K.O., Chernyshov D.Y., Bosak A.A. and Grigoriev S.V. (2009) Determination of the real structure of artificial and natural opals on the basis of three-dimensional reconstructions of reciprocal space. *JETP Letters*, 90, (4), 272-277.
- Ellis, S. and Haws, M. (1999) Producing Pearls Using the Black-lip Pearl Oyster (*Pinctada margaritifera*). Aquafarmer Information Sheet: Center for Tropical and Subtropical Aquaculture Publication Number 141December.
- Ellsworth S., Navrotsky A. and Ewing R.C. (1994) Energetics of radiation damage in natural zircon (ZrSiO₄). *Physics and Chemistry of Minerals*, 21, (3), 140-149.
- Elton, N.J. (1996) Variscite and metavariscite from Gunheath china clay pit, St. Austell, Cornwall. *Mineralogical Magazine* 60, 671-672.
- Elwell, D. (1988) The biggest crystals, *American Association of Crystal Growth - Newsletter*, 18. 2. 6
- Elzea J.M. and Rice S.B. (1996) TEM and X-ray diffraction evidence for cristobalite and tridymite stacking sequences in opal. *Clays and Clay Minerals*, 44, (4), 492-500.
- Elzea J.M., Odom I.E. and Miles W.J. (1994) Distinguishing well-ordered opal-CT and opal-C from high temperature cristobalite by X-ray diffraction. *Analytica Chimica Acta*, 286, (1), 107-116.
- Emmett, J. (2002) Hydrogen and Beryllium as coloring agents, in: Moses, T. (Ed.), New York.
- Emmett, J. L. (1985) Lapis lazuli: The gem of Afghanistan, *Lapidary Journal*, 38. 11. 1416-1419
- Emmett, J., Scarratt, K., McClure, S.F., Moses, T., Douthit, T.R., Hughes, R., Novak, S., Shigley, J.E., Wang, W., Bordelon, O. and Kane, R.E. (2003) Beryllium diffusion of ruby and sapphire. *Gems and Gemology* 39, 84-135.
- Emmett, J.L. (1999) Fluxes and the heat treatment of ruby and sapphire. *Gems and Gemology* 35, 90-92.
- Emmett, J.L. and Douthit, T.R. (1993) Heat treating the sapphires of Rock Creek, Montana. *Gems and Gemology* 29, 250-272.
- Emms, E. (1997) Gemmology: Coral. *Retail Jeweller and British Jeweller*, 18-19.
- Enami M., Suzuki K., Liou J.G. and Bird D.K. (1993) Al-Fe³⁺ and F-OH substitutions in titanite and constraints on their P-T dependence. *European Journal of Mineralogy*, 5, (2), 219-231.

- Engineering and Mining Journal (1890) The sapphires of Kashmir. *Engineering and Mining Journal*, 269.
- Enkelmann E., Jonckheere R. and Ratschbacher L. (2005) The effects of radiation damage accumulation and annealing on fission-track dating of titanite. *Nuclear Instruments and Methods in Physics Research B*, 227, (4), 567-576.
- Eppler, W. F. (1958) Synthetic emerald, *Journal of Gemmology*, 6. 8. 360-369
- Eppler, W. F. (1960a) A Brazilian emerald (a contribution to the study of crystal growth), *Journal of Gemmology*, 7. 6. 221-225
- Eppler, W. F. (1960b) Healing fissures in peridot. *Journal of Gemmology* 7, 301-302.
- Eppler, W. F. (1961) Growth marks in emerald, *Journal of Gemmology*, 8. 2. 72
- Eppler, W. F. (1962) Three-phase inclusions in emerald, aquamarine and topaz, *Journal of Gemmology*, 8. 7. 245-250
- Eppler, W. F. (1963) Emerald from Burbar, Colombia, *Journal of Gemmology*, 9. 4. 123-126
- Eppler, W. F. (1967) Star-diopside and star-enstatite, *Journal of Gemmology*, 10. 6. 185-188
- Eppler, W. F. (1968) Another Lechleitner-made synthetic emerald, *Journal of Gemmology*, 11. 4. 120-124
- Eppler, W. F. (1974) Synthetischer alexandrit und synthetischer opal, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 23. 4. 286-293
- Epstein D.S. (1988) Amethyst mining in Brazil. *Gems and Gemology*, 24, (4), 214-228.
- Epstein, D. S. (1989) The Capoeirana emerald deposit near Nova Era, Minas Gerais, Brazil, *Gems and Gemology*, 25. 3. 150-158
- Epstein, D.S., Brennan, W. and Mendes, J.C. (1994) The Indaia sapphire deposits of Minas Gerais, Brazil. *Gems and Gemology* 30, 24-32.
- Erel E., Aubriet F., Finqueneisel G. and Muller J.F. (2003) Capabilities of laser ablation mass spectrometry in the differentiation of natural and artificial opal gemstones. *Analytical Chemistry*, 75, (23), 6422-6429.
- Erel, E. (2007) Éléments de caractérisation des diamants naturels et synthétiques colorés, *Revue de Gemmologie a.f.g.*, 162. 4-8
- Ericksen J.L. (2001a) On the theory of growth twins in quartz. *Mathematics and Mechanics of Solids*, 6, (4), 359-386.
- Ericksen J.L. (2001b) On the theory of the α - β phase transition in quartz. *Journal of Elasticity*, 63, (1), 61-86.
- Ertl A. (2008) About the nomenclature and the type locality of elbaite: A historical review. *Mitteilungen der Oesterreichischen Mineralogischen Gesellschaft*, 154, 35-44.
- Ertl A., Hughes J.M., Prowatke S., Ludwig T., Brandstätter F., Korner W. and Dyar M.D. (2007) Tetrahedrally coordinated boron in Li-bearing olenite from "mushroom" tourmaline from Momeik, Myanmar. *Canadian Mineralogist*, 45, (4), 891-899.
- Ertl A., Hughes J.M., Prowatke S., Ludwig T., Prasad P.S.R., Brandstätter F., Korner W., Schuster R., Pertlik F. and Marschall H. (2006) Tetrahedrally coordinated boron in tourmalines from the liddicoatite-elbaite series from Madagascar: Structure, chemistry and infrared spectroscopic studies. *American Mineralogist*, 91, (11/12), 1847-1856.
- Ertl A., Hughes J.M., Prowatke S., Rossman G.R., London D. and Fritz E.A. (2003) Mn-rich tourmaline from Austria: Structure, chemistry optical spectra, and relations to synthetic solid solutions. *American Mineralogist*, 88, (8/9), 1369-1376.
- Ertl A., Marschall H.R., Giester G., Henry D.J., Schertl H.P., Ntaflos T., Luvizotto G.L., Nasdala L. and Tillmanns E. (2010) Metamorphic ultrahigh-pressure tourmaline: Structure, chemistry, and correlations to P-T conditions. *American Mineralogist*, 95, (1), 1-10.
- Ertl A., Rossman G.R., Hughes J.M., London D., Wang Y., O'Leary J.A., Dyar M.D., Prowatke S., Ludwig T. and Tillmanns E. (2010) Tourmaline of the elbaite-schorl series from the Himalaya mine, Mesa Grande, California: A detailed investigation. *American Mineralogist*, 95, (1), 24-40.
- Ertl A., Tillmanns E., Ntaflos T., Francis C., Giester G., Körner W., Hughes J.M., Lengauer C. and Prem M. (2008) Tetrahedrally coordinated boron in Al-rich tourmaline and its relationship to the pressure-temperature conditions of formation. *European Journal of Mineralogy*, 20, (5), 881-888.
- Esenli F., Kumbasar I., Eren R.H. and Uz B. (2001) Characteristics of opals from Simav, Turkey. *Neues Jahrbuch für Mineralogie Monatshefte*, (3), 97-113.
- Esenli F., Kumbasar I., Esenli V. and Kirikoğlu S. (2003) A study of the characteristics of some opals from Turkey. *Neues Jahrbuch für Mineralogie Monatshefte*, (4), 177-192.

- Evans N.J., Byrne J.P., Keegan J.T. and Dotter L.E. (2005) Determination of uranium and thorium in zircon, apatite and fluorite: Application to laser (U-Th)/He thermochronology. *Journal of Analytical Chemistry*, 60, (12), 1159-1165.
- Evans, D. and Crook, M.A. (1997) Irradiation of plastics: Damage and gas evolution. *Materials Research Society - Bulletin* 22, 36-40.
- Evdokimov, M. D. (1995) Charoite: A unique mineral from a unique occurrence, *World of Stones*, 7. 3-11
- Ewing R.C., Chakoumakos B.C., Lumpkin G.R., Murakami T., Gregor R.B. and Lyle F.W. (1988) Metamict minerals: Natural analogues for radiation damage effects in ceramic nuclear waste forms. *Nuclear Instruments and Methods in Physics Research B*, 32, (1/4), 487-497.
- Ewing R.C., Meldrum A., Wang L.M., Weber W.J. and Corrales R. (2003) Radiation effects in zircon. *Reviews in Mineralogy and Geochemistry*, 53, (1), 387-425.
- Eysel, W. and Breuer, K. H. (1981) Dioptas: kristallstruktur, entwässerung und farbänderungen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 30. 3/4. 219-223
- Faibisovich, V. and Bordovskaya, L. (1996) Rediscovering Russia's Heritage - part I: the amber room of Tsarskoe Selo, *Christie's International Magazine*, 13. 2. 30-31
- Falini, G., Albeck, S., Weiner, S. and Addadi, L. (1996) Control of aragonite or calcite polymorphism by mollusk shell macromolecules, *Science*, 271. 5245. 67-69
- Fan, J. L., Guo, S. G., Shi, L. Y. and Liu, X. L. (2007) Study on the mineralogy of synthetic forsterite (in Chinese), *Journal of Synthetic Crystals*, 36. 6. 131-1434
- Fan, J.L., Guo, S.G., Shi, L.Y. and Liu, X.L. (2007) Study on the mineralogy of synthetic forsterite (in Chinese). *Journal of Synthetic Crystals* 36, 131-1434.
- Fang, J.H. and Newnham, R.E. (1965) The crystal structure of sinhalite. *Mineralogical Magazine* 35, 196-199.
- Fankboner, P. (1991) Pearl culture in abalone. *Infofish*, 52-55.
- Fankboner, P. V. (2001) Abalone Pearl Culture. <http://www.biol.sfu.ca/faculty/fankboner/fankboner.html>. 2001,
- Fankboner, P. V. (2002) Culturing blister pearls in abalones. *Canadian Gemmologist*, 23, 1, 10-21.
- Fankboner, P.V. (1995) Abalone pearls: Natural and cultured. *Canadian Gemmologist* 16, 3-8.
- Farges F. (1994) The structure of metamict zircon: A temperature-dependent EXAFS study. *Physics and Chemistry of Minerals*, 20, (7), 504-514.
- Farges F. (1997) Fivefold-coordinated Ti^{4+} in metamict zirconolite and titanite: A new occurrence shown by Ti K-edge XANES spectroscopy. *American Mineralogist*, 82, (1/2), 44-50.
- Farges F. and Calas G. (1991) Structural analysis of radiation damage in zircon and thorite: An X-ray absorption spectroscopic study. *American Mineralogist*, 76, (1/2), 60-73.
- Farn, A. E. (1964) Please test emerald, *Journal of Gemmology*, 9. 7. 223-234
- Farn, A. E. (1973) Blue beryls which are not aquamarines, *Journal of Gemmology*, 13. 8. 293-295
- Farn, A. E. (1976) Notes from the Laboratory: A Mabe made of glass. *Journal of Gemmology* 15, 124-125.
- Farn, A. E. (1977) Notes from the Laboratory: Pink conch pearl. *The Journal of Gemmology*, XV, 7, 361-362.
- Farn, A. E. (1978a) Notes from the laboratory, *Journal of Gemmology*, 16. 4. 229-235
- Farn, A. E. (1978b) Notes from the Laboratory: Imitation of a cultured pearl. *Journal of Gemmology* 16, 233-234.
- Farn, A. E. (1979a) Notes from the Laboratory: Carved Conch Shell to Imitate Conch Pearl. *The Journal of Gemmology*, XVI, 6, 366.
- Farn, A. E. (1979b) Notes from the Laboratory: Coque de perle. *The Journal of Gemmology*, XVI, 6, 367.
- Farn, A. E. (1980) The Lennix synthetic emerald, *Journal of Gemmology*, 17. 2. 73-80
- Farn, A. E. (1986) *Pearls Natural, Cultured and Imitation*, Butterworths, London,
- Farnan I. and Salje E.K.H. (2001) The degree and nature of radiation damage in zircon observed by ^{29}Si nuclear magnetic resonance. *Journal of Applied Physics*, 89, (4), 2084-2090.
- Farre, B., Meibom, A., Salome, M., Williams, C.T. and Dauphin, Y. (2007) Nanostructures of the calcitic and aragonitic crystals of the pearl oyster shells and distribution of their mineralizing organic matrices. *Geophysical Research Abstracts* 9, 01643.
- Farrell, E.F. and Newnham, R.E. (1965) Crystal-field spectra of chrysoberyl, alexandrite, peridot, and sinhalite. *American Mineralogist* 50, 1972-1981.

- Farrington, O. C. (1923), *Amber: Its Physical Properties and Geological Occurrence*, Chicago, Field Museum of Natural History, 25–31.
- Farver J.R. and Yund R.A. (1991) Oxygen diffusion in quartz: Dependence on temperature and water fugacity. *Chemical Geology*, 90, (1/2), 55-70.
- Fast J.B. (2008) A 2007 collecting venture in Herkimer Co., NY. *Rocks and Minerals*, 83, (3), 196-200.
- Faulkner M.J. and Shigley J.E. (1989) Zircon from the Harts Range, Northern Territory, Australia. *Gems and Gemology*, 25, (4), 207-215.
- Faulques, E., Fritsch, E. and Ostroumov, M. (2001) Spectroscopy of natural silica-rich glasses. *Journal of Mineralogical and Petrological Sciences* 96, 120-128.
- Faust, G. T. (1950) Thermal analysis studies of carbonates I. Aragonite and calcite, *American Mineralogist*, 35. 3/4. 207-224
- Faye, G. H. and Harris, D. C. (1969) On the origin of colour and pleochroism in andalusite from Brazil, *Canadian Mineralogist*, 10. 1. 47-56
- Faye, G. H., Manning, P. G. and Nickel, E. H. (1968) The polarized optical absorption spectra of tourmaline, cordierite, chloritoid and vivianite: Ferrous-ferric electronic interaction as a source of pleochroism, *American Mineralogist*, 53. 7/8. 1174-1201
- Faye, G.H. (1971) On the optical spectra of di- and trivalent iron in corundum: A discussion. *American Mineralogist* 56, 344-348.
- Federico M., Andreozzi G.B., Lucchesi S. and Graziani G. (1998) Compositional variation of tourmalines in the granitic pegmatite dykes of the Cruzeiro Mine, Minas Gerais, Brazil. *Canadian Mineralogist*, 36, (2), 415-431.
- Federman, D. (1992) Diffusion treatment can blue the whitest of sapphires but since the color is only skin deep, full disclosure is a duty--one some sellers shirk. *Modern Jeweler*, 76-118.
- Federman, D. (1995) Classic rocks the top 10 gems of the '90s. *Modern Jeweler*, 34-46.
- Federman, D. (2000) African aquamarine, *Modern Jeweler*, 99. 5. 37-38
- Federman, D. (2004) Gem Profile: Scallop Pearl: Baja Beauty. *Modern Jeweler*, April, 38,
- Fedo C.M., Sircombe K.N. and Rainbird R.H. (2003) Detrital zircon analysis of the sedimentary record. *Reviews in Mineralogy and Geochemistry*, 53, (1), 277-303.
- Fedorov, A. V. (2002) Oh, these imitations again (in Russian), *Gemmological Bulletin*, 4. 7. 37-43
- Fedotova A.A., Bibikova E.V. and Simakin S.G. (2008) Ion-microprobe zircon geochemistry as an indicator of mineral genesis during geochronological studies. *Geochemistry International*, 46, (9), 912-927.
- Feineman M.D., Ryerson F.J., DePaolo D.J. and Plank T. (2007) Zoisite-aqueous fluid trace element partitioning with implications for subduction zone fluid composition. *Chemical Geology*, 239, (3/4), 250-265.
- Feist, M., Lamprecht, I. and Muller, F. (2007) Thermal investigations of amber and copal, *Thermochimica Acta*, 458. 1/2. 162-170
- Feng R., Machado N. and Ludden J. (1993) Lead geochronology of zircon by laser probe – inductively coupled plasma – mass spectrometry (LA-ICP-MS). *Geochimica et Cosmochimica Acta*, 57, (14), 3479-3486.
- Fenn, P. M. (1977) The nucleation and growth of alkali feldspars from hydrous melts, *Canadian Mineralogist*, 15. 2. 135-161
- Fenner, C. (1939) Australites: A unique shower of glass meteorites. *Mineralogical Magazine* 25, 82-85.
- Ferguson, J. and Fielding, P.E. (1971) The origins of the colours of yellow, green and blue sapphires. *Chemical Physics Letters* 10, 262-265.
- Ferguson, J. and Fielding, P.E. (1972) The origins of natural yellow, blue, and green sapphires. *Australian Journal of Chemistry* 25, 1371-1385.
- Ferguson, R.W. (1977) California's cuttable serpentines. *Lapidary Journal* 31, 174-180.
- Fernandes, S. (1993) Sillimanite (fibrolite) from Orissa.
- Fernando, G.W.A.R. and Hofmeister, W. (2000) Origin of some gem minerals in Sri Lanka: Evidence from corundum-spinel-scheelite-taaffeite-bearing rocks. *Applied Mineralogy*, 293-295.
- Fernando, G.W.A.R., Attanayake, A.N.B. and Hofmeister, W. (2005) Corundum - spinel - taaffeite - scheelite bearing metasomatites in Bakamuna, Sri Lanka: Modeling of its formation. *Gem Materials and Modern Analytical Methods*, 117-122.
- Ferreira de Souza L.B., Guzzo P.L. and Khoury H.J. (2010) Correlating the TL response in γ -irradiated natural quartz to aluminum and hydroxyl point defects. *Journal of Luminescence*, 130, (8), 1551-1556.

- Ferry J.M. and Watson E.B. (2007) New thermodynamic models and revised calibrations for the Ti-in-zircon and Zr-in-rutile thermometers. *Contributions to Mineralogy and Petrology*, 154, (4), 429-437.
- Ferry, J. M. (2001) Calcite inclusions in forsterite, *American Mineralogist*, 86, 7/8, 773-779
- Field, D. S. M. (1947) Canadian amber, *Journal of Gemmology*, 1, 4, 8-9
- Field, D.S.M. (1948) Canadian gems and gem localities. *Journal of Gemmology* 1, 2, 13-22, 16-15.
- Field, D.S.M. (1992) The cornflower-blue sapphires of Kashmir. *Canadian Gemmologist* 13, 55-58.
- Fijal, J. and Tokarz, M. (1981) Crystallochemical properties of synthetic OH- and Cl-forms of sodalite. *Mineralogia Polonica* 12, 27-45.
- Filip J., Novak M., Beran A. and Zboril R. (2006) Crystal chemistry and OH defect concentrations in spodumene from different granitic pegmatites. *Physics and Chemistry of Minerals*, 32, (10), 733-746.
- Finch R.J. and Hanchar J.M. (2003) Structure and chemistry of zircon and zircon-group minerals. *Reviews in Mineralogy and Geochemistry*, 53, (1), 1-25.
- Finch R.J., Hanchar J.M., Hoskin P.W.O. and Burns P.C. (2001) Rare earth elements in synthetic zircon: Part 2. A single crystal X-ray study of xenotime substitution. *American Mineralogist*, 86, (5/6), 681-689.
- Finger L. W. and E. Prince (1972), Neutron diffraction studies: Andalusite and sillimanite, *Carnegie Institute of Washington - Annual Report of the Geophysical Laboratory*, 496-500.
- Finger L.W., Hazen R.M. and Hofmeister A.M. (1986) High-pressure crystal chemistry of spinel (MgAl_2O_4) and magnetite (Fe_3O_4): Comparisons with silicate spinels. *Physics and Chemistry of Minerals*, 13, (4), 215-220.
- Fischer, K. (1977) Edelstein epidot - Fundorte und verarbeitung, *Lapis*, 2, 7, 10-13
- Fischer, K. (1985) Peridot - Olivine in Edelsteinqualität. *Lapis* 10, 31-40.
- Fisher J. (2011) Mines and minerals of the Southern California pegmatite province. *Rocks and Minerals*, 86, (1), 14-34.
- Fisher J., Foord E.E. and Bricker G.A. (1998) The geology, mineralogy and history of the Himalaya mine, Mesa Grande, San Diego County, California. *Rocks and Minerals*, 37, (5/6), 156-180.
- Fisher, J. (2004) Fluorite from the Northern Pennines orefield, England, *Rocks and Minerals*, 79, 6, 378-398
- Fitzpatrick, S.M. and Boyle, J.E. (2002) The antiquity of pearl shell (*Pinctada* sp.) burial artifacts in Palau, Western Micronesia. *Radiocarbon* 44, 691-699.
- Fizgeer, B., Uxan-Saguy, C., Cytermann, C., Richter, V., Avigal, I., Shaanan, M., Brener, R. and Kalish, R. (2001) Inhibition of light element diffusion in diamond due to ion implantation related defects, *Physica Status Solidi A*, 186, 2, 281-289
- Flamini, A., Graziani, G. and Martini, M. (1987) Further observations on Chatham flux-grown synthetic blue sapphire. *21st International Gemmological Congress - Transactions*, 55-56.
- Fleet, M. E. and Pan, Y. (1995) Crystal chemistry of rare earth elements in fluorapatite and some calc-silicates, *European Journal of Mineralogy*, 7, 3, 591-605
- Fleet, M.E. and Arima, M. (1985) Oriented hematite inclusions in sillimanite. *American Mineralogist* 70, 1232-1237.
- Flem B., Larsen R.B., Grimstvedt A. and Mansfeld J. (2002) In situ analysis of trace elements in quartz by using laser ablation inductively coupled plasma mass spectrometry.
- Fliegel D., Klementova M. and Kosler J. (2010) Phase and composition changes of titanite during laser ablation inductively coupled plasma mass spectrometry analysis. *Analytical Chemistry*, 82, (10), 4272-4277.
- Flinter, B. H. (1963) A note on ferroan gahnite from Malaya and its bearing on the published data for hercynite, *American Mineralogist*, 48, 1/2, 194-199
- Flörke O.W., Graetsch H., Martin B., Roller K. and Wirth R. (1991) Nomenclature of micro- and non-crystalline silica minerals based on structure and microstructure. *Neues Jahrbuch für Mineralogie Abhandlungen*, 163, (9), 19-42.
- Foit F.F. (1989) Crystal chemistry of alkali-deficient schorl and tourmaline structural relationships. *American Mineralogist*, 74, (3/4), 422-431.
- Foley J.A., Wright S.E. and Hughes J.M. (2001) Cation partitioning versus temperature in spinel: Optimization of site occupants. *Physics and Chemistry of Minerals*, 28, (3), 143-149.
- Fontaine, G.H., Hametner K., Peretti A., Günther D. (2010). Authenticity and provenance studies of copper-bearing andesines using Cu isotope ratios and element analysis by fs-LA-MC-ICPMS and ns-LA-ICPMS
- Fontana, I., Le Donne, A., Palanza, V., Binetti, S. and Spinolo, G. (2008) Optical spectroscopy study of type 1 natural and synthetic sapphires. *Journal of Physics: Condensed Matter* 20, 125228.

- Fontana, I., LeDonne, A., Palanza, V., Binetti, S. and Spinolo, G. (2009) Absorption and emission spectroscopy in natural and synthetic corundums. *Geophysical Research Abstracts* 11.
- Foord E.E. and Taggart J.E. (1998) A reexamination of the turquoise group: The minerals aheylite, planerite (redefined), turquoise and coeruleolactite. *Mineralogical Magazine*, 61, (1), 93-111.
- Foord E.E., Spaulding L.B., Mason R.A. and Martin R.F. (1989) Mineralogy and paragenesis of the Little Three mine pegmatites, Ramona District, San Diego County, California. *Mineralogical Record*, 20, (1), 101-128.
- Foord E.E., Starkey H.C. and Taggart J.E. (1986) Mineralogy and paragenesis of "pocket" clays and associated minerals in complex granitic pegmatites, San Diego County, California. *American Mineralogist*, 71, (3/4), 428-439.
- Foord, E. E. and Cunningham, C. G. (1978a) Thermal transformation of anomalously biaxial dimetric crystals, *American Mineralogist*, 63. 7/8. 747-749
- Foord, E. E. and Mills, B. A. (1978b) Biaxiality in "isometric" and "dimetric" crystals, *American Mineralogist*, 63. 3/4. 316-325
- Foord, E. E., Erd, R. C. and Hunt, G. R. (1981) New data for jeremejevite, *Canadian Mineralogist*, 19. 2. 303-310
- Foreman, J. (1997) Dynamic mechanical analysis of polymers. *American Laboratory*, 21-23.
- Foreman, J.A., Klinger, K.A. and Wolkowicz, M. (1996) Thermal analysis and rheology of modified polypropylenes. *American Laboratory* 28, 19-22.
- Forster, J. R. (1995) Red-hot fluorite, *U.V. Waves*, May/June. 4-5
- Foster, W. R. (1955) Simple method for the determination of the plagioclase feldspars, *American Mineralogist*, 40. 3/4. 179-185
- Fowler A., Prokoph A., Stern R. and Dupuis C. (2002) Organisation of oscillatory zoning in zircon: Analysis, scaling, geochemistry, and model of a zircon from Kipawa, Quebec, Canada. *Geochimica et Cosmochimica Acta*, 66, (2), 311-328.
- Francis C.A. (1985) Maine tourmaline. *Mineralogical Record*, 16, (5), 365-388.
- Francis, C. A. (1985) New data on the forsterite-tephroite series, *American Mineralogist*, 70. 5/6. 568-575
- Francis, C. A. and Ribbe, P. H. (1980) The forsterite-tephroite series: I. Crystal structure refinements, *American Mineralogist*, 65. 11/12. 1263-1269
- Francis, M.D.P.L. and Matsueda, H. (2004) A recent observation of corundum-spinel-sapphirine assemblage at Kaltota in Balangoda region, Sri Lanka, and its significance as a cabochoning material. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 53, 43-52.
- Francis, M.D.P.L. and Matsueda, H. (2004) A recent observation of corundum-spinel-sapphirine assemblage at Kaltota in Balangoda region, Sri Lanka, and its significance as a cabochoning material. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 53, 43-52.
- Francis, M.D.P.L., Matsueda, H., Torimoto, J., Dharmaratne, P.G.R. and Giuliani, G. (2003) Recent study of fluid inclusions in corundum of Sri Lanka. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 52, 163-176.
- Francis, P. (1988) Simojovel, Mexico: Village of amber, *Lapidary Journal*, 42. 8. 55-62
- Fransolet, A. M. and Tarte, P. (1977) Infrared spectra of analyzed samples of the amblygonite-montebrazite series: A new rapid semi-quantitative determination of fluorine, *American Mineralogist*, 62. 5/6. 559-564
- Franz G. and Selverstone J. (1992) An empirical phase diagram for the clinozoisite-zoisite transformation in the system $\text{Ca}_2\text{Al}_3\text{Si}_3\text{O}_{12}(\text{OH})$ - $\text{Ca}_2\text{Al}_2\text{Fe}^{3+}\text{Si}_3\text{O}_{12}(\text{OH})$. *American Mineralogist*, 77, (5/6), 631-642.
- Fraquet, H. (1989) Proceedings of the First International Amber Symposium, *Journal of Gemmology*, 21. 6. 347-350
- Fraquet, H. R. (1982) Amber from the Dominican Republic, *Journal of Gemmology*, 18. 4. 321-333
- Frazier, S. and Frazier, A. (1990) A benitoite bibliography, *Lapidary Journal*, 44. 8. 61-68
- Frazier, S. and Frazier, A. (1991a) Mysterious moldavite, *Lapidary Journal*, 45. 5. 36-44
- Frazier, S. and Frazier, A. (1991b) Out of this world, *Lapidary Journal*, 45. 5. 45-50
- Frazier, S. and Frazier, A. (1992) Heavenly peridot. *Lapidary Journal* 46, 36-40.
- Frazier, S. and Frazier, A. (1997a) The perils of peridot pursuit. *Lapidary Journal* 49, 18-23.
- Frazier, S. and Frazier, A. (1997b) Return of a royal blue. *Lapidary Journal* 50, 318-322.
- Frazier, S. and Frazier, A. (1999) Turquoise in the sky. *Lapidary Journal*, 53, (9), 36-42.

- Frederic, P. (1994) Le rubies de Luc Yen Vietnam. *University of Nantes - Diploma*, 1-39.
- Fregola R.A. and Scandale E. (2007) Cross-twinning in a natural spinel from Sri Lanka. *Physics and Chemistry of Minerals*, 34, (8), 529-541.
- Fregola R.A., Melone N. and Scandale E. (2005) X-ray diffraction topographic study of twinning and growth of natural spinels. *European Journal of Mineralogy*, 17, (5), 761-768.
- Fregola R.A., Scandale E. and De Lorenzo G. (2000) XRD study of spinel magnesium aluminate natural crystals. *Materials Chemistry and Physics*, 66, (2/3), 149-154.
- French, B. M. and Fahey, J. J. (1972) Manganaxinite from the Mesabi Range, Minnesota, *American Mineralogist*, 57, 5/6, 989-992
- Frenzel, G., Stähle, V. and Bank, F. H. (1986) Ein oktaedrischer gahnospinell-rohstein von Ratnapura, Sri Lanka, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 35, 1/2, 39-46
- Freund, F., Kathrein, H., Wengler, H., Knobel, R. and Heinen, H. J. (1980) Carbon in solid solution in forsterite - A key to the untractable nature of reduced carbon in terrestrial and cosmogenic rocks, *Geochimica et Cosmochimica Acta*, 44, 9, 1319-1333
- Friedrich, A., Lager, G. A., Kunz, M., Chakoumakos, B. C., Smyth, J. R. and Schultz, A. J. (2001) Temperature-dependent single-crystal neutron diffraction study of natural chondrodite and clinohumites, *American Mineralogist*, 86, 9, 981-989
- Friis H., Finch A.A., Williams C.T. and Hanchar J.M. (2010) Photoluminescence of zircon (ZrSiO₄) doped with REE³⁺ (REE = Pr, Sm, Eu, Gd, Dy, Ho, Er). *Physics and Chemistry of Minerals*, 37, (6), 333-342.
- Friis, H. (2011) Sodalite - a mineralogical chameleon. *Geology Today* 27, 194-198.
- Fritsch E. and Ivey J. (2015). Mustard Jasper or Bumble bee stone. *IGC 2015 - proceedings and extended abstracts*, 149-150.
- Fritsch E., Gaillou E., Ostrooumov M., Rondeau B., Devouard B. and Barreau A. (2004) Relationship between nanostructures and optical absorption in fibrous pink opals from Mexico and Peru. *European Journal of Mineralogy*, 16, (5), 743-752.
- Fritsch E., Gaillou E., Rondeau B., Barreau A., Albertini D. and Ostrooumov M. (2006) The nanostructure of fire opal. *Journal of Non-Crystalline Solids*, 352, (38/39), 3957-3960.
- Fritsch E., McClure S.F., Ostrooumov M., Andres Y., Moses T., Koivula J.I. and Kammerling R.C. (1999) The identification of Zachery-treated turquoise. *Gems and Gemology*, 35, (1), 4-16.
- Fritsch E., Ostrooumov M., Rondeau B., Barreau A., Albertini D., Marie A.M., Lasnier B. and Wery J. (2002) Mexican gem opals: Nano- and micro-structure, origin of colour, comparison with other common opals of gemmological significance. *Australian Gemmologist*, 21, (6), 230-238.
- Fritsch E., Shigley J.E., Rossman G.R., Mercer M.E., Muhlmeister S.M. and Moon M. (1990) Gem-quality cuprian-elbaite tourmalines from São José Da Batalha, Paraíba, Brazil. *Gems and Gemology*, 26, (3), 189-205.
- Fritsch E., Wery J., Jonusauskas G. and Faulques E. (2003) Transient photoluminescence from highly disordered silica-rich natural phases with and without nanostructures. *Physics and Chemistry of Minerals*, 30, (7), 393-400.
- Fritsch, E. (1993a) Best way to identify bleached and resin impregnated jadeite, *Jewellery News Asia*, 86-90
- Fritsch, E. (1993b) GIA says AGIL's findings insufficient, *Jewellery News Asia*, 86, 90
- Fritsch, E. (1994) Type-B jadeite: New polymers and estimating amount of wax, *Jewellery News Asia*, 123, 106-110
- Fritsch, E. and Karamelas, S. (2008a) Comment on "Determination of carotenoid as the purple pigment in *Gorgonia ventalina* sclerites using Raman spectroscopy" [Leverette et al., *Spectrochim. Acta A*, 69, 2008) 1058-1061]. *Spectrochimica Acta A* 71, 1627.
- Fritsch, E. and Karamelas, S. (2008b) Comment on: Determination of canthaxanthin in the red coral (*Corallium rubrum*) from Marseille by HPLC combined with UV and MS detection (Cvejić et al., *Mar. Biol.* 152: 855-862, 2007). *Marine Biology* 154, 929-930.
- Fritsch, E. and Mercer, M. (1993) Blue color in sapphire caused by Fe²⁺/Fe³⁺ intervalence charge transfer [letter to the editor]. *Gems and Gemology* 29, 151, 226.
- Fritsch, E. and Rossman, G.R. (1990) New technologies of the 1980s: Their impact on gemology. *Gems and Gemology* 26, 64-75.
- Fritsch, E., Chalain, J. P. and Hänni, H. A. (2001) Identification of GE POL diamonds, *Australian Gemmologist*, 21, 4, 172-177

- Fritsch, E., Hainschwang, T., Massi, L. and Rondeau, B. (2007a) Hydrogen-related optical centers in natural diamond: An update. *New Diamond and Frontier Carbon Technology* 17, 63-89.
- Fritsch, E., Massi, L., Rossman, G.R., Hainschwang, T., Jobic, S. and Dessapt, R. (2007b) Thermochromic and photochromic behaviour of "chameleon" diamonds. *Diamond and Related Materials* 16, 401-408.
- Fritsch, E., Misirowski, E. (1987) The history and gemology of queen conch 'pearls'. *Gems & Gemology*, 23, 4, 208-221.
- Fritsch, E., Moses, T., McClure, S.F. and Moon, M. (1993) Identification of bleached and polymer-impregnated jadeite, *Jewelry Circle Magazine*, 17. 84-91
- Fritsch, E., Rondeau, B., Hainschwang, T. and Quellier, M.H. (2007c) A contribution to the understanding of pink color in diamond: The unique, historical "Grande Conde". *Diamond and Related Materials* 16, 1471-1474.
- Fritsch, E., Shun, T. T. W., Moses, T., McClure, S.F. and Moon, M. (1992) Identification of bleached and polymer-impregnated jadeite, *Gems and Gemology*, 28. 3. 176-187
- Fritsch, E.F. and Shigley, J.E. (1994) Causes of the purple and pink colours of manganoan sugilites from the Wessels mine, South Africa. *Mineralogical Magazine* 58, 681-685.
- Fronde, C. (1936) Twisted crystals of pyrite and smoky quartz. *American Museum Novitates*, 1-6.
- Fronde, C. and Lindberg, M. L. (1948) Second occurrence of brazilianite, *American Mineralogist*, 33. 3/4. 135-141
- Frost B.R., Chamberlain K.R. and Schumacher J.C. (2001) Sphene (titanite): Phase relations and role as a geochronometer. *Chemical Geology*, 172, (1/2), 131-148.
- Frost R.L., Reddy B.J., Martens W.N. and Weier M. (2006) The molecular structure of the phosphate mineral turquoise: A Raman spectroscopic study. *Journal of Molecular Structure*, 788, (1/3), 224-231.
- Frost, R. L., Bouzaid, J. M., Martens, W. N. and Reddy, B. J. (2006) Raman spectroscopy of the borosilicate mineral ferroaxinite, *Journal of Raman Spectroscopy*, 38. 2. 135-141
- Frost, R.L., Reddy, B.J., Wain, D.L. and Hales, M.C. (2006) An application of near infrared spectroscopy to the study of carbonate minerals: Smithsonite, rhodochrosite, sphaerocobaltite and cadmium smithsonite. *Journal of Near Infrared Spectroscopy* 14, 317-324.
- Frunze, V. V., Tsutsikh, A. Y. and Krasilnikov, A. V. (2000) Selection of annealing regimes for irradiated diamonds, *Technical Physics Letters*, 26. 3. 184-186
- Fryer, C. (1981a) A coral substitute, dyed marble, *Gems and Gemology*, 17. 4. 226
- Fryer, C. (1981b) A new source of synthetic emeralds?, *Gems and Gemology*, 17. 2. 101-102
- Fryer, C. (1981c) Aquamarine, *Gems and Gemology*, 17. 1. 40
- Fryer, C. (1981d) Dyed and wax-treated lapis lazuli, *Gems and Gemology*, 17. 2. 103
- Fryer, C. (1981e) Emerald substitute, dyed beryl, *Gems and Gemology*, 17. 4. 227-228
- Fryer, C. (1981f) Emerald, *Gems and Gemology*, 17. 1. 43-44
- Fryer, C. (1981g) Heat-treated yellow-orange sapphires. *Gems and Gemology* 17, 230.
- Fryer, C. (1981h) Ivory, *Gems and Gemology*, 17. 3. 162
- Fryer, C. (1981i) Jade substitute. *Gems and Gemology* 17, 102-103.
- Fryer, C. (1981j) Malachite, *Gems and Gemology*, 17. 1. 44
- Fryer, C. (1981k) Sapphires - induced surface coloration of natural sapphires. *Gems and Gemology* 17, 46.
- Fryer, C. (1981l) Sillimanite. *Gems and Gemology* 17, 166.
- Fryer, C. (1981m) Sugilite. *Gems and Gemology* 17, 105-106.
- Fryer, C. (1982a) Cat's-eye emerald, *Gems and Gemology*, 18. 3. 169-170
- Fryer, C. (1982b) Emerald fakes, *Gems and Gemology*, 18. 2. 102-103
- Fryer, C. (1982c) Emerald, *Gems and Gemology*, 18. 4. 229-230
- Fryer, C. (1982d) Iolite, an unusual cat's-eye, *Gems and Gemology*, 18. 3. 171
- Fryer, C. (1982e) Korerupine with apatite inclusions, *Gems and Gemology*, 18. 2. 104
- Fryer, C. (1982f) Lapis lazuli imitation, *Gems and Gemology*, 18. 3. 172
- Fryer, C. (1982g) Natural sapphire with heat-induced star. *Gems and Gemology* 18, 106-107.
- Fryer, C. (1982h) Sapphire, diffusion colored. *Gems and Gemology* 18, 173.
- Fryer, C. (1982i) Sapphire, heat treated. *Gems and Gemology* 18, 231.
- Fryer, C. (1982j) Spinel and sapphire, colored by cobalt (?), *Gems and Gemology*, 18. 4. 231-233

- Fryer, C. (1982k) Sugilite. *Gems and Gemology* 18, 48-49.
- Fryer, C. (1982l) Synthetic emerald, *Gems and Gemology*, 18. 3. 170-171
- Fryer, C. (1982m) Synthetic green beryl reported from Australia, *Gems and Gemology*, 18. 1. 44-45
- Fryer, C. (1982n) Unusual inclusions in synthetic emerald, *Gems and Gemology*, 18. 1. 45-46
- Fryer, C. (1982o) World's largest taaffeite? *Gems and Gemology* 18, 49.
- Fryer, C. (1983a) A large cat's-eye, *Gems and Gemology*, 19. 3. 171
- Fryer, C. (1983b) Alexandrite, cat's-eye, *Gems and Gemology*, 19. 1. 43
- Fryer, C. (1983c) Amber, in plastic, *Gems and Gemology*, 19. 3. 171
- Fryer, C. (1983d) Diaspore, a rare gem material, *Gems and Gemology*, 19. 3. 172-173
- Fryer, C. (1983e) Emerald, synthetic, *Gems and Gemology*, 19. 2. 114-115
- Fryer, C. (1983f) Imitation emerald, *Gems and Gemology*, 19. 1. 44
- Fryer, C. (1983g) Jade simulant. *Gems and Gemology* 19, 233-234.
- Fryer, C. (1983h) Jade, dyed blue jadeite, *Gems and Gemology*, 19. 2. 115
- Fryer, C. (1983i) Lapis lazuli, a new imitation, *Gems and Gemology*, 19. 3. 174
- Fryer, C. (1983j) Yellow sapphires, heat treated. *Gems and Gemology* 19, 236-237.
- Fryer, C. (1984a) Abalone pearl. *Gems and Gemology* 20, 169.
- Fryer, C. (1984b) Beryl, with iridescent coating, *Gems and Gemology*, 20. 1. 45
- Fryer, C. (1984c) Coral, dyed blue with plastic coating. *Gems and Gemology* 20, 45-46.
- Fryer, C. (1984d) Diopside, *Gems and Gemology*, 20. 2. 107
- Fryer, C. (1984e) Dyed nephrite, *Gems and Gemology*, 20. 1. 48
- Fryer, C. (1984f) Emerald substitute - dyed beryl, *Gems and Gemology*, 20. 3. 167-168
- Fryer, C. (1984g) Emerald, oiled, *Gems and Gemology*, 20. 1. 46-47
- Fryer, C. (1984h) Enstatite, near colorless, *Gems and Gemology*, 20. 3. 168-169
- Fryer, C. (1984i) Hematite, magnetic, *Gems and Gemology*, 20. 1. 46-47
- Fryer, C. (1984j) Imitation "rice grain" Biwa cultured pearls. *Gems and Gemology* 20, 170-171.
- Fryer, C. (1984k) Imitation mabe pearls. *Gems and Gemology* 20, 108-109.
- Fryer, C. (1984l) Jade dyed jadeite, *Gems and Gemology*, 20. 1. 47-48
- Fryer, C. (1984m) Lechleitner synthetic overgrowth, *Gems and Gemology*, 20. 3. 167-169
- Fryer, C. (1984n) Natural seed pearls and glass imitations. *Gems and Gemology* 20, 171-172.
- Fryer, C. (1984o) Sapphire, more colors of heat-treated stones. *Gems and Gemology* 20, 231-232.
- Fryer, C. (1985a) Amber, with unusual inclusions, *Gems and Gemology*, 21. 2. 108
- Fryer, C. (1985b) Beryl, bicolor, *Gems and Gemology*, 21. 4. 232
- Fryer, C. (1985c) Fluorite carving, damaged by sulfuric acid, *Gems and Gemology*, 21. 2. 109-110
- Fryer, C. (1985d) Imitation pearls. *Gems and Gemology* 21, 111-112.
- Fryer, C. (1985e) Jadeite, with unusual inclusions, *Gems and Gemology*, 21. 3. 175
- Fryer, C. (1985f) Lapis lazuli, another imitation, *Gems and Gemology*, 21. 3. 175-176
- Fryer, C. (1985g) Oiled lapis lazuli, *Gems and Gemology*, 21. 4. 235
- Fryer, C. (1985h) Plagioclase feldspar and green muscovite mica, as major constituents in a carving, *Gems and Gemology*, 21. 3. 173-174
- Fryer, C. (1985i) Sapphirine, a rarely encountered cut stone. *Gems and Gemology* 21, 176-177.
- Fryer, C. (1985j) Star sapphire, diffusion-treated. *Gems and Gemology* 21, 112.
- Fryer, C. (1985k) Turquoise simulant, dyed magnesite, *Gems and Gemology*, 21. 1. 47-48
- Fryer, C. (1986a) "Cobalt-blue" spinel, an update, *Gems and Gemology*, 22. 2. 111-113
- Fryer, C. (1986b) Alexandrite, with unusual silky zones, *Gems and Gemology*, 22. 1. 46
- Fryer, C. (1986c) Andalusite with growth bands, *Gems and Gemology*, 22. 4. 235-236
- Fryer, C. (1986d) Calcite marble beads, *Gems and Gemology*, 22. 1. 46-47
- Fryer, C. (1986e) Cat's-eye petalite. *Gems and Gemology* 22, 239-240.
- Fryer, C. (1986f) Dyed lapis lazuli, difficult to detect, *Gems and Gemology*, 22. 3. 172-173

- Fryer, C. (1986g) Ekanite, a markedly radioactive metamict gemstone, *Gems and Gemology*, 22. 1. 47-48
- Fryer, C. (1986h) Faceted clinohumite, *Gems and Gemology*, 22. 4. 236
- Fryer, C. (1986i) Fused amber, *Gems and Gemology*, 22. 3. 170
- Fryer, C. (1986j) Golden yellow danburite from Sri Lanka, *Gems and Gemology*, 22. 1. 47
- Fryer, C. (1986k) Imitation lapis lazuli, *Gems and Gemology*, 22. 4. 238-239
- Fryer, C. (1986l) Imitation pearls, "coque de perle". *Gems and Gemology* 22, 239.
- Fryer, C. (1986m) Jadeite jade doublet, *Gems and Gemology*, 22. 3. 172
- Fryer, C. (1986n) Lapis lazuli dyed and "sealed", *Gems and Gemology*, 22. 2. 109
- Fryer, C. (1986o) Lapis lazuli imitation, dyed blue quartzite, *Gems and Gemology*, 22. 1. 49-50
- Fryer, C. (1986p) Oolitic opal with chalcedony matrix, *Gems and Gemology*, 22. 1. 50-51
- Fryer, C. (1986q) Sapphire, pinkish orange ("Padparadscha"). *Gems and Gemology* 22, 52-53.
- Fryer, C. (1987a) A brownish gray taaffeite. *Gems and Gemology* 23, 168.
- Fryer, C. (1987b) A rare gemstone. *Gems and Gemology* 23, 108-109.
- Fryer, C. (1987c) Amber, imitation, *Gems and Gemology*, 23. 4. 232
- Fryer, C. (1987d) Brazilian alexandrite, *Gems and Gemology*, 23. 3. 164
- Fryer, C. (1987e) Calcium carbonate beads, *Gems and Gemology*, 23. 4. 232-233
- Fryer, C. (1987f) Cat's-eye sillimanite (fibrolite). *Gems and Gemology* 23, 167-168.
- Fryer, C. (1987g) Diaspore, a rare gem material, *Gems and Gemology*, 23. 1. 44-45
- Fryer, C. (1987h) Fossiliferous chalcedony, *Gems and Gemology*, 23. 1. 47-48
- Fryer, C. (1987i) Jadeite jade earrings, *Gems and Gemology*, 23. 3. 165-166
- Fryer, C. (1987j) Peridot, cat's-eye. *Gems and Gemology* 23, 106.
- Fryer, C. (1987k) Quartzite, dyed yellow, *Gems and Gemology*, 23. 2. 106-107
- Fryer, C. (1987l) Ruby, heat-treated natural and synthetic. *Gems and Gemology* 23, 235-236.
- Fryer, C. (1987m) Serpentine, dyed yellow and reddish orange. *Gems and Gemology* 23, 109.
- Fryer, C. (1987n) Synthetic yellow sapphire. *Gems and Gemology* 23, 107-108.
- Fryer, C. (1987o) Unusual inclusions in heat-treated blue sapphire. *Gems and Gemology* 23, 108.
- Fryer, C. (1988a) Banded lapis lazuli, *Gems and Gemology*, 24. 1. 49
- Fryer, C. (1988b) Biron synthetic emerald, *Gems and Gemology*, 24. 2. 113
- Fryer, C. (1988c) Clinohumite, *Gems and Gemology*, 24. 1. 47-48
- Fryer, C. (1988d) Dyed spangled amber, *Gems and Gemology*, 24. 3. 169
- Fryer, C. (1988e) Imitation dyed black chalcedony beads, *Gems and Gemology*, 24. 4. 241
- Fryer, C. (1988f) Imitation turquoise with "veins" and pyrite. *Gems and Gemology* 24, 52.
- Fryer, C. (1988g) Jadeite jade pendant, *Gems and Gemology*, 24. 2. 113
- Fryer, C. (1988h) Jadeite jade teapot, *Gems and Gemology*, 24. 2. 114-115
- Fryer, C. (1988i) Synthetic Alexandrite, *Gems and Gemology*, 24. 1. 47
- Fryer, C. (1988j) Taaffeite with unusual fluorescence. *Gems and Gemology* 24, 174.
- Fryer, C. (1988k) Unusual inclusions in a synthetic alexandrite, *Gems and Gemology*, 24. 3. 169
- Fryer, C. (1988l) Walrus ivory, *Gems and Gemology*, 24. 4. 243-244
- Fryer, C. (1989a) A large phosphophyllite crystal. *Gems and Gemology* 25, 37-38.
- Fryer, C. (1989b) Chalcedony, imitation "black onyx", *Gems and Gemology*, 25. 3. 171
- Fryer, C. (1989c) Emerald, with plastic-like filling, *Gems and Gemology*, 25. 2. 104
- Fryer, C. (1989d) Imitation lapis lazuli - dyed blue calcite marble, *Gems and Gemology*, 25. 2. 104
- Fryer, C. (1989e) Impregnated jadeite jade, *Gems and Gemology*, 25. 4. 239-240
- Fryer, C. (1989f) Phenomenal chrysoberyl, *Gems and Gemology*, 25. 2. 102
- Fryer, C. (1989g) X-ray transparency separates two imitations, *Gems and Gemology*, 25. 2. 105
- Fryer, C. (1990a) Carved chrysoberyl, *Gems and Gemology*, 26. 3. 220-221
- Fryer, C. (1990b) Cat's-eye andalusite, *Gems and Gemology*, 26. 1. 94
- Fryer, C. (1990c) Cobalt colored color-change spinel, *Gems and Gemology*, 26. 3. 226-227

- Fryer, C. (1990d) Dyed natural beryl, *Gems and Gemology*, 26. 3. 220
- Fryer, C. (1990e) Emerald, with filled fractures, *Gems and Gemology*, 26. 1. 95-96
- Fryer, C. (1990f) Imitation coral, barium sulfate. *Gems and Gemology* 26, 153-154.
- Fryer, C. (1990g) Imitation turquoise, *Gems and Gemology*, 26. 4. 299
- Fryer, C. (1990h) Sapphire diffusion-treated Montana rough. *Gems and Gemology* 26, 224-225.
- Fryer, C. (1990i) Unusual gem-quality sodalite. *Gems and Gemology* 26, 156.
- Fryer, C. (1991a) "Emerald" with unusual color zoning, *Gems and Gemology*, 27. 1. 41
- Fryer, C. (1991b) Amber, damaged in cleaning, *Gems and Gemology*, 27. 2. 108
- Fryer, C. (1991c) Chalcedony "turquoise" color, *Gems and Gemology*, 27. 1. 40
- Fryer, C. (1991d) Cobalt-colored synthetic spines, with unusual inclusions, *Gems and Gemology*, 27. 2. 113-114
- Fryer, C. (1991e) Moonstone and iolite beads, *Gems and Gemology*, 27. 1. 42
- Fryer, C. (1992a) "Geneva [synthetic] ruby". *Gems and Gemology* 28, 127.
- Fryer, C. (1992b) Alexandrite, *Gems and Gemology*, 28. 3. 192
- Fryer, C. (1992c) Heat-damaged jadeite, *Gems and Gemology*, 27. 4. 250
- Fryer, C. (1992d) Identifying curved striae in yellow synthetic sapphire. *Gems and Gemology* 28, 128.
- Fryer, C. (1992e) Imitation lapis lazuli, *Gems and Gemology*, 28. 1. 55
- Fryer, C. (1992f) Quartzite and dolomite bead, *Gems and Gemology*, 27. 4. 251
- Fryer, C. (1992g) Repaired jadeite, *Gems and Gemology*, 28. 3. 193-194
- Fryer, C. (1992h) Treated "black" diamond. *Gems and Gemology* 28, 124-125.
- Fryer, C. (1992i) Twinned synthetic sapphires. *Gems and Gemology* 27, 252.
- Fryer, C. (1993a) Abalone pearls from North America. *Gems and Gemology* 29, 51.
- Fryer, C. (1993b) Bleached/polymerized jadeite update, *Gems and Gemology*, 29. 3. 201-202
- Fryer, C. (1993c) Clarified amber beads, *Gems and Gemology*, 29. 3. 198
- Fryer, C. (1993d) Devitrified glass, resembling actinolite, *Gems and Gemology*, 29. 3. 201
- Fryer, C. (1993e) Imitation lapis lazuli, an update, *Gems and Gemology*, 29. 1. 50
- Fryer, C. (1993f) Synthetic alexandrite with needle-like inclusions, *Gems and Gemology*, 29. 1. 46
- Fryer, C. (1993g) Treated amber, *Gems and Gemology*, 29. 2. 122-123
- Fryer, C. (1996a) Green synthetic sapphire. *Gems and Gemology* 32, 51.
- Fryer, C. (1996b) Imitation jade, *Gems and Gemology*, 32. 2. 123
- Fryer, C. (1996c) Imitation star ruby. *Gems and Gemology* 32, 280-281.
- Fryer, C. (1996d) Jadeite jade natural color, *Gems and Gemology*, 32. 2. 123
- Fryer, C. (1996e) Pearl, an unusual natural abalone blister. *Gems and Gemology* 32, 280.
- Fryer, C. (1996f) Pearls - abalone. *Gems and Gemology* 32, 47.
- Fryer, C. (1996g) Synthetic ruby, quench crackled. *Gems and Gemology* 32, 125-126.
- Fryer, C. (1997) Ruby, assembled imitation. *Gems and Gemology* 33, 139-140.
- Fryer, C. (1997a) Emerald, an unusual assembled imitation. *Gems and Gemology* 33, 136-137.
- Fryer, C. (1997b) Etched chalcedony, *Gems and Gemology*, 33. 2. 134
- Fryer, C. (1997c) Hornbill "ivory", *Gems and Gemology*, 33. 1. 57-58
- Fryer, C. (1997d) Identifying filled fractures: New challenges, *Gems and Gemology*, 33. 1. 56-57
- Fryer, C., Crowningshield, G. R., Hurwit, K. and Kane, R. (1983) Gem Trade Lab Notes: Emerald, *Gems and Gemology*, 10. 4. 105-113
- Fudali, R.F., Dyar, M.D., Griscom, D.L. and Schreiber, H.D. (1987) The oxidation state of iron in tektite glass. *Geochimica et Cosmochimica Acta* 51, 2749-2756.
- Fuetes Marcuello, J. and Garcia Guinea, J. (1990) Caracterización mineralógica e histórica del Larimar de Barahona (República Dominicana). *Boletín del Instituto Gemológico Español* 32, 6-12.
- Fuhrbach, J.R. (1992) Kilbourne Hole peridot. *Gems and Gemology* 28, 16-27.
- Fuhrbach, J.R. (1997) Peridot - fact and mythology. *Gem and Jewellery News* 6, 62.

- Fuhrbach, J.R. (1998) Peridot from the Black Rock Summit lava flow, Nye County, Nevada, USA. *Journal of Gemmology* 26, 86-102.
- Fujino, K. and Takéuchi, Y. (1978) Crystal chemistry of titanian chondrodite and titanian clinohumite of high-pressure origin, *American Mineralogist*, 63, 5/6, 535-543
- Fumagalli, M., Prosperi, L., Pavese, A. and Bordiga, S. (2003) Natural versus hydrothermal synthetic Russian red beryl: chemical composition and spectroscopic measurements, *Journal of Gemmology*, 28, 5, 291-301
- Furui, W. (1988) The sapphires of Penglai, Hainan Island, China. *Gems and Gemology* 24, 155-160.
- Furuya M. (2007) Copper-bearing tourmalines from new deposits in Paraíba State, Brazil. *Gems and Gemology*, 43, (3), 236-239.
- Futrell, D. (1999a) The lunar origin of tektite glass. *Rock and Gem* 29, 40-47.
- Futrell, D.S. (1999b) More on the lunar origin of tektite glass. *Rock and Gem* 29, 60-63.
- Fyfe, W.S. (1967) Stability of Al_2SiO_5 polymorphs. *Chemical Geology* 2, 67-76.
- Gadiyatov, V. G. (1996) Jewelry-quality chrome-diopside from the Inagli deposit, *World of Stones*, 11, 10-14
- Gaft M., Nagli L., Reisfeld R. and Panczer G. (2003) Laser-induced time-resolved luminescence of natural titanite CaTiOSiO_4 . *Optical Materials*, 24, (1/2), 231-241.
- Gaft M., Panczer G., Reisfeld R., Shinno I., Champagnon B. and Boulon G. (2000) Laser-induced Eu^{3+} luminescence in zircon ZrSiO_4 . *Journal of Luminescence*, 87/89, (1), 1032-1035.
- Gaft M., Shinno I., Panczer G. and Reisfeld R. (2002) Laser-induced time-resolved spectroscopy of visible broad luminescence bands in zircon. *Mineralogy and Petrology*, 76, (3/4), 235-246.
- Gaft, M., Nagli, L., Waychunas, G. and Panczer, G. (2005) The nature of red luminescence of natural benitoite $\text{BaTiSi}_3\text{O}_9$, *Mineralogy and Petrology*, 85, 1/2, 33-44
- Gaft, M., Panczer, G., Nagli, L. and Yeates, H. (2009) Laser-induced time-resolved luminescence of tugtupite, sodalite, and hackmanite. *Physics and Chemistry of Minerals* 36, 127-141.
- Gagnevin D., Daly J.S. and Kronz A. (2009) Zircon texture and chemical composition as a guide to magmatic processes and mixing in a granitic environment and coeval volcanic system. *Contributions to Mineralogy and Petrology*, 159, (4), 579-596.
- Gaillou E., Delaunay A., Rondeau B., Bouhnik-le-Coz M., Fritsch E., Cornen G. and Monnier C. (2008a) The geochemistry of gem opals as evidence of their origin. *Ore Geology Reviews*, 34, (1/2), 113-126.
- Gaillou E., Fritsch E., Aguilar-Reyes B., Rondeau B., Post J., Barreau A. and Ostrooumov M. (2008b) Common gem opal: An investigation of micro- to nano-structure. *American Mineralogist*, 93, (11/12), 1865-1873.
- Gaillou, E., Wang, W., Post, J.E., King, J.M., Butler, J.E., Collins, A.T. and Moses, T.M. (2010) The Wittelsbach-Graff and Hope diamonds: Not cut from the same rough. *Gems and Gemology* 46, 80-88.
- Gaines, R.V. (1951) The sapphire mines of Kashmir. *Rocks and Minerals* 26, 464-472.
- Gaite J.M., Bookin A.S. and Drits V.A. (1985) Local distortion of the spodumene structure around isolated cations using E.P.R. and the superposition model. *Physics and Chemistry of Minerals*, 12, (3), 145-148.
- Gaite, J. M. and Hafner, S. S. (1984) Environment of Fe^{3+} at the M2 and S1 sites in forsterite obtained from EPR, *Journal of Chemical Physics*, 80, 6, 2747-2751
- Galbraith, F. W. and Kuhn, T. H. (1940) A new occurrence of diopside in Arizona, *American Mineralogist*, 25, 10, 708-710
- Galia, W. (1987) Eine neue generation synthetischer rubine von P.O. Knischka unter verwendung natürlicher nährsubstanz [A new generation of synthetic rubies from P.O. Knischka grown without the use of seeding crystals]. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 36, 19-31.
- Galia, W. (1990) First investigation of natural and synthetic alexandrites with the UVS-2000 ultraviolet spectroscope, *Accredited Gemologists Association - Cornerstone*, June, 28-31
- Galibert, O. and Hughes, R.W. (1995) Chinese ruby and sapphire - A brief history. *Journal of Gemmology* 24, 467-473.
- Galloni, E.E. (1950) The crystal structure of ferroan zirconian rhodochrosite. *American Mineralogist* 35, 562-570.
- Gamini Zoysa, E. (1985) Scheelite, green feldspar orthoclase, fibrolite (sillimanite) from Ratnapura Area, Sri Lanka. *Journal of the Gemmological Association of Sri Lanka*, 18-23.
- Ganapathy, R. and Larimer, J.W. (1984) Nickel-iron spherules in tektites: Non-meteoritic in origin. *Journal of Non-Crystalline Solids* 67, 371-374.

- Gao, Y. and Zhang, H. (2002) Research on Raman spectra of natural and dyed red corals (in Chinese). *Journal of Gems and Gemmology* 4, 20-24.
- Garcia-Guinea, J., Correcher, V., Sanchez-Muñoz, L., Lopez-Arce, P., Townsend, P.D. and Hole, D.E. (2008) Radiation damage of variscite in historic crafts: Solarization, decoloration, structural changes and spectra from ionoluminescence. *Radiation Physics and Chemistry* 77, 18-22.
- Garcia-Lastra J.M., Barriuso M.T., Aramburu J.A. and Moreno M. (2008) Microscopic origin of the different colors displayed by $\text{MgAl}_2\text{O}_4:\text{Cr}^{3+}$ and emerald. *Physical Review B*, 78, (8), 085117.
- Garcia-Lastra, J.M., Barriuso, M.T., Aramburu, J.A. and Moreno, M. (2005) Origin of the different color of ruby and emerald. *Physical Review B* 72, 113104.
- Garland M.I. (2004) Amethyst in the Thunder Bay Region, Ontario. *Canadian Gemmologist*, 25, (2), 44-57.
- Garland, M. (2002) The Alluvial Sapphire Deposits of Western Montana, Graduate Department of Geology. University of Toronto, Toronto.
- Garlick, G.D. and Kamb, W.B. (1991) The strange optical properties of ulexite. *Journal of Geological Education* 39, 398-402.
- Garmo, T. (1989) Anatas aus Norwegen, *Lapis*, 14. 9. 17-19
- Garnier, V., Giuliani, G., Ohnenstetter, D., Fallick, A.E., Dubessy, J., Banks, D., Hoang, V.Q., Lhomme, T., Maluski, H., Pecher, A., Bakhsh, K.A., Pham, L.V., Phan, T.T. and Schwarz, D. (2008) Marble-hosted ruby deposits from Central and Southeast Asia: Towards a new genetic model. *Ore Geology Reviews* 34, 169-191.
- Garnier, V., Ohnenstetter, D., Giuliani, G., Blanc, P. and Schwarz, D. (2002) Trace-element contents and cathodoluminescence of "trapiche" rubies from Mong Hsu, Myanmar (Burma): Geological significance. *Mineralogy and Petrology* 76, 179-193.
- Garnier, V., Ohnenstetter, D., Giuliani, G., Fallick, A.E., Phan, T.T., Hoang, V.Q., Pham, L.V. and Schwarz, D. (2005) Basalt petrology, zircon ages and sapphire genesis from Dak Nong, southern Vietnam. *Mineralogical Magazine* 69, 21-38.
- Garsche, M., E. Tillmanns, H. Almen, H. Schneider and V. Kupcik (1991), Incorporation of chromium into aluminium borate $9\text{Al}_2\text{O}_3 \cdot 2\text{B}_2\text{O}_3$ (A9B2), *European Journal of Mineralogy*, 3, 5, 793-808.
- Gasharova B., Mihailova B. and Konstantinov L. (1997) Raman spectra of various types of tourmaline. *European Journal of Mineralogy*, 9, (5), 935-940.
- Gaspar, J. C. (1992) Titanian clinohumite in the carbonatites of the Jacupiranga Complex, Brazil: Mineral chemistry and comparison with titanian clinohumite from other environments, *American Mineralogist*, 77. 1/2. 168-178
- Gasparik, T. (1990) A thermodynamic model for the enstatite-diopside join, *American Mineralogist*, 75. 9/10. 1080-1091
- Gasparik, T. and Litvin, Y. A. (1997) Stability of $\text{Na}_2\text{Mg}_2\text{Si}_2\text{O}_7$ and melting relations on the forsterite-jadeite join at pressures up to 22 GPa, *European Journal of Mineralogy*, 9. 2. 311-326
- Gauthier J.P., Caseiro J., Lasnier (1997) The red pearls of *Pinna nobilis*. *Australian Gemmologist*, 19. 10. 422-426.
- Gauthier J.P., Mazzero F., Mandaba Y. and Fritsch E. (2004) L'opale d'Ethiopie: Gemmologie ordinaire et caractéristiques exceptionnelles. *Revue de Gemmologie a.f.g.*, (149), 15-23.
- Gauthier, G. and Delines, M. (1999) Cobalt minerals of the Katanga Crescent, Congo, *Mineralogical Record*, 30. 4. 255-267
- Gauthier, J. P. and Fumey, P. (1988) Une gemme métamictite: L'ékanite, *Revue de Gemmologie a.f.g.*, 94. 3-7
- Gauthier, J. P., Caseiro, J. and Lasnier, B. (1994) Les perles rouges de *Pinna nobilis*, *Revue de Gemmologie a.f.g.*, 118. 2-4
- Gauthier, J. P., Caseiro, J. and Lasnier, B. (1997) The red pearls of *Pinna Nobilis*, *Australian Gemmologist*, 19. 10. 422-426
- Gauthier, J.P. and Karampelas, S. (2009) Pearls and corals: "Trendy biomineralization". *Elements* 5, 179-180.
- Gebhard, G. (1982) Dioptas aus der Kirgisensteppe, *Lapis*, 7. 1. 21-22
- Geisler T. (2002) Isothermal annealing of partially metamict zircon: Evidence for a three-stage recovery. *Physics and Chemistry of Minerals*, 29, (6), 420-429.
- Geisler T., Pidgeon R.T., Kurtz R., van Bronswijk W. and Schleicher H. (2003) Experimental hydrothermal alteration of partially metamict zircon. *American Mineralogist*, 88, (10), 1496-1513.

- Geisler T., Pidgeon R.T., van Bronswijk W. and Kurtz R. (2002) Transport of uranium, thorium and lead in metamict zircon under low-temperature hydrothermal conditions. *Chemical Geology*, 191, (1/3), 141-154.
- Geisler T., Schaltegger U. and Tomaschek F. (2007) Re-equilibration of zircon in aqueous fluids and melts. *Elements*, 3, (1), 43-50.
- Geisler T., Ulonska M., Schleicher H., Pidgeon R.T. and van Bronswijk W. (2001) Leaching and differential recrystallization of metamict zircon under experimental hydrothermal conditions. *Contributions to Mineralogy and Petrology*, 141, (1), 53-65.
- Geisler, R.A. (1976) The ruby deposits at Fiskenaesset, Greenland. *Canadian Gemmologist* 1, 4.
- Gem Trade Lab Notes: Pearls, cultured, with dolomite beads, (1998) *Gems and Gemology*, 34. 2. 130-131
- Geranicheva, G.K., Afanasev, I.I. and Agafonova, T.G. (1975) Morphology of ruby crystals grown by Czochralski's method. *Growth of Crystals* 9, 166-169.
- Gerdes A. and Zeh A. (2009) Zircon formation versus zircon alteration: New insights from combined U-Pb and Lu-Hf in-situ LA-ICP-MS analyses, and consequences for the interpretation of Archean zircon from the central zone of the Limpopo Belt. *Chemical Geology*, 261, (3/4), 230-243.
- Ghera, A., Graziani, G. and Gübelin, E. (1988) Notes on the inclusions in a greyish kyanite, *Journal of Gemmology*, 21. 2. 83-87
- Ghera, A., Graziani, G. and Lucchesi, S. (1986a) Uneven distribution of blue colour in kyanite, *Neues Jahrbuch für Mineralogie Abhandlungen*, 155. 2. 109-127
- Ghose S., Ito Y. and Hatch D.M. (1991) Paraelectric-antiferroelectric phase transition in titanite, CaTiSiO₅. *Physics and Chemistry of Minerals*, 17, (7), 591-603.
- Ghose, S.W., C.; Clark, J.R. (1978) Ulexite, NaCaB₅O₆(OH)6•5H₂O: structure refinement, polyanion configuration, hydrogen bonding and fiber optics *American Mineralogist* 63 160-171.
- Giles, R., Mannne, S., Mann, S., Morse, D. E., Stucky, G. D. and Hansma, P. K. (1995) Inorganic overgrowth of aragonite on molluscan nacre examined by atomic force microscopy, *Biological Bulletin*, 188. 1. 8-15
- Gilg H.A., Morteani G., Kostitsyn Y., Preinfalk C., Gatter I. and Strieder A.J. (2003) Genesis of amethyst geodes in basaltic rocks of the Serra Geral formation (Ametista do Sul, Rio Grande do Sul, Brazil): A fluid inclusion, REE, oxygen, carbon, and Sr isotope study on basalt, quartz, and calcite. *Mineralium Deposita*, 38, (8), 1009-1025.
- Gillet, P. (1993) Stability of magnesite (MgCO₃) at mantle pressure and temperature conditions: A Raman spectroscopic study, *American Mineralogist*, 78. 11/12. 1328-1331
- Gillet, P. and Madon, M. (1982) Un modele de dislocations pour la transition aragonite ↔ calcite, *Bulletin de Mineralogie*, 105. 6. 590-597
- Gippius, A. A., Khmel'nitsky, R. A., Dravin, V. A. and Khomich, A. V. (2003) Diamond-graphite transformation induced by light ions implantation, *Diamond and Related Materials*, 12. 3/7. 538-541
- Giridhar, M.S. and Srivatsa, S.K. (1999) Pearls and shells. *Current Science* 76, 1324-1325.
- Giuli, G., Eeckhout, S.G., Cicconi, M.R., Koeberl, C., Glass, B.P., Pratesi, G., Cestelli-Guidi, M., Marcelli, A., Carroll, M.R. and Paris, E. (2010) Tektites and microtektites: Fe oxidation state and water content. *20th General Meeting International Mineralogical Association - Abstract*.
- Giuliani, G., Fallick, A., Ohnenstetter, D. and Pegere, G. (2009) Oxygen isotopes composition of sapphires from the French Central Massif: Implications for the origin of gem corundum in basaltic fields. *Mineralium Deposita* 44, 221-231.
- Giuliani, G., Fallick, A., Rakotondrazafy, M., Ohnenstetter, D., Andriamamonjy, A., Ralantoarison, T., Rakotaosamizananay, S., Razanatseho, M., Offant, Y., Garnier, V., Dunaigre, C., Schwarz, D., Mercier, A., Ratrimo, V. and Ralison, B. (2007) Oxygen isotope systematics of gem corundum deposits in Madagascar: Relevance for their geologic origin. *Mineralium Deposita* 42, 251-270.
- Giuliani, G., Fallick, A.E., Garnier, V., France-Lanord, C., Ohnenstetter, D. and Schwarz, D. (2005) Oxygen isotope composition as a tracer for the origins of rubies and sapphires. *Geology* 33, 249-252.
- Giuliani, G., Ohnenstetter, D., Fallick, A.E., Groat, L.A. and Feneyrol, J. (2012) Geographic origins of gems linked to their geological history. *InColor*, 16-27.
- Giuliani, G., Rodriguez, C. T. and Rueda, F. (1990a) Les gisements d'éméraude de la Cordillère Orientale de la Colombie: Nouvelles données métallogéniques, *Mineralium Deposita*, 25. 2. 105-111
- Giuliani, G., Silva, L. J. H. D. and Couto, P. (1990b) Origin of emerald deposits of Brazil, *Mineralium Deposita*, 25. 1. 57-64

- Glascok, M.D. (2002) Obsidian provenance research in the Americas. *Accounts of Chemical Research* 35, 611-617.
- Gobbi G.C., Christoffersen R., Otten M.T., Miner B., Buseck P.R., Kennedy G.J. and Fyfe C.A. (1985) Direct determination of cation disorder in MgAl_2O_4 spinel by high-resolution ^{27}Al magic-angle-spinning NMR spectroscopy. *Chemistry Letters*, 14, (6), 771-774.
- Göd R. (1989) The spodumene deposit at "Weinbene", Koralpe, Austria. *Mineralium Deposita*, 24, (4), 270-278.
- Godovikov, A. A. and Bulgak, L. V. (1989) Die mineralogische Sammlung des Fersman-Museums in Moskau, *Lapis*, 14. 10. 11-17
- Goga, B. (2000) The mystery of malachite, *Wire Artist Jeweller*, 3. 7. 8
- Gonzalez-Carreño T., Fernández M. and Sanz J. (1988) Infrared and electron microprobe analysis of tourmalines. *Physics and Chemistry of Minerals*, 15, (5), 452-460.
- Gordiyenko V.V., Zhukova I.A. and Ponomareva N.I. (1988) The physiochemical conditions of formation of quartz-spodumene and quartz-muscovite aggregates in rare-metal granite pegmatites. *International Geology Review*, 30, (1), 53-61.
- Goreva J.S., Ma C. and Rossman G.R. (2001) Fibrous nanoinclusions in massive rose quartz: The origin of rose coloration. *American Mineralogist*, 86, (4), 466-472.
- Gosse, R. C. (1962) Gem diaspore at Chester, Mass, *Lapidary Journal*, 16. 5. 515
- Götze T., Pettke T., Koch-Müller M. and Mullis J. (2011) Cathodoluminescence properties and trace element signature of hydrothermal quartz: A fingerprint of growth dynamics. *American Mineralogist*, 96, (5/6), 802-813.
- Gottschalk M. (2004) Thermodynamic properties of zoisite, clinozoisite and epidote. *Reviews in Mineralogy and Geochemistry*, 56, (1), 83-124.
- Götze J. (1997) Cathodoluminescence of quartz. *Journal of the Fluorescent Mineral Society*, 19, 1-18.
- Götze J. (2009) Chemistry, textures and physical properties of quartz: Geological interpretation and technical application. *Mineralogical Magazine*, 73, (4), 645-671.
- Götze J. and Plötze M. (1997) Investigation of trace-element distribution in detrital quartz by electron paramagnetic resonance (EPR). *European Journal of Mineralogy*, 9, (3), 529-537.
- Götze J., Plötze M. and Habermann D. (2001) Origin, spectral characteristics and practical applications of the cathodoluminescence (CL) of quartz. *Mineralogy and Petrology*, 71, (3/4), 225-250.
- Götze J., Plötze M. and Trautmann T. (2005) Structure and luminescence characteristics of quartz from pegmatites. *American Mineralogist*, 90, (1), 13-21.
- Götze J., Plötze M., Graupner T., Hallbauer D.K. and Bray C.J. (2004) Trace element incorporation in quartz: A combined study by ICP-MS, electron spin resonance, cathodoluminescence, capillary ion analysis, and gas chromatography. *Geochimica et Cosmochimica Acta*, 68, (18), 3741-3759.
- Gout, R. and Verdes, G. (1992) Des variations de cristallinité du diaspore et de leurs conséquences sur sa dissolution, *Bulletin de Liaison Société française Mineralogie et Cristallographie*, 4. 2. 26
- Graetsch H. (1994) Structural characteristics of opaline and microcrystalline silica minerals. *Reviews in Mineralogy*, 29, (6), 209-232.
- Graetsch H., Flörke O.W. and Miehe G. (1987) Structural defects in microcrystalline silica. *Physics and Chemistry of Minerals*, 14, (3), 249-257.
- Graetsch H., Flörke O.W. and Miehe, G. (1985) The nature of water in chalcedony and opal-C from Brazilian agate geodes. *Physics and Chemistry of Minerals*, 12, (5), 300-306.
- Graetsch H., Gies H. and Topalovic I. (1994) NMR, XRD and IR study on microcrystalline opals. *Physics and Chemistry of Minerals*, 21, (3), 166-175.
- Graetsch H., Mossett A. and Gies H. (1990) XRD and ^{29}Si MAS-NMR study on some non-crystalline silica minerals. *Journal of Non-Crystalline Solids*, 119, (2), 173-180.
- Graindorge, J. M. (1974) A gemmological study of emerald from Poona, Western Australia, *Australian Gemmologist*, 12. 3. 75-80
- Grampp, R. B. (1999) Pegasus enhanced diamonds, *Today's Pawnbroker*, 12. 2. 38, 40, 44
- Grapes R. H. (1987) Composition and melting relationships of andalusite in a schist xenolith, Wehr Volcano, East Eifel, *Neues Jahrbuch für Mineralogie Monatshefte*, 12, 550-556.
- Grapes, R. and Palmer, K. (1996) (Ruby-sapphire)-chromian mica-tourmaline rocks from Westland, New Zealand. *Journal of Petrology* 37, 293-315.

- Grapes, R. H. (1981) Chromian epidote and zoisite in kyanite amphibolite, Southern Alps, New Zealand, *American Mineralogist*, 66. 9/10. 974-975
- Grapes, R.H. and Hoskin, P.W.O. (2004) Colour zoning and composition of ruby-sapphire from Westland, New Zealand. *Journal of Gemmology* 29, 8-14.
- Gravender, M. D. (1935) Chrysoberyl (alexandrite, cat's-eye and chrysolite), *Gems and Gemology*, 1. 1. 9-10
- Gray, M. (1992) Recent developments at the Benitoite Mine, *Canadian Gemmologist*, 13. 4. 118-120
- Gray, M. (1994) Gemstones of California, *Rocks and Minerals*, 69. 6. 379-384
- Graziani, G. and Lucchesi, S. (1979) Einschlüsse und genese eines vanadiumberylls von Salininha, Bahia, Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 28. 3. 134-145
- Graziani, G., Gübelin, E. and Lucchesi, S. (1983) The genesis of an emerald from the Kitwe District, Zambia, *Neues Jahrbuch für Mineralogie Monatshefte*, 4. 175-186
- Gregor, R.B., Pingitore, N.E. and Lytle, F.W. (1997) Strontianite in coral skeletal aragonite. *Science* 275, 1452-1454.
- Green T.H. and Pearson N.J. (1986) Rare-earth element partitioning between sphene and coexisting silicate liquid at high pressure and temperature. *Chemical Geology*, 55, (1/2), 105-119.
- Green, G. R. and Walker, G. (1985) Luminescence excitation spectra of Mn²⁺ in synthetic forsterite, *Physics and Chemistry of Minerals*, 12. 5. 271-278
- Greenspan, J. (1978) Charoite, a spectacular new cutting material, *Lapidary Journal*, 32. 9. 1942-1943
- Greenspan, J. (1988) A new look at charoite, *Lapidary Journal*, 42. 8. 36-40
- Greer, R. T. and Weber, J. N. (1969) Correlation of mineral luminescent phenomena and its selenological implications, *Icarus*, 11. 1. 55-65
- Greiner, D. J. and Bloss, F. D. (1987) Amblygonite-montebrazite optics: Response to (OHO-) orientation and rapid estimation of F from 2V, *American Mineralogist*, 72. 5/6. 617-624
- Grevel K.D., Nowlan E.U., Fasshauer D.W. and Burchard M. (2000) In situ X-ray diffraction investigation of lawsonite and zoisite at high pressures and temperatures. *American Mineralogist*, 85, (1), 206-216.
- Grew, E.S., Halenius, E., Pasero, M. and Barbier, J. (2008) Recommended nomenclature for the sapphirine and surinamite groups (sapphirine supergroup). *Mineralogical Magazine* 72, 839-876.
- Grice J.D. and Ercit T.S. (1993) Ordering of Fe and Mg in the tourmaline crystal structure: The correct formula. *Neues Jahrbuch für Mineralogie Abhandlungen*, 165, (3), 245-266.
- Griesbach, C. L. (1892) The geology of Safed Koh, *Geological Survey of India - Records*, 25. 2. 71
- Griffith, W. P. (1987) Advances in the Raman and infrared spectroscopy of minerals, *Spectroscopy of Inorganic-Based Materials*, Chapter 2. 119-186
- Grigg, R. W. (2004) Harvesting impacts and invasion by an alien species decrease estimates of black coral yield off Maui, Hawaii, *Pacific Science*, 58. 1. 1-6
- Grigg, R.W. (1993) Precious coral fisheries of Hawaii and the U.S. Pacific Islands. *Marine Fisheries Review* 55, 50-60.
- Grigg, R.W. (2001) Black coral: History of a sustainable fishery in Hawaii. *Pacific Science* 55, 291-299.
- Grigg, R.W. and Brown, G. (1991) Tasmanian gem corals. *Australian Gemmologist* 17, 399-404.
- Grimaldi, D. A., Shedrinsky, A., Ross, A. and Baer, N. S. (1994) Forgeries of fossils in "amber": History, identification and case studies, *Curator*, 37. 4. 251-274
- Grimes C.B., John B.E., Kelemen P.B., Mazdab F.K., Wooden J.L., Cheadle M.J., Hanghøj K. and Schwartz J.J. (2007) Trace element chemistry of zircons from oceanic crust: A method for distinguishing detrital zircon provenance. *Geology*, 35, (7), 643-646.
- Gritsyna V.T., Afanasyev-Charkin I.V., Kazarinov Y.G. and Sickafus K.E. (2004) Optical transitions in magnesium aluminate spinel crystals of different compositions exposed to irradiation. *Nuclear Instruments and Methods in Physics Research B*, 218, (1), 264-270.
- Groat, L. A., Chakoumakos, B. C., Brouwer, D. H., Hoffman, C. M., Fyfe, C. A., Morell, H. and Schultz, A. J. (2003) The amblygonite (LiAlPO₄F) - montebrazite (LiAlPO₄OH) solid solution: A combined powder and single-crystal neutron diffraction and solid-state ⁶Li MAS, CP MAS, and REDOR NMR study, *American Mineralogist*, 88. 1. 195-210
- Groat, L. A., Giuliani, G., Marshall, D. D. and Turner, D. (2008) Emerald deposits and occurrences: A review, *Ore Geology Reviews*, 34. 1/2. 87-112

- Groat, L. A., Raudsepp, M., Hawthorne, F. C., Ercit, T. S., Sherriff, B. L. and Hartman, J. S. (1990) The amblygonite-montebasite series: characterization by single-crystal structure refinement, infrared spectroscopy, and multinuclear MAS-NMR spectroscopy, *American Mineralogist*, 75. 9/10. 992-1008
- Groat, L. A., Turner, D. and Rossman, G. R. (2008) Dark blue aquamarine from the True Blue Showing, Yukon Territory, *Canadian Gemmologist*, 29. 2. 48-53
- Groppo, C., Rinaudo, C., Cairo, S., Gastaldi, D. and Compagnoni, R. (2006) Micro-Raman spectroscopy for a quick and reliable identification of serpentine minerals in ultramafics. *European Journal of Mineralogy* 18, 319-329.
- Grossman, K.R., Frazer, R.K., Bamberger, R. and Miragliotta, J. (2001) Optical technique to sense thermal stress in sapphire. *SPIE Proceedings* 4375, 258-265.
- Grottoli, A.G. and Eakin, C.M. (2007) A review of modern coral $\delta^{18}\text{O}$ and $\Delta^{14}\text{C}$ proxy records. *Earth Science Reviews* 81, 67-91.
- Grubessi, O. (1990) Gemstones of Malawi: Ruby, sapphire, padparadscha, and fancy corundums. *15th General Meeting, International Mineralogical Association - Abstracts* 2, 676-677.
- Grubessi, O., Aurisicchio, C. and Castiglioni, A. (1990) The Pharaohs' forgotten emerald mines, *Journal of Gemmology*, 22. 3. 164-177
- Grum-Grzhimailo, S. V. (1949) On the alexandrite color of crystal, *Gems and Gemology*, 6. 5. 143-145
- Grundmann, G. and Morteani, G. (1995) A new occurrence of emerald, alexandrite, ruby and sapphire in a topaz-bearing phlogopite rock in Poona, Cue District, Western Australia. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 44, 11-32.
- Gübelin, E. and Schmetzer, K. (1980) Alexandritartige edelsteine, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 29. 3/4. 126-134
- Gübelin, E. and Schmetzer, K. (1982a) Eine neue edelstein-varietät aus Tansania: Gelbe, grüne und rötlich-braune apatit-katzenaugen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 31. 4. 261-264
- Gübelin, E. and Schmetzer, K. (1982b) Gemstones with alexandrite effect, *Gems and Gemology*, 18. 4. 197-203
- Gübelin, E. and Schmetzer, K. (1983) A new gemstone variety from Tanzania, *Journal of Gemmology*, 18. 7. 592-595
- Gübelin, E. and Shipley, R. M. (1941) The synthetic emerald, *Gems and Gemology*, 3. 10. 146-150
- Gübelin, E. J. (1940) Differentiation between Russian and Colombian emeralds, *Gems and Gemology*, 3. 6. 89-92
- Gübelin, E. J. (1941) The synthetic emerald, *Gems and Gemology*, 3. 10. 146-150
- Gübelin, E. J. (1944) Gemstone inclusions - Emerald, *Gems and Gemology*, 4. 12. 174-179
- Gübelin, E. J. (1945) Inclusions as a means of identification - Parts 1, 2 and 3, *Gems and Gemology*, 5. 2, 3, 4. 226-231, 242-247, 270-274
- Gübelin, E. J. (1947) Identification of synthetic gems - Part 3 - synthetic spinel and emerald, *Gems and Gemology*, 5. 10. 421-427
- Gübelin, E. J. (1950) Some additional data on Indian emeralds, *Gems and Gemology*, 7. 1. 13-22
- Gübelin, E. J. (1955) Amblygonite: Old mineral - new gem, *Gems and Gemology*, 8. 7. 208-214
- Gübelin, E. J. (1956a) The emerald from Habachtal, *Gems and Gemology*, 8. 10. 295-309
- Gübelin, E. J. (1956b) Emerald from Habachtal, *Journal of Gemmology*, 5. 7. 342-361
- Gübelin, E. J. (1958a) Das neue Smaragdorkommen in Rhodesien, *Deutsche Goldschmiede Zeitung*, 5.
- Gübelin, E. J. (1958b) Emeralds from Sandawana, *Journal of Gemmology*, 6. 8. 340-354
- Gübelin, E. J. (1958c) Notes on the new emeralds from Sandawana, *Gems and Gemology*, 9. 7. 195-203
- Gübelin, E. J. (1959) Promenores sobre as novas esmeraldas de Sandawana, *Revista Gemologia*, 5. 17. 1-10
- Gübelin, E. J. (1960) More light on beryls and rubies with synthetic overgrowth, *Gems and Gemology*, 10. 4. 105-113
- Gübelin, E. J. (1961a) Ekanite: Another new metamict gem from Ceylon, *Gems and Gemology*, 10. 6. 163-179, 191
- Gübelin, E. J. (1961b) Hydrothermal rubies and emerald-coated beryl, *Journal of Gemmology*, 8. 2. 49-63
- Gübelin, E. J. (1962a) Beryll mit synthetischem Smaragdüberzug, *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 37.

- Gübelin, E. J. (1962b) Ekanit: Ein neuer metamikter Edelstein aus Ceylon, *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 40.
- Gübelin, E. J. (1962c) Ekanite, *Gemmologist*, 31. 373, 374. 142-152, 165-196
- Gübelin, E. J. (1964) Ekanit: Ein neuer metamikter Edelstein aus Ceylon, *Gold und Silber*,
- Gübelin, E. J. (1964–65) Maw-sit-sit: A new decorative gemstone from Burma, *Gems and Gemology*, 11. 8. 227–238, 255, color plate
- Gübelin, E. J. (1964a) Two new synthetic emeralds, *Gems and Gemology*, 11. 5. 139–148
- Gübelin, E. J. (1964b) Zwei neue synthetische Smaragde, *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 47.
- Gübelin, E. J. (1965a) Jadealbit: ein neuer Schmuckstein aus Burma, *Zeitschrift der Deutschen Gesellschaft für Edelsteinkunde*, 51. 4–22
- Gübelin, E. J. (1965b) Maw-sit-sit proves to be jade-albite, *Journal of Gemmology*, 9. 11. 372–379
- Gübelin, E. J. (1965c) Maw-sit-sit—A new decorative gemstone from Burma, *Journal of Gemmology*, 9. 10. 329–344
- Gübelin, E. J. (1966) The ruby mines of Burma (Two parts). *Lapidary Journal* 20, 418-422, 522-525.
- Gübelin, E. J. (1967) Mineralogisch-gemmologische untersuchungen an apatiten von edelsteinqualität aus dem Casaccia-tal, Tessin, *Zeitschrift der Deutschen Gesellschaft*, 61. 75-85
- Gübelin, E. J. (1968) Gemmologische Beobachtungen am neuen Smaragd aus Pakistan, *Der Aufschluss*, Special Issue 18.
- Gübelin, E. J. (1974) The emerald deposit at Lake Manyara, Tanzania, *Lapidary Journal*, 28. 2. 338-347, 359-360
- Gübelin, E. J. (1976a) Alexandrite from Lake Manyara, Tanzania, *Gems and Gemology*, 15. 7. 203–209
- Gübelin, E. J. (1976b) Das Smaragd-Alexandritvorkommen von Lake Manyara/Tansania, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 25. 3. 130–147
- Gübelin, E. J. (1976c) Problem des farbwechsels im alexandrit, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 25. 2. 96-102
- Gübelin, E. J. (1978a) Jadeit der grüne Schatz aus Burma, *Lapis*, 3. 2. 17-28
- Gübelin, E. J. (1978b) Maw-sit-sit, *Lapis*, 3. 10. 24–28
- Gübelin, E. J. (1978c) The tears of Heliades, *Gems and Gemology*, 16. 3. 66–76
- Gübelin, E. J. (1979a) Neue edelsteine aus Sri Lanka, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 28. 4. 194-196
- Gübelin, E. J. (1979b) Fiskensættet - Rubinvorkommen auf Grönland. *Lapis* 4, 19-26.
- Gübelin, E. J. (1979c) Tell-tale inclusions in a phenakite from Brazil. *Journal of Gemmology* 16, 357-362.
- Gübelin, E. J. (1980) Seberged: Die Peridot-Insel im Roten Meer. *Lapis* 5, 19-26.
- Gübelin, E. J. (1981a) The emerald and the ruby/spinel resources of Pakistan, *18th International Gemmological Conference - Proceedings*, 8. 1/4. 61-66
- Gübelin, E. J. (1981b) The emerald and the ruby/spinel resources of Pakistan, *Journal of the Gemmological Society of Japan*, 8. 1–4. 61–66
- Gübelin, E. J. (1981c) Pakistan enters the gem scene, *Gems and Gemology*, 17. 3. 180-181
- Gübelin, E. J. (1981d) Seberged: Die Peridot-Insel im Roten Meer. *Lapis* 6, 19–26.
- Gübelin, E. J. (1981e) Taprobanite: A new mineral of the taaffeite group. *Schweizerische Mineralogische und Petrographische Mitteilungen*, 13–21.
- Gübelin, E. J. (1981f) Zabargad: The ancient peridot island in the Red Sea. *Gems and Gemology* 17, 2-8.
- Gübelin, E. J. (1982a) Gemstones of Pakistan: Emerald, ruby and spinel. *Gems and Gemology* 18, 123–129.
- Gübelin, E. J. (1982b) Die Edelsteinvorkommen Pakistans - 2: Die smaragd-vorkommen im Swat-Tal, *Lapis*, 7. 6. 19-26
- Gübelin, E. J. (1983) Identification of the new synthetic and treated sapphires. *Journal of Gemmology* 18, 677-706.
- Gübelin, E. J. (1984) Report on the investigation of an emerald from the Kitwe district, Zambia, *Australian Gemmologist*, 15. 7. 227–234
- Gübelin, E. J. (1985–86) Deux nouveaux produits artificiels sur le marché des pierres précieuses: Le rubis synthétique "Ramaura" et le gallo-aluminate d'yttrium. *Revue de Gemmologie a.f.g.*

- Gübelin, E. J. (1986) Les inclusions dans la péridot. *Monde et Minéraux*, 28.
- Gübelin, E. J. (1987) Une nouvelle variété noble de la famille des feldspaths, *Monde et Minéraux*, 79. 20
- Gübelin, E. J. (1998) The sapphires of the recently discovered deposit at Andranondambo on Madagascar. *Journal of the Gemmological Association of Hong Kong* 20, 32-42.
- Gübelin, E. J. and Chudoba, K. F. (1956), *Echt Oder Synthetisch?*, Stuttgart, Rühle-Diebener-Verlag KG, 156 pp.,
- Gübelin, E. J. and Gysler-Sanz, J. (1991) Emeralds from Mozambique - A gemmological and mineralogical study, *22nd International Gemmological Conference - Abstracts*,
- Gübelin, E. J. and Koivula, J. I. (1986) Inklusen im Bernstein, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 35. 3/4. 73–86
- Gübelin, E. J. and Koivula, J. I. (1987) Fluorite and its inclusions, *Australian Gemmologist*, 16. 5. 184–185
- Gübelin, E. J. and Schmetzer, K. (1980) The alexandrite effect in minerals: Chrysoberyl, gamet, corundum, fluorite, *Neues Jahrbuch für Mineralogie Abhandlungen*, 138. 2. 147-164
- Gübelin, E., Weibel, M. and Woensdregt, C.F. (1986) Some unusual sillimanite cat's-eyes. *Gems and Gemology* 22, 96-98.
- Gübelin, E.J. and Knischka, P.O. (1980) Synthetische Rubine mit Edelsteinqualität, isometrischem Habitus und hoher Zahl unbeschädigter Kristallflächen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 29, 155–186.
- Gübelin, E.J. and Peretti, A. (1996) New inclusions in Pakistani peridot: Vonsenite-ludwigite needles. *JewelSiam*.
- Gübelin, E.J. and Peretti, A. (1997) Sapphires from the Andranondambo mine in SE Madagascar: Evidence for metasomatic skarn formation. *Journal of Gemmology* 25, 453–516.
- Gübelin, E.J., Barot, N.R., Flamini, A. and Graziani, G. (1989) Star sapphire from Kenya. *Journal of Gemmology* 21, 467–473.
- Guman, W. J. (1976) Color patterns in fire agate, *Lapidary Journal*, 29. 11. 2131-2133
- Gunaratne, H.S. (1981) "Geuda sapphires" - their colouring elements and their reaction to heat. *Journal of Gemmology* 17, 292-300.
- Gunawardene, M. (1983) Pyrite and marcasite occurrence in Sri Lanka with special emphasis on Meethiyagoda gem field, *Journal of Gemmology*, 18. 7. 635-640
- Gunawardene, M. (1983a) Further investigations on opal imitation made of plastic. *Journal of Gemmology* 18, 707-714.
- Gunawardene, M. (1983b) Pyrite and marcasite occurrence in Sri Lanka with special emphasis on Meethiyagoda gem field. *Journal of Gemmology* 18, 635-640.
- Gunawardene, M. (1983c) Über die synthetischen blauen und orangefarbenen sapphire von Chatham. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 32, 196-203.
- Gunawardene, M. (1984a) A close examination of platinum inclusions in Chatham blue and orange sapphires. *19th International Gemmological Conference - Proceedings*, 33-37.
- Gunawardene, M. (1984b) Identification characteristics of synthetic ruby made by Knischka. *Lapidary Journal* 37, 1700-1706.
- Gunawardene, M. (1984c) Inclusions in taaffeites from Sri Lanka. *Gems and Gemology* 20, 159-164.
- Gunawardene, M. (1985a) Identification characteristics of flux grown synthetic orange sapphires. *Journal of Gemmology* 19, 389-403.
- Gunawardene, M. (1985b) Peridot from Ratnapura District, Sri Lanka. *Journal of Gemmology* 19, 692-702.
- Gunawardene, M. and Chawla, S.S. (1985) Sapphires from Kanchanaburi Province, Thailand. *Journal of Gemmology* 19, 228-239.
- Gunawardene, M. and Mertens, R. (1983) Japanische opalimitation aus plastik. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 32, 59-68.
- Gunter M. and F. D. Bloss (1982), Andalusite - kanonaite series: Lattice and optical parameters, *American Mineralogist*, 67, 11/12, 1218-1228.
- Gunter M.E. (1999) Quartz - The most abundant mineral species in the Earth's crust and a human carcinogen? *Journal of Geoscience Education*, 47, 341-349.
- Guo, J., Griffin, W. L. and O'Reilly, S. Y. (1994) A cobalt-rich spinel inclusion in a sapphire from Bo Ploi, Thailand, *Mineralogical Magazine*, 58. 2. 247-258

- Guo, J.F., O'Reilly, S.Y. and Griffin, W.L. (1996) Corundum from basaltic terrains: A mineral inclusion approach to the enigma. *Contributions to Mineralogy and Petrology* 122, 368–386.
- Guo, J.F., Wang, F.Q. and Yakoumelos, G. (1992) Sapphires from Changle in Shandong Province, China. *Gems and Gemology* 28, 255–260.
- Guo, X., Chen, M., Li, N., Qin, Q., Huang, M., Fei, J., Wen, S., Li, Z. and Qin, Y. (1987) Czochralski growth of alexandrite crystals and investigation of their defects, *Journal of Crystal Growth*, 83. 3. 311-318
- Guse, W. (1982) Blue colour-variety of calcite from the Tsumeb ore deposit, Namibia, SW-Africa, *Neues Jahrbuch für Mineralogie Monatshefte*, 9. 417-421
- Guthrie G.D., Bish D.L. and Reynolds R.C. (1995) Modeling the X-ray diffraction pattern of opal-CT. *American Mineralogist*, 80, (7/8), 869-872.
- Gutierrez, P.C., Ynsa, M.D., Climent-Font, A. and Calligaro, T. (2010) Detection of beryllium treatment of natural sapphires by NRA (nuclear reaction analysis). *Nuclear Instruments and Methods in Physics Research B* 268, 2038-2041.
- Haapala, I., Siivola, J., Ojanpera, P. and Yeletinen, V. (1971) Red corundum, sapphirine and kornerupine from Kittilä, Finish Lappland. *Bulletin of the Geological Society of Finland* 43, 221–231.
- Hager, T. (2007) The absorption edge of ruby and sapphire UV-Vis spectra. *Asia Oceania Geosciences Society - Meeting*.
- Hager, T., Nguyen, N.K., Duong, A.T., Bidny, A.S., Koshenskaya, T.O., Baksheev, I.A., Le, T.T.H. and Hofmeister, W. (2010) Ruby and sapphire rimmed by spinel from the Luc Yen - Yen Bai gem mining area, Vietnam. *20th General Meeting International Mineralogical Association - Abstract*.
- Häger, T., Priester, M., Rupasinghe, M. and Mackay, H. (2003) Information and Source Material on Gemstone Identification and Valuation. ITC, p. 44.
- Hainschwang, T. (2008) Lead-glass-treated blue sapphire. *Gems & Jewellery* 17, 3, 5.
- Hainschwang, T. and Leggio, L. (2006) The characterization of tortoise shell and its imitations. *Gems and Gemology* 42, 36-52.
- Hainschwang, T. and Notari, F. (2011) Multi-treated HPHT-grown synthetic diamonds showing some characteristics of natural diamonds. *GGTL Laboratories Gemmological Newsletter*
- Hainschwang, T., Hochstrasser, T., Hajdas, I. and Keutschegger, W. (2010) A cautionary tale about a little-known type of non-nacreous calcareous concretion produced by the *Magilus antiquus* marine snail. *Journal of Gemmology* 32, 15-22.
- Hainschwang, T., Katrusha, A. and Vollstaedt, H. (2005a) HPHT treatment of different classes of type I brown diamonds. *Journal of Gemmology* 29, 261-273.
- Hainschwang, T., Notari, F., Fritsch, E. and Massi, L. (2006) Natural, untreated diamonds showing the A, B, and C infrared absorptions ("ABC" diamonds), and the H2 absorption. *Diamond and Related Materials* 15, 1555-1564.
- Hainschwang, T., Notari, F., Fritsch, E., Massi, L., Rondeau, B., Breeding, C.M. and Vollstaedt, H. (2008) HPHT treatment of CO₂ containing and CO₂-related brown diamonds. *Diamond and Related Materials* 17, 340-351.
- Hainschwang, T., Respinger, A., Notari, F., Hartmann, H.J. and Günthard, C. (2009) A comparison of diamonds irradiated by high fluence neutrons or electrons, before and after annealing. *Diamond and Related Materials* 18, 1223-1234.
- Hainschwang, T., Simic, D., Fritsch, E., Deljanin, B., Woodring, S. and Del Re, N. (2005b) A gemological study of a collection of Chameleon diamonds. *Gems and Gemology* 41, 20-35.
- Hakomori, S. and Seto, K. (1951) Cathodoluminescence as applied to the study of minor constituents in shells, corals, pearls, and bones (in Japanese). *Journal of the Chemical Society of Japan* 72, 532-535.
- Halden N.M. and Hawthorne F.C. (1993) The fractal geometry of oscillatory zoning in crystals: Application to zircon. *American Mineralogist*, 78, (9/10), 1113-1116.
- Hålenius U., Andreozzi G.B. and Skogby H. (2010) Structural relaxation around Cr³⁺ and the red-green color change in the spinel (sensu stricto)-magnesiocromite (MgAl₂O₄ - MgCr₂O₄) and gahnite-zincocromite (ZnAl₂O₄ - ZnCr₂O₄) solid-solution series. *American Mineralogist*, 95, (4), 456-462.
- Hålenius U., Skogby H. and Andreozzi G.B. (2002) Influence of cation distribution on the optical absorption spectra of Fe³⁺-bearing spinel s.s. - hercynite crystals: Evidence for electron transitions in ^{VI}Fe²⁺ - ^{VI}Fe³⁺ clusters. *Physics and Chemistry of Minerals*, 29, (5), 319-330.
- Halford-Watkins, J.F. (1932) Burma jade, *Gemmologist*, 2. 14. 40-44
- Halford-Watkins, J.F. (1935) Burma sapphires - Locations and characteristics. *Gemmologist* 5, 89-94.

- Halford-Watkins, J.F. (1936) Rubies and sapphires in Burma. *Gemmologist* 5, 154–157.
- Halford-Watkins, J.F. (1941) Chalcedony, *Gemmologist*, 10. 118. 88–91
- Hamid, G., Kelly, S.M.B. and Brown, G. (1999) Ruby from Tunduru-Songea, East Africa. *Australian Gemmologist* 20, 326-330.
- Hanchar J.M. and Miller C.F. (1993) Zircon zonation patterns as revealed by cathodoluminescence and backscattered electron images: Implications for interpretation of complex crustal histories. *Chemical Geology*, 110, (1/3), 1-13.
- Hanchar J.M. and Rudnick R.L. (1995) Revealing hidden structures: The application of cathodoluminescence and back-scattered electron imaging to dating zircons from lower crustal xenoliths. *Lithos*, 36, (3/4), 289-303.
- Hanchar J.M. and Watson E.B. (2003) Zircon saturation thermometry. *Reviews in Mineralogy and Geochemistry*, 53, (1), 89-112.
- Hanchar J.M., Finch R.J., Hoskin P.W.O., Watson E.B., Cherniak D.J. and Mariano A.N. (2001) Rare earth elements in synthetic zircon: Part 1. Synthesis, and rare earth element and phosphorus doping. *American Mineralogist*, 86, (5/6), 667-680.
- Hänni H.A. and Weibel M. (1988) Origin of the cat's-eye effect in heat-treated zircons from Sri Lanka. *Australian Gemmologist*, 16, (10), 363-366.
- Hänni, H. A. (1981) Chemischer Vergleich zwischen natürlichen und synthetischen Smaragden, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 30. 3/4. 214-218
- Hänni, H. A. (1982) A contribution to the separability of natural and synthetic emeralds, *Journal of Gemmology*, 18. 2. 138-144
- Hänni, H. A. (1983a) Comparaison chimique de émeraudes-naturelles et synthétiques, *Revue de Gemmologie a.f.g.*, 76. 6-8
- Hänni, H. A. (1983b) Weitere Untersuchungen an einigen farbwechselnden Edelsteinen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 32. 2/3. 99-106
- Hänni, H. A. (1988) An oil well in your garden?, *Swiss Watch and Jewelry Journal*, 3. 461-464
- Hänni, H. A. (1990) A contribution to the distinguishing characteristics of sapphire from Kashmir. *Journal of Gemmology* 22, 67-75.
- Hänni, H. A. (1992a) Considerations terminologiques au sujet des émeraudes du Nigeria de couleur bleu-vert, *Revue de Gemmologie a.f.g.*, 113. 2-4
- Hänni, H. A. (1992b) Identification of fissure-treated gemstones. *Journal of Gemmology* 23, 201–205.
- Hänni, H. A. (1993) A new synthetic ruby from Greece poses challenges for gemologists. *Rapaport Diamond Report* 16, 27-28.
- Hänni, H. A. (1994) Origin determination for gemstones: Possibilities, restrictions and reliability. *Journal of Gemmology* 24, 139-147.
- Hänni, H. A. (1996) A short synopsis of pearls: Natural, cultured, imitation. *Journal of the Gemmological Association of Hong Kong* 18, 43-46.
- Hänni, H. A. (2000) Freshwater Cultured “Kasumiga Pearls” with Akoya Cultured Pearl Nuclei. *Gems & Gemology*, Summer, 167-168.
- Hänni, H. A. (2001a) Beobachtungen an hitzebehandeltem Rubin mit künstlicher Rissheilung. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 50, 123-136.
- Hänni, H. A. (2001b) Ruby heat treatment and fracture repair. *Jewellery News Asia*, 75-76.
- Hänni, H. A. (2002) Orange treated sapphire - Towards finding a name for a new product. *Journal of the Gemmological Association of Hong Kong* 23, 23-30.
- Hänni, H. A. (2006) A short review of the use of 'keshi' as a term to describe pearls. *The Journal of Gemmology*, 30, 1/2, 51-58.
- Hänni, H. A. and Gunawardene, M. (1982) Ferroaxinite - Another new gem from Sri Lanka, *Journal of Gemmology*, 18. 1. 20-27
- Hänni, H. A. and Kerez, C. J. (1983) Neues vom Smaragd-vorkommen von Sta. Terezinha de Goiás, Goiás, Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 32. 1. 50-58
- Hänni, H. A. and Klein, H. H. (1982) Ein Smaragd-vorkommen in Madagaskar, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 31. 1/2. 71-77
- Hänni, H. A. and Klein, H. H. (1983) Un gisement d'émeraudes? Madagascar, *Revue de Gemmologie a.f.g.*, 74. 3-5

- Hänni, H. A. and Krzemnicki, M. S. (2003a) Caesium-rich morganite from Afghanistan and Madagascar, *Journal of Gemmology*, 28. 7. 417-429
- Hänni, H. A. and Krzemnicki, M. S. (2003b) Cäsiumreiche Morganite aus Afghanistan und Madagaskar, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 52. 2/3. 67-80
- Hänni, H. A. and Krzemnicki, M. S. (2004) Pezzotait - ein neues mineral, *Gemmologie*, 53. 1. 3-4
- Hänni, H. A. and Krzemnicki, M.S. (2009) Das neue Rubinvorkommen von Montepuez, Mosambik (The new ruby deposit of Montepuez, Mozambique). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 58, 127-130.
- Hänni, H. A., Kiefert, L., Chalain, J. P. and Wilcock, I. C. (1996) Ein Renishaw Raman Mikroskop im gemmologischen Labor: Erste Erfahrungen bei der Anwendung, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 45. 2. 55-70
- Hänni, H. A., Wu, S. T., Yan, X. and Tsai, W. (2001) A glass imitation of blue chalcedony, *Journal of Gemmology*, 27. 5. 275-285
- Hänni, H.A. and Pettke, T. (2002) Eine neue Diffusionsbehandlung liefert orangefarbene und gelbe Saphire. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 51, 137-152.
- Hänni, H.A. and Schmetzer, K. (1991) New rubies from the Morogoro area, Tanzania. *Gems and Gemology* 27, 156-167.
- Hänni, H.A. and Stern, W.B. (1982) Über die gemmologische bedeutung des gallium-nachweises in korunden. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 31, 225-260.
- Hänni, H.A., Milisenda, C.C. and Henn, U. (2001) Rubine aus neuen vorkommen in Madagaskar (Rubies from new deposits in Madagascar). *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 50, 89-94.
- Hänni, H.A., Schmetzer, K. and Bernhardt, H.J. (1994) Synthetic rubies by Douros: A new challenge for gemologists. *Gems and Gemology* 30, 72-86.
- Hanson, L. (1956) Sillimanite - the world's newest gem. *Lapidary Journal* 10, 294-298.
- Harder H. (1986) Natürliche kobaltblaue Spinelle von Ratnapura, Sri Lanka. *Neues Jahrbuch für Mineralogie Monatshefte*, (3), 97-100.
- Harder H. (1995) Precious layer opal with a complex sedimentary formation process as colloid chemical precipitation, sedimentation and evaporation. *Neues Jahrbuch für Mineralogie Monatshefte*, (3), 121-126.
- Harder, H. (1992) Moonstone mining in Sri Lanka: New aspects, *Journal of Gemmology*, 23. 1. 27-35
- Harding R.R. and Wall F. (1987) Blue spinel from the Hunza Valley, Pakistan. *Journal of Gemmology*, 20, (7/8), 403-405.
- Harding, R. R., Jobbins, E. A., Young, B. R. and Winter, C. H. (1982) Near-colourless enstatite from Sri Lanka, *Journal of Gemmology*, 18. 3. 213-216
- Harding, R.R. and Jobbins, E.A. (1984) Verdite and ruby-verdite from Zimbabwe. *Journal of Gemmology* 19, 150-159.
- Harding, R.R. and Scarratt, K. (1986) A description of ruby from Nepal. *Journal of Gemmology* 20, 3-10.
- Harding, R.R. and Zoysa, E.G. (1990) Sapphirine from the Kolonne area, Sri Lanka. *Journal of Gemmology* 22, 136-140.
- Hardy, E. (1947) What a Study of Tridacna Pearls has shown: Scotchng a Pearl Myth. *The Gemmologist*, XVI, 197, 335-337.
- Hardy, E. (1959) The Australian pearl shell industry. *Gemmologist* 28, 98.
- Hargett, D. (1990) Jadeite of Guatemala: A contemporary view, *Gems and Gemology*, 26. 2. 134-141
- Harley S.L. and Kelly N.M. (2007) Zircon - Tiny but timely. *Elements*, 3, (1), 13-18.
- Harley S.L., Kelly, N.M. and Möller A. (2007) Zircon behaviour and the thermal histories of mountain chains. *Elements*, 3, (1), 25-30.
- Harlov D. E. and R. C. Newton (1993), Reversal of the metastable kyanite + corundum + quartz and andalusite + corundum + quartz equilibria and the enthalpy of formation of kyanite and andalusite, *American Mineralogist*, 78, 5/6, 594-600.
- Harlow, G. and Sorensen, S. (2005) Jade (nephrite and jadeite) and serpentinite: Metasomatic considerations. *International Geology Review* 47, 113-146.
- Harlow, G. E. (1994) Jadeitites, albitites and related rocks from the Motagua fault zone, Guatemala, *Journal of Metamorphic Geology*, 12. 1. 49-68

- Harrison R.J., Dove M.T., Knight K.S. and Putnis A. (1999) In-situ neutron diffraction study of non-convergent cation ordering in the $(\text{Fe}_3\text{O}_4)_{1-x}(\text{MgAl}_2\text{O}_4)_x$ spinel solid solution. *American Mineralogist*, 84, (4), 555-563.
- Hartmann L.A., Wildner W., Duarte L.C., Duarte S.K., Pertille J., Arena K.R., Martins L.C. and Dias N.L. (2010) Geochemical and scintillometric characterization and correlation of amethyst geode-bearing Paraná lavas from the Quaraí and Los Catalanes districts, Brazil and Uruguay. *Geological Magazine*, 147, (6), 954-970.
- Harutunyan, V.V., Hakhverdyan, E.A., Hakobyan, T.S., Gevorkyan, V.A., Grigoryan, V.A. and Makhov, V.N. (1999) Luminescence excitation and influence of radiation on the stimulated processes in corundum crystals. *Physica Status Solidi A* 171, 623-629.
- Hassan I. and Buseck P.R. (1988) HRTEM characterization of scapolite solid solutions. *American Mineralogist*, 73, (1/2), 119-134.
- Hassan, F. (1978) Impurity-related centers in a pale green calcite crystal, *American Mineralogist*, 63, 7/8, 732-736
- Hassan, F. and El-Rakhawy, A. (1974) Chromium III centers in synthetic alexandrite, *American Mineralogist*, 59, 1/2, 159-165
- Hassan, I. and Grundy, H. D. (1989) The structure of nosean, ideally $\text{Na}_8[\text{Al}_6\text{Si}_6\text{O}_{24}]\text{SO}_4 \cdot \text{H}_2\text{O}$, *Canadian Mineralogist*, 27, 2, 165-172
- Hassan, I. and Grundy, H. D. (1991) The crystal structure of hauyne at 293 and 153 K, *Canadian Mineralogist*, 29, 1, 123-130
- Hassan, I. and Grundy, H.D. (1984) The crystal structures of sodalite-group minerals. *Acta Crystallographica B* 40, 6-13.
- Hatipoğlu M. (2009) Moganite and quartz inclusions in the nano-structured Anatolian fire opals from Turkey. *Journal of African Earth Sciences*, 54, (1/2), 1-21.
- Hattan, S. J., Laue, T. M. and Chasteen, N. D. (2001) Purification and characterization of a novel calcium-binding protein from the extrapallial fluid of the mollusc, *Mytilus edulis*, *Journal of Biological Chemistry*, 276, 6, 4461-4468
- Hauzenberger, C., Hager, T., Hofmeister, W., Quang, V.X. and Rohan-Fernando, G.W.A. (2003) Origin and formation of gem-quality corundum in Vietnam. *Geo- and Material-Science on Gem Minerals of Vietnam*.
- Hawkins K.D., MacKinnon I.D.R. and Schneeberger H. (1995) Influence of chemistry on the pyroelectric effect in tourmaline. *American Mineralogist*, 80, (5/6), 491-501.
- Hawthorne F.C. (1996) Structural mechanisms for light-element variations in tourmaline. *Canadian Mineralogist*, 34, (1), 123-132.
- Hawthorne F.C. and Henry D.J. (1999) Classification of the minerals of the tourmaline group. *European Journal of Mineralogy*, 11, (2), 201-215.
- Hawthorne F.C. and Sokolova E. (2008) The crystal chemistry of the scapolite-group minerals, II: The origin of the $I4/m \leftrightarrow P4_2/n$ phase transition and the nonlinear variations in chemical composition. *Canadian Mineralogist*, 46, (6), 1555-1575.
- Hawthorne F.C., Groat L.A., Raudsepp M., Ball N.A., Kimata M., Spike F.D., Gaba R., Halden N.M., Lumpkin G.R., Ewing R.C., Greigor R.B., Lytle F.W., Ercit T.S., Rossman G.R., Wicks F.J., Ramik R.A., Sherriff B.L., Fleet M.E. and McCammon C. (1991) Alpha-decay damage in titanite. *American Mineralogist*, 76, (3/4), 370-396.
- Hawthorne F.C., MacDonald D.J. and Burns P.C. (1993) Reassignment of cation site occupancies in tourmaline: Al-Mg disorder in the crystal structure of dravite. *American Mineralogist*, 78, (3/4), 265-270.
- Hawthorne, F. C. (1987) The crystal chemistry of the benitoite group minerals and structural relations in (Si_3O_9) ring structures, *Neues Jahrbuch für Mineralogie Monatshefte*, 1, 16-30
- Hayashi, M. (1994) Iron-rich chrysoberyl cat's eye (in Japanese), *Journal of the Gemmological Society of Japan*, 19, 1/4, 31-32
- Hayashi, M. and Manaka, Y. (1994) Gem identification by FT-IR - emerald, jadeite, sillimanite, etc. (in Japanese). *Journal of the Gemmological Society of Japan* 19, 3-6.
- Hayden L.A., Watson E.B. and Wark D.A. (2008) A thermobarometer for sphene (titanite). *Contributions to Mineralogy and Petrology*, 155, (4), 529-540.
- Hayward S.A., del Cerro J. and Salje E.K.H. (2000) Antiferroelectric phase transition in titanite: Excess entropy and short range order. *American Mineralogist*, 85, (3/4), 557-562.

- Hayward, C.L., Angel, R.J. and Ross, N.L. (1994) The structural redetermination and crystal chemistry of sinhalite, MgAlBO_4 . *European Journal of Mineralogy* 6, 313-321.
- Hazen R.M. and Sharp Z.D. (1988) Compressibility of sodalite and scapolite. *American Mineralogist*, 73, (9/10), 1120-1122.
- Hazen, R.M. and Au, A.Y. (1986) High-pressure crystal chemistry of phenakite (Be_2SiO_4) and bertrandite ($\text{Be}_4\text{Si}_2\text{O}_7(\text{OH})_2$). *Physics and Chemistry of Minerals* 13, 69-78.
- Hazen, R.M. and Finger, L.W. (1987) High-temperature crystal chemistry of phenakite (Be_2SiO_4) and chrysoberyl (BeAl_2O_4). *Physics and Chemistry of Minerals* 14, 426-434.
- Healey, D. and Yu, R. M. (1983) Quality grading of jadeite, *Lapidary Journal*, 36. 10. 1670-1674
- Heaney P.J. and Veblen D.R. (1991a) Observations of the α - β phase transition in quartz: A review of imaging and diffraction studies and some new results. *American Mineralogist*, 76, (5/6), 1018-1032.
- Heaney P.J. and Veblen D.R. (1991b) Observation and kinetic analysis of a memory effect at the α - β quartz transition. *American Mineralogist*, 76, (9/10), 1459-1466.
- Hebert L.B. and Rossman G.R. (2008) Greenish quartz from the Thunder Bay Amethyst Mine Panorama, Thunder Bay, Ontario, Canada. *Canadian Mineralogist*, 46, (1), 111-124.
- Hedegaard, C., Bardeau, J.F. and Chateigner, D. (2006) Molluscan shell pigments: An in situ resonance Raman study. *Journal of Molluscan Studies* 72, 157-162.
- Heflik, W. and Natkaniec-Nowak, L. (2003) Lapis lazuli from Sar-e-Sang, Badakhshan, Afghanistan, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 52. 1. 11-24
- Heflik, W., Pawlikowski, M., Sobczak, T. and Sobczak, N. (1993) Jaspers from Swierki near Nowa Ruda, Lower Silesia, Poland, *Journal of Gemmology*, 23. 6. 356-359
- Heide, H. G., Boll-Dornberger, K., Thilo, E. and Thilo, E. M. (1955) Die struktur des dioplas, $\text{Cu}_6(\text{Si}_6\text{O}_{18}) \cdot 6\text{H}_2\text{O}$, *Acta Crystallographica*, 8. 7. 425-430
- Heide, K., Heide, G. and Kloess, G. (2001) Glass chemistry of tektites. *Planetary and Space Science* 49, 839-844.
- Heilmann, G. and Henn, U. (1986) On the origin of blue sapphire from Elahera, Sri Lanka. *Australian Gemmologist* 16, 2-4.
- Heinrich, E. W. (1963) Paragenesis of clinohumite and associated minerals from Wolf Creek, Montana, *American Mineralogist*, 48. 5/6. 597-613
- Heinrich, E. W. and Corey, A. F. (1955) Montebasite from Eight Mile Park, Fremont County, Colorado, *American Mineralogist*, 40. 11/12. 1141-1145
- Heinrich, E. W. and Corey, A. F. (1959) Manganian andalusite from Kiawa Mountain, Rio Araiba County, New Mexico, *American Mineralogist*, 44. 11/12. 1261-1271
- Heinrich, E.W. (1975) Economic geology and mineralogy of petalite and spodumene pegmatites. *Indian Journal of Earth Sciences* 2, 18-29.
- Helm, O. (1892) On a new fossil, amber-like resin occurring in Burma, *Geological Survey of Burma - Records*, 25. 4. 180-181
- Helm, O. (1893) Further notes on Burmite a new amber-like fossil resin from Upper Burma, *Geological Survey of India - Records*, 26. 1. 61-64
- Helm, O. (1894) Über Birmite, ein in Oberbirma vorkommendes fossiles Harz, *Schrift Naturforschung Gesellschaft Danzig*, 8. 63-66
- Hemingway, B. S., R. A. Robie, H. W. Evans and D. M. Kerrick (1991), Heat capacities and entropies of sillimanite, fibrolite, andalusite, kyanite, and quartz and the Al_2SiO_5 phase diagram, *American Mineralogist*, 76, 9/10, 1597-1613.
- Hemley, R. J., Mao, H. K. and Yan, C. S. (2006) Colorless single-crystal CVD diamond at rapid growth rate, *WIPO Patent*, 2006/127611.
- Henderson, E. P. (1945) A cat's-eye emerald, *Gems and Gemology*, 5. 2. 222
- Henderson, W. A., Richards, R. P. and Howard, D. G. (2000) Elongated twins of sodalite and other isometric minerals, *Mineralogical Record*, 31. 2. 141-151
- Henig, M. and Collins, J. (2001) An engraved gemstone from Turkey and Virgil's plow, *Oxford Journal of Archaeology*, 20. 3. 307-310
- Henn U. (2005) Skapolith-Katzenaugen aus Indien. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 54, (1), 55-58.

- Henn U. and Bank H. (1990) On the colour and pleochroism of Cu-bearing green and blue tourmalines from Paraíba, Brazil. *Neues Jahrbuch für Mineralogie Monatshefte*, (6), 280-288.
- Henn U. and Güttler R.S. (2009) Colour-enhanced quartz and its identification: Green, violet-blue and yellow-green quartz from Brazil. *Canadian Gemmologist*, 30, (2), 46-54.
- Henn U. and Milisenda C.C. (2005) Türkis - Eigenschaften und Vorkommen, Imitationen und künstliche Eigenschaftsveränderungen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 54, (2/3), 97-110.
- Henn, H. (1988) Untersuchungen an smaragden aus dem Swat-Tal, Pakistan, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 37, 3/4. 121-127
- Henn, U. (1985a) A comparison of the chemical and optical properties of chrysoberyls from different origins (in German), *Johann Gutenberg Universität Mainz - Thesis*, 1-156
- Henn, U. (1985b) Untersuchungen an kornerupin und sinhalit von elahera, Sri Lanka, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 34, 1/2. 13-19
- Henn, U. (1986a) Saphire aus Nigeria und von Sta. Terezinha de Goias, Brasilien. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 35, 15-19.
- Henn, U. (1986b) Sugilit aus Südafrika. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 35, 65-67.
- Henn, U. (1987) Inclusions in yellow chrysoberyl, natural and synthetic alexandrite, *Australian Gemmologist*, 16. 6. 217-220
- Henn, U. (1990) Cordierit aus Süd-Norwegen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 39. 2/3. 99-106
- Henn, U. (1991) Burma-type rubies from Vietnam. *Australian Gemmologist* 17, 505-509.
- Henn, U. (1992) Über die diagnostischen Merkmale von synthetischen Alexandriten aus der Gemeinschaft Unabhängiger Staaten (GUS), *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 41. 2/3. 85-93
- Henn, U. (1994a) A new type of synthetic ruby from Russia. *Australian Gemmologist* 18, 362-364.
- Henn, U. (1994b) An update on synthetic stones manufactured in Russia - Properties and distinguishing features, *American Gem Society - Conclave*,
- Henn, U. (1995a) Edelsteinkundliches Praktikum, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 44. 4. 3-112
- Henn, U. (1995b) Makusanit - ein klar durchsichtiger Obsidian aus Peru. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 44, 25-28.
- Henn, U. (1999a) Peridot aus China (Peridot from China). *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 48, 113-116.
- Henn, U. (1999b) Synthetische aquamarine im handel, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 48. 3. 163-165
- Henn, U. (1999c) Synthetic forsterite - A new tanzanite imitation, *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 48. 4. 234-236
- Henn, U. (2001) Sapphirin aus Sri Lanka (Sapphirine from Sri Lanka). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 50, 112-115.
- Henn, U. (2002) Farbwechselnder Fluorit aus Indien, *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 51. 1. 52-54
- Henn, U. (2005) Roter, klar durchsichtiger Andesin aus dem Kongo, *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 54. 1. 53-55
- Henn, U. (2006) Korallen im Edelstein- und Schmuckhandel. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 55, 77-104.
- Henn, U. (2008) Mit kunstharz stabilisierter Seraphinit (Klinochlor). *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 57, 143-144.
- Henn, U. and Bank, H. (1990a) Blaue Saphire aus Malawi. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 39, 89-92.
- Henn, U. and Bank, H. (1990b) Über die Farbe der Sodalith-Mineralen: Sodalith, Lasurit (Lapis lazuli) und Hauyn. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 39, 159-163.
- Henn, U. and Bank, H. (1991a) Aussergewöhnliche Smaragde aus Nigeria, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 40. 4. 181-187
- Henn, U. and Bank, H. (1991b) Epidot von der Knappenwand im Untersulzbachtal, Österreich, *Zeitschrift der Deutsche Gemmologische Gesellschaft*, 40. 1. 1-9
- Henn, U. and Bank, H. (1991c) Rubies of facet-cutting quality from Tanzania. *Börsen Bulletin*, 116.

- Henn, U. and Bank, H. (1991d) Rubine aus Vietnam. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 40, 25-28.
- Henn, U. and Bank, H. (1992a) Aquamarine aus Mocambique, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 41. 2/3. 107-110
- Henn, U. and Bank, H. (1992b) Examination of an unusual alexandrite, *Australian Gemmologist*, 18. 1. 13-15
- Henn, U. and Bank, H. (1992c) On the distinction between yellow corundum/"padparadscha"/rubies. *Börsen Bulletin*, 226.
- Henn, U. and Bank, H. (1992d) Radioaktive, künstlich bestrahlte schwarze Diamanten. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 41, 63.
- Henn, U. and Bank, H. (1993a) Flux-grown synthetic rubies from Russia. *Journal of Gemmology* 23, 393-396.
- Henn, U. and Bank, H. (1993b) Neues Rubinvorkommen in Myanmar (Burma). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 42, 63-65.
- Henn, U. and Bank, H. M. C. C. (1994) Gemmologische Kurzinformationen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 43. 3/4. 105-109
- Henn, U. and Becker, A.F.A. (1992) On the properties of meteoritic gem olivine from a pallasite from Esquel, Patagonia, Argentina. *Journal of Gemmology* 23, 86-88.
- Henn, U. and Milisenda, C. C. (1999a) Synthetic red beryl from Russia, *Journal of Gemmology*, 26. 8. 481-486
- Henn, U. and Milisenda, C. C. (1999b) Synthetische rote berylle aus Russland, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 48. 2. 97-104
- Henn, U. and Milisenda, C.C. (1994) A microscopical study of Nepaleses ruby and sapphire. *Journal of the Gemmological Association of Hong Kong* 17, 82-84.
- Henn, U. and Milisenda, C.C. (1997) Neue Edelsteinvorkommen in Tansania: Die Region Tunduru-Songea (New gemstone occurrences in Tanzania: the Tunduru-Songea area). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 46, 29-43.
- Henn, U. and Milisenda, C.C. (2005) Gemmologische untersuchungen an Korunden aus Pakistan (Gemmological studies on corundum from Pakistan). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 54, 111-114.
- Henn, U. and Petsch, E. (2000) Verschiedenfarbige Saphire aus Brasilien (Various colored sapphires from Brazil). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 49, 173-175.
- Henn, U. and Scheider, B. (1994) Azurit-Malachit - Verwechslungsmöglichkeiten und Imitationen, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 43. 3/4. 127-132
- Henn, U., Bank, H. and Bank, F.H. (1989) Orangefarbene Korunde aus Malawi. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 38, 164-166.
- Henn, U., Bank, H. and Bank, F.H. (1990) Red and orange corundum (ruby and padparadscha) from Malawi. *Journal of Gemmology* 22, 83-89.
- Henn, U., Bank, H. and Bank-Scherner, M. (1990) Rubine aus dem Pamir-Gebirge, UdSSR. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 39, 201-205.
- Henn, U., Bank, H. and Milisenda, C.C. (1994a) Gemmologische Kurzinformationen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 43, 1-4.
- Henn, U., Bank, H. and Milisenda, C.C. (1994b) Gemmologische Kurzinformationen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 43, 105-109.
- Henn, U., Hofmann, C. and Schrader, H. W. (1984) Verschiedenfarbige Berylle aus Nigeria, *Uhren, Juwelen und Schmuck*, 10. 108-110
- Henn, U., Hyrsi, J. and Milisenda, C. (2001) Gem-quality clinohumite from Tajikistan and the Taymyr region, northern Siberia, *Journal of Gemmology*, 27. 6. 335-339
- Henn, U., Milisenda, C.C. and Henn, J. (1999) Sapphire aus einem neuen Vorkommen im Südwesten von Madagaskar. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 48, 201-210.
- Henry D.J. and Dutrow B.L. (1990) Ca substitution in Li-poor aluminous tourmaline. *Canadian Mineralogist*, 28, (1), 111-124.
- Henry D.J. and Dutrow B.L. (1992) Tourmaline in a low-grade clastic metasedimentary rock: An example of the petrogenetic potential of tourmaline. *Contributions to Mineralogy and Petrology*, 112, (2/3), 203-218.
- Henry D.J. and Dutrow B.L. (2011) The incorporation of fluorine in tourmaline: Internal crystallographic controls or external environmental influences? *Canadian Mineralogist*, 49, (1), 41-56.

- Henry D.J. and Guidotti C.V. (1985) Tourmaline as a petrogenetic indicator mineral: An example from the staurolite-grade metapelites of NW Maine. *American Mineralogist*, 70, (1/2), 1-15.
- Henry D.J., Novak M., Hawthorne F.C., Ertl A., Dutrow B.L., Uher P. and Pezzotta F. (2011) Nomenclature of the tourmaline-group minerals. *American Mineralogist*, 96, (5/6), 895-913.
- Henry D.J., Sun H., Slack J.F. and Dutrow B.L. (2008) Tourmaline in meta-evaporites and highly magnesian rocks: Perspectives from Namibian tourmalinites. *European Journal of Mineralogy*, 20, (5), 889-904.
- Hernandez, J. B. (1980) Geologia preliminar del área "El Valle", Provincia El Seybo, Republica Dominicana, *9th Caribbean Geological Conference - Proceedings*, 675-680
- Herting, S. and Strunz, H. (1978) Jeremjewit von Cape Cross in SW-Afrika, *Der Aufschluss*, 29. 45-53
- Hertz, W. A. (1912), Burma Gazetteer: Myitkyina District, *Rangoon*, Superintendent, Govt. Printing and Staty., Volume A, 193 pp., map,
- Heung, Y. Y. , J. Qin, Y. M. Chang and C. Rudowicz (1994), Correlation of spectroscopic properties and substitutional sites of Cr³⁺ in aluminosilicates - Parts 1 and 2, *Physics and Chemistry of Minerals*, 21, 8, 532-538 and 526-531.
- Heylmun E.B. (1987) Virgin valley. *Lapidary Journal*, 41, (3), 33-44.
- Heyns A., Harden P.M. and Prinsloo L.C. (2000) Resonance Raman study of the high-pressure phase transition in chromium-doped titanite, CaTiOSiO₄. *Journal of Raman Spectroscopy*, 31, (8/9), 837-841.
- Hickel P.E., Demazeau G., Arnaud R., Chapoulie R., Guibert P., Vartanian E., Villeneuve G., Bechtel F. and Capelle B. (2000) The hydrothermal growth of α-quartz and the nature of the physico-chemical defects detected in the resulting crystal. *High Pressure Research*, 18, (1/6), 265-269.
- Hidden, W. E. and Pratt, J. H. (1898) On rhodolite, a new variety of garnet, *American Journal of Science*, 5. 28. 294-296
- Hietanen A. (1956), Kyanite, andalusite, and sillimanite in the schist in Boehls Butte Quadrangle, Idaho, *American Mineralogist*, 41, 1/2, 1-27.
- Hietanen, A. (1971) Diopside and actinolite from Skarn, Clearwater County, Idaho, *American Mineralogist*, 56. 1/2. 234-239
- High Pressure Research*, 20, (2), 219-227.
- Hill, L. and Carmichael, P. (2004) *The World's Most Beautiful Seashells*, 7th ed. World Publications, Tampa.
- Hill, R.J. (1977) The crystal structure of phosphophyllite. *American Mineralogist* 62, 812-817.
- Hill., K. (2004) Mercenaria mercenaria (Linnaeus, 1758) (common name Northern quahog, hard clam, cherrystone, littleneck). http://www.sms.si.edu/IRLSpec/Mercen_mercen.htm. 2005, Feb.
- Hillmer, G. (1999) Amber from the Miocene of Borneo, *Malayan Nature Journal*, 53. 3. 211-215
- Hinton R.W. and Upton B.G.J. (1991) The chemistry of zircon: Variations within and between large crystals from syenite and alkali basalt xenoliths. *Geochimica et Cosmochimica Acta*, 55, (11), 3287-3302.
- Hintze, J. (2010) Rubin in zoisit - Ein klassiker aus Longido in Tansania. *Lapis* 35, 15-19.
- Hirata T. and Nesbitt R.W. (1995) U-Pb isotope geochronology of zircon: Evaluation of the laser probe-inductively coupled plasma mass spectrometry technique. *Geochimica et Cosmochimica Acta*, 59, (12), 2491-2500.
- Hlaing T. (1989) The characteristics of Burmese spinel. *Australian Gemmologist*, 17, (3), 84-87.
- Hlaing, U. T. (1999) Burmite -- Burmese amber, *Australian Gemmologist*, 20. 6. 250-253
- Hlawatsch, C. (1909) Die Kristallform des Benitoit, *Centralblatt fur Mineralogie, Geologie und Palaeontologie*, 10. 293-302
- Hoang, V.Q., Giuliani, G., Phan, T.T., Coget, P., France-Lanord, C. and Pham, L.V. (1999) Origin of ruby formation in Yen Bai Province. *Journal of Geology B*, 118-123.
- Hobbs, J. M. (1982) The jade enigma, *Gems and Gemology*, 18. 1. 3-19
- Hochleitner, R. and Weiss, S. (2000) Jeremejewit, *Lapis*, 26. 2. 9-11
- Hodgkinson, A. (1988) Hallmarked synthetic emerald, *Journal of Gemmology*, 21. 3. 179-181
- Hodgkinson, A. (1993) Gemstone enhancement - Detection of polymer-treated jadeite, *Journal of Gemmology*, 23. 7. 415-417
- Hodgkinson, A. (1996) Identification of jadeite by spectroscopy, *Auction Market Resource for Gems and Jewelry*, 3. 1. 14-17
- Hodgkinson, A. (2000) Red synthetic diamond, <http://www.scotgem.demon.co.uk>,

- Hodgkinson, A. (2002) Golden and black pearls, Jpeg D:/Kens Documents/Pearl Book Data/Alan Hogkinson Images/ShelPrIsGoldBlk.
- Hofmeister, A. M. (1987) Single-crystal absorption and reflection infrared spectroscopy of forsterite and fayalite, *Physics and Chemistry of Minerals*, 14, 6. 499-513
- Hofmeister, A. M. and Rossman, G. R. (1985a) Exsolution of metallic copper from Lake County labradorite, *Geology*, 13, 9. 644-647
- Hofmeister, A. M. and Rossman, G. R. (1985b) A model for the irradiative coloration of smoky feldspar and the inhibiting influence of water, *Physics and Chemistry of Minerals*, 12, 6. 324-332
- Hofmeister, A. M. and Rossman, G. R. (1985c) A spectroscopic study of irradiation coloring of amazonite: structurally hydrous, Pb-bearing feldspar, *American Mineralogist*, 70, 7/8. 794-804
- Hofmeister, A. M. and Rossman, G. R. (1986) A spectroscopic study of blue radiation coloring in feldspar, *American Mineralogist*, 71, 1/2. 95-98
- Hofmeister, A.M., Hoering, T.C. and Virgo, D. (1987) Vibrational spectroscopy of beryllium aluminosilicates: Heat capacity calculations from band assignments. *Physics and Chemistry of Minerals* 14, 205-224.
- Hofmeister, W. (1992) Polymere als edelsteinrelevante Werkstoffe (Polymers as gemstone relevant materials). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 41, 159-160.
- Holdaway M. J. and B. Mukhopadhyay (1993), A reevaluation of the stability relations of andalusite: Thermochemical data and phase diagram for the aluminum silicates, *American Mineralogist*, 78, 3/4, 298-315.
- Holényi K. and Annersten H. (1987) Iron in titanite: A Mössbauer-spectroscopy study. *Canadian Mineralogist*, 25, (3), 429-433.
- Holgado M., García-Santamaría F., Blanco A., Ibasate M., Cintas A., Miguez H., Serna C. J., Molpeceres C., Requena J., Mifsud A., Meseguer F. and López C. (1999) Electrophoretic deposition to control artificial opal growth. *Langmuir*, 15, (14), 4701-4704.
- Hollick, A. (1905) The occurrence and origin of amber in the Eastern United States, *American Naturalist*, 39, 459. 137-145
- Holmes, R. J. and Crowningshield, G. R. (1960) A new emerald substitute, *Gems and Gemology*, 10, 1. 11-22
- Holzapfel, W.B. (2003) Refinement of the ruby luminescence pressure scale. *Journal of Applied Physics* 93, 1813-1818.
- Holzhey, G. (1996) Durchsichtiger Obsidian (Marekanit) im Perlit von Superior, Arizona, USA. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 45, 83-89.
- Holzhey, G. (1998) Farbloser danburit aus Dalnergorsk, Russland, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 47, 3. 170-171
- Hoover D.B., Yohannes T.Z. and Collins D.S. (1996) Ethiopia: A new source for precious opal. *Australian Gemmologist*, 19, (7), 303-307.
- Horikawa, Y. (2001) Identification of a new type of laser treatment (KM treatment) of diamonds, *Journal of Gemmology*, 27, 5. 259-263
- Horiuchi, N. (1979) Application of multi-purpose spectrophotometer and X-ray fluorescence analysis to distinguish natural and synthetic alexandrites (in Japanese), *Journal of the Gemmological Society of Japan*, 6, 3. 77-80
- Horiuchi, N. (1982) New synthetic opal made of plastics. *Australian Gemmologist* 14, 213-218.
- Hörmann, P. K. and Raith, M. (1971) Optische daten, gitterkonstanten, dichte und magnetische suszeptibilität von Al-Fe(III)-Epidoten, *Neues Jahrbuch für Mineralogie Abhandlungen*, 116, 1. 41-60
- Horn, P. (1985) Moldavite - Ihre Entstehung bei der Rieskatastrophe, *Lapis*, 10, 6. 22-26
- Horn, R. (1987), Radioactive gems are dangerous, <http://www.jhu.edu/~newslett/11-13-97/News/9.html>, December 25th 2002
- Horrocks, P.C. (1983) A corundum and sapphirine paragenesis from the Limpopo Mobile Belt, Southern Africa. *Journal of Metamorphic Geology* 1, 13-23.
- Horton D. (2002) Australian sedimentary opal - Why is Australia unique? *Australian Gemmologist*, 21, (8), 278-294.
- Hosaka, M. (1990) Hydrothermal growth of gem stones and their characterization, *Progress in Crystal Growth and Characterization*, 21, 1. 71-96
- Hoskin P.W.O. (2000) Patterns of chaos: Fractal statistics and oscillatory chemistry of zircon. *Geochimica et Cosmochimica Acta*, 64, (11), 1905-1923.

- Hoskin P.W.O. and Ireland T.R. (2000) Rare earth element chemistry of zircon and its use as a provenance indicator. *Geology*, 28, (7), 627-630.
- Hoskin P.W.O. and Schaltegger U. (2003) The composition of zircon and igneous and metamorphic petrogenesis. *Reviews in Mineralogy and Geochemistry*, 53, (1), 27-62.
- House M.A., Farley K.A. and Stockli D. (2000) Helium chronometry of apatite and titanite using Nd-YAG laser heating. *Earth and Planetary Science Letters*, 183, (3/4), 365-368.
- Howard, R. (1997) Wild oat in quartz - discovering a seed locked in chalcedony. *Rock and Gem* 27, 51, 71.
- Howells, R. G. (2005) The Tampico Pearlymussel (*Cyrtornaias tampicoensis*) Shades of the Old West. http://www.conchologists.com/articles/y1996/9606_howell.asp.
- Howie, F.M. (1992) Pyrite and marcasite. *The Care and Conservation of Geological Material*, 70-84.
- Hoyer, E.M. (1997) Saxon serpentine: A stone and its uses. *Studies in the Decorative Arts*, 120-123.
- Hrabanek, J. and Malley, J. (1988) Moldavite aus Süd-Böhmen und Süd-Mähren, *Kurzmitteilungen aus dem Institut für Edelsteinforschung*, 4. 2. 10-11
- Htein, W. and Naing, A. M. (1994) Mineral and chemical compositions of jadeite of Myanmar, *Journal of Gemmology*, 24. 4. 269-276
- Htein, W. and Naing, A. M. (1995) Studies on kosmochlor, jadeite and associated minerals in jade of Myanmar, *Journal of Gemmology*, 24. 5. 315-320
<http://www.gia.edu/research-resources/news-from-research/index.html>
http://www.giathai.net/Red_Feldspar_Special_Report.php
- Hu, G.L., Dam-Johansen, K., Wedel, S. and Hansen, J.P. (2006) Decomposition and oxidation of pyrite. *Progress in Energy and Combustion Science* 32, 295-314.
- Huang, C. K. and Kerr, P. F. (1960) Infrared study of the carbonate minerals, *American Mineralogist*, 45. 3/4. 311-324
- Huber, N.K. (1975) Pink copper-bearing prehnite from Isle Royale National Park, Michigan. *Lapidary Journal* 29, 666-673.
- Hudson, D.R., Wilson, A.F. and Treadgold, I.M. (1967) A new polytype of taaffeite - A rare beryllium mineral from the granulites of Central Australia. *Mineralogical Magazine* 36, 305-310.
- Hughes J.M., Bloodaxe E.S., Hanchar J.M. and Foord E.E. (1997) Incorporation of rare earth elements in titanite: Stabilization of the A2/a dimorph by creation of antiphase boundaries. *American Mineralogist*, 82, (5/6), 512-516.
- Hughes K., Hughes J.M. and Dyar M. D. (2001) Chemical and structural evidence for B $\leftrightarrow$ Si substitution in natural tourmalines. *European Journal of Mineralogy*, 13, (4), 743-747.
- Hughes, R. and Galibert, O. (1997) Mogok - Valley of rubies. *Asia Precious* 5, 76-79.
- Hughes, R.E. (1982) Age and exploitation of obsidian from the Medicine Lake Highland, California. *Journal of Archaeological Science* 9, 173-195.
- Hughes, R.W. (1987) The plastic coating of gemstones. *Australian Gemmologist* 16, 259-261.
- Hughes, R.W. (1988) Identifying yellow sapphires - two important techniques. *Journal of Gemmology* 21, 23-25.
- Hughes, R.W. (1992) Vietnam's Quy Chau ruby mines. *JewelSiam* 3, 56-62.
- Hughes, R.W. (1996a) Devil's Advocate: Death of the Thai ruby. *JewelSiam* 7, 100-105.
- Hughes, R.W. (1996b) Ruby and sapphire from Laos. *JewelSiam* 1, 36-37.
- Hughes, R.W. (1997) *Ruby & Sapphire*. RWH Publishing, Boulder, CO.
- Hughes, R.W. and Galibert, O. (1998) Foreign affairs: Fracture healing/filling of Mong Hsu ruby. *Australian Gemmologist* 20, 70-74.
- Hughes, R.W. and Vock, R. (2000) Blue velvet: Kashmir sapphires. *Professional Gemologist* 3, 2-3.
- Hughes, R.W. and Win, U.H. (1995) Burmese sapphire giants. *Journal of Gemmology* 24, 551-561.
- Hull S., Fayek M., Mathien F.J., Shelley P. and Durand K.R. (2008) A new approach to determining the geological provenance of turquoise artifacts using hydrogen and copper stable isotopes. *Journal of Archaeological Science*, 35, (5), 1355-1369.
- Hummel, F. A. (1950) Synthesis of uvarovite, *American Mineralogist*, 35. 3/4. 324-325
- Hunt, D. C., Twichen, D. J., Newton, M. E., Baker, M. J., Kirui, J. K., van Wyck, J. A., Anthony, T. R. and Banholzer, W. F. (2000) EPR data on the self-interstitial complex O3 in diamond, *Physical Review B*, 62. 10. 6587-6597

- Hurlbut, C. S. and Francis, C. A. (1984) An extraordinary calcite gemstone, *Gems and Gemology*, 20, 4. 222-225
- Hurlbut, C. S. and Weichel, E. J. (1946) Additional data on brazilianite, *American Mineralogist*, 31, 9/10. 507
- Hurtig, M. (2005) Moldavite aus Ottendorf-Okrilla bei Dresden / Sachsen, *Lapis*, 30, 4. 35-37
- Hurwit, K. (2000) GIA INSIDER - FROM GEMS & GEMOLOGY: Black Cultured Pearls from Baja California, Mexico. www.gia.edu. 2000, 28 December 2002.
- Hurwit, K. (2001) GIA Gem Trade Lab Notes: Faceted Cultured Pearls, Dyed Black. *Gems & Gemology*, Summer, 134-135.
- Hurwit, K. (2002) GIA Gem Trade Lab Notes: Coated Natural Pearls. *Gems and Gemology* 38, 83-84.
- Hurwit, K. (2003) Lab Notes - Cultured Pearl Mystery. *Gems & Gemology*, 39, 3, 216-217.
- Hyde, B. and O'Keeffe, M. (1996) Marcasite and pyrite (FeS₂). *Australian Journal of Chemistry* 49, 867-872.
- Hyrsl, J. (1996) Gem aragonite from the Czech Republic, *Canadian Gemmologist*, 17, 3. 76-77
- Hyrsl, J. (1997) Some new unusual cat's eye, *Canadian Gemmologist*, 18, 4. 105-106
- Hyrsl, J. (1999) Chrome chalcedony - A review, *Journal of Gemmology*, 26, 6. 364-370
- Hyrsl, J. (2001) Gemstones of Peru. *Journal of Gemmology* 27, 328-334.
- Hyrsl, J. (2006) Inclusioni nel quarzo. *Rivista Gemmologica Italiana*, 1, (1), 39-53.
- Hyrsl, J. (2011) Historical use of olivine - The origin of peridots in baroque-period jewellery. *32nd International Geological Congress - Abstracts*, 108-109.
- Hyrsl, J. and Milisenda, C. C. (1996) Sterndisthen und Disthen-Katzenaugen aus Indien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 45, 2. 91-92
- Hyrsl, J. and Milisenda, C. C. (2003) Bestrahlter farbwechselnder Fluorit aus Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 52, 2/3. 115-116
- Hyrsl, J. and Petrov, A. (1998) Gemstones and ornamental stones from Bolivia: A review, *Journal of Gemmology*, 26, 1. 41-47
- Hyrsl, J. and Petrov, A. (1999) Sodalite from Bolivia. *Canadian Gemmologist* 20, 54-56.
- Hyrsl, J. and Quintens, I. (1999) Druses of synthetic alexandrite and synthetic phenakite from Russia. *Journal of Gemmology* 26, 447-449.
- Hyrsl, J. and Žáček, V. (1999) Obsidian from Chile with unusual inclusions. *Journal of Gemmology* 26, 321-323.
- Iakubovskii, K. (2006) Comment on "Nickel-nitrogen complexes in synthetic diamond: The 2.427 eV absorption system". *Diamond and Related Materials*, 15, 9. 1282-1283
- Ibragimov, F. M. (1996) Kazakhstan landscape chalcedony, *World of Stones*, 9, 24
- Ihinger P.D. and Zink S.I. (2000) Determination of relative growth rates of natural quartz crystals. *Nature*, 404, (6780), 865-869.
- Iishi, K. (1978) Lattice dynamics of forsterite, *American Mineralogist*, 63, 11/12. 1198-1208
- Iishi, K. (1979) Phononspectroscopy and lattice dynamical calculations of anhydrite and gypsum, *Physics and Chemistry of Minerals*, 4, 4. 341-359
- Iishi, K., E. Salje and C. Werneke (1979), Phonon spectra and rigid-ion model calculations on andalusite, *Physics and Chemistry of Minerals*, 4, 2, 173-188.
- Iizuka T. and Hirata T. (2005) Improvements of precision and accuracy in in-situ Hf isotope microanalysis of zircon using the laser ablation-MC-ICPMS technique. *Chemical Geology*, 220, (1/2), 121-137.
- Ilieva A., Mihailova B., Tsintsov Z. and Petrov O. (2007) Structural state of microcrystalline opals: A Raman spectroscopic study. *American Mineralogist*, 92, (8/9), 1325-1333.
- Imae, N., Tsuchiyama, A. and Kitamura, M. (1993) An experimental study of enstatite formation reaction between forsterite and Si-rich gas, *Earth and Planetary Science Letters*, 118, 1/4. 21-30
- Inamori Jewelry Division (1980) *The Inamori Created Ruby*. Kyocera International, Inc., San Diego.
- Ingerson, E. and Barksdale, J. D. (1943) Iridescent garnet from the Adelaide Mining District, Nevada, *American Mineralogist*, 28, 5. 303-312
- Ireland T.R. and Williams I.S. (2003) Considerations in zircon geochronology by SIMS. *Reviews in Mineralogy and Geochemistry*, 53, (1), 216-241.
- Ireland T.R. and Wlotzka F. (1992) The oldest zircons in the solar system. *Earth and Planetary Science Letters*, 109, (1/2), 1-10.

- Ishida, K., Hawthorne, F. C. and Ando, Y. (2002) Fine structure of infrared OH-stretching bands in natural and heat-treated amphiboles of the tremolite ferro-actinolite series, *American Mineralogist*, 87. 7. 891-898
- Isogami, M., Nakata, R. and Kyoto (1986) Chrysoberyl cats-eye synthetic single crystal, *United States Patent*, US 4621065.
- Isotani S., Watari K., Mizukami A., Bonventi W. and Ito A.S. (2007) UV optical absorption spectra analysis of spodumene crystals from Brazil. *Physica B: Condensed Matter*, 391, (2), 322-330.
- Ito A.S. and Isotani S. (1991) Heating effects on the optical absorption spectra of irradiated, natural spodumene. *Radiation Effects and Defects in Solids*, 116, (4), 307-314.
- Ito, J. and Arem, J. E. (1970) Idocrase: Synthesis, phase relations and crystal chemistry, *American Mineralogist*, 55. 5/6. 880-912
- Ito, T. (1947) The structure of epidote ($\text{HCa}_2(\text{Al,Fe})\text{Al}_2\text{Si}_3\text{O}_{13}$), *American Mineralogist*, 32. 5/6. 309-331
- Ito, Y. (1986) Some unusual cat's-eyes, *Journal of Gemmology*, 20. 3. 161-162
- Ito, Y. (1987) Some unusual cat's-eyes - 2, *Journal of Gemmology*, 20. 5. 292-293
- Ivchinova, L. and Zhelyazkova-Panaiotova, M. (1969) Accessory elements in spinels from Bulgarian ultra-basic rocks. I. Nickel, cobalt, manganese, and gallium, *God. Sofii. Univ. Geol.-Geogr. Fak.*, 61. 1. 340-374
- Iwahashi, Y. and Akamatsu, S. (1994) Porphyrin pigment in black-lip pearls and its application to pearl identification. *Fisheries Science* 60, 69-71.
- Iwasaki F. and Iwasaki H. (2002) Historical review of quartz crystal growth. *Journal of Crystal Growth*, 237/239, (1), 820-827.
- Izumida, H., Yoshimura, T., Suzuki, A., Nakashima, R., Ishimura, T., Yasuhara, M., Inamura, A., Shikazono, N. and Kawahta, H. (2011) Biological and water chemistry controls of Sr/Ca, Ba/Ca, Mg/Ca and $\delta^{18}\text{O}$ profiles in freshwater pearl mussel *Hyriopsis* sp. *Paleogeography, Paleoclimatology, Paleocology* 309, 298-308.
- Jackson S.E., Pearson N.J., Griffin W.L. and Belousova E.A. ((2004) The application of laser ablation – inductively coupled plasma – mass spectrometry to in situ U-Pb zircon geochronology. *Chemical Geology*, 211, (1/2), 47-69.
- Jackson, B. (1984) Sapphire from Loch Roag, Isle of Lewis, Scotland. *Journal of Gemmology* 19, 336–342.
- Jackson, B. (1985) Note on inclusions in diopside from Ala, Piedmont, Italy, *Journal of Gemmology*, 19. 6. 486-489
- Jacob, D. E., Soldati, A. L., Wirth, R., Huth, J., Wehrmeister, U. and Hofmeister, W. (2008) Nanostructure, composition and mechanisms of bivalve shell growth, *Geochimica et Cosmochimica Acta*, 72. 22. 5401-5415
- Jacobs, A. (1997) Darwin-glas: Ein schleifwürdiger, grüner Tektit. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 46, 7-12.
- Jacobson, M. I. (1993) Aquamarine in the United States - the search continues, *Rocks and Minerals*, 68. 5. 306-319
- Jacobson, M.I. (1979) Famous mineral localities: Mount Antero. *Mineralogical Record* 10, 339-346.
- Jaek I.V., Vasilchenko V.P. and Smirnov J. (2003) Optically activated luminescence in a natural quartz. *Journal of Applied Spectroscopy*, 70, (6), 896-900.
- Jahn, S. (2007) Hauyn - das schöne blaue mineral, *Mineralien Welt*, 18. 3. 21-23
- Jain J.C., Neal C.R. and Hanchar J.M. (2001) Problems associated with the determination of rare earth elements of a "gem" quality zircon by inductively coupled plasma mass spectrometry. *Geostandards Newsletter*, 25, (2/3), 229-237.
- James, B. M. (1994) Mississippi agate, *Rock and Gem*, 72-75
- Janardhanan, A.S. and Leake, B.E. (1974) Sapphirine in the Sittampundi complex, India. *Mineralogical Magazine* 39, 901-902.
- Janeczek, J. and Sachanbinski, M. (1992) Babingtonite, Y-Al-rich titanite, and zoned epidote from the Strzegom pegmatites, Poland, *European Journal of Mineralogy*, 4. 2. 307-319
- Jaoul, O., Michaut, M., Gueguen, Y. and Ricoult, D. (1979) Decorated dislocations in forsterite, *Physics and Chemistry of Minerals*, 5. 1. 15-19
- Jarrell, S. (1997) Cat's eyes not so lucky, *International Jewellery*, 225. 4
- Javier-Ccallata H., Tomaz-Filho L. and Watanabe S. (2011) Thermoluminescent properties of natural zoisite mineral under γ -irradiations and high-temperature annealing. *Spectrochimica Acta A*, 78, (4), 1272-1277.
- Jayakody, D.F. (1983) Taaffeite - A rare gemstone of Sri Lanka. *Lapidary Journal* 37, 74-78.

- Jayaraman, A. (1953) The structure and optical behaviour of chalcedony, *Proceedings of the Indian Academy of Sciences*, A38. 441-449
- Jenkins D.M., Newton R.C. and Goldsmith J.R. (1985) Relative stability of Fe-free zoisite and clinozoisite. *Journal of Geology*, 93, (6), 663-672.
- Jensen, A. and Petersen, O.V. (1982) Tugtupite: A gemstone from Greenland. *Gems and Gemology* 18, 90-94.
- Jiang S.Y. (1998) Stable and radiogenic isotope studies of tourmaline: An overview. *Journal of the Czech Geological Society*, 45, (1/2), 75-90.
- Jiang S.Y. and Palmer M.R. (1998) Boron isotope systematics of tourmaline from granites and pegmatites: A synthesis. *European Journal of Mineralogy*, 10, (6), 1253-1265.
- Jimenez-Millan, J. and Velilla, N. (1993) Compositional variation of piemontites from different Mn-rich rock-types of the Iberian Massif (SW Spain), *European Journal of Mineralogy*, 5. 5. 961-970
- Jobbins, E. (1981) The agates and agate-cutting industry of Uttar Pradesh, India, *18th International Gemmological Conference - Proceedings*, 8. 1/4. 67
- Jobbins, E. A., Merriman, R. J. and Styles, M. T. (1978) Charoite, a spectacular, new, purple mineral, *Journal of Gemmology*, 16. 1. 1-4
- Jobbins, E. A., Scarratt, K., Ho, H., Bosshart, G. (1993) Freshwater Pearl Cultivation in Vietnam. *The Journal of Gemmology*, 23, 6,
- Jobbins, E. A., Tresham, A. E. and Young, B. R. (1975) Magnesioaxinite, a new mineral found as a blue gemstone from Tanzania, *Journal of Gemmology*, 14. 8. 368-375
- Jobbins, E.A. (1971) Heat treatment of pale blue sapphire from Malawi. *Journal of Gemmology* 12, 342-343.
- Jobbins, E.A. and Berrangé, J.P. (1981) The Pailin ruby and sapphire gemfield, Cambodia. *Journal of Gemmology* 17, 555-567.
- Jobbins, E.A. and Rutland, E.H. (1974) Saussurite as a jade simulant. *Journal of Gemmology* 14, 1-7.
- Johnson M.L., Wentzell C.Y. and Elen S. (1997) Multicolored bismuth-bearing tourmaline from Lundazi, Zambia. *Gems and Gemology*, 33, (3), 204-211.
- Johnson, E. L. (1990) Planar arrays of synthetic fluid inclusions in spontaneously nucleated forsterite crystals grown at constant pressure and temperature in a hydrostatic environment, *Geochimica et Cosmochimica Acta*, 54. 4. 1191-1194
- Johnson, M. and Kammerling, R. (1995) How to use infrared spectrometry to detect treatments, synthetics, *Jewellery News Asia*, October. 62-68
- Johnson, M. L. and Kammerling, R. C. (1995b) Some interesting examples of "B-jade" examined at the GIA Gem Trade Laboratory, *Hong Kong Jewellery*, September. 118-120
- Johnson, M. L. and Koivula, J. I. (1996a) A new chalcedony locality, *Gems and Gemology*, 32. 4. 284
- Johnson, M. L. and Koivula, J. I. (1996b) Cultured abalone pearls. *Gems and Gemology* 32, 55-56.
- Johnson, M. L. and Koivula, J. I. (1996c) Gem materials from the new locality at Tunduru, Tanzania, *Gems and Gemology*, 32. 1. 58-59
- Johnson, M. L. and Koivula, J. I. (1996d) Large taaffeite crystal from Sri Lanka. *Gems and Gemology* 32, 57.
- Johnson, M. L. and Koivula, J. I. (1997a) Cathodoluminescence of yellow diamonds, *Gems and Gemology*, 33. 4. 298-299
- Johnson, M. L. and Koivula, J. I. (1997b)...And with pyrite inclusions. *Gems and Gemology* 33, 65-66.
- Johnson, M. L. and Koivula, J. I. (1997c) An especially misleading quench-crackled synthetic ruby. *Gems and Gemology* 33, 151.
- Johnson, M. L. and Koivula, J. I. (1997d) Cat's-eye chrysoberyl, *Gems and Gemology*, 33. 1. 61-62
- Johnson, M. L. and Koivula, J. I. (1997e) Identification of amber by laser Raman microspectroscopy, *Gems and Gemology*, 33. 4. 300-301
- Johnson, M. L. and Koivula, J. I. (1997f) Imitation pearls--so-called "I Pearls" from Japan. *Gems and Gemology* 33, 306.
- Johnson, M. L. and Koivula, J. I. (1997g) Inclusions-related fluorescence zoning in amber, *Gems and Gemology*, 33. 4. 301
- Johnson, M. L. and Koivula, J. I. (1997h) Orange sapphire and other gems from the Tunduru region. *Gems and Gemology* 33, 66.
- Johnson, M. L. and Koivula, J. I. (1997i) "Pink geuda" sapphires from Vietnam and their treatment. *Gems and Gemology* 33, 227.

- Johnson, M. L. and Koivula, J. I. (1997j) Lab alert: Radioactive cat's-eye chrysoberyls, *Gems and Gemology*, 33. 3. 221-222
- Johnson, M. L. and Koivula, J. I. (1997k) "Rainbow" obsidian hearts. *Gems and Gemology* 33, 63.
- Johnson, M. L. and Koivula, J. I. (1997l) New chrysoberyl deposits in India, *Gems and Gemology*, 33. 4. 301-302
- Johnson, M. L. and Koivula, J. I. (1997m) Tunduru-Songea gem fields in southern Tanzania, *Gems and Gemology*, 33. 4. 305
- Johnson, M. L. and Koivula, J. I. (1997n) Update on vanadium-bearing synthetic chrysoberyl, *Gems and Gemology*, 33. 2. 148-149
- Johnson, M. L. and Koivula, J. I. (1998a) Andalusite (chiastolite) sphere, *Gems and Gemology*, 34. 1. 51
- Johnson, M. L. and Koivula, J. I. (1998b) Coral with a blue sheen from Alaska. *Gems and Gemology* 34, 51.
- Johnson, M. L. and Koivula, J. I. (1998c) Beryl from Madagascar: aquamarine, *Gems and Gemology*, 34. 2. 137-138
- Johnson, M. L. and Koivula, J. I. (1998d) Highly translucent green serpentine from Afghanistan. *Gems and Gemology* 34, 297.
- Johnson, M. L. and Koivula, J. I. (1998e) Colorado lapis lazuli, *Gems and Gemology*, 34. 3. 224-225
- Johnson, M. L. and Koivula, J. I. (1998f) Kashmir rubies. *Gems and Gemology* 34, 59-60.
- Johnson, M. L. and Koivula, J. I. (1998g) Danburite from San Diego County, California: A potential gem mineral, *Gems and Gemology*, 34. 3. 220
- Johnson, M. L. and Koivula, J. I. (1998h) Obsidian imitation. *Gems and Gemology* 34, 301.
- Johnson, M. L. and Koivula, J. I. (1998i) Iolite gemologically indistinguishable from feldspar, *Gems and Gemology*, 34. 4. 295-296
- Johnson, M. L. and Koivula, J. I. (1998j) Chalcedony with goethite inclusions from Madagascar, *Gems and Gemology*, 34. 4. 295
- Johnson, M. L. and Koivula, J. I. (1998k) Color-change pyrope-spessartine garnet, also from Madagascar, *Gems and Gemology*, 34. 3. 222-223
- Johnson, M. L. and Koivula, J. I. (1998l) "Flame agate": what's in a name?, *Gems and Gemology*, 34. 2. 136-137
- Johnson, M. L. and Koivula, J. I. (1998m) Pyrope-spessartine garnet from Madagascar, *Gems and Gemology*, 34. 3. 222
- Johnson, M. L. and Koivula, J. I. (1999a) Iolite and other gems from Canada, *Gems and Gemology*, 35. 1. 52-53
- Johnson, M. L. and Koivula, J. I. (1999b) Jasper "planets", *Gems and Gemology*, 35. 1. 52-53
- Johnson, M. L. and Koivula, J. I. (1999c) Near-colorless forsterite, *Gems and Gemology*, 35. 1. 49-51
- Johnson, M. L. and Koivula, J. I. (1999d) New deposits in India and Nepal, *Gems and Gemology*, 35. 1. 51-52
- Johnson, M. L. and Koivula, J. I. (1999e) Synthetic diamonds widely available, *Gems and Gemology*, 35. 1. 47-48
- Johnson, M. L. and Koivula, J. I. (1999f) New finds of spessartine in Brazil, *Gems and Gemology*, 35. 1. 55
- Johnson, M. L. and Koivula, J. I. (1999g) Imitation "Chinese freshwater" cultured pearls. *Gems and Gemology* 35, 56-57.
- Johnson, M. L., Crowningshield, G. R., Kammerling, R. C., Reinitz, I. and Liu, Y. (1995a) Some interesting examples of jade-like rocks examined at the GIA Gem Trade Laboratory, *Hong Kong Jewellery*, 4. 68. 109-111
- Johnson, M. L., Koivula, J. I., McClure, S.F. and DeGhionno, D. (1999a) Another source for bicolored sapphire: Tunduru, Tanzania. *Gems and Gemology* 35, 215-216.
- Johnson, M. L., Koivula, J. I., McClure, S.F. and DeGhionno, D. (1999b) Manufactured products imitating charoite, *Gems and Gemology*, 35. 4. 221
- Johnson, M. L., Koivula, J. I., McClure, S.F. and DeGhionno, D. (1999c) Ruby from Songea, Tanzania. *Gems and Gemology* 35, 215.
- Johnson, M. L., Koivula, J. I., McClure, S.F. and DeGhionno, D. (1999d) Star ekanite, *Gems and Gemology*, 35. 4. 211-212

- Johnson, M. L., Koivula, J. I., McClure, S.F. and DeGhionno, D. (1999e) An update on the John Saul ruby mine. *Gems and Gemology* 35, 213-215.
- Johnson, M. L., Koivula, J. I., McClure, S.F. and DeGhionno, D. (1999f) Spessartine from Nigeria, *Gems and Gemology*, 35. 4. 216
- Johnson, M. L., Koivula, J. I., McClure, S.F. and DeGhionno, D. (1999g) Spessartine from Zambia, *Gems and Gemology*, 35. 4. 217
- Johnson, M. L., Koivula, J. I., McClure, S.F. and DeGhionno, D. (1999h) Tsavorite from Madagascar, *Gems and Gemology*, 35. 4. 218
- Johnson, M.L., Mercer, M.E., Fritsch, E., Maddison, P. and Shigley, J.E. (1995) "Ti-sapphire": Czochralski-pulled synthetic pink sapphire from Union Carbide. *Gems and Gemology* 31, 188-195.
- Johnson, P. W. (1959) The emeralds of Chivor today, *Lapidary Journal*, 13. 4. 516-524
- Johnson, P. W. (1961a) All about emeralds natural or synthetic, *Lapidary Journal*, 15. 1. 118-131
- Johnson, P. W. (1961b) The Chivor Emerald Mine, *Journal of Gemmology*, 8. 4. 126-152
- Jolliff B.L., Papike J.J. and Shearer C.K. (1986) Tourmaline as a recorder of pegmatite evolution: Bob Ingersoll pegmatite, Black Hills, South Dakota. *American Mineralogist*, 71, (3/4), 472-500.
- Jones B. (1996) Mineral masterpieces of Russia, *Rock and Gem*, 26. 8. 54-62
- Jones B. (1997) Denver's wall of rhodochrosite. *Rock and Gem* 27, 21-22.
- Jones B. (2000) The permanence of turquoise. *Rock and Gem*, 30, (4), 12-18.
- Jones B. (2005a) The colorful beryl minerals, *Rock and Gem*, 35. 10. 20-25
- Jones B. (2005b) The tourmaline group. *Rock and Gem*, 35, (8), 40-46 and (9), 12-16.
- Jones B. (2005c) Turquoise - A universally popular stone. *Rock and Gem*, 35, (12), 12-16.
- Jones, F. T. (1952) Iris agate, *American Mineralogist*, 37. 7/8. 578-587
- Jones, N. W. (1969) Crystallographic nomenclature and twinning in the humite minerals, *American Mineralogist*, 54. 1/2. 309-313
- Jones, N. W., Ribbe, P. H. and Gibbs, G. V. (1969) Crystal chemistry of the humite minerals, *American Mineralogist*, 54. 3/4. 391-411
- Jones, R. W. (1979) Chrysocolla, Arizona's premier gem, *Lapidary Journal*, 33. 1. 6-16
- Jones, S.C., Robinson, M.C. and Gupta, Y.M. (2003) Ordinary refractive index of sapphire in uniaxial tension and compression along the c axis. *Journal of Applied Physics* 93, 1023-1031.
- Jordan, W. and Naughton, J. J. (1964) Growth of forsterite crystals in a reactive crucible, *American Mineralogist*, 49. 5/6. 806-808
- Joseph, D., Lal, M., Shinde, S.P. and Padalia, B.D. (2000) Characterization of gemstones (rubies and sapphires) by energy-dispersive X-ray fluorescence spectrometry. *Xray Spectrometry* 29, 147-150.
- Jouini A., Sato H., Yoshikawa A., Fukuda T., Boulon G., Kato K. and Hanamura E. (2006) Crystal growth and optical absorption of pure and Ti, Mn-doped MgAl_2O_4 spinel. *Journal of Crystal Growth*, 287, (2), 313-317.
- Jouini A., Yoshikawa A., Fukuda T. and Boulon G. (2006) Growth and characterization of Mn^{2+} -activated magnesium aluminate spinel single crystals. *Journal of Crystal Growth*, 293, (2), 517-521.
- Jungnickel, G., Latham, C. D., Heggi, M. I. and Frauenheim, T. (1996) On the graphitization of diamond surfaces: the importance of twins, *Diamond and Related Materials*, 5. 1. 102-107
- Kai, A. T., S. Larsson and U. Halenius (1980), The electronic structure and absorption spectrum of MnO_9 -6 octahedra in manganian andalusite, *Physics and Chemistry of Minerals*, 6, 1, 77-84.
- Kalachev, V. N. (1993) Axinite: new finds in Russia, *World of Stones*, 3-4
- Kalinin D.V. and Serdobintseva V.V. (2003) Deposits of precious opal: Genesis and search criteria. *Russian Geology and Geophysics*, 44, (4), 331-337.
- Kalinin D.V., Plekhanov A.I., Vosel S.V. and Sobolev N.V. (2003) The origin of layer-by-layer alternation of cubic and hexagonal symmetry in natural and synthetic noble opal structure. *Doklady Earth Sciences*, 393, (8), 1113-1115.
- Kalinin D.V., Serdobintseva V.V. and Kuznetsova Y.V. (2002) Thixotropy in supramolecular crystallization and genesis of macrostructures of precious opal. *Russian Geology and Geophysics*, 43, (11), 1002-1008.
- Kalinin D.V., Serdobintseva V.V. and Kuznetsova Y.V. (2004) Natural and experimental conditions of formation on coarse-grained precious opal. *Russian Geology and Geophysics*, 45, (5), 600-606.

- Kalinin D.V., Vose S.V. and Serdobintseva V.V. (1998) A new interpretation of the structure of noble opal and energetic analysis of the interaction of the spherical particles of silica during its formation. *Russian Geology and Geophysics*, 39, (7), 1013-1016.
- Kamat, S., Su, X., Ballarini, R., Heuer, A. H. (2000) Structural basis for the fracture toughness of the shell of the conch *Strombus gigas*. *Nature*, 405, 1036-1040.
- Kamenetsky V.S., Crawford A.J. and Meffre S. (2001) Factors controlling the chemistry of magmatic spinel: An empirical study of associated olivine, Cr-spinel and melt inclusions from primitive rocks. *Journal of Petrology*, 42, (4), 655-671.
- Kammerling, R. C. and Fryer, C. (1994a) Jadeite jade bleached and impregnated, with distinctive surface features, *Gems and Gemology*, 30. 4. 266-267
- Kammerling, R. C. and Fryer, C. (1994b) Jadeite jade with impregnating substance in drill hole, *Gems and Gemology*, 30. 3. 187
- Kammerling, R. C. and Fryer, C. (1994c) Lavender jadeite, impregnated, *Gems and Gemology*, 30. 1. 43
- Kammerling, R. C. and Fryer, C. (1994d) Abalone "Mabe" pearl. *Gems and Gemology* 30, 268.
- Kammerling, R. C. and Fryer, C. (1994e) Grossular-diopside rock, *Gems and Gemology*, 30. 3. 186
- Kammerling, R. C. and Fryer, C. (1994f) Spotted malachite, imitation and natural, *Gems and Gemology*, 30. 4. 267-268
- Kammerling, R. C. and Fryer, C. (1994g) Jadeite, with metallic inclusions, *Gems and Gemology*, 30. 2. 117-118
- Kammerling, R. C. and Fryer, C. (1995a) Alexandrite, with pleochroic twinned growth zones, *Gems and Gemology*, 31. 1. 52
- Kammerling, R. C. and Fryer, C. (1995b) Black pearl imitations. *Gems and Gemology* 31, 202-203.
- Kammerling, R. C. and Fryer, C. (1995c) Dyed green nephrite, *Gems and Gemology*, 31. 1. 55
- Kammerling, R. C. and Fryer, C. (1995d) Jadeite bleached and impregnated, with distinctive surface texture, *Gems and Gemology*, 31. 1. 55
- Kammerling, R. C. and Fryer, C. (1995e) Alexandrite; fracture filled, with high R.I. values, *Gems and Gemology*, 31. 3. 196
- Kammerling, R. C. and Fryer, C. (1995f) Fracture-filled with unusual material, *Gems and Gemology*, 31. 4. 226-267
- Kammerling, R. C. and Fryer, C. (1995g) Jadeite jade - extremely thin carving, *Gems and Gemology*, 31. 4. 266-268
- Kammerling, R. C. and Fryer, C. (1995h) Magnetic serpentine. *Gems and Gemology* 31, 271-272.
- Kammerling, R. C. and Fryer, C. (1995i) Imitation emerald plastic-coated beryl. *Gems and Gemology* 31, 198-199.
- Kammerling, R. C. and Fryer, C. (1995j) Jadeite jade assemblages, *Gems and Gemology*, 31. 3. 199-200
- Kammerling, R. C. and Fryer, C. (1995k) Synthetic alexandrite; flux grown, without diagnostic inclusions, *Gems and Gemology*, 31. 3. 196
- Kammerling, R. C. and Fryer, C. (1995l) Treated old-mine cut, *Gems and Gemology*, 31. 1. 53
- Kammerling, R. C. and Fryer, C. (1995m) Jadeite jade, with misleading inclusions, *Gems and Gemology*, 31. 2. 123-124
- Kammerling, R. C. and Fryer, C. (1995n) Treated-color pink diamond, *Gems and Gemology*, 31. 2. 121-122
- Kammerling, R. C. and Fryer, C. (1995o) Treated and untreated beads in one necklace, *Gems and Gemology*, 31. 1. 55
- Kammerling, R. C. and Koivula, J. I. (1989) Microfeatures of some glass and plastic imitations of phenomenal gems. *The Scope* 4, 1-3.
- Kammerling, R. C. and Koivula, J. I. (1990a) An investigation of a dyed quartzite resembling sugilite. *South African Gemmologist* 4, 20-27.
- Kammerling, R. C. and Koivula, J. I. (1990b) An update on assembled emerald specimens from Africa, *South African Gemmologist*, 4. 3. 9-15
- Kammerling, R. C. and Koivula, J. I. (1990c) Detecting gemstone color enhancements, *The Scope*, 1. 4. 19-21/1-3
- Kammerling, R. C. and Koivula, J. I. (1990d) An interesting imitation of jadeite, *South African Gemmologist*, 4. 2. 20-23

- Kammerling, R. C. and Koivula, J. I. (1991a) An unusual assembled inclusion specimen, *Journal of Gemmology*, 22. 8. 459-462
- Kammerling, R. C. and Koivula, J. I. (1991b) Highly diagnostic inclusions in natural gems, *The Scope*, 4. 3. 1-3
- Kammerling, R. C. and Koivula, J. I. (1991c) Two strongly pleochroic chatoyant gems, *Journal of Gemmology*, 22. 7. 395-398
- Kammerling, R. C. and Koivula, J. I. (1994) Microscopic features of synthetic rubies (Parts 1 and 2). *Canadian Gemmologist* 15, 82-85, 104-108.
- Kammerling, R. C. and Koivula, J. I. (1995a) An examination of peridot from Ethiopia. *Australian Gemmologist* 19, 190-194.
- Kammerling, R. C. and Koivula, J. I. (1995b) Microscope lighting techniques for identifying melt-grown synthetics. *Bangkok Gems and Jewellery* 8, 88-94.
- Kammerling, R. C. and Koivula, J. I. (1995c) A preliminary investigation of peridot from Vietnam. *Journal of Gemmology* 24, 355-361.
- Kammerling, R. C. and Koivula, J. I. (1995d) An update on identifying "Yehuda-treated" diamonds, *Bangkok Gems and Jewellery*, 238-243
- Kammerling, R. C., Crowningshield, G. R., Reinitz, I. and Fritsch, E. (1995) Separating natural pinks from their treated counterparts, *Diamond World Review*, 88. 86-89
- Kammerling, R. C., Fritsch, E. and Koivula, J. I. (1995) Swarovski's new synthetic ruby with induced fingerprints. *Jewellery News Asia*, 70-76.
- Kammerling, R. C., Johnson, M. and Koivula, J. I. (1995) Pakistan a new source; output 100 kilograms. *Jewellery News Asia*, 100-104.
- Kammerling, R. C., Johnson, M.L. and Liu, Y. (1996) An examination of colour-change sapphires from Tanzania. *Australian Gemmologist* 19, 255-258.
- Kammerling, R. C., Kane, R.E., Koivula, J. I. and McClure, S.F. (1990) An investigation of a suite of black diamond jewelry. *Gems and Gemology* 26, 282-287.
- Kammerling, R. C., Keller, A.S., Scarratt, K.V. and Repetto, S. (1994) Update on mining rubies and fancy sapphires in Northern Vietnam. *Gems and Gemology* 30, 109-114.
- Kammerling, R. C., Koivula, J. I. and Fritsch, E. (1994) An examination of Chatham flux-grown synthetic pink sapphires. *Journal of Gemmology* 24, 149-154.
- Kammerling, R. C., Koivula, J. I. and Fryer, C. W. (1991) An unusual imitation jade carving, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 40. 1. 29-32
- Kammerling, R. C., Koivula, J. I. and Johnson, M. L. (1995) Gem News: Rubies from the Barrington volcanic field, East Australia. *Gems and Gemology* 31, 281-282.
- Kammerling, R. C., Koivula, J. I. and Shigley, J. E. (1995a) Some common - and not so common - imitations of jade, *Journal of the Gemmological Association of Hong Kong*, 18. 12-19
- Kammerling, R. C., Koivula, J. I. and Shigley, J. E. (1995b) Some common - and not so common - imitations of jade. *Journal of the Gemmological Association of Hong Kong* 18, 12-19.
- Kammerling, R. C., Koivula, J. I., Kane, R. E., Maddison, P., Shigley, J. E. and Fritsch, E. (1991) Fracture filling of emeralds - Opticon and traditional "oils", *Gems and Gemology*, 27. 1. 70-85
- Kammerling, R. C., McClure, S.F. and Koivula, J. I. (1995) Examination of a red synthetic diamond, *Bangkok Gems and Jewellery*, September. 240-241
- Kammerling, R. C., McClure, S.F., Johnson, M. L., Koivula, J. I., Moses, T. M., Fritsch, E. and Shigley, J. E. (1995a) Detecting filled stones, *Diamond International*, 34. 71-78
- Kammerling, R. C., McClure, S.F., Johnson, M. L., Koivula, J. I., Moses, T. M., Fritsch, E. and Shigley, J. E. (1995b) GIA updates identification and durability of filled diamonds, *Europa Star*, 209-2.
- Kammerling, R. C., McClure, S.F., Johnson, M. L., Koivula, J. I., Moses, T. M., Fritsch, E. and Shigley, J. E. (1995c) Onderzoek naar vullen van breuken in diamant, *Holland Gem*, 1. 7-13
- Kammerling, R. C., McClure, S.F., Johnson, M. L., Koivula, J. I., Moses, T. M., Fritsch, E. and Shigley, J. E. (1996a) Diamantes con fisuras rellenas Identificación y durabilidad, *Boletín del Instituto Gemológico Espanol*, 37. 20-40
- Kammerling, R. C., McClure, S.F., Johnson, M. L., Koivula, J. I., Moses, T. M., Fritsch, E. and Shigley, J. E. (1996b) Diamantes con fisuras rellenas Identificación y durabilidad, *Boletín del Instituto Gemológico Espanol*, 37. 20-40

- Kammerling, R. C., Scarratt, K., Bosshart, G., Jobbins, E. A., Kane, R. E., Gubelin, E. J. and Levinson, A. A. (1994) Myanmar and its gems - An update. *Journal of Gemmology* 24, 3-40.
- Kamperman M., Danyushevsky L., Taylor W.R. and Jablonski W. (1996) Direct oxygen measurements of Cr-rich spinel: Implications for spinel stoichiometry. *American Mineralogist*, 81, (9/10), 1186-1194.
- Kampf, A.R. (1991) Taaffeite crystals. *Mineralogical Record* 22, 343-347.
- Kanazawa, H., Ito, K., Sato, H., Kumatoriya, M., Miyazaki, K., Uehara, S., Tsuda, H., Kuzawa, K., Kawame, N., Kitazawa, T., Tamada, O., Boisen, M. B. and Takei, H. (2007) Synthesis and absorption spectra of large homogeneous single crystals of forsterite doped with manganese, *Journal of Crystal Growth*, 304. 2. 492-496
- Kane, R.E. (1979) "Trapiche" emerald, *Gems and Gemology*, 16. 7. 211
- Kane, R.E. (1980a) Mobile bubble in a three-phase emerald inclusion, *Gems and Gemology*, 16. 12. 392-393
- Kane, R.E. (1980b) Unexpected absorption spectrum in natural emeralds, *Gems and Gemology*, 16. 12. 391-392
- Kane, R.E. (1982) The gemological properties of Chatham flux-grown synthetic orange sapphire and synthetic blue sapphire. *Gems and Gemology* 18, 140-153.
- Kane, R.E. (1983) The Ramaura synthetic ruby. *Gems and Gemology* 19, 130-148.
- Kane, R.E. (1985) A preliminary report on the new Lechleitner synthetic ruby and synthetic blue sapphire. *Gems and Gemology* 21, 35-39.
- Kane, R.E. (1987) Inamori synthetic cat's-eye alexandrite, *Gems and Gemology*, 23. 3. 158-162
- Kane, R.E. (1997) Kashmir ruby - A preliminary report on the deposit at Nangimali, Azad Kashmir, Pakistan. *26th International Gemmological Conference - Abstracts*, 28-30.
- Kane, R.E. (2004) The creation of a magnificent suite of peridot jewelry: From the Himalayas to Fifth Avenue. *Gems and Gemology* 40, 288-302.
- Kane, R.E. (2010) American sapphires: Montana and Yogo. *World of Gems Conference*, 59-64.
- Kane, R.E. and Kammerling, R.C. (1992) Status of ruby and sapphire mining in the Mogok Stone Tract. *Gems and Gemology* 28, 152-174.
- Kane, R.E., Kammerling, R. C., Moldes, R., Koivula, J. I., McClure, S.F. and Smith, C. P. (1989) Emerald and gold treasures of the Spanish Galleon Nuestra Senora de Atocha, *Gems and Gemology*, 25. 4. 196-206
- Kane, R.E., Kammerling, R.C., Koivula, J. I., Shigley, J.E. and Fritsch, E. (1990) The identification of blue diffusion-treated sapphires. *Gems and Gemology* 26, 115-133.
- Kane, R.E., McClure, S.F., Kammerling, R.C., Khoa, N.D., Mora, C., Repetto, S., Khai, N.D. and Koivula, J. I. (1991) Rubies and fancy sapphires from Vietnam. *Gems and Gemology* 27, 136-155.
- Kanis, J., Arps, C. E. S. and Zwaan, P. (1991) "Machingwe": A new emerald deposit in Zimbabwe, *Journal of Gemmology*, 22. 5. 264
- Karampelas S., Fritsch E., Zorba T., Paraskevopoulos K.M. and Sklavounos S. (2005) Distinguishing natural from synthetic amethyst: The presence and shape of the 3595 cm⁻¹ peak. *Mineralogy and Petrology*, 85, (1/2), 45-52.
- Karampelas S., Gauthier J.P., Fritsch E. (2009) Gem News International: Characterization of some pearls of the Pinnidae family. *Gems and Gemology*, 45. 3. 221-223.
- Karampelas, S., Fritsch, E., Gauthier, J.P. and Hainschwang, T. (2011) UV-Vis-NIR reflectance spectroscopy of natural-color saltwater cultured pearls from *Pinctada margaritifera*. *Gems and Gemology* 47, 31-35.
- Karampelas, S., Fritsch, E., Mevellec, J.Y., Gauthier, J.P., Sklavounos, S. and Soldatos, T. (2007) Determination by Raman scattering of the nature of pigments in cultured freshwater pearls from the mollusk *Hyriopsis cumingi*. *Journal of Raman Spectroscopy* 38, 217-230.
- Karampelas, S., Fritsch, E., Rondeau, B., Andouche, A. and Métivier, B. (2009) Identification of the endangered pink-to-red *Stylaster* corals by Raman spectroscopy. *Gems and Gemology* 45, 48-52.
- Karanth, R.V., Mathew, G. and Gundu Rao, T.K. (1999) FT-IR spectroscopic investigation of hydrous components in sillimanite from Eastern Ghats granulite belt, India. *Gondwana Research* 2, 89-94.
- Karfunkel J. and Wegner R.R. (1996) Paraiba tourmalines: Distribution, mode of occurrence and geologic environment. *Canadian Gemmologist*, 17, (4), 99-106.
- Karfunkel J., Quemeneur J., Krambrock K., Pinheiro M., Dias G.O. and Wegner R. (2002) Edelsteine aus dem Gebiet norlich von Araçuaí (Minas Gerais, Brasilien): Vorkommen, Eigenschaften und

Behandlungsmethoden. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 51, (4), 171-184.

Karguppikar, A.M. and Vedeshwar, A.G. (1988) Electrical and optical properties of natural iron pyrite (FeS). *Physica Status Solidi A* 109, 549-558.

Karkin, A. E., Voronin, V. I., Berger, I. F., Kazantsev, V. A., Ponomov, Y. S., Ralchenko, V. G., Konov, V. I. and Goshchitskii, B. N. (2008) Neutron irradiation effects in chemical-vapor-deposited diamond, *Physical Review B*, 78. 3. 033204

Karpov I.A., Samarov E.N., Masalov V.M., Bozhko S.I. and Emelchenko G.A. (2005) The intrinsic structure of spherical particles of opal. *Physics of the Solid State*, 47, (2), 347-351.

Kashii N., Maekawa H. and Hinatsu Y. (1999) Dynamics of the cation mixing of MgAl_2O_4 and ZnAl_2O_4 spinel. *Journal of the American Ceramic Society*, 82, (7), 1844-1848.

Katrusha, A. N., Ivakhnenko, S. A., Zanevsky, O. A. and Hainschwang, T. (2004a) Special features of the application of high pressure high temperature treatment to modify defect - impurity contents of natural diamond single crystals, *Journal of Superhard Materials*, 26. 3. 47-54

Katrusha, A.N., Ivakhnenko, S.A., Zanevsky, O.A. and Hainschwang, T. (2004b) The use of high pressure - high temperature treatment to manipulate the defect and impurity content of natural diamond single crystals. *Journal of Superhard Materials* 26, 42-49.

Kavtrea O.A., Ankudinov A.V., Bazhenova A.G., Kumzerov Y.A., Limonov M.F., Samusev K.B. and Selkin A.V. (2007) Optical characterization of natural and synthetic opals by Bragg reflection spectroscopy. *Physics of the Solid State*, 49, (4), 708-714.

Kawachi, Y., Ashley, P.M., Vince, D. and Goodwin, M. (1994) Sugilite in manganese silicate rocks from the Hoskins Mine and Woods Mine, New South Wales, Australia. *Mineralogical Magazine* 58, 671-677.

Kawano, J. (2009) Durability of significant fissure filled ruby with lead-glass. *Gemmology*, 23-25.

Kazmi, A. H. and Snee, L. W. (1989), Emeralds of Pakistan: Geology, Gemology and Genesis, New York, Geological Survey of Pakistan and Van Nostrand Reinhold, 269 pp.,

Keeling, J. L. (1991) Review of a new theory on emerald formation in schist-hosted deposits, *Australian Gemmologist*, 17. 11. 440-442

Kek S., Aroyo M., Bismayer U., Schmidt C., Eichhorn K. and Krane H.G. (1997) The two-step phase transition of titanite, CaTiSiO_5 : A synchrotron radiation study. *Zeitschrift für Kristallographie*, 212, (1), 9-19.

Keller, A.S. and Keller, P.C. (1986) The sapphires of Mingxi, Fujian Province, China. *Gems and Gemology* 22, 41-45.

Keller, P. C. (1981) Emeralds of Colombia, *Gems and Gemology*, 17. 2. 80-92

Keller, P.C. (1982) The Chanthaburi-Trat gem field, Thailand. *Gems and Gemology* 18, 186-196.

Keller, P.C. (1983) The rubies of Burma: A review of the Mogok Stone Tract. *Gems and Gemology* 19, 209-219.

Keller, P.C., Koivula, J. I. and Jara, G. (1985) Sapphire from the Mercaderes-Río Mayo area, Cauca, Colombia. *Gems and Gemology* 21, 20-25.

Kelloway, S.J., Kononenko, N., Torrence, R. and Carter, E.A. (2010) Assessing the viability of portable Raman spectroscopy for determining the geological source of obsidian. *Vibrational Spectroscopy* 53, 88-96.

Kelly, S. M. B., Brown, G. (2003) An Interesting Australian Abalone Pearl. *The Australian Gemmologist*, 21, 12, 498-501.

Kempe, D.R.C. (1967) Some topaz-, sillimanite-, and kyanite-bearing rocks from Tanzania. *Mineralogical Magazine* 36, 515-521.

Kennedy A.K., Kamo S.L., Nasdala L. and Timms N.E. (2010) Grenville skarn titanite: Potential reference materials for SIMS U-Th-Pb analysis. *Canadian Mineralogist*, 48, (6), 1423-1443.

Kennedy, S. (2002) Notes from the Laboratory, *Journal of Gemmology*, 28. 2. 76-80

Kennedy, S.J., Francis, J.G. and Jones, G.C. (1988) Imitation pearl coatings. *Journal of Gemmology* 21, 211-214.

Kent, D. and Webster, R. (1973) Star-diopside and labradorite as paramagnetic minerals, *Journal of Gemmology*, 13. 8. 308-311

Key, R. M. and Ochieng, J. O. (1991) The growth of rubies in south-east Konya, *Journal of Gemmology*, 22. 8. 484-496

Khanchuk, A., Zalishchak, B., Pakhomova, V., Odarichenko, E. and Sapin, V. (2003) Genesis and gemmology of the sapphires from the Nezametnoye deposit, Primorye Region, Russia. *Australian Gemmologist* 21, 329-335.

- Khomenko V.M. and Platonov A.N. (1985) Electronic absorption spectra of Cr³⁺ ions in natural clinopyroxenes. *Physics and Chemistry of Minerals*, 11, (6), 261-265.
- Kibar R., Garcia-Guinea J., Çetin A., Selvi S., Karal T. and Can N. (2007) Luminescent, optical and color properties of natural rose quartz. *Radiation Measurements*, 42, (10), 1610-1617.
- Kiefert, L. (1987) Mineralogische Untersuchungen zur Charakterisierung und Unterscheidung natürlicher und synthetischer Sapphire. *University of Heidelberg - Thesis*.
- Kiefert, L. and Schmetzer, K. (1987a) Blue and yellow sapphire from Kaduna Province, Nigeria. *Journal of Gemmology* 20, 427-442.
- Kiefert, L. and Schmetzer, K. (1987b) Pink and violet sapphires from Nepal. *Australian Gemmologist* 16, 225-230.
- Kiefert, L. and Schmetzer, K. (1988) Morphology and twinning in Chatham synthetic blue sapphire. *Journal of Gemmology* 21, 16-22.
- Kiefert, L. and Schmetzer, K. (1991a) The microscopic determination of structural properties for the characterization of optical uniaxial natural and synthetic gemstones - Part 1: General considerations and description of the methods. *Journal of Gemmology* 22, 344-354.
- Kiefert, L. and Schmetzer, K. (1991b) The microscopic determination of structural properties for the characterization of optical uniaxial natural and synthetic gemstones - Part 3: Examples for the applicability of structural features for the distinction of natural and synthetic sapphire, ruby, amethyst and citrine. *Journal of Gemmology* 22, 471-482.
- Kiefert, L. and Schmetzer, K. (1998) Distinction of taaffeite and musgravite. *Journal of Gemmology* 26, 165-167.
- Kiefert, L., Hanni, H. A. and Chalaïn, J. P. (2000) Identification of gemstone treatments with Raman spectroscopy, *Proceedings of the SPIE*, 4098. 241-251
- Kiefert, L., Schmetzer, K., Krzemnicki, M.S., Bernhardt, H.J. and Hanni, H.A. (1996) Sapphires from Andranondambo area, Madagascar. *Journal of Gemmology* 25, 185-209.
- Kiflawi, I., Fisher, D., Kanda, H. and Sittas, G. (1997) The creation of the 3107 cm⁻¹ hydrogen absorption peak in synthetic diamond single crystals, *Diamond and Related Materials*, 5, 12. 1516-1518
- Kihara K., Hirata H., Ida A., Okudera H. and Morishita T. (2007) An X-ray single crystal study of asymmetric thermal vibrations and the positional disorder of atoms in elbaite. *Journal of Mineralogical and Petrological Sciences*, 102, (2), 115-126.
- Killingback H. (2008) The positions of light spots on rose quartz star spheres. *Journal of Gemmology*, 31, (1/2), 40-42.
- Kim, W.S. (1998) Bowenite from Booyo, Korea. *Neues Jahrbuch für Mineralogie Monatshefte*, 85-96.
- Kim, W.S. and Cho, S.H. (1998) A study of Korean precious serpentine. *Journal of Gemmology* 26, 156-164.
- Kim, W.S. and Kim, E.H. (2006) Gemmological and mineralogical characteristics of tektites from Zhangjiang, Guangdong Province, China. *Canadian Gemmologist* 27, 82-88.
- King R.J. (2000) Minerals explained 28 - The tourmaline group (Parts 1 and 2). *Geology Today*, 16, (1), 35-37 and 16, (2), 76-79.
- King R.J. (2002) Turquoise. *Geology Today*, 18, (3), 110-114.
- King R.J. (2004) Minerals explained, Part 40: The spinels. *Geology Today*, 20, (5), 194-200.
- King R.J. (2008) Minerals explained: Part 48 - Zircon. *Geology Today*, 24, (5), 195-198.
- King R.W., Kerrich R.W. and Daddar R. (1988) REE distributions in tourmaline: An INAA technique involving pretreatment by B volatilization. *American Mineralogist*, 73, (3/4), 424-431.
- King, J. (1991) Grading fancy-color diamonds. *International Gemmological Symposium - Proceedings*, 62.
- King, J. M., Moses, T. M., Shigley, J. E., Welbourn, C. M., Lawson, S. C. and Cooper, M. (1998) Characterizing natural-color type IIb blue diamonds, *Gems and Gemology*, 34, 4. 246-269
- King, J.M., Geurts, R.H., Gilbertson, A.M. and Shigley, J.E. (2008) Color grading "D-to-Z" diamonds at the GIA Laboratory. *Gems and Gemology* 44, 296-321.
- King, J.M., Johnson, E.A. and Post, J.E. (2003) Gem News International: A comparison of three historic blue diamonds. *Gems and Gemology* 39, 322-325.
- King, J.M., Moses, T.M. and Wang, W. (2006) The impact of internal whitish and reflective graining on the clarity grading of D-to-Z color diamonds in the GIA Laboratory. *Gems and Gemology* 42, 206-220.
- King, J.M., Moses, T.M., Shigley, J.E. and Liu, Y. (1994) Color grading of colored diamonds in the GIA Gem Trade Laboratory. *Gems and Gemology* 30, 220-242.

- King, J.M., Shigley, J.E. and Kammerling, R.C. (1995) GIA announces refinements for fancy colors. *Rapaport Diamond Report* 18, 4-5, 13.
- King, J.M., Shigley, J.E., Gelb, T.H., Guhin, S.S., Hall, M. and Wang, W. (2005) Characterization and grading of natural-color yellow diamonds. *Gems and Gemology* 41, 88-115.
- King, J.M., Shigley, J.E., Guhin, S.S., Gelb, T.H. and Hall, M. (2002) Characterization and grading of natural-color pink diamonds. *Gems and Gemology* 38, 128-147.
- Kinnunen, K.A. (1990) Lechatelierite inclusions in indochinites and the origin of tektites. *Meteoritics* 25, 181-184.
- Kinny P.D. and Meyer H.O.A. (1994) Zircon from the mantle: A new way to date old diamonds. *Journal of Geology*, 102, (4), 475-481.
- Kirk, R.D. (1955) The luminescence and tenebrescence of natural and synthetic sodalite. *American Mineralogist* 40, 22-31.
- Kissin, A.J. (1994) Ruby and sapphire from the Southern Ural Mountains, Russia. *Gems and Gemology* 30, 243-252.
- Kleber, W., Liebau, F. and Piateowiak, E. (1961) Zur struktur des phosphophyllits, $\text{Zn}_2\text{Fe}[\text{PO}_4]_2 \cdot 4\text{H}_2\text{O}$. *Acta Crystallographica* 14, 795.
- Kleismantas, A. (2003) Effects of chemical composition and temperature on the formation of beryl varieties, *Geologija*, 41, 3-13
- Kleyenstuber, A. (1996) Southern African gem minerals: Sugilite. *South African Gemmologist* 10, 23-30.
- Knischka, P.O. and Gübelin, E. (1980) Synthetische rubine mit edelsteinqualität, isometrischem habitus und hoher zahl unbeschädigter kristallflächen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 29, 155-185.
- Knoche R., Angel R.J., Seifert F. and Fliervoet T.F. (1998) Complete substitution of Si for Ti in titanite: $\text{Ca}(\text{Ti}_{1-x}\text{Si}_x)^{\text{VI}}\text{Si}^{\text{IV}}\text{O}_5$. *American Mineralogist*, 83, (9/10), 1168-1175.
- Knox, K. and Lees, B.K. (1997) Gem rhodochrosite from the Sweet Home Mine, Colorado. *Gems and Gemology* 33, 122-133.
- Kocman, V. and Rucklidge, J. (1973) The crystal structure of a titaniferous clinohumite, *Canadian Mineralogist*, 12, 1. 39-45
- Koeberl, C. (1990) The geochemistry of tektites: An overview. *Tectonophysics* 171, 405-422.
- Koeberl, C. (1992) Geochemistry and origin of Muong Nong-type tektites. *Geochimica et Cosmochimica Acta* 56, 1033-1064.
- Koeberl, C. (1994) Tektite origin by hypervelocity asteroidal or cometary impact: Target rocks, source craters and mechanisms. *Geological Society of America - Special Paper* 293, 133-151.
- Kohlstedt D.L. (2006). The role of water in high-temperature rock deformation. *Reviews in Mineralogy and Geochemistry*, 29, (1), 123-176.
- Koivula, J. I. (1980a) Diopside as an inclusion in peridot. *Gems and Gemology* 16, 332-333.
- Koivula, J. I. (1980b) Gübelin identifies apatite in taaffeite, *Gems and Gemology*, 16, 12. 409
- Koivula, J. I. (1980c) Inclusions in andalusite - A comparison of localities, *Gems and Gemology*, 16, 12. 401-404
- Koivula, J. I. (1981) San Carlos peridot. *Gems and Gemology* 17, 205-214.
- Koivula, J. I. (1982a) Some observations on the treatment of lavender jadeite, *Gems and Gemology*, 18, 1. 32-35
- Koivula, J. I. (1982b) Tourmaline as an inclusion in Zambian emeralds, *Gems and Gemology*, 18, 4. 225-227
- Koivula, J. I. (1984a) Colored stones - chrysoberyl, *Gems and Gemology*, 20, 4. 243
- Koivula, J. I. (1984b) Colored stones - emerald, *Gems and Gemology*, 20, 4. 244
- Koivula, J. I. (1984c) Colored stones - chrysoberyl, *Gems and Gemology*, 20, 2. 121
- Koivula, J. I. (1984d) Colored stones - emerald, *Gems and Gemology*, 20, 2. 121
- Koivula, J. I. (1984e) Colored stones - synthetics, *Gems and Gemology*, 20, 1. 60
- Koivula, J. I. (1984f) Russian hydrothermal synthetic emeralds, *Gems and Gemology*, 20, 4. 245
- Koivula, J. I. (1985a) Colored stones - diaspore, *Gems and Gemology*, 21, 1. 58-59
- Koivula, J. I. (1985b) Aquamarine, *Gems and Gemology*, 21, 3. 185-186
- Koivula, J. I. (1986a) Amblygonite treatment, *Gems and Gemology*, 22, 4. 246
- Koivula, J. I. (1986b) Electrically treated chalcedony, *Gems and Gemology*, 22, 4. 246

- Koivula, J. I. (1986c) Magnesite, *Gems and Gemology*, 22. 2. 114
- Koivula, J. I. (1986d) Carbon dioxide fluid inclusions as proof of natural-colored corundum. *Gems and Gemology* 22, 152-155.
- Koivula, J. I. (1986e) Important new amazonite find, *Gems and Gemology*, 22. 4. 246-247
- Koivula, J. I. (1986f) "Rainbow" moonstone, *Gems and Gemology*, 22. 2. 114
- Koivula, J. I. (1986g) Metavariscite. *Gems and Gemology* 22, 247-248.
- Koivula, J. I. (1986h) Pectolite. *Gems and Gemology* 22, 187-188.
- Koivula, J. I. (1986i) Pectolite. *Gems and Gemology* 22, 114.
- Koivula, J. I. (1986j) Taaffeite. *Gems and Gemology* 22, 115.
- Koivula, J. I. (1987a) More on Brazilian alexandrites, *Gems and Gemology*, 23. 4. 238-240
- Koivula, J. I. (1987b) Plasticized emeralds. *Gems and Gemology* 23, 175.
- Koivula, J. I. (1987c) "Rainbow moonstones" are labradorite, *Gems and Gemology*, 23. 3. 175
- Koivula, J. I. (1992) The gemmological properties of extraterrestrial peridots. *South African Gemmologist* 6, 10-16.
- Koivula, J. I. (1996) New and unusual inclusion. *Indian Gemmologist* 6, 13-15.
- Koivula, J. I. and Elen, S. (1998) Barite inclusions in fluorite, *Gems and Gemology*, 34. 4. 281-283
- Koivula, J. I. and Fritsch, E. (1993a) "Denim" lapis lazuli from Afghanistan, *Gems and Gemology*, 29. 3. 210
- Koivula, J. I. and Fritsch, E. (1993aa) Some unusually large gems. *Gems and Gemology* 29, 56.
- Koivula, J. I. and Fritsch, E. (1993ab) Transparent rhodochrosite from Colorado. *Gems and Gemology* 29, 60.
- Koivula, J. I. and Fritsch, E. (1993b) "Rainbow" hematite from Brazil, *Gems and Gemology*, 29. 3. 209-210
- Koivula, J. I. and Fritsch, E. (1993c) Apatite from Brazil and Madagascar, *Gems and Gemology*, 29. 1. 53-54
- Koivula, J. I. and Fritsch, E. (1993d) Brazilian aragonite mistaken for ruby, *Gems and Gemology*, 29. 3. 212
- Koivula, J. I. and Fritsch, E. (1993e) Charoite, *Gems and Gemology*, 29. 4. 292
- Koivula, J. I. and Fritsch, E. (1993f) Jadeite from the Russian Federation, *Gems and Gemology*, 29. 1. 56-57
- Koivula, J. I. and Fritsch, E. (1993g) Some unusually large gems, *Gems and Gemology*, 29. 1. 56
- Koivula, J. I. and Fritsch, E. (1993h) Baltic amber, *Gems and Gemology*, 29. 1. 53
- Koivula, J. I. and Fritsch, E. (1993i) Banded iridescent obsidian. *Gems and Gemology* 29, 133.
- Koivula, J. I. and Fritsch, E. (1993j) Chalcedony colored by large mineral inclusions, *Gems and Gemology*, 29. 3. 208-209
- Koivula, J. I. and Fritsch, E. (1993k) Douros flux-grown synthetic ruby. *Gems and Gemology* 29, 295.
- Koivula, J. I. and Fritsch, E. (1993l) Exceptional iris agates, *Gems and Gemology*, 29. 1. 53
- Koivula, J. I. and Fritsch, E. (1993m) More "pulled" synthetic materials available, *Gems and Gemology*, 29. 1. 63
- Koivula, J. I. and Fritsch, E. (1993n) Natural resin from Colombia, *Gems and Gemology*, 29. 2. 135-136
- Koivula, J. I. and Fritsch, E. (1993o) Russian synthetics, *Gems and Gemology*, 29. 4. 295
- Koivula, J. I. and Fritsch, E. (1993p) Extraterrestrial gem materials. *Gems and Gemology* 29, 55-56.
- Koivula, J. I. and Fritsch, E. (1993q) Reconstructed amber, *Gems and Gemology*, 29. 1. 63
- Koivula, J. I. and Fritsch, E. (1993r) Russian synthetics, *Gems and Gemology*, 29. 4. 295
- Koivula, J. I. and Fritsch, E. (1993s) Uncommon cat's-eye gems, *Gems and Gemology*, 29. 1. 54
- Koivula, J. I. and Fritsch, E. (1993t) Gems from Orissa, India. *Gems and Gemology* 29, 133-134.
- Koivula, J. I. and Fritsch, E. (1993u) More on plastic imitation opal. *Gems and Gemology* 29, 138-139.
- Koivula, J. I. and Fritsch, E. (1993v) Natural glass. *Gems and Gemology* 29, 293.
- Koivula, J. I. and Fritsch, E. (1993w) Peridot from Ethiopia. *Gems and Gemology* 29, 59.
- Koivula, J. I. and Fritsch, E. (1993x) Peridot from Vietnam. *Gems and Gemology* 29, 211.
- Koivula, J. I. and Fritsch, E. (1993y) Peridot from Zabargad Island. *Gems and Gemology* 29, 134-135.
- Koivula, J. I. and Fritsch, E. (1993z) Ruby mining near Mahenge, Tanzania. *Gems and Gemology* 29, 136-137.
- Koivula, J. I. and Fritsch, E. (1994a) "Caymanite" from the Grand Cayman Islands, Caribbean, *Gems and Gemology*, 30. 3. 193

- Koivula, J. I. and Fritsch, E. (1994b) "Teal" blue cobalt-colored spinel, *Gems and Gemology*, 30. 4. 276-277
- Koivula, J. I. and Fritsch, E. (1994c) Arizona gem materials, *Gems and Gemology*, 30. 1. 49
- Koivula, J. I. and Fritsch, E. (1994d) Coated jadeite, *Gems and Gemology*, 30. 3. 199
- Koivula, J. I. and Fritsch, E. (1994e) Color-change diaspore from Turkey, *Gems and Gemology*, 30. 4. 273-274
- Koivula, J. I. and Fritsch, E. (1994f) More on Russian synthetics and simulants, *Gems and Gemology*, 30. 1. 57
- Koivula, J. I. and Fritsch, E. (1994g) Arizona gem materials. *Gems and Gemology* 30, 49.
- Koivula, J. I. and Fritsch, E. (1994h) Gems from Madagascar, *Gems and Gemology*, 30. 1. 50-51
- Koivula, J. I. and Fritsch, E. (1994i) Cat's-eye sillimanite from Orissa, India. *Gems and Gemology* 30, 127-128.
- Koivula, J. I. and Fritsch, E. (1994j) Douros synthetic rubies. *Gems and Gemology* 30, 57.
- Koivula, J. I. and Fritsch, E. (1994k) Gems from Madagascar. *Gems and Gemology* 30, 50-51.
- Koivula, J. I. and Fritsch, E. (1994l) Miscellaneous notes on peridot. *Gems and Gemology* 30, 53.
- Koivula, J. I. and Fritsch, E. (1994m) More on peridot from Pakistan. *Gems and Gemology* 30, 275.
- Koivula, J. I. and Fritsch, E. (1994n) More on Russian synthetics and simulants. *Gems and Gemology* 30, 57.
- Koivula, J. I. and Fritsch, E. (1994o) Peridot from Pakistan. *Gems and Gemology* 30, 196.
- Koivula, J. I. and Fritsch, E. (1994p) Rubies and other gems from Orissa. *Gems and Gemology* 30, 54-55.
- Koivula, J. I. and Fritsch, E. (1994q) Synthetic phenakite from Russia. *Gems and Gemology* 30, 199-200.
- Koivula, J. I. and Fritsch, E. (1995a) Diaspore from Turkey, *Gems and Gemology*, 31. 1. 60
- Koivula, J. I. and Fritsch, E. (1995b) Impregnated malachite, *Gems and Gemology*, 31. 3. 213
- Koivula, J. I. and Fritsch, E. (1995c) More firms processing fracture-filled diamonds, *Gems and Gemology*, 31. 2. 129
- Koivula, J. I. and Fritsch, E. (1995d) Parti-colored fluorite from Brazil, *Gems and Gemology*, 31. 2. 131
- Koivula, J. I. and Fritsch, E. (1995e) Spessartine garnet from Namibia, *Gems and Gemology*, 31. 2. 134
- Koivula, J. I. and Fritsch, E. (1995f) Cat's-eye apatites from Madagascar, *Gems and Gemology*, 31. 3. 205-206
- Koivula, J. I. and Fritsch, E. (1995g) Faceted Kashan synthetic rubies and sapphires. *Gems and Gemology* 31, 70.
- Koivula, J. I. and Fritsch, E. (1995h) Fashioned "rainbow" hematite, *Gems and Gemology*, 31. 1. 61-62
- Koivula, J. I. and Fritsch, E. (1995i) Iolite and other gems from Madagascar, *Gems and Gemology*, 31. 1. 62
- Koivula, J. I. and Fritsch, E. (1995j) Faceted sphalerite and other collector stones from Canada. *Gems and Gemology* 31, 65-66.
- Koivula, J. I. and Fritsch, E. (1995k) Iolite and other Orissa gems, *Gems and Gemology*, 31. 1. 62
- Koivula, J. I. and Fritsch, E. (1995l) Large apatites from Madagascar, *Gems and Gemology*, 31. 1. 60
- Koivula, J. I. and Fritsch, E. (1995m) Kyocera plastic-impregnated synthetic opals. *Gems and Gemology* 31, 137-138.
- Koivula, J. I. and Fritsch, E. (1995n) More on Czochraski "pulled" synthetic sapphires. *Gems and Gemology* 31, 214-215.
- Koivula, J. I. and Fryer, C.W. (1986) The gemological characteristics of Chinese peridot. *Gems and Gemology* 22, 38-40.
- Koivula, J. I. and Fryer, C.W. (1987a) Chalcopyrite in peridot: A first observation. *Journal of Gemmology* 20, 272-273.
- Koivula, J. I. and Fryer, C.W. (1987b) Sapphirine (not sapphire) in a ruby from Bo Rai, Thailand. *Journal of Gemmology* 20, 369-370.
- Koivula, J. I. and Fryer, C.W. (1990) Forsterite in Arizona pyrope, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 39. 4. 207-209
- Koivula, J. I. and Johnson, M. L. (1996a) Cat's-eye diopside from Southern India, *Gems and Gemology*, 32. 2. 130-131
- Koivula, J. I. and Johnson, M. L. (1996b) Green-and-white jadeite from Russia, *Gems and Gemology*, 32. 2. 131-132

- Koivula, J. I. and Johnson, M. L. (1996c) Manufactured composite material imitating jadeite, *Gems and Gemology*, 32. 2. 137-138
- Koivula, J. I. and Johnson, M. L. (1996d) Rubies from Madagascar. *Gems and Gemology* 32, 133-135.
- Koivula, J. I. and Johnson, M. L. (1996e) Update on porous chrysocolla-colored chalcedony, *Gems and Gemology*, 32. 2. 129-130
- Koivula, J. I. and Johnson, M. L. (1996f) Variegated translucent jasper from Mexico, *Gems and Gemology*, 32. 2. 132-133
- Koivula, J. I. and Kammerling, R. C. (1988a) A gemological look at Kyocera's new synthetic star ruby. *Gems and Gemology* 24, 237-240.
- Koivula, J. I. and Kammerling, R. C. (1988b) Alaskan nephrite jade, *Gems and Gemology*, 24. 3. 178-179
- Koivula, J. I. and Kammerling, R. C. (1988c) New Mexico moonstone, *Gems and Gemology*, 24. 3. 177-178
- Koivula, J. I. and Kammerling, R. C. (1988d) Plastic imitations of lapis lazuli and malachite, *Gems and Gemology*, 24. 2. 123
- Koivula, J. I. and Kammerling, R. C. (1988e) Ruby from North Carolina. *Gems and Gemology* 24, 121.
- Koivula, J. I. and Kammerling, R. C. (1988f) Sapphirine from Greenland and Canada. *Gems and Gemology* 24, 179-180.
- Koivula, J. I. and Kammerling, R. C. (1988g) Sri Lanka update, *Gems and Gemology*, 24. 2. 121-122
- Koivula, J. I. and Kammerling, R. C. (1988h) The Pool synthetic emerald, *Gems and Gemology*, 24. 4. 252-253
- Koivula, J. I. and Kammerling, R. C. (1988i) Inclusions identified in new Brazilian alexandrites, *Gems and Gemology*, 24. 1. 59
- Koivula, J. I. and Kammerling, R. C. (1988j) Synthetic red chrysoberyl, *Gems and Gemology*, 24. 1. 59
- Koivula, J. I. and Kammerling, R. C. (1989a) "Adularescent" chalcedony, *Gems and Gemology*, 25. 4. 245
- Koivula, J. I. and Kammerling, R. C. (1989b) Chinese "jade" update. *Gems and Gemology* 25, 182-183.
- Koivula, J. I. and Kammerling, R. C. (1989c) "Reconstructed" azurite-malachite, *Gems and Gemology*, 25. 1. 51
- Koivula, J. I. and Kammerling, R. C. (1989d) Hackmanite: A remarkable variety of sodalite. *Gems and Gemology* 25, 112.
- Koivula, J. I. and Kammerling, R. C. (1989e) Chinese "jade" update, *Gems and Gemology*, 25. 3. 182-183
- Koivula, J. I. and Kammerling, R. C. (1989f) Imitation opalized shells. *Gems and Gemology* 25, 183-184.
- Koivula, J. I. and Kammerling, R. C. (1989g) An investigation of three imitation opalized shells. *Australian Gemmologist* 17, 148-152.
- Koivula, J. I. and Kammerling, R. C. (1989h) Colored stone update from China, *Gems and Gemology*, 25. 2. 111-112
- Koivula, J. I. and Kammerling, R. C. (1989i) "Opalite": Plastic imitation opal with true play-of-color. *Gems and Gemology* 25, 30-34.
- Koivula, J. I. and Kammerling, R. C. (1989j) A beautiful new form of orthoclase, *Gems and Gemology*, 25. 1. 47
- Koivula, J. I. and Kammerling, R. C. (1989k) Aquamarine found in Wyoming, *Gems and Gemology*, 25. 2. 110-111
- Koivula, J. I. and Kammerling, R. C. (1989l) Update on hackmanite. *Gems and Gemology* 25, 245-246.
- Koivula, J. I. and Kammerling, R. C. (1989m) A clever imitation emerald crystal, *Gems and Gemology*, 25. 2. 117
- Koivula, J. I. and Kammerling, R. C. (1989n) Brazil update, *Gems and Gemology*, 25. 3. 179-180
- Koivula, J. I. and Kammerling, R. C. (1989o) Star chrysoberyl from Sri Lanka, *Gems and Gemology*, 25. 4. 245
- Koivula, J. I. and Kammerling, R. C. (1989p) Emerald imitation from quartz, *Gems and Gemology*, 25. 1. 50
- Koivula, J. I. and Kammerling, R. C. (1989q) Fine aquamarine from India, *Gems and Gemology*, 25. 3. 179
- Koivula, J. I. and Kammerling, R. C. (1989r) Gemmological properties of emeralds from Gujar Killi Valley, Northwest Frontier Province, Pakistan, *South African Gemmologist*, 3. 3. 5-12
- Koivula, J. I. and Kammerling, R. C. (1989s) Santa Terezinha-emerald treatment, *Gems and Gemology*, 25. 3. 180-181

- Koivula, J. I. and Kammerling, R. C. (1990a) An unusual Indian aquamarine, *Australian Gemmologist*, 17. 7. 270-272
- Koivula, J. I. and Kammerling, R. C. (1990b) Black coral industry on the Mexican Caribbean, *Gems and Gemology*, 26. 4. 301-302
- Koivula, J. I. and Kammerling, R. C. (1990c) Dyed quartz imitation of sugilite? *Gems and Gemology* 26, 308-309.
- Koivula, J. I. and Kammerling, R. C. (1990d) A glass imitation pectolite? *Gems and Gemology* 26, 308-309.
- Koivula, J. I. and Kammerling, R. C. (1990e) Color-change cobalt spinel, *Gems and Gemology*, 26. 4. 305-306
- Koivula, J. I. and Kammerling, R. C. (1990f) Fine-quality chatoyant iolite, *Gems and Gemology*, 26. 3. 232
- Koivula, J. I. and Kammerling, R. C. (1990g) Imitation rhodochrosite beads. *Gems and Gemology* 26, 168.
- Koivula, J. I. and Kammerling, R. C. (1990h) Fluorite imitating emerald, *Gems and Gemology*, 26. 3. 237
- Koivula, J. I. and Kammerling, R. C. (1990i) Peridot mining update. *Gems and Gemology* 26, 162-163.
- Koivula, J. I. and Kammerling, R. C. (1990j) "Plastic"-coated sugar-treated opal. *Gems and Gemology* 26, 236.
- Koivula, J. I. and Kammerling, R. C. (1990k) Major jade deposits in Japan, *Gems and Gemology*, 26. 2. 161-162
- Koivula, J. I. and Kammerling, R. C. (1990l) Unusual cat's-eye diopside, *Gems and Gemology*, 26. 3. 231
- Koivula, J. I. and Kammerling, R. C. (1990m) Apatite "from Paraiba" and purchased as emerald, *Gems and Gemology*, 26. 2. 161
- Koivula, J. I. and Kammerling, R. C. (1990n) Assembled "plume" agate, *Gems and Gemology*, 26. 2. 160-161
- Koivula, J. I. and Kammerling, R. C. (1990o) Beryl discovery in Finland, *Gems and Gemology*, 26. 1. 106
- Koivula, J. I. and Kammerling, R. C. (1990p) Imitation jade carving, *Gems and Gemology*, 26. 3. 237-238
- Koivula, J. I. and Kammerling, R. C. (1990q) New find of orthoclase, *Gems and Gemology*, 26. 1. 106
- Koivula, J. I. and Kammerling, R. C. (1990r) Brazilian chrysoprase, *Gems and Gemology*, 26. 2. 161
- Koivula, J. I. and Kammerling, R. C. (1990s) Fluorite imitating emerald, *Gems and Gemology*, 26. 3. 237
- Koivula, J. I. and Kammerling, R. C. (1990t) Greenish blue cat's-eye apatite, *Gems and Gemology*, 26. 3. 230
- Koivula, J. I. and Kammerling, R. C. (1990u) Imitation rhodochrosite beads, *Gems and Gemology*, 26. 2. 168
- Koivula, J. I. and Kammerling, R. C. (1990v) Oregon sunstone update, *Gems and Gemology*, 26. 1. 107-108
- Koivula, J. I. and Kammerling, R. C. (1990w) A gemmological review of Colombian emeralds, *South African Gemmologist*, 4. 1. 5-13
- Koivula, J. I. and Kammerling, R. C. (1990x) Unusual pseudomorph, *Gems and Gemology*, 26. 2. 163
- Koivula, J. I. and Kammerling, R. C. (1990y) Imitation emeralds from southern Africa, *Gems and Gemology*, 26. 2. 167-168
- Koivula, J. I. and Kammerling, R. C. (1990z) Zimbabwe emerald update, *Gems and Gemology*, 26. 3. 230
- Koivula, J. I. and Kammerling, R. C. (1991a) Arizona peridot. *Gems and Gemology* 27, 50.
- Koivula, J. I. and Kammerling, R. C. (1991b) Enhanced Paua shell. *Gems and Gemology* 27, 52.
- Koivula, J. I. and Kammerling, R. C. (1991c) Gemological examination of a red taaffeite. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 40, 32-37.
- Koivula, J. I. and Kammerling, R. C. (1991d) Heat treatment of ruby in Sri Lanka. *Gems and Gemology* 27, 53.
- Koivula, J. I. and Kammerling, R. C. (1991e) Man-made hematite simulant, *Gems and Gemology*, 27. 1. 54
- Koivula, J. I. and Kammerling, R. C. (1991f) Plastic-treated ammonite, *Gems and Gemology*, 27. 1. 52
- Koivula, J. I. and Kammerling, R. C. (1991g) Purple and "chrome" green vesuvianites from Quebec, *Gems and Gemology*, 27. 3. 185
- Koivula, J. I. and Kammerling, R. C. (1991h) Tourmaline/andalusite: a pleochroism caveat, *Gems and Gemology*, 27. 3. 185
- Koivula, J. I. and Kammerling, R. C. (1991i) Colored opticon for emeralds, *Gems and Gemology*, 27. 1. 52-53

- Koivula, J. I. and Kammerling, R. C. (1991j) Dyed quartzite imitation of dyed jadeite, *Gems and Gemology*, 27. 2. 122-123
- Koivula, J. I. and Kammerling, R. C. (1991k) More Soviet synthetics, *Gems and Gemology*, 27. 1. 55
- Koivula, J. I. and Kammerling, R. C. (1991l) Gemmological properties of emeralds from the Panjshir Valley, Afghanistan, *South African Gemmologist*, 5. 3. 9-14
- Koivula, J. I. and Kammerling, R. C. (1991m) New laser crystals with gem potential, *Gems and Gemology*, 27. 4. 263
- Koivula, J. I. and Kammerling, R. C. (1991n) Plastic-treated jadeite, *Gems and Gemology*, 27. 2. 122
- Koivula, J. I. and Kammerling, R. C. (1991o) More on synthetic emeralds, *Gems and Gemology*, 27. 1. 54
- Koivula, J. I. and Kammerling, R. C. (1991p) New synthetic alexandrite, *Gems and Gemology*, 27. 1. 53
- Koivula, J. I. and Kammerling, R. C. (1991q) More Soviet synthetics, *Gems and Gemology*, 27. 1. 55
- Koivula, J. I. and Kammerling, R. C. (1991r) Update on Chatham production, *Gems and Gemology*, 27. 1. 53-54
- Koivula, J. I. and Kammerling, R. C. (1991s) Uralian emeralds, *Gems and Gemology*, 27. 1. 49
- Koivula, J. I. and Kammerling, R. C. (1991t) Cat's-eye beryllonite, *Gems and Gemology*, 27. 1. 47-48
- Koivula, J. I. and Kammerling, R. C. (1991u) Imitation lapis lazuli, *Gems and Gemology*, 27. 1. 54
- Koivula, J. I. and Kammerling, R. C. (1991v) Large clinohumite, *Gems and Gemology*, 27. 1. 48
- Koivula, J. I. and Kammerling, R. C. (1991w) Madagascar apatite, *Gems and Gemology*, 27. 1. 46-47
- Koivula, J. I. and Kammerling, R. C. (1992a) Axinite from Russia, *Gems and Gemology*, 28. 1. 59
- Koivula, J. I. and Kammerling, R. C. (1992b) Chrysocolla-colored chalcedony from Mexico, *Gems and Gemology*, 28. 1. 59-60
- Koivula, J. I. and Kammerling, R. C. (1992c) Moldavite plentiful, *Gems and Gemology*, 28. 1. 60-61
- Koivula, J. I. and Kammerling, R. C. (1992d) Rubies and sapphires from Vietnam. *Gems and Gemology* 28, 61.
- Koivula, J. I. and Kammerling, R. C. (1992e) Synthetic blue and green sapphires grown by Czochralski pulling. *Gems and Gemology* 28, 66.
- Koivula, J. I. and Kammerling, R. C. (1992f) Attractive Tanzanian diopside, *Gems and Gemology*, 27. 4. 257
- Koivula, J. I. and Kammerling, R. C. (1992g) Chrysocolla-colored chalcedony from Mexico, *Gems and Gemology*, 28. 1. 59-60
- Koivula, J. I. and Kammerling, R. C. (1992h) Faceted apatites from Madagascar, *Gems and Gemology*, 28. 1. 59
- Koivula, J. I. and Kammerling, R. C. (1992i) Hairy insect in amber, *Gems and Gemology*, 27. 4. 256
- Koivula, J. I. and Kammerling, R. C. (1992j) Imitations of sugilite and other nontransparent gems, *Gems and Gemology*, 28. 1. 66
- Koivula, J. I. and Kammerling, R. C. (1992k) Novel chrysoberyl "cross" cat's-eye, *Gems and Gemology*, 27. 4. 257
- Koivula, J. I. and Kammerling, R. C. (1992l) Synthetic alexandrite gets new name, *Gems and Gemology*, 28. 1. 63
- Koivula, J. I. and Kammerling, R. C. (1992m) Update from Sri Lanka, *Gems and Gemology*, 27. 4. 260-261
- Koivula, J. I. and Kammerling, R. C. (1992n) More on Paraiba tourmaline simulants, *Gems and Gemology*, 27. 4. 265
- Koivula, J. I. and Kammerling, R. C. (1992o) Unusual fire agate, *Gems and Gemology*, 28. 1. 58
- Koivula, J. I. and Kammerling, R. C. (1992p) Imitations of sugilite and other nontransparent gems. *Gems and Gemology* 28, 66.
- Koivula, J. I. and Kammerling, R. C. (1992q) Rare gemstones from Mont St.-Hilaire. *Gems and Gemology* 28, 62.
- Koivula, J. I. and Kammerling, R. C. (1992r) Rubies and pink sapphires from Azad Kashmir, Pakistan. *Gems and Gemology* 28, 61.
- Koivula, J. I. and Kammerling, R. C. (1992s) Sunstone/iolite mixture, *Gems and Gemology*, 27. 4. 261-262
- Koivula, J. I. and Kammerling, R. C. (1992t) Update from Sri Lanka, *Gems and Gemology*, 27. 4. 260-261
- Koivula, J. I. and Kammerling, R. C. (1992u) Update on diffusion-treated sapphires. *Gems and Gemology* 28, 62-63.

- Koivula, J. I. and Kammerling, R. C. (1992v) Update on peridot. *Gems and Gemology* 28, 60.
- Koivula, J. I. and Kammerling, R. C. (1993) Inclusions can help identify natural from man-made, *Jewellery News Asia*, October. 116-122
- Koivula, J. I., Fritsch, E. and Fryer, C. (1988) The gemmological characteristics of Inamori synthetic cat's-eye alexandrite chrysoberyl, *Journal of Gemmology*, 21. 4. 232-236
- Koivula, J. I., Fryer, C. W. and Shigley, J. E. (1988) Gemmological investigation of a large faceted east African enstatite, *Journal of Gemmology*, 21. 2. 92-94
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1990) Gemmological description of a glass imitation emerald from Zambia, *South African Gemmologist*, 4. 2. 7-13
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992a) Dumortierite-in-quartz beads, *Gems and Gemology*, 28. 4. 271
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992b) Dyed massive beryl and quartz resembling ornamental gems, *Gems and Gemology*, 28. 2. 135
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992c) Large jadeite boulder, *Gems and Gemology*, 28. 2. 132-133
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992d) Unusual aragonite, *Gems and Gemology*, 28. 4. 269-270
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992e) Black mabe "pearls" and simulants (from nautilus shell). *Gems and Gemology* 28, 133-134.
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992f) Amber from the Dominican Republic and the Baltic region, *Gems and Gemology*, 28. 4. 269
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992g) Beryl beads with multiple color enhancements, *Gems and Gemology*, 28. 2. 136
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992h) Diopside from Tanzania, *Gems and Gemology*, 28. 3. 201
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992i) Enhancements - Acrylic coating of gem materials, *Gems and Gemology*, 28. 2. 135
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992j) Experimental synthetic sodalite from China. *Gems and Gemology* 28, 139.
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992k) New synthetic alexandrite, *Gems and Gemology*, 28. 3. 207
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992l) Sri Lanka: update on gem production, *Gems and Gemology*, 28. 4. 273-274
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992m) Blue chalcedony from Montana, *Gems and Gemology*, 28. 3. 200
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992n) Faceted ruby from Longido, Tanzania. *Gems and Gemology* 28, 203.
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992o) More amber from Russia, *Gems and Gemology*, 28. 3. 200
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992p) Tajikistan to develop gem resources, *Gems and Gemology*, 28. 2. 134-135
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992q) Large hydrothermal synthetic ruby. *Gems and Gemology* 28, 278.
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992r) Large taaffeite. *Gems and Gemology* 28, 274.
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992s) Rare gemstones from Quebec. *Gems and Gemology* 28, 134.
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1992t) Treatable "concrete" opal. *Gems and Gemology* 28, 136.
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1993) Amber simulant from India, *Gems and Gemology*, 29. 4. 288-289
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1995a) Amber simulant: Natural resin in plastic, *Gems and Gemology*, 31. 2. 134-136
- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1995b) Miscellaneous notes on peridot. *Gems and Gemology* 31, 63.

- Koivula, J. I., Kammerling, R. C. and Fritsch, E. (1995c) Rubies and sapphires from North Carolina. *Gems and Gemology* 31, 211.
- Koivula, J. I., Kammerling, R. C. and Johnson, M. L. (1995a) Jade market in Mandalay, *Gems and Gemology*, 31. 4. 278-280
- Koivula, J. I., Kammerling, R. C. and Johnson, M. L. (1995b) Russian flux-grown synthetic alexandrites, *Gems and Gemology*, 31. 4. 285-286
- Koivula, J. I., Kammerling, R. C. and Johnson, M. L. (1995c) New and unusual inclusions in amber and other gems, *Gems and Gemology*, 31. 4. 275-276
- Koivula, J. I., Kammerling, R. C. and Johnson, M.L. (1995d) Natural glass: tektites. *Gems and Gemology* 31, 277-278.
- Koivula, J. I., Kammerling, R. C. and Johnson, M.L. (1995e) Rubies from the Barrington volcanic field, East Australia. *Gems and Gemology* 31, 281-282.
- Koivula, J. I., Kammerling, R. C. and Johnson, M.L. (1995f) The sapphire deposit in southern Madagascar. *Gems and Gemology* 31, 283-285.
- Koivula, J. I., Kammerling, R. C. and Johnson, M.L. (1995g) Sapphire mining in Laos. *Gems and Gemology* 31, 282-284.
- Koivula, J. I., Kammerling, R.C. and Weldon, R. (1990) Microcaracterísticas de algunas imitaciones de gemas en vidrio o plástico con efectos ópticos especiales. *Boletín del Instituto Gemológico Español* 32, 15-22.
- Koivula, J. I., Shigley, J. E. and Fryer, C. W. (1988) A gemological look at clinohumite, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 37. 1/2. 53-55
- Kolesnikova, T. A. (1980) Gem-grade spinel, clinohumite, and manasseite of the Kukhilar deposit (Pamirs), *Dragotsennyye Tsretn. Kamni*, 181-199
- Kolesov B.A., Geiger C.A. and Armbruster T. (2001) The dynamic properties of zircon studied by single-crystal X-ray diffraction and Raman spectroscopy. *European Journal of Mineralogy*, 13, (5), 939-948.
- Kolitsch U. and Giester G. (2000) The crystal structure of faustite and its copper analogue turquoise. *Mineralogical Magazine*, 64, (5), 905-913.
- Komatsu, H., Yazaki, J. and Matsuda, Y. (1993) A flame-like pattern on the surface of conch pearl. *Gem News*.
- Kondo, D. and Beaton, D. (2009) Hackmanite/sodalite from Myanmar and Afghanistan. *Gems and Gemology* 45, 38-43.
- Kondo, K. I. and Ahrens, T. J. (1983) Heterogeneous shock-induced thermal radiation in minerals, *Physics and Chemistry of Minerals*, 9. 3/4. 173-181
- Konev, A. A., Vorobjov, E. I. and Bulach, A. (1993) Charoit - der Schmuckstein aus Sibirien und seine seltenen Begleitminerale, *Lapis*, 18. 4. 13-20
- Konishi, K. and Sakai, H. (1972) Fibrous aragonite of freshwater origin in sealed Pliocene Glycymeris yessoensis, *Japanese Journal of Geology and Geography*, 62. 1/4. 19-30
- Konovalenko, S. I., Rossovsky, L. N. and Ananiev, S. A. (1983) Jeremjevit as again found in Russia mineral, *Zapiski Vsesoyuznoye Mineralogicheskoye Obshchestvo*, 112. 212-217
- Konta, J. and Saul, J. M. (1976) Moldavites and a survey of other naturally occurring glasses, *Journal of Gemmology*, 15. 4. 179-204
- Kopchikov, M. B. and Shelementiev, Y. B. (2004) The identification properties of synthetic hydrothermal red, green and blue beryl (in Russian), *Gemmological Bulletin*, 1. 11. 17-22
- Korago, A. A., Golubev, B. F., Kesarev, O. V., Muratov, I. G. and Shitov, V. A. (1978) The composition and structure of pearls from the Northwestern USSR, *Doklady Akademii Nauk SSSR - Earth Science Section*, 228. 5. 122-125
- Korevaar, H. J. and Zwaan, P. C. (1977) Kornerupine cat's-eye from Sri Lanka (Ceylon), *Journal of Gemmology*, 15. 5. 225-230
- Kornitzer, L., (1937), *On the Conch Pearl*, The Pearl Trader, Sheridan House, 255-256,
- Koschek G. (1993) Origin and significance of the SEM cathodoluminescence from zircon.
- Košler J. and Sylvester P.J. (2003) Present trends and the future of zircon in geochronology: Laser ablation ICPMS. *Reviews in Mineralogy and Geochemistry*, 53, (1), 243-275.
- Kosmowska, B. (1990) Infrared spectroscopy of amber and other fossil resins in Poland, *15th General Meeting, International Mineralogical Association - Abstracts*, 590-591

- Kosnar, R.A. (1979) Famous mineral localities: The Sweet Home mine. *Mineralogical Record* 10, 333-338.
- Koziarska B., Godlewski M., Suchocki A., Czaja M. and Mazurak Z. (1994) Optical properties of zoisite. *Physical Review B*, 50, (17), 12297-12300.
- Kraczka J., Pieczka A., Hryniewicz A.Z. and Zabinski W. (1986) Mössbauer study of tourmalines. *Hyperfine Interactions*, 29, (114), 1121-1124.
- Kraeff, A., Poorter, R. P. E. and Schuiling, R. D. (1980) Additional information on charoite, *Neues Jahrbuch für Mineralogie Monatshefte*, 11. 498-500
- Krambrock K., Guedes K.J., Pinheiro M.V.B., Xavier R.C., Tavares M.C., Guimaraes G.M., Fantini C., Pimenta M.A. and Menezes-Filho L.A.D. (2009) Characterization of a series of colored tourmalines of uvite/dravite series from Brumado District, Bahia, Brazil. *Estudios Geologicos*, 19, (2), 145-149.
- Krambrock K., Pinheiro M.V.B., Guedes K.J., Medeiros S.M., Schweizer S. and Spaeth J.M. (2004) Correlation of irradiation-induced yellow color with the O⁻ hole center in tourmaline. *Physics and Chemistry of Minerals*, 31, (3), 168-175.
- Krambrock K., Pinheiro M.V.B., Medeiros S.M., Guedes K.J., Schweizer S. and Spaeth J.M. (2002) Investigation of radiation-induced yellow color in tourmaline by magnetic resonance. *Nuclear Instruments and Methods in Physics Research B*, 191, (1/4), 241-245.
- Krokhin V.P., Bessmertnyi V.S., Puchka O.V. and Kirienko A.D. (1998) The role of the modifying chromium ion in the structure of magnesian spinel (A review). *Glass and Ceramics*, 55, (9/10), 278-282.
- Kronenberg A.K. (1994) Hydrogen speciation and chemical weakening of quartz.
- Krstanovic, I. (1997) Serpentine mineral from Crni Kamen, Serbia. *Neues Jahrbuch für Mineralogie Monatshefte*, 451-465.
- Krzemnicki, M.S. (2011) An analysis of rubies with corroded surfaces. *Journal of the Gemmological Association of Hong Kong* 32, 36-40.
- Krzemnicki, M.S. and Hänni, H.A. (2008) New Tanzania mine uncovers source of exceptional rubies. *InColor*, 46-47.
- Krzemnicki, M.S., Hänni, H.A. and Walters, R.A. (2004) A new method for detecting Be diffusion-treated sapphires: Laser-induced breakdown spectroscopy (LIBS). *Gems and Gemology* 40, 314-322.
- Krzemnicki, M.S., Hanni, H.A., Guggenheim, R. and Mathys, D. (1996) Investigations on sapphires from an alkali basalt, South West Rwanda. *Journal of Gemmology* 25, 90-106.
- Kuck, A. and Saaid, J. (1998) Les minéraux des pegmatites de la region de Papachacra Province de Catamarca - Argentine. *Le Règne Minéral*, 5-13.
- Kumaratilake W.L.D.R.A. (1998) Spinel and garnet star networks: An interesting asterism in gems from Sri Lanka. *Journal of Gemmology*, 26, (1), 24-28.
- Kumskova, N. M. and Khvostova, V. A. (1964) X-ray study of the epidote-allanite group of minerals, *Geochemistry International*, 1. 676-686
- Kunz M., Arlt T. and Stolz J. (2000) In situ powder diffraction study of titanite (CaTiOSiO₄) at high pressure and high temperature. *American Mineralogist*, 85, (10), 1465-1473.
- Kunz M., Xirouchakis D., Lindsley D.H. and Hausermann D. (1996) High-pressure phase transition in titanite (CaTiOSiO₄). *American Mineralogist*, 81, (11/12), 1527-1530.
- Kunz, G. F. (1916), Ivory and the Elephant, *Garden City, NY*, Doubleday, Page and Co., 527 pp.,
- Künzel, H. E. (1989) Gelber jeremejewit aus der Eifel, *Lapis*, 14. 11. 30
- Kupriyanov, I. N., Palyanov, Y. N., Kalinin, A. A., Sokol, A. G., Khokhryakov, A. F. and Gusev, V. A. (2008) The effect of HPHT treatment of the spectroscopic features of type IIb synthetic diamonds, *Diamond and Related Materials*, 17. 7/10. 1203-1206
- Kurat, G., Niedermayr, G. and Prinz, M. (1982) Peridot von Zabargad, Rotes Meer. *Der Aufschluss* 33, 169-182.
- Kurazhkovskaya V.S., Dorohova G.I., Rosenberg K.A. and Kabalov J.K. (2000) X-ray diffraction and infrared spectroscopy of Al-Cr spinels. *Experiment in Geosciences*, 9, (1), 119-121.
- Kurlov, V.N. and Theodore, F. (1999) Growth of sapphire crystals of complicated shape. *Crystal Research and Technology* 34, 293-300.
- Kurosawa M., Shimano S., Ishi S., Shima K. and Kato T. (2003) Quantitative trace element analysis of single fluid inclusions by proton-induced X-ray emission (PIXE): Application to fluid inclusions in hydrothermal quartz. *Geochimica et Cosmochimica Acta*, 67, (22), 4337-4352.
- Kuznetsova L.G. (2009) Uncommon rare-elements spectrum and geochemical evolution of the Tastyg spodumene granitoids (south Siberia, Russia). *Estudios Geologicos*, 19, (2), 150-155.

- Kuznetsova L.G. and Prokofev V.Y. (2009) Petrogenesis of extremely lithium-rich spodumene aplites of the Tastyg deposit, Sangilen Highland, Tyva Republic. *Doklady Earth Sciences*, 429, (8), 1262-1266.
- Kuznetsova Y.V., Kalinin D.V., Serdobintseva V.V. and Sobolev N.V. (2003) Nature of forces acting in the formation of supramolecular noble opal crystals: Main cause of the macrostructural diversity of mineral. *Doklady Earth Sciences*, 389, (2), 216-218.
- Kvapil, J., Perner, B., Sulovsky, J. and Kvapil, J. (1973) Colour centre formation in corundum doped with divalent ions. *Kristall und Technik* 8, 247-251.
- Kyi, U. H. and Thu, U. K. (2006) A new deposit of jeremejevite from the Mogok Stone Tract, Myanmar, *Australian Gemmologist*, 22. 9. 402-405
- Kyi, U.H., Buchholz, P. and Wolf, D. (1999) Heat treatment of milky sapphires from the Mogok stone tract, Myanmar. *Journal of Gemmology* 26, 313-315.
- La Touche, T.D. (1890) The sapphire mines of Kashmir. *Geological Survey of India - Records* 23, 59-69.
- Lagache M. and Sebastian A. (1991) Experimental study of Li-rich granitic pegmatites: Part II. Spodumene + albite + quartz equilibrium. *American Mineralogist*, 76, (3/4), 611-616.
- Laird, J. and Albee, A. L. (1972) Chemical composition and physical, optical, and structural properties of benitoite, neptunite, and joaquinite, *American Mineralogist*, 57. 1/2. 85-102
- Landes, K. K. (1938) Origin of the Quebec phlogopite-apatite deposits, *American Mineralogist*, 23. 6. 359-390
- Landman, N. H., Mikkelsen, P.M., Bieler, R. Bronson, B. (2001) *Pearls: a natural history*, Harry N. Abrams, Inc, New York, 232 pp.
- Landmann A. (1999) Synthetische Quarzkristalle - Kristalleigenschaften, hydrothermale Zuchtung und gemmologische Unterscheidung von natürlichen Quarzkristallen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 48, (3), 129-140.
- Landtwing M.R. and Pettke T. (2005) Relationships between SEM-cathodoluminescence response and trace-element composition of hydrothermal vein quartz. *American Mineralogist*, 90, (1), 122-131.
- Langenheim, J. H. and Beck, C. W. (1965) Infrared spectra as a means of determining botanical sources of amber, *Science*, 149. 3679. 52-55
- Langer K. (1979), Absorption spectroscopy on microcrystals of rock-forming silicate minerals in the range 4000-5000 cm^{-1} (250-2000 nm): Methods and applications, *Physics and Chemistry of Minerals*, 4, 1, 101-103.
- Langer K., Tillmanns E., Kersten M., Almen H. and Arni R.K. (2002) The crystal chemistry of Mn^{3+} in the clino- and ortho-zoisite structure types, $\text{Ca}_2\text{Mn}^{3+}_3(\text{OH})[\text{SiO}_4][\text{Si}_2\text{O}_7]$: A structural and spectroscopic study of some natural piemontites and "thulites" and their synthetic equivalents. *Zeitschrift für Kristallographie*, 217, (11), 563-580.
- Langer, K. and Abu-Eid, R. M. (1977) Measurement of the polarized absorption spectra of synthetic transition metal-bearing silicate microcrystals in the spectral range 44,000-4,000 cm^{-1} , *Physics and Chemistry of Minerals*, 1. 3. 273-299
- Langer, K. and Raith, M. (1974) Infrared spectra of Al-Fe(III)-epidotes and zoisites, $\text{Ca}_2(\text{Al}_{1-p}\text{Fe}_{3+p})\text{Al}_2\text{O}(\text{OH})[\text{Si}_2\text{O}_7][\text{SiO}_4]$, *American Mineralogist*, 59. 11/12. 1249-1258
- Langer, K., Platonov, A. N., Matsyuk, S. S. and Wildner, M. (2002) The crystal chemistry of the humite minerals: Fe^{2+} - Ti^{4+} charge transfer and structural allocation of Ti^{4+} in chondrodite and clinohumite, *European Journal of Mineralogy*, 14. 6. 1027-1032
- Langer, K., Platonov, A.N., Matsuk, S.S. and Andrut, M. (1994) Electronic absorption spectra of chromium-bearing sapphirine. *Physics and Chemistry of Minerals* 21, 29-35.
- Lapham, D. M. (1957) Epidote from Hawleyville, Connecticut, *American Mineralogist*, 42. 1/2. 62-72
- Larsen, E. S. (1928) The optical properties of the humite group, *American Mineralogist*, 13. 7. 354-359
- Larsen, E.S. (1942) The mineralogy and paragenesis of the variscite nodules from near Fairfield, Utah. *American Mineralogist* 27, 281-300, 350-372, 441-451.
- Larsson L. (1995) Temperature dependent cation distribution in a natural $\text{Mg}_{0.4}\text{Fe}_{0.6}\text{Al}_2\text{O}_4$ spinel. *Neues Jahrbuch für Mineralogie Monatshefte*, (4), 173-184.
- Lasnier, B., Poirot, J. P. and Smith, D. C. (1992) Intercroissances de jadeite de differentes compositions dans des jades revelees par cathodoluminescence, *Revue de Gemmologie a.f.g.*, 113. 8-11
- Launer, P. J. (1952) Regularities in the infrared absorption spectra of silicate minerals, *American Mineralogist*, 37. 9/10. 764-783

- Laurs B.M., Simmons W.B., Falster A.U. and Anckar B. (2009) Genesis of yellow manganese-rich elbaite from the Canary mining area, Lundazi, Zambia. *Applied Geochemistry*, 24, (6), 1113-1124.
- Laurs B.M., Simmons W.B., Rossman G.R., Fritz E.A., Koivula J.I., Anckar B. and Falster A.U. (2007) Yellow Mn-rich tourmaline from the Canary mining area, Zambia. *Gems and Gemology*, 43, (4), 314-331.
- Laurs B.M., Zwaan J.C., Breeding C.M., Simmons W.B., Beaton D., Rijdsdijk K.F., Befi R. and Falster A.U. (2008) Copper-bearing (Paraíba-type) tourmalines from Mozambique. *Gems and Gemology*, 44, (1), 4-30.
- Laurs, B. M., Rohtert, W. R. and Gray, M. (1997) Benitoite from the new Idria District, San Benito County, California, *Gems and Gemology*, 33. 3. 166-187
- Lavina B., Reznitskii L.Z. and Bosi F. (2003) Crystal chemistry of some Mg, Cr, V normal spinels from Sludyanka (Lake Baikal, Russia): The influence of V^{3+} on structural stability. *Physics and Chemistry of Minerals*, 30, (10), 599-605.
- Lavina B., Salviulo G. and Della Giusta A. (2002) Cation distribution and structure modelling of spinel solid solutions. *Physics and Chemistry of Minerals*, 29, (1), 10-18.
- Lavrentiev M.Y., Purton J.A. and Allan N.L. (2003) Ordering in spinels - A Monte Carlo study. *American Mineralogist*, 88, (10), 1522-1531.
- Lawson, S. C., Kanda, H., Watanabe, K., Kiflawi, I., Sato, Y. and Collins, A. T. (1996) Spectroscopic study of cobalt-related optical centers in synthetic diamond, *Journal of Applied Physics*, 79. 8. 4348-4357
- Lazebnik, K. A. and Nikishova, L. V. (1992) First find of a manganese-bearing silicate in charoitites, *Doklady Akademii Nauk SSSR*, 322. 3. 580-594
- Leal-Gomes, C.C. and Dias, P.A. (2009) The gemmologic qualification of some varieties of pegmatites and hydrothermal minerals in Portugal. *Estudios Geológicos* 19, 156-161.
- Leckebusch, R. (1976) Die Abhängigkeit der Farbe von der Beleuchtungsart beim Alexandrit und Fluorit und ihre Ursachen, *Der Aufschluss*, 27. 2. 277-280
- Lee J.K.W. and Tromp J. (1995) Self-induced fracture generation in zircon. *Journal of Geophysical Research*, 100, (B9), 17753-17770.
- Lee Y.L. (1999) Geotectonic significance of detrital chromian spinel: A review. *Geosciences Journal*, 3, (1), 23-29.
- Lee, D. E. (1962) Grossularite-spessartite garnet from the Victory mine, Gabbs, Nevada, *American Mineralogist*, 47. 1/2. 147-151
- Lee, D.E. and Erd, R.C. (1963) Phenakite from the Mount Wheeler area, Snake Range, White Pine County, Nevada. *American Mineralogist* 48, 189-193.
- Lee, G. K. (1991) Analytical chemistry tracks poachers, *Analytical Chemistry*, 63. 9. 513-515
- Lee, H., Lee, S.M., Ada, E.T., Kim, B., Weiss, M., Perry, S.S. and Rabalais, J.W. (1999) Shallow implantation of Ti^{3+} ions in sapphire [$\alpha-Al_2O_3(0001)$]. *Nuclear Instruments and Methods in Physics Research B* 157, 226-232.
- Lee, K.W. and Hoggard, P.E. (1990) Relationship of the ruby spectrum to the geometry of the chromium (III) environment. *Inorganic Chemistry* 29, 850-854.
- Lee, S.W., Kim, G.H. and Choi, C.S. (2008) Characteristic crystal orientation of folia in oyster shell, *Crassostrea gigas*. *Materials Science and Engineering C* 28, 758-763.
- Lee, Y.T., Chen, J.C., Ho, K.S. and Juang, W.S. (2004) Geochemical studies of tektites from East Asia. *Geochemical Journal* 38, 1-17.
- Leelawathanasuk, T., Atichat, W., Sutthirat, C., Wathanakul, P., Sriprasert, B., Naruedeesombat, N., Srithunayothin, P. and Davies, S. (2011) Pallasitic peridot: The gemstone from outer space. *32nd International Geological Congress - Abstracts*, 110-113.
- Leelawathanasuk, T., Pisutha-Arnond, V., Atichat, W., Sutthirat, C., Wathanakul, P. and Sriprasert, B. (2009) Some characteristics of "Mozambique ruby". *31st International Gemmological Congress - Abstracts*, 33-34.
- Leelawathanasuk-Pavaro, T., Atichat, W., Sutthirat, C., Pisutha-Arnond, V., Wathanakul, P. and Sriprasert, B. (2008) Inclusions in rubies from Winza, Tanzania. *2nd International Gem and Jewelry Conference*, 184-186.
- Lees, B.K., Voynick, S., Moore, T., Misantoni, D., Silberman, M.K., Murphy, J.A., Hurlbut, J.F., Wenrich, K.J., Reynolds, J. and Aumente-Modreski, R. (1998) The Sweet Home Mine. *Mineralogical Record* 29, 1-192.
- Lefever, R. A., Chase, A. B. and Sobon, L. E. (1962) Synthetic emerald, *American Mineralogist*, 47. 11/12. 1450-1453

- Lehmann K., Berger A., Götze T., Ramseier K. and Wiedenbeck M. (2009) Growth related zonation in authigenic and hydrothermal quartz characterized by SIMS-, EPMA-, SEM-CL-, and SEM-CC-imaging. *Mineralogical Magazine*, 73, (4), 633-643.
- Leithner, H. (1980) Alexandrite aus dem Ural, *Lapis*, 5. 4. 25-28
- Lenaz, D., Skogby H., Nestola F. and Princivalle F. (2008) OH incorporation in nearly pure $MgAl_2O_4$ natural and synthetic spinels. *Geochimica et Cosmochimica Acta*, 72, (2), 475-479.
- Lennie, A.R. and Vaughan, D.J. (1992) Kinetics of the marcasite-pyrite transformation: An infrared spectroscopic study. *American Mineralogist* 77, 1166-1171.
- Leonyuk, N.I., Lyutin, A.V., Maltsev, V.V., Barilo, S.N., Bychkov, G.L., Kurnevich, L.A., Emelchenko, G.A., Masalov, V.M. and Zhokhov, A.A. (2005) Growth and morphology of ruby crystals with unusual chromium concentration. *Journal of Crystal Growth* 280, 551-556.
- Lepold, M. and Schramm, M. (1989) Schleifwürdige, grüne peridote aus Lanzarote. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 38, 40-41.
- Lesh, C. (1980) Remodeling the ivory tower, *Gems and Gemology*, 16. 11. 370-372
- Letson, N. (1980) Jaqueto-Brazil's newest treasure, *Lapidary Journal*, 34. 4. 852-854
- Leventouri, T., Chakoumakos, B. C., Papanearchou, N. and Perdikatis, V. (2001) Comparison of crystal structure parameters of natural and synthetic apatites from neutron powder diffraction, *Journal of Materials Research*, 16. 9. 2600-2606
- Leverette, C.L., Warren, M., Smith, M.A. and Smith, G.W. (2008) Determination of carotenoid as the purple pigment in *Gorgonia ventalina* sclerites using Raman spectroscopy. *Spectrochimica Acta A* 69, 1058-1061.
- Levinson, A.A. and Cook, F.A. (1994) Gem corundum in alkali basalt: Origin and occurrence. *Gems and Gemology* 30, 253-262.
- Lhoest, J. J., Gauthier, G. J. and King, V. T. (1991) The Mashamba West mine Shaba, Zaire, *Mineralogical Record*, 22. 1. 13-20
- Li D., Bancroft G.M., Kasrai M., Fleet M.E., Secco R.A., Feng X.H., Tan K.H. and Yang B.X. (1994) X-ray absorption spectroscopy of silicon dioxide (SiO_2) polymorphs: The structural characterization of opal. *American Mineralogist*, 79, (7/8), 622-632.
- Li, J.J., Hao, W.J., Sun, Y., Luo, H., Cheng, Y.F., Liu, H.F., Liu, Y., Fan, C.X. and Ye, H. (2011) Comparative study of different types of filled rubies. *Australian Gemmologist* 24, 106-115.
- Li, L. and Zhang, J. (2001) Gemmology of abalone shell and analysis on the origin of its iridescence (in Chinese). *Journal of Gems and Gemology* 3, 1-5.
- Li, X.D. (2007) Nanoscale structural and mechanical characterization of natural nanocomposites: Seashells. *JOM* 59, 71-74.
- Li, Z. (2001) Study on inclusions in natural and synthetic gems, *Chinese Journal of Geochemistry*, 20. 4. 324-332
- Libowitzky E. (1994) Optical anisotropy in the spinel group: A polishing effect. *European Journal of Mineralogy*, 6, (2), 187-194.
- Libowitzky, E. and Beran, A. (1995) OH defects in forsterite, *Physics and Chemistry of Minerals*, 22. 6. 387-392
- Liccardo, A., Oliveira, E.F. and Jordt-Evangelista, H. (2005) Rubi and safiras de Minas Gerais, Brazil. *Revista Escola de Minas* 58, 237-245.
- Liccini, M. (1998) Two new colour enhanced gemstones, *Wahroongai News*, 32. 11. 18-19
- Liddicoat, R. T. (1962a) Cat's-eye apatite, *Gems and Gemology*, 10. 10. 315-316
- Liddicoat, R. T. (1962b) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 10. 10. 315-318
- Liddicoat, R. T. (1962c) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 10. 9. 278-280
- Liddicoat, R. T. (1962d) Ekanite, *Gems and Gemology*, 10. 10. 317
- Liddicoat, R. T. (1962e) Enstatite-hypersthene, *Gems and Gemology*, 10. 9. 278-279
- Liddicoat, R. T. (1962f) Kenya ruby. *Gems and Gemology* 10, 316.
- Liddicoat, R. T. (1962g) Padparadscha sapphire. *Gems and Gemology* 10, 316.
- Liddicoat, R. T. (1962h) Serpentine. *Gems and Gemology* 10, 342.
- Liddicoat, R. T. (1962i) Unusual stones, *Gems and Gemology*, 10. 11. 343-344

- Liddicoat, R. T. (1963a) Blue-dyed, plastic-treated marble beads, *Gems and Gemology*, 11. 4. 115-116
- Liddicoat, R. T. (1963b) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 11. 1. 17-22
- Liddicoat, R. T. (1963c) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 11. 2. 50-57
- Liddicoat, R. T. (1963d) Green jadeite, *Gems and Gemology*, 11. 3. 89-90
- Liddicoat, R. T. (1963e) Imperial jadeite, *Gems and Gemology*, 11. 2. 54-55
- Liddicoat, R. T. (1963f) Other unusual gem materials recently encountered, *Gems and Gemology*, 11. 1. 20
- Liddicoat, R. T. (1963g) Synthetic emerald versus natural, *Gems and Gemology*, 11. 3. 91
- Liddicoat, R. T. (1963h) Translucent lapis, *Gems and Gemology*, 11. 1. 20
- Liddicoat, R. T. (1963i) Transparent labradorite, *Gems and Gemology*, 11. 4. 114
- Liddicoat, R. T. (1963j) Unusual stones, *Gems and Gemology*, 11. 2. 55-56
- Liddicoat, R. T. (1964a) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 11. 6. 185-189
- Liddicoat, R. T. (1964b) Developments in the synthetic-emerald field, *Gems and Gemology*, 11. 5. 131-137
- Liddicoat, R. T. (1964c) Star labradorite, *Gems and Gemology*, 11. 5. 155
- Liddicoat, R. T. (1964d) Unevenly colored emerald, *Gems and Gemology*, 11. 6. 185
- Liddicoat, R. T. (1965a) A new color in dyed chalcedony, *Gems and Gemology*, 11. 12. 372-373
- Liddicoat, R. T. (1965b) "Black jade". *Gems and Gemology* 11, 284.
- Liddicoat, R. T. (1965c) Cat's-eye apatite, *Gems and Gemology*, 11. 12. 372
- Liddicoat, R. T. (1965d) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 11. 12. 368-376
- Liddicoat, R. T. (1965e) Four-rayed star diopside, *Gems and Gemology*, 11. 12. 370
- Liddicoat, R. T. (1965f) Linde synthetic emeralds, *Gems and Gemology*, 11. 12. 372
- Liddicoat, R. T. (1965g) Semioriented separations in synthetic emerald, *Gems and Gemology*, 11. 9. 283-284
- Liddicoat, R. T. (1965h) Unusual light-colored emerald, *Gems and Gemology*, 11. 12. 368
- Liddicoat, R. T. (1966a) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 12. 4. 118-124
- Liddicoat, R. T. (1966b) Rare cat's eye, *Gems and Gemology*, 12. 4. 120
- Liddicoat, R. T. (1966c) Turquoise imitation. *Gems and Gemology* 12, 119-120.
- Liddicoat, R. T. (1966d) Uvarovite crystal, *Gems and Gemology*, 12. 4. 123
- Liddicoat, R. T. (1967a) Andesine feldspar, *Gems and Gemology*, 12. 7. 218-219
- Liddicoat, R. T. (1967b) Arizona andradite, *Gems and Gemology*, 12. 6. 185
- Liddicoat, R. T. (1967c) Benitoite inclusions, *Gems and Gemology*, 12. 9. 285-286
- Liddicoat, R. T. (1967d) Carved cordierite, *Gems and Gemology*, 12. 8. 249
- Liddicoat, R. T. (1967e) Chrome-rich chalcedony, *Gems and Gemology*, 12. 6. 188-190
- Liddicoat, R. T. (1967f) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 12. 6. 183-190
- Liddicoat, R. T. (1967g) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 12. 7. 212-222
- Liddicoat, R. T. (1967h) A new Australian emerald source, *Gems and Gemology*, 12. 7. 220-222
- Liddicoat, R. T. (1967i) Taaffeite proves largest. *Gems and Gemology* 12, 212-215.
- Liddicoat, R. T. (1967j) Transparent green grossularite, *Gems and Gemology*, 12. 8. 248-249
- Liddicoat, R. T. (1967k) Unusual materials, *Gems and Gemology*, 12. 8. 251
- Liddicoat, R. T. (1967l) White serpentine. *Gems and Gemology* 12, 187.
- Liddicoat, R. T. (1968a) Developments and highlights at the Gem Trade Lab in Los Angeles, *Gems and Gemology*, 12. 9. 281-287
- Liddicoat, R. T. (1968b) New peridot occurrence. *Gems and Gemology* 12, 311-312.
- Liddicoat, R. T. (1968c) Trapiche emeralds, *Gems and Gemology*, 12. 10. 316-317

- Liddicoat, R. T. (1969a) Cat's-eye peridot. *Gems and Gemology* 13, 129.
- Liddicoat, R. T. (1969b) Changes in synthetic emerald, *Gems and Gemology*, 13. 1. 23-24
- Liddicoat, R. T. (1969c) Chrysocolla opal, *Gems and Gemology*, 13. 2. 67-68
- Liddicoat, R. T. (1969d) Developments and highlights at GIA's Lab in Los Angeles, *Gems and Gemology*, 13. 3. 97-102
- Liddicoat, R. T. (1969e) Happy gift. *Gems and Gemology* 13, 25-26.
- Liddicoat, R. T. (1969f) Hornbill ivory, *Gems and Gemology*, 13. 3. 98-99
- Liddicoat, R. T. (1969g) Inclusions in phosphophyllite. *Gems and Gemology* 13, 65.
- Liddicoat, R. T. (1969h) High indices in synthetic emerald, *Gems and Gemology*, 13. 2. 64-65
- Liddicoat, R. T. (1969i) Hydrothermal synthetic emerald, *Gems and Gemology*, 13. 4. 123
- Liddicoat, R. T. (1969j) Kashan flux grown rubies. *Gems and Gemology* 13, 30-34.
- Liddicoat, R. T. (1969k) Linde hydrothermal emerald, *Gems and Gemology*, 13. 2. 65
- Liddicoat, R. T. (1969l) More on synthetic flux-melt emeralds, *Gems and Gemology*, 13. 4. 123-125
- Liddicoat, R. T. (1969m) Nephrite absorption spectrum, *Gems and Gemology*, 13. 2. 63-64
- Liddicoat, R. T. (1969n) Russian emeralds, *Gems and Gemology*, 13. 2. 63
- Liddicoat, R. T. (1969o) Synthetics examined. *Gems and Gemology* 13, 22-23.
- Liddicoat, R. T. (1970a) A beautiful idocrase, *Gems and Gemology*, 13. 10. 316
- Liddicoat, R. T. (1970b) A purple-to-violet cabochon, *Gems and Gemology*, 13. 10. 316
- Liddicoat, R. T. (1970c) Amber snuff bottles, *Gems and Gemology*, 13. 9. 276
- Liddicoat, R. T. (1970d) Chrome fluorite, *Gems and Gemology*, 13. 7. 231
- Liddicoat, R. T. (1970e) Doctored synthetic rubies. *Gems and Gemology* 13, 275-276.
- Liddicoat, R. T. (1970f) Horn, *Gems and Gemology*, 13. 6. 182
- Liddicoat, R. T. (1970g) Large water-worn crystal of peridot. *Gems and Gemology* 13, 322.
- Liddicoat, R. T. (1970h) More on Linde hydrothermal emerald, *Gems and Gemology*, 13. 7. 233-234
- Liddicoat, R. T. (1970i) New hydrothermal synthetic emerald, *Gems and Gemology*, 13. 6. 185-187
- Liddicoat, R. T. (1970j) Rare star peridot. *Gems and Gemology* 13, 150.
- Liddicoat, R. T. (1970k) Parallel growth in emerald, *Gems and Gemology*, 13. 5. 151
- Liddicoat, R. T. (1970l) Sinhalite. *Gems and Gemology* 13, 231.
- Liddicoat, R. T. (1970m) Rare inclusions in synthetic emerald, *Gems and Gemology*, 13. 5. 152-152
- Liddicoat, R. T. (1970n) Synthetic vs. natural emeralds, *Gems and Gemology*, 13. 9. 277
- Liddicoat, R. T. (1970o) Unusual spessartite garnet, *Gems and Gemology*, 13. 6. 189
- Liddicoat, R. T. (1971a) Dyed light-violet jade, *Gems and Gemology*, 13. 10. 323-324
- Liddicoat, R. T. (1971b) Unusual and challenging gem materials, *Gems and Gemology*, 13. 12. 383
- Liddicoat, R. T. (1971c) Yet another synthetic emerald, *Gems and Gemology*, 13. 11. 359-360
- Liddicoat, R. T. (1972a) A large black diamond. *Gems and Gemology* 14, 41-42.
- Liddicoat, R. T. (1972b) Alexandrite-like sapphire. *Gems and Gemology* 14, 43-44.
- Liddicoat, R. T. (1972c) Another serpentine. *Gems and Gemology* 14, 23-24.
- Liddicoat, R. T. (1972d) Cat's-eye jadeite, *Gems and Gemology*, 14. 3. 93
- Liddicoat, R. T. (1972e) Jade substitute, *Gems and Gemology*, 14. 2. 44-45
- Liddicoat, R. T. (1972f) Noteworthy inclusions in natural emeralds, *Gems and Gemology*, 14. 1. 18-19
- Liddicoat, R. T. (1972g) Synthetic alexandrite finally reaches the market, *Gems and Gemology*, 14. 4. 102-104
- Liddicoat, R. T. (1972h) Transparent Pakistani diopside, *Gems and Gemology*, 14. 1. 20
- Liddicoat, R. T. (1972i) Turquoise and matrix. *Gems and Gemology* 14, 86-87.
- Liddicoat, R. T. (1972j) Unusual inclusions in synthetic emeralds, *Gems and Gemology*, 14. 1. 19-20
- Liddicoat, R. T. (1973a) Developments and highlights at GIA's Lab in Los Angeles, *Gems and Gemology*, 14. 6. 180-189
- Liddicoat, R. T. (1973b) One of the great rarities, *Gems and Gemology*, 14. 6. 184-185
- Liddicoat, R. T. (1973c) Rich blue kyanite, *Gems and Gemology*, 14. 8. 254-255

- Liddicoat, R. T. (1973d) Twinned star, *Gems and Gemology*, 14. 6. 183
- Liddicoat, R. T. (1974a) A new synthetic alexandrite by the Czochralski method, *Gems and Gemology*, 14. 12. 367
- Liddicoat, R. T. (1974b) A totally new coral, *Gems and Gemology*, 14. 12. 369-370
- Liddicoat, R. T. (1974c) Transparent sodalite. *Gems and Gemology* 14, 345.
- Liddicoat, R. T. (1974d) Unevenly dyed jadeite, *Gems and Gemology*, 14. 11. 350
- Liddicoat, R. T. (1975a) Black diamond. *Gems and Gemology* 15, 47-48.
- Liddicoat, R. T. (1975b) Large Montana sapphire. *Gems and Gemology* 15, 27.
- Liddicoat, R. T. (1975c) A large new synthetic pink sapphire. *Gems and Gemology* 15, 46-47.
- Liddicoat, R. T. (1975d) Moldavite, *Gems and Gemology*, 15. 3. 75
- Liddicoat, R. T. (1975e) Semitransparent jadeite, *Gems and Gemology*, 15. 3. 73-74
- Liddicoat, R. T. (1975f) Variscite. *Gems and Gemology* 15, 29.
- Liddicoat, R. T. (1976a) African alexandrites?, *Gems and Gemology*, 15. 7. 211-212
- Liddicoat, R. T. (1976b) Another synthetic emerald, *Gems and Gemology*, 15. 5. 138
- Liddicoat, R. T. (1976c) Developments and highlights at GIA's Lab in Los Angeles. *Gems and Gemology* 15, 138-142.
- Liddicoat, R. T. (1976d) One of the rarer. *Gems and Gemology* 15, 170.
- Liddicoat, R. T. (1976e) Rare and unusual stones, *Gems and Gemology*, 15. 8. 235-236
- Liddicoat, R. T. (1976f) Rarely used gem materials seen recently, *Gems and Gemology*, 15. 5. 138
- Liddicoat, R. T. (1977a) Very interesting items, *Gems and Gemology*, 15. 10. 295-296
- Liddicoat, R. T. (1977b) Zoned emerald, *Gems and Gemology*, 15. 11. 328-329
- Liddicoat, R. T. and Fryer, C. W. (1974) Three new gem materials, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 23. 2. 125-127
- Liebau, F. (1980) The role of cationic hydrogen in pyroxenoid crystal chemistry. *American Mineralogist* 65, 981-985.
- Lieber, W. (1976) Peridot-Arizonas staatsjuwel - Portat eines begehrten steines. *Lapis* 1, 14-17.
- Lieber, W. (1994) Der Blue John - fluorit, *Lapis*, 19. 13-22
- Liebert, D. (1996) The use of amber in antiquity, *Celator*, 10. 10. 51
- Liebscher A., Gottschalk M. and Franz G. (2002) The substitution Fe^{3+} -Al and the isosymmetric displacive phase transition in synthetic zoisite: A powder X-ray and infrared spectroscopy study. *American Mineralogist*, 87, (7), 909-921.
- Liermann H.P. and Ganguly J. (2002) Diffusion kinetics of Fe^{2+} and Mg in aluminous spinel: Experimental determination and applications. *Geochimica et Cosmochimica Acta*, 66, (16), 2903-2913.
- Liferovich R.P. and Mitchell R.H. (2005a) Composition and paragenesis of Na-, Nb-, and Zr-bearing titanite from Khibina, Russia, and crystal-structure data for synthetic analogues. *Canadian Mineralogist*, 43, (2), 795-812.
- Liferovich R.P. and Mitchell R.H. (2005b) Solid solution of rare earth elements in synthetic titanite: A reconnaissance study. *Mineralogy and Petrology*, 83, (3/4), 271-282.
- Liferovich R.P. and Mitchell R.H. (2006a) Tantalum-bearing titanite: Synthesis and crystal structure data. *Physics and Chemistry of Minerals*, 33, (2), 73-83.
- Liferovich R.P. and Mitchell R.H. (2006b) Solid solutions of niobium in synthetic titanite. *Canadian Mineralogist*, 44, (5), 1089-1097.
- Lin J.S., Payne M.C., Heine V. and McConnell J.D.C. (1994) Ab initio calculations on $(\text{OH})_4$ defects in α -quartz. *Physics and Chemistry of Minerals*, 21, (3), 150-155.
- Lin, A.Y.M., Meyers, M.A. and Vecchio, K.S. (2006) Mechanical properties and structure of *Strombus gigas*, *Tridacna gigas*, and *Haliotis rufescens* sea shells: A comparative study. *Materials Science and Engineering C* 26, 1380-1389.
- Lin, L.B., Luo, D.L., Zhang, C.X. and Su, T.C. (1998) Defects in sapphire: Mn induced by neutron irradiation. *Nuclear Instruments and Methods in Physics Research B* 141, 450-454.
- Linares, C., Bianchimano, O., Torrents, O., Marschal, C., Drap, P., Garrabou, J. (2010). Marine protected areas and the conservation of long-lived marine invertebrates: The Mediterranean red coral. *Marine Ecology Progress Series* 402. 69-79.

- Linares, R. (2006) Boron-doped diamond semiconductor, *WIPO Patent*,
- Linares, R. C. and Doering, P. J. (2007a) System and method for producing synthetic diamond, *United States Patent*, US 7258741. 42 pages
- Linares, R.C. (1965) Properties and growth of flux ruby. *Journal of the Physics and Chemistry of Solids* 26, 1817–1820.
- Lind, T., Schmetzer, K. and Bank, H. (1986) Blue and green beryls (aquamarines and emeralds) of gem quality from Nigeria, *Journal of Gemmology*, 20. 1. 40-48
- Linde, C. (1998) Bemerkenswerte Eigenfunde in Lapis, *Lapis*, 23. 1. 22
- Lindner, P. H. and Rolff, A. (1967) Fabulous aquamarines and a huge lilac diamond found in Brazil, *Lapidary Journal*, 21. 9. 1116-1125
- Lindner, P.H. (1967) Petalite and turquoise discovered in Brazil. *Lapidary Journal* 21, 196-201.
- Linley-Shaw, S. (1975) Blue John Stone - its formation, history and working, *Lapidary Journal*, 29. 7. 1294-1297
- Linton, T. (1997) A new technique for detecting synthetic yellow sapphire. *Australian Gemmologist* 19, 509-511.
- Liou, J.G. (1971) Synthesis and stability relations of prehnite, $\text{Ca}_2\text{Al}_2\text{Si}_3\text{O}_{10}(\text{OH})_2$. *American Mineralogist* 56, 507-531.
- Lipatov E.I., Orlovskii V.M., Tarasenko V.F. and Solomonov V.I. (2007) Comparison of luminescence spectra of natural spodumene under KrCl laser and e-beam excitation. *Journal of Luminescence*, 126, (2), 817-821.
- Liu Y., Shigley J., Fritsch E. and Hemphill S. (1995) Abnormal hue-angle change of the gemstone tanzanite between CIE Illuminants D65 and A in CIELAB color space. *Color Research and Application*, 20, (4), 245-250.
- Liu, G. (1982) Hydrothermal synthesis of sodalite and its photochromic, cathodochromic properties. *1st International Symposium on Hydrothermal Reactions - Proceedings*, 553-560.
- Liu, G. (1991) The synthetic gem materials made in China and color enhancement of gem materials. *International Gemmological Symposium - Proceedings*.
- Liu, L. G. (1987) Effects of H_2O on the phase behavior of the forsterite - enstatite system at high pressures and temperatures and implications for the Earth, *Physics of the Earth and Planetary Interiors*, 49. 1/2. 142-167
- Liu, L. G. and Mernagh, T. P. (1992) Phase transitions and Raman spectra of anatase and rutile at high pressures and room temperature, *European Journal of Mineralogy*, 4. 1. 45-52
- Liu, Y. and Fry, B. A. (2006) A colorimetric study of a tourmaline from Mozambique which shows a reverse alexandrite effect, *Journal of Gemmology*, 30. 3/4. 201-206
- Liu, Y., Hurwit, K. and Tian, L. (2003a) Iridescence of a shell of Pteria Sterna (Gould 1851): An optical and structural investigation. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 52, 145-150.
- Liu, Y., Hurwit, K.N. and Shigley, J.E. (2002) Iridescence of a shell of the abalone Haliotis rufescens caused by diffraction. *Journal of Gemmology* 28, 1-5.
- Liu, Y., Hurwit, K.N. and Tian, L. (2003b) Relationship between the groove density of the grating structure and the strength of iridescence in mollusc shells. *Australian Gemmologist* 21, 405-407.
- Liu, Y., Shigley, J.E. and Hurwit, K.N. (1999) Iridescence color of a shell of the mollusk *Pinctada Margaritifera* caused by diffraction. *Optics Express* 4, 177-181.
- Livstrand U. (1987) The black opals of Lightning Ridge. *Lapidary Journal*, 41, (3), 49-56.
- Liyanage, D. V. (1997) The cat's eye tale, *Rapaport Diamond Report*, December. 41
- Lizzadro, J. (1987) The interesting story of a new blue gem material called larimar. *Lizzadro Museum*, 13-14.
- Loh, S. E. and Wise, W. S. (1976) Synthesis and fluorine-hydroxyl exchange in the amblygonite series, *Canadian Mineralogist*, 14. 3. 357-363
- London D. (1986) Formation of tourmaline-rich gem pockets in miarolitic pegmatites. *American Mineralogist*, 71, (3/4), 396-405.
- London D. (2011) Experimental synthesis and stability of tourmaline: A historical overview. *Canadian Mineralogist*, 49, (1), 117-136.
- London D. and Burt D.M. (1982) Alteration of spodumene, montebrasite and lithiophilite in pegmatites of the White Picacho District, Arizona. *American Mineralogist*, 67, (1/2), 97-113.
- London, D. (1984) Experimental phase equilibria in the system $\text{LiAlSiO}_4\text{-SiO}_2\text{-H}_2\text{O}$: A petrogenetic grid for lithium-rich pegmatites, *American Mineralogist*, 69. 11/12. 995-1004

- London, D., Morgan, G. B. and Wolf, M. B. (2001) Amblygonite-montebrazite solid solutions as monitors of fluorine in evolved granitic and pegmatitic melts, *American Mineralogist*, 86, 3, 225-233
- Loock, G. W. (1987) Chrysoberyll aus Orissa, Indien, *Lapis*, 12, 12, 11-15
- Lottermoser, B.G. (1986) Cathodoluminescence of phenakite. *Mineralogical Magazine* 50, 733-734.
- Louderback, G. D. (1907) Benitoite, a new California gem mineral, *University of California Publications - Bulletin of the Department of Geology*, 5, 9, 149-153
- Love, M.S., Yoklavich, M.M., Black, B.A. and Andrews, A.H. (2007) Age of black coral (*Antipathes Dendrochristos*) colonies, with notes on associated invertebrate species. *Bulletin of Marine Science* 80, 391-400.
- Low, W. and Zeira, S. (1972) ESR spectra of Mn^{2+} in heat-treated aragonite, *American Mineralogist*, 57, 7/8, 1115-1124
- Lu T., Sunagawa I. and Balitsky V.S. (1990) Brazil twinning in natural and synthetic amethyst crystals. *Journal of Crystal Growth*, 99, (1/4), 1232-1237.
- Lu T.J. and Sunagawa I. (1990) Structure of Brazil twin boundaries in amethyst showing Brewster fringes. *Physics and Chemistry of Minerals*, 17, (3), 207-211.
- Lu, T. and Shigley, J.E. (1998) Optical characterization of synthetic faceted gem materials grown from hydrothermal solutions. *SPIE Proceedings* 3425, 37-45.
- Lu, T. and Sunagawa, I. (1987) Origin of undulated growth steps on hematite crystals from Sasazawa, Japan, *Mineralogical Journal*, 13, 7, 409-423
- Lucas, J. C. (1974) The actinolite crystals of Wenatchee Lake, *Lapidary Journal*, 27, 11, 1654-1659, 1668-1669
- Lucassen F., Franz G., Rhede D. and Wirth R. (2010) Ti-Al zoning of experimentally grown titanite in the system $CaO-Al_2O_3-TiO_2-SiO_2-NaCl-H_2O-(F)$: Evidence for small-scale fluid heterogeneity. *American Mineralogist*, 95, (10), 1365-1378.
- Lucchesi S. and Della Giusta A. (1994) Crystal chemistry of non-stoichiometric Mg-Al synthetic spinels. *Zeitschrift für Kristallographie*, 209, (9), 714-719.
- Lucchesi S., Della Giusta A. and Russo U. (1998) Cation distribution in natural Zn-aluminate spinels. *Mineralogical Magazine*, 62, (1), 41-54.
- Lucchesi S., Russo U. and Della Giusta A. (1997) Crystal chemistry and cation distribution in some Mn-rich natural and synthetic spinels. *European Journal of Mineralogy*, 9, (1), 31-42.
- Luckow, D. (1989) B.C. Professor cultures abalone pearl. *Canadian Jeweller* 110, 9-11.
- Ludwig T., Marschall H.R., Pogge von Strandmann P.A.E., Shabaga B.M., Fayek M. and Hawthorne F.C. (2011) A secondary ion mass spectrometry (SIMS) re-evaluation of B and Li isotopic compositions of Cu-bearing elbaite from three global localities. *Mineralogical Magazine*, 75, (4), 2485-2494.
- Lumpkin G.R., Eby R.K. and Ewing R.C. (1991) Alpha-recoil damage in titanite ($CaTiSiO_5$): Direct observation and annealing study using high resolution transmission electron microscopy. *Journal of Materials Research*, 6, (3), 560-564.
- Lumpkin, G. R. and Ribbe, P. H. (1979) Chemistry and physical properties of axinites, *American Mineralogist*, 64, 5/6, 635-645
- Lussier A.J. and Hawthorne F.C. (2011) Oscillatory zoned liddicoatite from Anjanabonoina, central Madagascar. II. Compositional variation and mechanisms of substitution. *Canadian Mineralogist*, 49, (1), 89-104.
- Lussier A.J., Abdu Y., Hawthorne F.C., Michaelis V.K., Aguiar P.M. and Kroeker S. (2011) Oscillatory zoned liddicoatite from Anjanabonoina, central Madagascar. I. Crystal chemistry and structure by SREF and ^{11}B and ^{27}Al MAS-NMR spectroscopy. *Canadian Mineralogist*, 49, (1), 63-88.
- Lussier A.J., Aguiar P.M., Michaelis V.K., Kroeker S. and Hawthorne F.C. (2009) The occurrence of tetrahedrally coordinated Al and B in tourmaline: An ^{11}B and ^{27}Al MAS NMR study. *American Mineralogist*, 94, (5/6), 785-792.
- Lussier A.J., Aguiar P.M., Michaelis V.K., Kroeker S., Herwig S., Abdu Y. and Hawthorne F.C. (2008) "Mushroom" elbaite from the Kat Chay mine, Momeik, near Mogok, Myanmar: I. Crystal chemistry by SREF, EMPA, MAS-NMR and Mössbauer spectroscopy. *Mineralogical Magazine*, 72, (3), 747-761.
- Lussier A.J., Cooper M.A., Hawthorne F.C. and Kristiansen R. (2009) Triclinic titanite from the Heftejern granitic pegmatite, Tørdal, southern Norway. *Mineralogical Magazine*, 73, (5), 709-722.
- Lussier A.J., Hawthorne F.C., Abdu Y., Herwig S., Michaelis V.K., Aguiar P.M. and Kroeker S. (2011) The crystal chemistry of "wheatsheaf" tourmaline from Mogok, Myanmar. *Mineralogical Magazine*, 75, (1), 65-86.

- Lussier A.J., Hawthorne F.C., Herwig S., Abdu Y., Aguiar P.M., Michaelis V.K. and Kroeker S. (2008) "Mushroom" elbaite from the Kat Chay mine, Momeik, near Mogok, Myanmar: II. Zoning and crystal growth. *Mineralogical Magazine*, 72, (5), 999-1010.
- Luther, G.W. (1991) Pyrite synthesis via polysulfide compounds. *Geochimica et Cosmochimica Acta* 55, 2839-2849.
- Luttge, A., Metz, P., Walther, J., Althaus, E. and Heinrich, W. (1992) CO₂-H₂O fluid inclusions in forsterite of a synthesized calc-silicate paragenesis, *Neues Jahrbuch für Mineralogie Abhandlungen*, 165. 1. 109-110
- Lyckberg P. (2011) Edelstein-pegmatite in Afghanistan: Paprok. *Mineralien Welt*, 22, (3), 46-57.
- Ma C., Goreva J.S. and Rossman G.R. (2002) Fibrous nanoinclusions in massive rose quartz: HRTEM and AEM investigation. *American Mineralogist*, 87, (2/3), 269-276.
- Ma, H., Zhang, B., Lee, I. S., Qin, Z., Tong, Z. and Qiu, S. (2007) Aragonite observed in the prismatic layer of seawater-cultured pearls, *Frontiers of Material Science in China*, 1. 3. 326-329
- Mac Fadden, C. K. (1934) Emerald mining in Colombia, *Gems and Gemology*, 1. 6. 149-154
- MacDonald D.J. and Hawthorne F.C. (1995) The crystal chemistry of Si⁴⁺↔Al substitution in tourmaline. *Canadian Mineralogist*, 33, (4), 849-858.
- Macdonald G. A. and R. Merriam (1938), Andalusite in pegmatite from Fresno County, California, *American Mineralogist*, 23, 9, 588-594.
- MacDonald, G. J. F. (1956) Experimental determination of calcite-aragonite equilibrium relations at elevated temperatures and pressures, *American Mineralogist*, 41. 9/10. 744-756
- MacFall, R. P. (1982) Historic Blue John and other fluorites, *Lapidary Journal*, 35. 10. 1998-2002, 2010-2018
- MacFall, R.P. (1974) Florida coral -- treasure from the sea. *Lapidary Journal* 28, 490-495, 500.
- Machida, H. and Yoshihara, Y. (1980) Synthetic single crystal for alexandrite gem, *United States Patent*, US 4240834.
- Maekawa H., Kato S., Kawamura K. and Yokokawa T. (1997) Cation mixing in natural MgAl₂O₄ spinel: A high-temperature ²⁷Al NMR study. *American Mineralogist*, 82, (11/12), 1125-1132.
- Maeta, H., Matsumoto, N., Haruna, K., Saotome, T., Ono, F., Sugai, H., Ohtsuka, H. and Ohashi, K. (2006) The characterization of synthetic and natural single crystal diamonds by X-ray diffraction, *Physica B: Condensed Matter*, 376/377. 1. 283-287
- Maitrallet, P. (1996) Le diamant et ses traitements, *Le Bijoutier*, 643. 55-56
- Makagon V.M. (2009) Geochemical and genetic differences of spodumene pegmatites in zonal veins of the East Sayan Belt. *Estudios Geológicos*, 19, (2), 203-206.
- Maki, J. M., Tuomisto, F., Kelly, C., Fisher, D. and Martineau, P. (2007) Effects of thermal treatment on optically active vacancy defects in CVD diamonds, *Physica B: Condensed Matter*, 401/402. 1. 613-616
- Makishima A. and Nakamura E. (1994) Rare-earth element geochemistry of zircon. *Journal of Mineralogy, Petrology and Economic Geology*, 89, (1), 1-14.
- Makovicky, E. and Karup-Møller, S. (2006) Mineralogy of the chrysanthemum stone, *Neues Jahrbuch für Mineralogie Abhandlungen*, 182. 3. 241-251
- Malcherek T., Domeneghetti M.C., Tazzoli V., Salje E.K.H. and Bismayer U. (1999) A high temperature diffraction study of synthetic titanite, CaTiOSiO₄. *Phase Transitions*, 69, (1), 119-131.
- Malcherek T., Paulmann C., Domeneghetti M.C. and Bismayer U. (2001) Diffuse scattering anisotropy and the P2₁/a ↔ A2/a phase transition in titanite, CaTiOSiO₄. *Journal of Applied Crystallography*, 34, (2), 108-113.
- Males, P. A. (1974) Gem quality kyanite crystals from the Harts Range, Northern Territory, *Australian Gemmologist*, 12. 1. 5-8
- Malikova, P. (1999) Origin of sapphires from the Jizerska Louka alluvial deposit in north Bohemia, Czech Republic, Europe. *Australian Gemmologist* 20, 202-206.
- Malisa E.P. (2003a) Trace elements characterization of the hydrothermally deposited tanzanite and green grossular in the Merelani-Lelatema shear zone, northeastern Tanzania. *Tanzania Journal of Science*, 29, (1), 45-60.
- Malisa E.P. (2003b) Petrology and litho-geochemistry of the mineralized tanzanite-grossular bearing rocks in the Merelani-Lelatema area, northeastern Tanzania. *Tanzania Journal of Science*, 29, (2), 55-70.
- Malisa E.P. (2005) Petrography and mineral chemistry of the pelitic and semi-pelitic gneisses of the Merelani tanzanite mining area, northeastern Tanzania. *Tanzania Journal of Science*, 31, (2), 81-92.

- Malisa E.P. and Kinabo C.P. (2005) Environmental risks for gemstone miners with reference to the Merelani tanzanite mining area, northeastern Tanzania. *Tanzania Journal of Science*, 31, (1), 1-12.
- Malley, J. (1988) Synthetischer Alexandrit aus der UdSSR, *Zurmitteilungen aus dem Institut für Edelsteinforschung der Johannes Gutenberg-Universität Mainz*, 4. 3/4. 21
- Maloney J.S., Nabelek P.I., Sirbescu M-L.C. and Halama R. (2008) Lithium and its isotopes in tourmaline as indicators of the crystallization process in the San Diego County pegmatites, California, USA. *European Journal of Mineralogy*, 20, (5), 905-916.
- Malsy A. and Klemm L. (2010) Distinction of gem spinels from the Himalayan Mountain Belt. *Chimia*, 64, (10), 741-746.
- Malyukin, Y.V., Lebedenko, A.N., Pogrebnyk, N.L., Litvinov, L.A., Roth, M. and Leonyuk, N.I. (2000) Peculiarities of the Ti^{3+} ion spectroscopy in defective corundum crystals. *Optics Communications* 186, 121-125.
- Manaka, Y. (1994) Jadeite coated by resin-like material, *Journal of the Gemmological Society of Japan*, 19. 1/4. 30-31
- Manfredotti, C., Giudice, A. L., Medunic, S., Jaksic, M. and Colombo, E. (2006) Ion beam annealing of single crystal CVD diamond, *Materials Research Society - Symposium Proceedings*, 908E.
- Manfredotti, C., Jaksic, M., Medunic, S., Lo Giudice, A., Garino, Y., Colombo, E., Marinelli, M., Milani, E. and Verona Rianti, G. (2007) Ion beam induced charge characterization of epitaxial single crystal CVD diamond, *Diamond and Related Materials*, 16. 4/7. 940-943
- Mankelevich, Y. A. and May, P. W. (2008) New insights into the mechanism of CVD diamond growth: Single crystal diamond in MW PECVD reactors, *Diamond and Related Materials*, 17. 7/10. 1021-1028
- Mann, B. and Brown, G. (2008) Steller's sea cow bone, *Australian Gemmologist*, 23. 6. 272-277
- Mann, S., Archibald, D. D., Didymus, J. M., Douglas, T., Heywood, B. R., Meldrum, F. C. and Reeves, N. J. (1993) Crystallization at inorganic-organic interfaces: Biominerals and biomimetic synthesis, *Science*, 261. 5126. 1286-1292
- Manning C.E. (1994) The solubility of quartz in H_2O in the lower crust and upper mantle. *Geochimica et Cosmochimica Acta*, 58, (22), 4831-4839.
- Manning, P. G. (1967) The optical absorption spectra of the garnets almandine-pyrope, pyrope and spessartine and some structural interpretations of mineralogical significance, *Canadian Mineralogist*, 9. 2. 237-251
- Manson, D. V. and Stockton, C. M. (1982) Gem-quality grossular garnets, *Gems and Gemology*, 18. 4. 204-213
- Manson, D.V. (1978) Plastic impregnated gem opal. *Gems and Gemology* 16, 49-57.
- Mao, P.F. (1990) Peridot in China. *15th General Meeting, International Mineralogical Association - Abstracts*, 683-684.
- Mao, Y., Liang, F., Fu, S., Yu, X., Ye, F., Deng, C. (2004) Preliminary studies on rainbow-pearl of penguin wing oyster *Pteria penguin*. *Chinese Journal of Zoology*, 39, 1, 100-102.
- Mappin, K. G. (1946) An analysis of recent hematite substitutes, *Gems and Gemology*, 5. 6. 325 and 328
- Marcczewska, B., Tromson, D., Descamps, C., Bilski, P., Schirru, F., Nowak, T. and Bogus, A. (2007) Thermoluminescent properties of CVD diamonds for radiation protection and radiotherapy applications, *Physica Status Solidi A*, 204. 9. 3036-3040
- Marcos-Pascual, C. and Moreiras, D.B. (1997) Characterization of alexandrite, emerald and phenakite from Franqueira (NW Spain). *Journal of Gemmology* 25, 340-357.
- Marinelli, M., Milani, E., Tucciarone, A. and Rinati, G. V. (2006) Defects in CVD diamond films from their response as nuclear detectors, *Topics in Applied Physics: Carbon*, 100. 107-135
- Mark, H.F. (1984) The development of plastics. *American Scientist* 72, 156-162.
- Marko F., Hurai V., Dyda M., Almeida G., Prochaska W. and Thomas R. (2006) Tectonic and fluid inclusion constraints on the origin of quartz veins with giant crystals in the Tocantins structural province (Cristalândia, central Brazil). *Journal of South America Earth Sciences*, 21, (3), 239-251.
- Marks M.A.W., Coulson I.M., Schilling J., Jacob D.E., Schmitt A.K. and Markl G. (2008) The effect of titanite and other HFSE-rich mineral (Ti-bearing andradite, zircon, eudialyte) fractionation on the geochemical evolution of silicate melts. *Chemical Geology*, 257, (1/2), 153-172.
- Markwitz, A., Barry, B., Gaudie, R.W. and Roberts, R.D. (2003) Probing for heavy element impurities in the shell of the Pacific oyster, *Crassostrea gigas*, with nuclear microscopy. *Nuclear Instruments and Methods in Physics Research B* 210, 418-423.

- Marler B. (1988) On the relationship between refractive index and density for SiO₂-polymorphs. *Physics and Chemistry of Minerals*, 16, (3), 286-290.
- Marschall H.R., Korsakov A.V., Luvizotto G.L., Nasdala L. and Ludwig T. (2009) On the occurrence and boron isotopic composition of tourmaline in (ultra)high-pressure metamorphic rocks. *Journal of the Geological Society*, 166, (4), 811-823.
- Marschall H.R., Meyer C., Wunder B., Ludwig T. and Heinrich W. (2009) Experimental boron isotope fractionation between tourmaline and fluid: Confirmation from in situ analyses by secondary ion mass spectrometry and from Rayleigh fractionation scattering. *Contributions to Mineralogy and Petrology*, 158, (5), 675-681.
- Martignago F., dal Negro A. and Carbonin S. (2003) How Cr³⁺ and Fe³⁺ affect Mg-Al order-disorder transformation at high temperature in natural spinels. *Physics and Chemistry of Minerals*, 30, (8), 401-408.
- Martin, B. F. (1970) A study of rhodolite garnet, *Journal of Gemmology*, 12, 2, 29-36
- Martin, M. H. E., Ober, C. K., Hubbard, C. R., Porter, W. D. and Cavin, O. B. (1992) Poly(methacrylate) precursors to forsterite, *American Ceramic Society - Journal*, 75, 7, 1831-1838
- Mashkovtsev R.I., Smirnov S.Z. and Shigley J.E. (2006) The features of the Cu²⁺-entry into the structure of tourmaline. *Journal of Structural Chemistry*, 47, (2), 252-257.
- Mason, R. A. (1997) The influence of heating on cathodoluminescence emission from natural calcite, *Canadian Mineralogist*, 35, 3, 723-733
- Mason, R. A. (1998) The response of luminescence in synthetic calcite to laboratory heating, *Canadian Mineralogist*, 36, 4, 1089-1104
- Massi, L. (2005) Les corindons à changement de couleur. *Revue de Gemmologie a.f.g.*, 16-19.
- Massi, L., Fritsch, E., Collins, A.T., Hainschwang, T. and Notari, F. (2005) The "amber centres" and their relation to the brown colour of diamond. *Diamond and Related Materials* 14, 1623-1629.
- Mathew, G., Karanth, R. V., Gundu Rao, T. K. and Deshpande, R. S. (1998) Maxixe-type colour centre in natural colourless beryl from Orissa, India: An ESR and OA investigation, *Journal of Gemmology*, 26, 4, 238-251
- Mathien F.J. (2001) The organisation of turquoise production and consumption by the prehistoric Chacoans. *American Antiquity*, 66, (1), 103-118.
- Mattice, G. (1995) Peridot from Pakistan. *Pala International - The Gem Spectrum* 1, 1-4.
- Mattinson J.M. (2005) Zircon U-Pb chemical abrasion ("CA-TIMS") method: Combined annealing and multi-step partial dissolution analysis for improved precision and accuracy of zircon ages. *Chemical Geology*, 220, (1/2), 47-66.
- Mattson S.M. and Rossman G.R. (1987) Fe²⁺-Fe³⁺ interactions in tourmaline. *Physics and Chemistry of Minerals*, 14, (2), 163-171.
- Mauthner M. (2011a) Recent finds at the Oceanview Mine. *Rocks and Minerals*, 86, (1), 41-47.
- Mauthner M. (2011b) The history of kunzite and the California connection. *Rocks and Minerals*, 86, (2), 112-131.
- May, P. W., Smith, J. A. and Rosser, K. N. (2008b) 785 nm Raman spectroscopy of CVD diamond films, *Materials Research Society - Symposium Proceedings*, 1039, 59-67
- Mayers, D. E. (1958a) The Sandawana emerald discovery, *Gemmologist*, 27, 320, 39-40
- Mayers, D. E. (1958b) Sandawana emeralds: Some commercial aspects, *Gems and Gemology*, 9, 7, 221-223
- Mayerson, W. (2001) Gem Trade Lab Notes: A New Imitation: "Shell Pearls" with Calcite Bead, *Gems and Gemology*, 37, 2, 135-136
- Mazdab F.K. (2009) Characterization of flux-grown trace-element-doped titanite using the high-mass-resolution ion microprobe (SHRIMP-RG). *Canadian Mineralogist*, 47, (4), 813-831.
- Mazzerro F., Désagulier C., Rondeau B., Ayalew D., Ezezew G., Cenk T. and Bekele E. (2010) L'opale du Wollo, Ethiopie: Des mines de gisement. *Revue de Gemmologie a.f.g.*, (174), 14-20.
- McArthur J.R., Jennings E.A., Kissin S.A. and Sherlock R.L. (1993) Stable-isotope, fluid-inclusion, and mineralogical studies relating to the genesis of amethyst, Thunder Bay Amethyst Mine, Ontario. *Canadian Journal of Earth Sciences*, 30, (9), 1955-1969.
- McCallum, J.C. and Morpeth, L.D. (1999) Synthesis of Ti:sapphire by ion implantation. *Nuclear Instruments and Methods in Physics Research B* 148, 726-729.
- McClure, S.F. (2000) Detecting new laser drilling techniques, Rapaport Diamond Report, 23, 16, 1, 15, 19

- McClure, S.F. (2002) Gem Trade Lab Notes: Bulk diffusion-treated sapphire with synthetic overgrowth. *Gems and Gemology* 38, 255-256.
- McClure, S.F. (2005) Le traitement des corindons au béryllium: Une mise au point. *Revue de Gemmologie a.f.g.*, 4-7.
- McClure, S.F. and Kammerling, R. C. (1995) A visual guide to the identification of filled diamonds, *Gems and Gemology*, 31. 2. 114-119
- McClure, S.F. and Moses, T. (2002) From Gems and Gemology: An update on the orange to orangy pink treated natural sapphires. *GIA Insider*.
- McClure, S.F. and Shen A.H. (2008) Coated tanzanite. *Gems and Gemology*, 44, (2), 142-147.
- McClure, S.F., Kammerling, R.C. and Fritsch, E. (1993) Update on diffusion-treated corundum: Red and other colors. *Gems and Gemology* 29, 16-28.
- McClure, S.F., King, J.M., Koivula, J. I. and Moses, T.M. (2000) A new lasering technique for diamond. *Gems and Gemology* 36, 138-146.
- McClure, S.F., Smith, C.P., Wang, W. and Hall, M. (2006) Identification and durability of lead glass-filled rubies. *Gems and Gemology* 42, 22-34.
- McColl, D. and Warren, G. (1984) Kornerupine and sapphirine crystals from the Harts Range, Central Australia. *Mineralogical Record* 15, 99-101.
- McCondra, B. (1998) Apache chrysocolla - A glamorous find from an ancient mine, *Rock and Gem*, 28. 6. 28-32
- McConnell J.D.C., Lin J.S. and Heine V. (1995) The solubility of (4H)_{Si} defects in α -quartz and their role in the formation of molecular water and related weakening on heating. *Physics and Chemistry of Minerals*, 22, (6), 357-366.
- McKague, H. L. (1964) Trapiche emeralds from Colombia - part 1, *Gems and Gemology*, 11. 7. 210-213 and 223
- McKie, D. (1963) Order-disorder in sapphirine. *Mineralogical Magazine* 33, 635-645.
- McLaren A.C., Fitz-Gerald J.D. and Williams I.S. (1994) The microstructure of zircon and its influence on the age determination from Pb/U isotopic ratios measured by ion microprobe. *Geochimica et Cosmochimica Acta*, 58, (2), 993-1005.
- McLaurin, D. (2002) Bigger and Better: "Perlas del Mar de Cortez"TM is proud to present Pearl Harvest 2002. <http://www.perlas.com.mx/Ingles/harvest2002.htm>. 2002, 28 December 2002.
- McLaurin, D. M., Arizmendi, E.A. (2002) Five Centuries of Mexican Pearls. *The Australian Gemmologist*, 21, 5, 190-201.
- McLean, E. M. (1967) Chrome chalcedony, *Lapidary Journal*, 21. 9. 1188-1189
- McLean, J. (1997) Radioactive gemstones circulating in Asia, *Journal of the Gem Industry*, 35. 12. 68-70
- McMahon, C.A. (1890) Notes on bowenite or pseudo-jade from Afghanistan. *Mineralogical Magazine* 9, 187-191.
- McOrist G.D. and Smallwood A. (1997) Trace elements in precious and common opals using neutron activation analysis. *Journal of Radioanalytical and Nuclear Chemistry*, 223, (1/2), 9-15.
- McTigue, J. W. and Wenk, H. R. (1985) Microstructures and orientation relationships in the dry-state aragonite-calcite and calcite-lime phase transformations, *American Mineralogist*, 70. 11/12. 1253-1261
- Medlin, W. L. (1959) The preparation of synthetic dolomite, *American Mineralogist*, 44. 9/10. 979-986
- Meen, V. B. (1966) Both nephrite and jadeite occur in same area in Japan, *Lapidary Journal*, 20. 1. 42-55
- Meguro, K., Yamamoto, Y. and Imai, T. (2006) Single crystalline diamond and producing method thereof, *United States Patent*, Application 2006/0231015. 10 pages
- Melby, J.H. and Taylor, A.M. (1983) Phenakite a lucky find in Colorado. *Lapidary Journal* 37, 1276-1282.
- Meldrum A., Boatner L.A., Weber W.J. and Ewing R.C. (1998) Radiation damage in zircon and monazite. *Geochimica et Cosmochimica Acta*, 62, (14), 2509-2520.
- Meldrum A., Boatner L.A., Zinkle S.J., Wang S.X., Wang L.M. and Ewing R.C. (1999) Effects of dose rate and temperature on the crystalline-to-metamict transformation in the ABO₄ orthosilicates. *Canadian Mineralogist*, 37, (1), 207-221.
- Menneken M., Nemchin A.A., Geisler T., Pidgeon R.T. and Wilde S.A. (2007) Hadean diamonds in zircon from Jack Hills, Western Australia. *Nature*, 448, (7156), 917-920.
- Mercier, A., Rakotondrazafy, M. and Ravolomandrinarivo, B. (1999) Ruby mineralization in Southwest Madagascar. *Gondwana Research* 2, 433-438.

- Merlin, J.C. and Dele-Dubois, M.L. (1986) Resonance Raman characterization of polyacetylenic pigments in the calcereous skeleton. *Comparative Biochemistry and Physiology B* 84, 97-103.
- Mernagh, T.P. and Liu, L.G. (1991) Raman spectra from the Al_2SiO_5 polymorphs at high pressures and room temperature. *Physics and Chemistry of Minerals* 18, 126-130.
- Mertens, R. (1984) Hauyn, ein seltener edelstein, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 33. 1/2. 65-67
- Mertens, R. (1988) Schleifwürdiger variscit aus dem hunsrück. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 36, 170-171.
- Meseguer F., Blanco A., Míguez H., García-Santamaría F., Ibasate M. and López C. (2002) Synthesis of inverse opals. *Colloids and Surfaces A*, 202, (2/3), 281-290
- Metson, N. A. and Taylor, A. M. (1977) Observations on some Rhodesian emerald occurrences, *Journal of Gemmology*, 15. 8. 422-434
- Mével, C. and Kiénast, J. R. (1986) Jadeite-kosmochlor solid solution and chromian sodic amphiboles in jadeitites and associated rocks from Tawmaw (Burma), *Bulletin de Mineralogie*, 109. 6. 617-633
- Meyer H.W., Bismayer U., Adiwidjaja G., Zhang M., Nistor L. and Van Tendeloo G. (1998) Natural titanite and malayite: Structural investigations and the 500 K anomaly. *Phase Transitions*, 67, (1/2), 27-49.
- Meyer H.W., Zhang M., Bismayer U., Salje E.K.H., Schmidt C., Kek S., Morgenroth W. and Bleser T. (1996) Phase transformation of natural titanite: An infrared, Raman spectroscopic, optical birefringence and X-ray diffraction study. *Phase Transitions*, 59, (1/3), 39-60.
- Meyer, H.O.A. and Mitchell, R.H. (1988) Sapphire-bearing ultramafic lamprophyre from Yogo, Montana: A ouachitite. *Canadian Mineralogist* 26, 81-88.
- Mezger K. and Krogstad E.J. (1997) Interpretation of discordant U-Pb zircon ages: An evaluation. *Journal of Metamorphic Geology*, 15, (1), 127-140.
- Middlemiss, C. S. and Parshad, L. J. (1918) Note on the aquamarine mines of Daso on the Braldu River, Shigar Valley, Baltistan, *Geological Survey of India*, 59. 3. 161-172
- Mikkelsen, P. M. (2003) Glossary of Pearl Terms.
<http://research.amnh.org/invertzoo/malacology/research/pearls/glossary.html>. 2005, August.
- Milisenda C.C. (2005) "Paraiba-Turmaline" aus Quintos de Baixo, Rio Grande do Norte, Brasilien. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 54, (2/3), 73-84.
- Milisenda C.C. and Henn U. (2001) Kupferhaltige Turmaline aus Nigeria. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 50, (4), 217-223.
- Milisenda C.C., Horikawa Y., Emori E., Miranda R., Bank F.H. and Henn U. (2006) Neues Vorkommen kupferführender Turmaline in Mosambik. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 55, (1/2), 5-24.
- Milisenda C.C., Malango V. and Taupitz K.C. (2000) Edelsteine aus Sambia - Teil 2: Turmalin und Aquamarin. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 49, (1), 31-48.
- Milisenda, C.C. (1996) Neuere Smaragdmanipulationen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 45, 27-28.
- Milisenda, C.C. and Bank, H. (2005) Aquamarine aus neuen Vorkommen in Brasilien, *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 54. 1. 47-51
- Milisenda, C.C. and Henn, U. (1996) Compositional characteristics of sapphires from a new find in Madagascar. *Journal of Gemmology* 25, 177-184.
- Milisenda, C.C. and Henn, U. (2006) Gelb-grüne, facettierte Sillimanite aus Orissa (Indien) (Yellow-green, faceted sillimanites from Orissa (India)). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 55, 59-61.
- Milisenda, C.C., Bank, H. and Henn, A. (1995) Peridot aus Pakistan. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 44, 33-42.
- Milisenda, C.C., Horikawa, Y. and Henn, U. (2005) Rubine mit bleihaltigen Gläsern gefüllt. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 54, 35-42.
- Millard R.L., Peterson R.C. and Hunter B.K. (1992) Temperature dependence of cation disorder in MgAl_2O_4 spinel using ^{27}Al and ^{17}O magic-angle-spinning NMR. *American Mineralogist*, 77, (1/2), 44-52.
- Miller, H.W. (1971) Rhodochrosite crystal localities in the west. *Mineralogical Record* 2, 105-110.
- Miller, J.A. (2006) Fabulous fire obsidian. *Rock and Gem* 36, 60-64.
- Millette, J. R., Hopen, T. J. and Bradley, J. P. (1993) Titanium dioxide: Anatase or rutile, *Microscopy*, 41. 147-153

- Millhauser, J.K., Rodriguez-Alegria, E. and Glascock, M.D. (2011) Testing the accuracy of portable X-ray fluorescence to study Aztec and Colonial obsidian supply at Xaltocan, Mexico. *Journal of Archaeological Science* 38, 3141-3152.
- Mills, J. S., White, R. and Gough, L. J. (1984) The chemical composition of Baltic amber, *Chemical Geology*, 47. 1/2. 15-39
- Millsteed, P.W. (2006) Faceting transparent rhodonite from Broken Hill, New South Wales, Australia. *Gems and Gemology* 42, 151-158.
- Millsteed, P.W., Mernagh, T.P., Otieno-Alego, V. and Creagh, D.C. (2005) Inclusions in transparent gem rhodonite from Broken Hill, New South Wales, Australia. *Gems and Gemology* 41, 246-254.
- Mirnejad H., Mathur R., Einali M., Dendas M. and Alirezae S. (2010) A comparative copper isotope study of porphyry copper deposits in Iran. *Geochemistry: Exploration, Environment, Analysis*, 10, (4), 413-418.
- Mita, Y. (1996) Change of absorption spectra in type-Ib diamond with heavy neutron irradiation, *Physical Review B*, 53. 17. 11360-11364
- Mitchell, D. (1996) Fluorescent cookbook: Tugtupite tenebrescence. *UV Waves*, 3.
- Mitchell, K. (1981) Japanese synthetic emeralds?, *Journal of Gemmology*, 17. 5. 290-291
- Mitchell, R. H. (1978) Manganoan magnesian ilmenite and titanian clinohumite from the Jacupiranga carbonatite, Sao Paulo, Brazil, *American Mineralogist*, 63. 5/6. 544-547
- Mitchell, R. K. (1952) Some more unusual gems, *Journal of Gemmology*, 3. 7. 305-308
- Mitchell, R. K. (1954) Some notes on unusual gems, *Journal of Gemmology*, 4. 5. 210-211
- Mitchell, R. K. (1961) Ekanite, *Journal of Gemmology*, 8. 3. 96-98
- Mitchell, R. K. (1976) African grossular garnets; blue topaz; cobalt spinel; and grandidierite, *Journal of Gemmology*, 15. 7. 354-357
- Mitchell, R. K. (1980) The fluorescence of benitoite, *Journal of Gemmology*, 17. 3. 149
- Mitchell, R. K. (1982) Visual identification of Gilson lapis, *Journal of Gemmology*, 18. 2. 114-118
- Mitchell, R. K. (1986) An andalusite anomaly, *Journal of Gemmology*, 20. 1. 18-19
- Miura, M., Arai, S. and Mizukami, T. (2011) Raman spectroscopy of hydrous inclusions in olivine and orthopyroxene in ophiolitic harzburgite: Implications for elementary processes in serpentinization. *Journal of Mineralogical and Petrological Sciences* 106, 91-96.
- Miyashita, T. and Takagi, R. (2011) Tyrosinase causes the blue shade of an abalone pearl. *Journal of Molluscan Studies* 77, 312-314.
- Miyoshi, T., Matsuda, Y. and Komatsu, H. (1987) Fluorescence from pearls and shells of black lip oyster, *Pinctada margaritifera*, and its contribution to the distinction of mother oysters used in pearl culture. *Japanese Journal of Applied Physics* 26, 1069-1072.
- Moecher D.P. (1993) Scapolite phase equilibria and carbon isotopes: Constraints on the nature and distribution of CO₂ in the lower continental crust. *Chemical Geology*, 108, (1/4), 163-174.
- Moecher D.P. and Essene E.J. (1990) Phase equilibria for calcic scapolite, and implications of variable Al-Si disorder for P-T, T-X_{CO2}, and a-X relations. *Journal of Petrology*, 31, (5), 997-1024.
- Moecher D.P. and Essene E.J. (1991) Calculation of CO₂ activities using scapolite equilibria: Constraints on the presence and composition of a fluid phase during high grade metamorphism. *Contributions to Mineralogy and Petrology*, 108, (1/2), 219-240.
- Moecher D.P., Valley J.W. and Essene E.J. (1994) Extraction and carbon isotope analysis of CO₂ from scapolite in deep crustal granulites and xenoliths. *Geochimica et Cosmochimica Acta*, 58, (2), 959-967.
- Mogilevsky, R., Nedilko, S., Sharafutdinova, L., Burlay, S., Sherbatskii, V., Boyko, V. and Mittl, S. (2009) Sapphire: Relation between luminescence of starting materials and luminescence of single crystals. *Optical Materials* 31, 1880-1882.
- Mohanani, K., Sharma, S. K. and Bishop, F. C. (1993) A Raman spectral study of forsterite-monticellite solid solutions, *American Mineralogist*, 78. 1/2. 42-48
- Moine, B., Ramambazafy, A., Rakotondrazafy, M., Ravolomandrinarivo, B., Cuney, M. and de Parseval, P. (1998) The role of fluor-rich fluids in the formation of the thorianite and sapphire deposits from SE Madagascar. *Mineralogical Magazine* 62A, 999-1000.
- Mok, D. (1991) Artificial treatment of gemstones, *Hong Kong Jewellery Magazine*, 3. 51. 73-75
- Mok, D. (1993) The identification of type B jadeite, *Hong Kong Jewellery Magazine*, 80-82

- Monecke T., Bombach G., Klemm W., Kempe U., Götze J. and Wolf D. (2000) Determination of trace elements in the quartz reference material UNS-SpS and in natural quartz samples by ICP-MS. *Geostandards Newsletter*, 24, (1), 73-81.
- Monistier, G. (2006) Beryll und aquamarin aus dem Bergell, *Lapis*, 31. 1. 20-39
- Moon, A.R. and Phillips, M.R. (1986) Inclusions in sapphire and heat treatment. *Australian Gemmologist* 16, 163-166.
- Moon, A.R. and Phillips, M.R. (1991) Titania precipitation in sapphire containing iron and titanium. *Physics and Chemistry of Minerals* 18, 251-258.
- Moore P.B. (1986) Quartz: Variations on a theme. *American Mineralogist*, 71, (3/4), 540-546.
- Moore T.P. (2007) Alpine quartz gwindels. *Mineralogical Record*, 38, (2), 103-121.
- Moore, J.M., Kuhn, B.K., Mark, D.F. and Tsikos, H. (2011) A sugilite-bearing assemblage from the Wolhaarkop breccia, Bruce iron-ore mine, South Africa: Evidence for alkali metasomatism and ^{40}Ar - ^{39}Ar dating. *European Journal of Mineralogy* 23, 661-673.
- Moore, P. B. and Bennett, J. M. (1968) Korerupine: Its crystal structure, *Science*, 159. 3814. 524-526
- Moore, P.B. (1969) The crystal structure of sapphirine. *American Mineralogist* 54, 31-49.
- Moore, P.B., Gupta, P.K.S. and Schlemper, E.O. (1989) Korerupine: Chemical crystallography, comparative crystallography, and its cation relation to olivine and to Ni_2In intermetallic. *American Mineralogist* 74, 642-655.
- Moragat, D., Avendaño, M., Peña, J., Le Pennect, M., Tanguyt, A., Baron, J. (2001) Genetic and Morphological Differentiation Between Two Pectinid Populations of *Argopecten Purpuratus* from the Northern Chilean Coast. *Estud. Oceanol*, 20, 51-60.
- Morimoto, N. (1989) Nomenclature of pyroxenes, *Canadian Mineralogist*, 27. 1. 143-156
- Morin, F. J., Oliver, J. R. and Housley, R. M. (1977) Electrical properties of forsterite, Mg_2SiO_4 , *Physical Review B*, 16. 10. 4434-4445
- Morishita Y., Giletti B.J. and Farver J.R. (1996) Volume self-diffusion of oxygen in titanite. *Geochemical Journal*, 30, (2), 71-79.
- Morita, S., Sekiwa, H., Toshima, H. and Miyazawa, Y. (1993) The growth of Al_2O_3 single crystals by the Czochralski method. *Journal of the Ceramic Society of Japan*.
- Moroshkin, V. (1996) Luminescence of minerals and its application in geology, *World of Stones*, 9. 4-8
- Moroz, I. I., Roth, M. L. and Deich, V. B. (1999b) The visible absorption spectroscopy of emeralds from different deposits, *Australian Gemmologist*, 20. 8. 315-320
- Morpeth, L.D., McCallum, J.C. and Jamieson, D.N. (2001) Structural characterisation of Ti:sapphire regions formed by localised high-energy implantation of Ti and O ions. *Nuclear Instruments and Methods in Physics Research B* 181, 372-376.
- Morteani G., Kostitsyn Y., Preinfalk C. and Gilg H.A. (2010) The genesis of the amethyst geodes at Artigas (Uruguay) and the paleohydrology of the Guarani aquifer: Structural, geochemical, oxygen, carbon, strontium isotope and fluid inclusion study. *International Journal of Earth Sciences*, 99, (4), 927-947.
- Moses, C.O. and Herman, J.S. (1991) Pyrite oxidation at circumneutral pH. *Geochimica et Cosmochimica Acta* 55, 471-482.
- Moses, C.O., Nordstrom, D.K., Herman, J.S. and Mills, A.L. (1987) Aqueous pyrite oxidation by dissolved oxygen and by ferric iron. *Geochimica et Cosmochimica Acta* 51, 1561-1571.
- Moses, T. (2001) GIA Gem Trade Lab Notes: Conch "Pearl", Highly Unusual Necklace Layout. *Gems & Gemology*, 37, 3, 213.
- Moses, T. (2002a) Gem Trade Lab Notes: Sapphire, Bulk or Lattice Diffusion Treated. *Gems and Gemology* 38, 254-255.
- Moses, T. (2002b) Gem Trade Lab Notes: Synthetic Sapphire Treated by "Traditional" Bulk Diffusion with Transition Elements. *Gems and Gemology* 38, 256-257.
- Moses, T., Reinitz, I. and McClure, S.F. (1997a) Aquamarine, unheated carving, *Gems and Gemology*, 33. 4. 292
- Moses, T., Reinitz, I. and McClure, S.F. (1997b) Fracture-filled pink diamond, *Gems and Gemology*, 33. 4. 294-295
- Moses, T., Reinitz, I. and McClure, S.F. (1997c) With surface droplets of filling material, *Gems and Gemology*, 33. 3. 213-214
- Moses, T., Reinitz, I. and McClure, S.F. (1998a) An unusual sapphirine. *Gems and Gemology* 34, 132-133.

- Moses, T., Reinitz, I. and McClure, S.F. (1998b) Beryl, plastic-coated assemblage imitating trapiche emerald, *Gems and Gemology*, 34. 3. 212
- Moses, T., Reinitz, I. and McClure, S.F. (1998c) Brown with green-to-blue color zones, *Gems and Gemology*, 34. 4. 285
- Moses, T., Reinitz, I. and McClure, S.F. (1998d) Calcite, colored by inclusions, *Gems and Gemology*, 34. 2. 127
- Moses, T., Reinitz, I. and McClure, S.F. (1998e) Chrysoberyl, dark green, *Gems and Gemology*, 34. 3. 212-213
- Moses, T., Reinitz, I. and McClure, S.F. (1998f) Diamond color treated from orangy yellow to reddish purple, *Gems and Gemology*, 34. 2. 213-214
- Moses, T., Reinitz, I. and McClure, S.F. (1998g) Diamond colored by pink coating, *Gems and Gemology*, 34. 2. 128-129
- Moses, T., Reinitz, I. and McClure, S.F. (1998h) Manufactured glass represented as "green obsidian". *Gems and Gemology* 34, 129-130.
- Moses, T., Reinitz, I. and McClure, S.F. (1998i) Maxixe beryl, faded and fading, *Gems and Gemology*, 34. 4. 284-285
- Moses, T., Reinitz, I. and McClure, S.F. (1998j) Pearls cultured, with dolomite beads, *Gems and Gemology*, 34. 2. 130-131
- Moses, T., Reinitz, I. and McClure, S.F. (1998k) Quartzite, dyed to imitate sugilite. *Gems and Gemology* 34, 131-132.
- Moses, T., Reinitz, I. and McClure, S.F. (1999a) Cat's-eye taaffeite. *Gems and Gemology* 35, 46.
- Moses, T., Reinitz, I. and McClure, S.F. (1999b) Glass imitation of peridot. *Gems and Gemology* 35, 44.
- Moses, T., Reinitz, I. and McClure, S.F. (1999c) Yellow to yellow-green diamonds treated by HPHT from GE and others, *Gems and Gemology*, 35. 4. 203-204
- Moses, T.M., Johnson, M.L., Green, B., Blodgett, T., Cino, K., Geurts, R.H., Gilbertson, A.M., Hemphill, T.S., King, J.M., Kornylak, L., Reinitz, I.M. and Shigley, J.E. (2004) A foundation for grading the overall cut quality of round brilliant cut diamonds. *Gems and Gemology* 40, 202-228.
- Moses, T.M., King, J.M., Wang, W. and Shigley, J.E. (2002) A highly unusual, 7.34 ct, Fancy Vivid purple diamond. *Journal of Gemmology* 28, 7-12.
- Moses, T.M., Reinitz, I.M., Johnson, M.L., King, J.M. and Shigley, J.E. (1997) A contribution to understanding the effect of blue fluorescence on the appearance of diamonds. *Gems and Gemology* 33, 244-259.
- Moss, A. A., Fejer, E. E. and Embrey, P. G. (1969) On the X-ray identification of amblygonite and montebrasite, *Mineralogical Magazine*, 37. 287. 414-422
- Mossman, D. J. and Pawson, D. J. (1976) X-ray and optical characterization of the forsterite-fayalite-tephroite series with comments on knebelite from Bluebell Mine, British Columbia, *Canadian Mineralogist*, 14. 4. 479-486
- Mouri, H. and Enami, M. (2008) Raman spectroscopic study of olivine-group minerals. *Journal of Mineralogical and Petrological Sciences* 103, 100-104.
- Muhlmeister S., Koivula J.I., Kammerling R.C., Smith C.P., Fritsch E. and Shigley J.E. (1993) Flux-grown synthetic red and blue spinels from Russia. *Gems and Gemology*, 29, (2), 81-98.
- Muhlmeister, S., Fritsch, E., Shigley, J.E., Devouard, B. and Laurs, B.M. (1998) Separating natural and synthetic rubies on the basis of trace-element chemistry. *Gems and Gemology* 34, 80-101.
- Muhongo S., Tuisku P. and Mtoni Y. (1999) Pan-African pressure-temperature evolution of the Merelani area in the Mozambique Belt in northeast Tanzania. *Journal of African Earth Sciences*, 29, (2), 353-365.
- Muir, I. D. (1955) Transitional optics of some andesines and labradorites, *Mineralogical Magazine*, 30. 228. 545-568
- Mukerjee, M. (1997) Suburban Amber, *Scientific American*, 276. 1. 26
- Mukhopadhyay A., Bhattacharya A. and Mohanty L. (1992) Geobarometers involving clinopyroxene, garnet, plagioclase, ilmenite, rutile, sphene and quartz: Estimation of pressure in quartz-absent assemblages. *Contributions to Mineralogy and Petrology*, 110, (2/3), 346-354.
- Müllenmeister, H. J. (1988) Neuentdecktes im Dominikanischen bernstein, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 37. 1/2. 1-25
- Mullenmeister, H.J. and Zang, J. (1995) Ein Trapiche-Rubin aus Myanmar (Burma). *Lapis* 20, 50.

- Muller A., Wiedenbeck M., van den Kerkhof A.M., Kronz A. and Simon K. (2003) Trace elements in quartz - A combined electron microprobe, secondary ion mass spectrometry, laser-ablation ICP-MS, and cathodoluminescence study. *European Journal of Mineralogy*, 15, (4), 747-763.
- Murakami T., Chakoumakos B.C. and Ewing R.C. (1986) X-ray powder diffraction analysis of alpha-event radiation damage in zircon (ZrSiO_4). *Advances in Ceramics*, 20, 745-753.
- Murakami T., Chakoumakos B.C., Ewing R.C., Lumpkin G.R. and Weber W.J. (1991) Alpha-decay event damage in zircon. *American Mineralogist*, 76, (9/10), 1510-1532.
- Murakami, N., Kato, T., Miura, Y. and Hirowatari, F. (1976) Sugilite, a new silicate mineral from Iwagi Islet, Southwest Japan. *Mineralogical Journal* 8, 110-121.
- Murdoch J. (1936), Andalusite in pegmatite, *American Mineralogist*, 21, 1, 68-69.
- Murdoch, J. (1955) Phosphate minerals of the Borborema Pegmatites: I-Patrimonio, *American Mineralogist*, 40. 1/2. 50-63
- Murowchick, J.B. (1992) Marcasite inversion and the petrographic determination of pyrite ancestry. *Economic Geology* 87, 1141-1152.
- Murowchick, J.B. and Barnes, H.L. (1987) Effects of temperature and degree of supersaturation on pyrite morphology. *American Mineralogist* 72, 1241-1250.
- Murray A.S. and Olley J.M. (2002) Precision and accuracy in the optically stimulated luminescence dating of sedimentary quartz: A status review. *Geochronometria*, 21, 1-16.
- Murray, C.G. (1968) Turquoise, variscite and wavellite in Queensland. *Queensland Government Mining Journal*, 337-342.
- Mursic Z., Vogt T., Boysen H. and Frey F. (1992) Single-crystal neutron diffraction study of metamict zircon up to 2000 K. *Journal of Applied Crystallography*, 25, (4), 519-523.
- Mustard, J. F. (1992) Chemical analysis of actinolite from reflectance spectra, *American Mineralogist*, 77. 3/4. 345-358
- Muto J., Nagahama H. and Hashimoto T. (2004) Micro-infrared reflection spectroscopic mapping: Application to the detection of hydrogen-related species in natural quartz.
- Nagase T. and Akizuki M. (1997) Texture and structure of opal-CT and opal-C in volcanic rocks. *Canadian Mineralogist*, 35, (4), 947-958.
- Naito, Y. (1990) Synthesis of gem quality diopside by the floating zone method, using natural chromian diopside (in Japanese), *Journal of the Gemmological Society of Japan*, 15. 1/4. 28-36
- Nakatsuka A., Ueno H., Nakayama N., Mizota T. and Maekawa H. (2004) Single-crystal X-ray diffraction study of cation distribution in MgAl_2O_4 - MgFe_2O_4 spinel solid solution. *Physics and Chemistry of Minerals*, 31, (5), 278-287.
- Naqvi, A.S., Naveedullah, K. and Hamdan, J.M. (1991) Raman scattering studies of sodalite for crystal structure and coloration mechanism. *Il Nuovo Cimento D* 13, 21-29.
- Narasimhulu, K. V. and Rao, J. L. (2000) EPR and IR spectral studies of the sea water mussel *Mytilus conradinus* shells, *Spectrochimica Acta A*, 56. 7. 1345-1353
- Nasdala L., Beran A., Libowitzky E. and Wolf D. (2001) The incorporation of hydroxyl groups and molecular water in natural zircon (ZrSiO_4). *American Journal of Science*, 301, (10), 831-857.
- Nasdala L., Hanchar J.M., Kronz A. and Whitehouse M.J. (2005) Long-term stability of alpha particle damage in natural zircon. *Chemical Geology*, 220, (1/2), 83-103.
- Nasdala L., Hofmeister W., Norberg N., Martinson J.M., Corfu F., Dörr W., Kamo S.L., Kennedy A.K., Kronz A., Reiners P.W., Frei D., Kosler J., Wang Y.S., Götze J., Häger T., Kröner A. and Valley J.W. (2008) Zircon M257 – A homogeneous natural reference material for the ion microprobe U-Pb analysis of zircon. *Geostandards and Geoanalytical Research*, 32, (3), 247-265.
- Nasdala L., Irmer G. and Wolf D. (1995) The degree of metamictization in zircon: A Raman spectroscopic study. *European Journal of Mineralogy*, 7, (3), 471-478.
- Nasdala L., Miletich R., Ruschel K. and Vaczi T. (2008) Raman study of radiation-damaged zircon under hydrostatic compression. *Physics and Chemistry of Minerals*, 35, (10), 597-602.
- Nasdala L., Pidgeon R.T. and Wolf D. (1996) Heterogeneous metamictization of zircon on a microscale. *Geochimica et Cosmochimica Acta*, 60, (6), 1091-1097.
- Nasdala L., Wenzel M., Vavra G., Irmer G., Wenzel T. and Kober B. (2001) Metamictisation of natural zircon: Accumulation versus thermal annealing of radioactivity-induced damage. *Contributions to Mineralogy and Petrology*, 141, (2), 125-144.
- Nassau K. (1989) Opal treatment. *Lapidary Journal*, 43, (3), 44-51.

- Nassau, K. (1969) "Reconstructed" or "Geneva" ruby. *Journal of Crystal Growth* 5, 338–344.
- Nassau, K. (1977a) Irradiation colors in topaz, quartz and beryl, *Gems and Gemology*, 15. 11. 350-351
- Nassau, K. (1977b) The history of emerald synthesis, *3rd MSA-FM Symposium - Crystal Growth and Habit*,
- Nassau, K. (1979a) An additional note on the new Gilson "coral". *Lapidary Journal* 33, 1504.
- Nassau, K. (1979b) An examination of the new Gilson "coral". *Gems and Gemology* 16, 179-185.
- Nassau, K. (1980a) Gemstone imitations made of glass, ceramics, plastic, and composites, *Lapidary Journal*, 33. 12. 2528-2550
- Nassau, K. (1980b) Synthetics in the seventies, *Lapidary Journal*, 34. 1. 50-68
- Nassau, K. (1981a) Heat treating ruby and sapphire: Technical aspects. *Gems and Gemology* 17, 121-131.
- Nassau, K. (1981b) Raman spectroscopy as a gemstone test, *Journal of Gemmology*, 17. 5. 306-320
- Nassau, K. (1982a) Colored synthetics and imitations, *International Gemmological Symposium - Proceedings*, 143-150
- Nassau, K. (1982b) Heat treating ruby and sapphire. *Lapidary Journal* 36, 708-719.
- Nassau, K. (1986) Color in plastics: The varied causes. *44th Annual Technical Conference and Exhibit*, 1184-1187.
- Nassau, K. (1987a) Irradiated gemstones - Could the ice be hot?, *Lapidary Journal*, 41. 5. 41-46
- Nassau, K. (1987b) The current decade - Synthetic gemstones in the 1980's, *Lapidary Journal*, 40. 12. 32-42
- Nassau, K. (1990) Synthetic gem materials in the 1980s, *Gems and Gemology*, 26. 1. 50-63
- Nassau, K. (1991) The seven types of yellow sapphire and the proposed Ponahlo test. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 40, 247-251.
- Nassau, K. (1991) Two types of historical traps: On "diamond softening" and the "antiquity of emerald oiling", *Journal of Gemmology*, 22. 7. 399-403
- Nassau, K. (1994) Synthetic forsterite and synthetic peridot, *Gems and Gemology*, 30. 2. 102-108
- Nassau, K. (1996) Fade testing: Has the time come? *Jewelers' Circular Keystone Magazine* 167, 116-117.
- Nassau, K. and Jackson, K. A. (1970) Trapiche emeralds from Chivor and Muzo, Colombia, *American Mineralogist*, 55. 1/2. 416-427
- Nassau, K. and Nassau, J. (1980) The growth of synthetic and imitation gems, *Crystals: Growth, Properties and Applications*, 2. 1-50
- Nassau, K. and Shigley, J. E. (1987) A study of the General Electric synthetic jadeite, *Gems and Gemology*, 23. 1. 27-35
- Nassau, K. and Valente, G.K. (1987) The seven types of yellow sapphire and their stability to light. *Gems and Gemology* 23, 222-231.
- Natkaniec-Nowak L. (2007) Spodumenes from Nuristan, Afghanistan. *Australian Gemmologist*, 23, (2), 51-57.
- Natkaniec-Nowak, L. (2008) Afghan beryl varieties, *Journal of Gemmology*, 31. 1/2. 31-39
- Nazarova, G.S., Ostashenko, B.A., Shilova, O.Y., Mitrofanov, V.Y. and Zaripova, L.D. (1990) Colour changes in prehnite. *15th General Meeting, International Mineralogical Association - Abstracts*, 441-443.
- Nechaev, V.P., Nechaeva, E.V., Chashchin, A.A., Vysotskiy, S.V., Graham, I.T. and Sutherland, F.L. (2009) New isotopic data on Late Cenozoic age and mantle origin of gem zircon and corundum from placers of Primorye, Russia. *Doklady Earth Sciences* 429A, 1426-1429.
- Neiva, A. M. R. (1984) Chromium-bearing kyanite from Mozambique, *Mineralogical Magazine*, 48. 349. 563-564
- Nel, H. J. (1946) Petalite and amblygonite from Karibib, South West Africa, *American Mineralogist*, 31. 1/2. 51-57
- Nelson, J. (1995) Scotch tape and a magic box, *Diamond International*, November/December. 47-54
- Nelson, W.R. and Griffen, D.T. (2005) Crystal chemistry of Zn-rich rhodonite ("fowlerite"). *American Mineralogist* 90, 969-983.
- Nesladek, M., Bogdan, A., Deferme, W., Tranchant, N. and Bergonzo, P. (2008) Charge transport in high mobility single crystal diamond, *Diamond and Related Materials*, 17. 7/10. 1235-1240
- Neumann E. and Schmetzer, K. (1985) Mechanism of thermal conversion of colour and colour centres by heat treatment of amethyst. *Neues Jahrbuch für Mineralogie Monatshefte*, (6), 272-282.

- Neuvill, D.R., Bressel, L., de Ligny, D. and Cochain, B. (2010) Structure, properties and implications for the formation of tektite glasses. *20th General Meeting International Mineralogical Association - Abstract*.
- Neves, A. J., Nazare, M. H., Lopes, J. C. and Kanda, H. (1999) An orthorhombic nickel-nitrogen complex in high-pressure synthetic diamond, *Physica B: Condensed Matter*, 273/274. 1. 636-639
- Newsome, D. (1976) Tugtupite, an unusual fluorescent! *Lapidary Journal* 29, 1945-1946.
- Newton, M. E., Campbell, B. A., Twitchen, D. J., Baker, J. M. and Anthony, T. R. (2002) Recombination-enhanced diffusion of self-interstitial atoms and vacancy-interstitial recombination in diamond, *Diamond and Related Materials*, 11. 3/6. 618-622
- Nguy, N.T., Nguyen, N.V., Nguyen, K.N., Phan, Q.V., Nguyen, M.T.T. and Vu, T.V. (2006) Characteristics of corundum from primary deposit in Truc Lau area, northern Vietnam. *1st International Gem and Jewelry Conference - Abstracts*, 69.
- Ni P., Dong P., Cheng B., Li X. and Zhang, D. (2001) Synthetic SiO₂ opals. *Advanced Materials*, 13, (6), 437-441.
- Nickel E H (1968) Structural stability of minerals with the pyrite, marcasite, arsenopyrite and löllingite structures, *The Canadian Mineralogist*, 9, 311-321
- Nickel, E.H., Hough, R.M., Verrall, M.R., Hancock, E., Thorne, A.M. and Vaughan, D. (2008) The Woodlands variscite-gold occurrence in the Gascoyne region of Western Australia. *Australian Journal of Mineralogy* 14, 27-36.
- Nieder, A. E. (1982) Nephrite jade in the Republic of Korea, *Lapidary Journal*, 35. 12. 2374-2380
- Niedermayr, G. (1978) Phenakit in edelsteinqualität aus dem Habachtal, Salzburg (Österreich). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 27, 205-207.
- Nimis, P. (1998) Evaluation of diamond potential from the composition of peridotitic chromian diopside, *European Journal of Mineralogy*, 10. 3. 505-519
- Notari, F. (1997) Le saphir <<Padparadscha>>, (Extraits, D.U.G.). *Revue de Gemmologie a.f.g.*, 24-27.
- Notari, F. (2002) Traitement du diamant noir par graphitisation "interne" (Black diamond treatment by "internal" graphitization). *Revue de Gemmologie a.f.g.*, 42-60.
- Notari, F. and Grobon C. (2003) Spectrométrie de fluorescence du chrome (Cr³⁺) dans les spinelles: Identification des spinelles synthétiques produits par dissolution anhydre et des autres matériaux dits "spinelles synthétiques" produits par fusion Verneuil. *Revue de Gemmologie a.f.g.*, (147), 24-29.
- Notari, F., Boillat P.Y. and Grobon C. (2001) La tanzanite (β zoisite): Detection du traitement thermique. *Revue de Gemmologie a.f.g.*, (141/142), 34-36.
- Notari, F., Boillat P.Y. and Grobon C. (2001) Quartz - α SiO₂: Discrimination des améthystes et des citrines naturelles et synthétiques. *Revue de Gemmologie a.f.g.*, (141/142), 75-80.
- Notari, F., Fritsch, E. and Grobon, C. (2003) Comment l'observation de la luminescence (fluorescence) peut aider à l'identification des corindons jaunes, rose orange et orange, traités par diffusion de béryllium. *Revue de Gemmologie a.f.g.*, 40-43.
- Novak M. and Povondra P. (1995) Elbaite pegmatites in the Moldanubicum: A new subtype of the rare-element class. *Mineralogy and Petrology*, 55, (1/3), 159-176.
- Novak, G.A. (1982) Verde Web variscite from Lander County, Nevada. *Lapidary Journal* 36, 544-552.
- Novikov, N. V., Katrusha, A. N., Ivakhnenko, S. A. and Zanevsky, O. A. (2003) The effect of high-temperature treatment on the defect and impurity state and color of diamond single crystals (Review), *Journal of Superhard Materials*, 25. 6. 1-12
- Nuckles, P. (1984) A record shattering find of Ellensburg blue agate, *Lapidary Journal*, 38. 7. 948-952
- Nunes J.E.L. and Gomes C.L. (1994) The crystal chemistry of spodumene in some granitic aplite-pegmatite bodies of Northern Portugal: A comparative review - discussion. *Canadian Mineralogist*, 32, (1), 223-226.
- O'Donoghue, M. (1983) Orange synthetic corundum. *Journal of Gemmology* 18, 736-737.
- Oberti R., Smith D.C., Rossi G. and Caucia F. (1991) The crystal-chemistry of high-aluminum titanites. *European Journal of Mineralogy*, 3, (5), 777-792.
- O'Donoghue, M. J. (1971) Trapiche emerald, *Journal of Gemmology*, 12. 8. 329-332
- O'Donoghue, M. J. (1975) Emerald from North Carolina, *Journal of Gemmology*, 14. 7. 339-340
- O'Donoghue, M. J. (1976) Recent developments in the synthesis of possible gem materials, *Journal of Gemmology*, 15. 3. 119-124
- O'Donoghue, M. J. (1978) Further developments in synthetic materials, *Journal of Gemmology*, 16. 1. 30-35

- O'Donoghue, M. J. (1979) New forms of synthetic gem materials: Two brief notes, *Journal of Gemmology*, 16, 7, 462-463
- O'Donoghue, M. J. (1981) Characterization of crystals with gem application, *Progress in Crystal Growth and Characterization*, 3, 193-209
- Odriozola, C.P., Linares-Catela, J.A. and Hurtado-Perez, V. (2010) Variscite source and source analysis: Testing assumptions at Picto Centeno (Encinasola, Spain). *Journal of Archaeological Science* 37, 3146-3157.
- Ogawa, H., Hayashi, M. and Horikawa, Y. (1999) New hematite imitation, *International Colored Stone Association - Laboratory Alert*,
- Ohashi, Y. and Finger, L.W. (1975) Pyroxenoids: A comparison of refined structures of rhodonite and pyroxmangite. *Carnegie Institute of Washington - Annual Report of the Geophysical Laboratory*, 564-569.
- Ohashi, Y., Kato, A. and Matsubara, S. (1975) Pyroxenoids: A variation in chemistry of natural rhodonites and pyroxmangites. *Carnegie Institute of Washington - Annual Report of the Geophysical Laboratory*, 561-564.
- Ohguchi, H. (1981) Application to gem identification of fluorescence X-ray analysis, *Journal of the Gemmological Society of Japan*, 8, 1/4, 145-149
- Oishi, S., Teshima, K. and Kondo, H. (2004) Flux growth of hexagonal bipyramidal ruby crystals. *Journal of the American Chemical Society Communications* 126, 4768-4769.
- O'Keefe, J.A. (1984) Natural glasses. *Journal of Non-Crystalline Solids* 67, 1-17.
- Okrusch, M. (1971) Zur genese von chrysoberyll- und alexandrit-lagerstätten eine literaturübersicht, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 20, 3, 114-124
- Olivier, C., Gihwala, D., Peisach, M., Pineda, C.A. and Pienaar, H.S. (1983) Determination of lithium in the gem mineral sugilite. *Journal of Radioanalytical Chemistry* 76, 241-248.
- O'Neill, K. (1986) Roses of the sea. *Lapidary Journal* 40, 49-52.
- Ontiveros M., Wilson W.E. and Megaw P.K.M. (2004) Famous mineral localities - The Guerrero amethyst deposits, Mexico. *Mineralogical Record*, 35, (6), 29-37.
- Oppenheim, V. (1948) The Muzo emerald zone, Colombia, S.A, *Economic Geology*, 43, 1, 31-38
- Opresko, D.M. (1996) New species of black coral (Cnidaria: Anthozoa: Antipatharia) from the Caribbean. *Bulletin of Marine Science* 58, 289-300.
- Ostapenko G.T. and Mitsyuk B.M. (2006) Asymmetry of growth and dissolution on basal, minor rhombohedral and prism faces of quartz. *Journal of Crystal Growth*, 294, (2), 330-338.
- Ostrooumov M. (2007) A Raman, infrared and XRD analysis of the instability in volcanic opals from Mexico. *Spectrochimica Acta A*, 68, (4), 1070-1076.
- Ostrooumov M. and Talay H.A. (2000) Diffraction colours of opal: First spectrometric data. *Australian Gemmologist*, 20, (11), 467-472.
- Ostrooumov M., Fritsch E., Lasnier B. and Lefrant S. (1999) Spectres Raman des opales: Aspect diagnostique et aide à la classification. *European Journal of Mineralogy*, 11, (5), 899-908.
- Ostwald, J. (1964) Some rare blue gemstones, *Journal of Gemmology*, 9, 5, 182-184
- Ottolini L. and Hawthorne F.C. (1999) An investigation of SIMS matrix effects on H, Li and B ionization in tourmaline. *European Journal of Mineralogy*, 11, (4), 679-690.
- Ou Yang, C. M. (1993a) Examining texture critical in tests for type-B jadeite, *Jewellery News Asia*, 96-100
- Ou Yang, C. M. (1993b) Microscopic studies of Burmese jadeite jade, *Journal of Gemmology*, 23, 5, 278-284
- Ou Yang, C. M. (1994) The right way to identify B-grade jadeite, *China Gems*, 3, 2, 24-26
- Ou Yang, C. M. (1996) The research of Burmese jadeite under magnification (in Chinese), *Jewelry Circles Magazine*, 38, 84-87
- Ouyang, Q. (1997) Found high radioactive cat's-eye chrysoberyl, *China Gems*, 6, 4, 110
- Owen M.R. (1988) Radiation-damage halos in quartz. *Geology*, 16, (6), 529-532.
- Pabian, R. K. (1980) Lake Superior agates - A historical review, *Lapidary Journal*, 34, 1, 110-120, 146-153
- Page F.Z., Fu B., Kita N.T., Fournelle J., Spicuzza M., Schulze D.J., Viljoen F., Basei M.A.S. and Valley J.W. (2007) Zircons from kimberlite: New insights from oxygen isotopes, trace elements, and Ti in zircon thermometry. *Geochimica et Cosmochimica Acta*, 71, (15), 3887-3903.
- Pagonis V., Ankjaergaard C., Murray A.S., Jain M., Chen R., Lawless J. and Greilich S. (2010) Modelling the thermal quenching mechanism in quartz based on time-resolved optically stimulated luminescence. *Journal of Luminescence*, 130, (5), 902-909.

- Pagonis V., Lawless J., Chen R. and Chithambo M.L. (2011) Analytical expressions for time-resolved optically stimulated luminescence experiments in quartz. *Journal of Luminescence*, 131, (9), 1827-1835.
- Paião, J.R.B. and Watanabe, S. (2008) Thermoluminescence, electron paramagnetic resonance and optical absorption in natural and synthetic rhodonite crystals. *Physics and Chemistry of Minerals* 35, 535-544.
- Pakhomova, V.A., Buravleva, S.U. and Tishkina, V.B. (2011) Inclusions as the indicator of genesis in the sapphires of Montana. *Journal of the Gemmological Association of Hong Kong* 32, 64-66.
- Paktunc A.D. and Cabri L.J. (1995) A proton- and electron-microprobe study of gallium, nickel and zinc distribution in chromian spinel. *Lithos*, 35, (3/4), 261-282.
- Palache, C., Richmond, W. E. and Wolfe, C. W. (1943) On amblygonite, *American Mineralogist*, 28. 1. 39-53
- Palacios-Lidón E., Juárez B.H., Castillo-Martínez E. and López C. (2005) Optical and morphological study of disorder in opals. *Journal of Applied Physics*, 97, (6), 063502.
- Palanza, V., Chiodini, N., Galli, A., Lorenzi, R., Moretti, F., Paleari, A. and Spinolo, G. (2010) Updating of the interpretation of the optical absorption and emission of Verneuil synthetic and natural metamorphic blue sapphire: The role of V^{2+} , V^{3+} and Cr^{2+} . *Materials Science and Engineering* 15, 012087.
- Palenik C.S., Nasdala L. and Ewing R.C. (2003) Radiation damage in zircon. *American Mineralogist*, 88, (5/6), 770-781.
- Palin E.J. and Harrison R.J. (2007) A computational investigation of cation ordering phenomena in the binary spinel system $MgAl_2O_4$ - $FeAl_2O_4$. *Mineralogical Magazine*, 71, (6), 611-624.
- Pan Y.M. and Dong P. (2003) Bromine in scapolite-group minerals and sodalite: XRF microprobe analysis, exchange experiments, and application to skarn deposits. *Canadian Mineralogist*, 41, (2), 529-540.
- Pan Y.M., Fleet M.E. and MacRae N.D. (1993) Late alteration in titanite ($CaTiSiO_5$): Redistribution and remobilization of rare earth elements and implications for U/Pb and Th/Pb geochronology and nuclear waste disposal. *Geochimica et Cosmochimica Acta*, 57, (2), 355-367.
- Pan Y.M., Nilges M.J. and Mashkovtsev R.I. (2008) Radiation-induced defects in quartz: II. Single-crystal W-band EPR study of a natural citrine quartz. *Physics and Chemistry of Minerals*, 35, (7) 387-397.
- Pan, Y.M., Mao, M. and Lin, J.R. (2009) Single-crystal EPR study of Fe^{3+} and VO^{2+} in prehnite from the Jeffrey Mine, Asbestos, Quebec. *Canadian Mineralogist* 47, 933-945.
- Panjikar, J. (1994) Comparative study of beryl from various Indian occurrences - Beryl from Jammu and Kashmir - Parts 1, 2, *Indian Gemmologist*, 4,4. 1,2. 3-8,3-7
- Panjikar, J. and Ramchandran, K. T. (1997) New chrysoberyl deposits from India, *Indian Gemmologist*, 7. 1&2. 3-7
- Pankrath R. and Flörke O.W. (1994) Kinetics of Al-Si exchange in low and high quartz: Calculation of Al diffusion coefficients. *European Journal of Mineralogy*, 6, (4), 435-457.
- Papike, J.J. and Zoltai, T. (1967) Ordering of tetrahedral aluminum in prehnite. *American Mineralogist* 52, 974-984.
- Pardieu, V. (2007) Tajikistan: Gems from the roof of the world. *InColor*, 27-30.
- Pardieu, V., Hughes R., Soubiraa G., Rogers M., Chitty W., Chitty M. and Brunot P. (2009) Working the blue seam: The tanzanite mines of Merelani. *Australian Gemmologist*, 23, (11), 482-494.
- Pardieu, V., Jacquat, S., Bryl, L.P. and Senoble, J.B. (2009) Rubies from northern Mozambique. *InColor*, 32-36.
- Paris M., Fritsch E. and Aguilar-Reyes B.O. (2007) 1H , ^{29}Si , and ^{27}Al NMR study of the destabilization process of a paracrystalline opal from Mexico. *Journal of Non-Crystalline Solids*, 353, (16/17), 1650-1656.
- Parker, B.V. (1989) Shining seashell. *Lapidary Journal* 43, 31.
- Parker, R. L. (1923) Zur kristallographie von anatas und rutil, *Zeitschrift für Kristallographie*, 58. 522-582
- Partlow D.P. and Cohen A.J. (1986) Optical studies of biaxial Al-related color centers in smoky quartz. *American Mineralogist*, 71, (3/4), 589-598.
- Paterson B.A. and Stephens W.E. (1992) Kinetically induced compositional zoning in titanite: Implications for accessory-phase/melt partitioning of trace elements. *Contributions to Mineralogy and Petrology*, 109, (3), 373-385.
- Paterson M.S. (1986) The thermodynamics of water in quartz. *Physics and Chemistry of Minerals*, 13, (4), 245-255.
- Paulin, P.E. (1979) The blue colour of sodalite. *Journal of Gemmology* 16, 452-454.
- Paulmann C., Bismayer U. and Groat L.A. (2000) Thermal annealing of metamict titanite: A synchrotron radiation and optical birefringence study. *Zeitschrift für Kristallographie*, 215, (11), 678-682.

- Pavese A., Prosperi L. and Dapiaggi M. (2005) Use of IR-spectroscopy and diffraction to discriminate between natural, synthetic, and treated turquoise and its imitations. *Australian Gemmologist*, 22, (8), 366-371.
- Payette F. and Pearson G. (2011) The 'hill of precious stones', Rattanak Kiri, Cambodia. *Australian Gemmologist*, 24, (6), 148-153.
- Payne, C. J. (1952) Sinhalite - A new mineral and gemstone. *Gemmologist* 21, 177-181.
- Payne, C. J. (1954) Kornerupine, *Gemmologist*, 23. 281. 215-219
- Payne, C. J. (1956) An alexandrite crystal from Burma, *Gemmologist*, 25. 296. 39-40
- Payne, C. J. (1958) A crystal of sinhalite from Mogok, Burma. *Mineralogical Magazine* 32, 978-979.
- Payne, S. A. (1995) Ytterbium-doped apatite laser crystals, *Engineering and Technology Review*, Nov. 5-6
- Peacock, M. A. (1935) On pectolite - On johannite from Joachimsthal and Colorado. *Zeitschrift für Kristallographie* 90A, 107, 119.
- Peacock, M. A. (1937) On the crystallography of axinite and the normal setting of triclinic crystals, *American Mineralogist*, 22. 5. 588-624
- Peacock, M. A. (1938) Supplementary notes on axinite, *American Mineralogist*, 23. 8. 522-526
- Peacor, D.P. and Niizeki, N. (1963) The redetermination and refinement of the crystal structure of rhodonite, (Mn,Ca)SiO₃. *Zeitschrift für Kristallographie* 119, 98-116.
- Peacor, D.R., Essene, E.J., Brown, P.E. and Winter, G.A. (1978) The crystal chemistry and petrogenesis of a magnesian rhodonite. *American Mineralogist* 63, 1137-1142.
- Pearson G. (1985) Role of water in cracking of opal. *Australian Gemmologist*, 15, (12), 435-445.
- Pearson G. (2008) A spectrophotometric study of the thermal colour change of tanzanite. *Australian Gemmologist*, 23, (6), 254-265.
- Pearson G. R. and D. M. Shaw (1960), Trace elements in kyanite, sillimanite and andalusite, *American Mineralogist*, 45, 7/8, 808-817.
- Pechar F. (1985) Infrared reflection spectra of selected modifications of SiO₂ and Al₂O₃. *Crystal Research and Technology*, 29, (2), 239-246.
- Peck A. B. (1924), Note on andalusite from California: A new use and some thermal properties, *American Mineralogist*, 9, 6, 123-129.
- Pecover S.R. (2007) Australian opal resources - Outback spectral fire. *Rocks and Minerals*, 82, (2), 103-115.
- Pedersen, M. C. (2008) The green amber story continues, *Gems and Jewelry*, 17. 3. 4-5
- Pelto, C. R. (1956) A study of chalcedony, *American Journal of Science*, 254. January. 32-50
- Peng, G. Z. and Zhu, L. (2006) Ambers from Dominican Republic (in Chinese), *Journal of Gems and Gemology*, 8. 3. 32-35
- Pepperberg, L.J. (1911) Variscite near Lucin, Utah. *Mining and Scientific Press* 103, 233-234.
- Pereira, C.E.d.B., Miekeley, N., Poupeau, G. and Kuchler, I.L. (2001) Determination of minor and trace elements in obsidian rock samples and archaeological artifacts by laser ablation inductively coupled plasma mass spectrometry using synthetic obsidian standards. *Spectrochimica Acta B* 56, 1927-1940.
- Pérès, J.M. & Picard, J. (1964). Nouveau manuel de bionomie benthique de la mer Méditerranée. *Recueil des Travaux de la Station Marine d'Endoume*. 47(31), 1-137.
- Peretti, A. (1993) Foreign substances in Mong Hsu rubies. *JewelSiam* 4, 42.
- Peretti, A. and Gubelin, E. (1996) New inclusions in Pakistan peridot vonsenite - ludwigite needles. *JewelSiam*, 68-69.
- Peretti, A. and Günther, D. (2002) Color enhancement of natural fancy sapphires with a new heat-treatment technique. *Contributions to Gemology*, 1-48.
- Peretti, A., Günther, D. and Graber, A. (2003) The Beryllium Treatment of Fancy Sapphires with a New Heat-treatment Technique (Part B). *Contributions to Gemology*, 21-33.
- Peretti, A., Mullis, J. and Kundig, R. (1990) Die Kaschmir-saphire und ihr Geologisches Erinnerungsvermögen, *Neue Zürich Zeitung*, Zürich, p. 1 p.
- Peretti, A., Mullis, J., Mouawad, F. and Guggenheim, R. (1997) Inclusions in synthetic rubies and synthetic sapphires produced by hydrothermal methods (TAIRUS, Novosibirsk, Russia). *Journal of Gemmology* 25, 540-561.
- Peretti, A., Schmetzer, K., Bernhardt, H.-J. and Mouawad, F. (1995) Rubies from Mong Hsu. *Gems and Gemology* 31, 2-26.

- Peretti, H.A. and Smith, C.P. (1993) A new type of synthetic ruby on the market: Offered as hydrothermal rubies from Novosibirsk. *Australian Gemmologist* 18, 149-156.
- Peretyazhko I.S., Zagorsky V.Y., Smirnov S.Z. and Mikhailov M.Y. (2004) Conditions of pocket formation in the Oktyabrskaya tourmaline-rich gem pegmatite (the Malkhan field, central Transbaikalia, Russia). *Chemical Geology*, 210, (1/4), 91-111.
- Perry B., Eberhardt P., Ramseyer K., Mullis J. and Pankrath R. (1992) Microdistribution of Al, Li, and Na in α -quartz: Possible causes and correlation with short-lived cathodoluminescence. *American Mineralogist*, 77, (5/6), 534-544.
- Perseil E.A. and Smith D. (1995) Sb-rich titanite in the manganese concentrations at St. Marcel-Praborna, Aosta Valley, Italy: Petrography and crystal-chemistry. *Mineralogical Magazine*, 59, (4), 717-734.
- Perugini D. and Poli G. (2007) Tourmaline nodules from Capo Bianco aplite (Elba Island, Italy): An example of diffusion limited aggregation growth in a magmatic system. *Contributions to Mineralogy and Petrology*, 153, (5), 493-508.
- Pesquera A., Torres F., Gil-Crespo P. and Torres-Ruiz J. (2008) TOURCOMP: A program for estimating end-member proportions in tourmalines. *Mineralogical Magazine*, 72, (5), 1021-1034.
- Petersen, O.V. (1978) The twin formation of tugtupite - A contribution. *Mineralogical Magazine* 42, 251-254.
- Petersen, O.V. and Secher, K. (1993) Minerals of Greenland. *Mineralogical Record* 24, 1-65.
- Peterson, R.C. (1983) The structure of hackmanite, a variety of sodalite, from Mont St-Hilaire, Quebec. *Canadian Mineralogist* 21, 549-552.
- Petrov, A. (2009) The Cerro Sapo sodalite deposit: A Pre-Columbian gem mine. *ExtraLapis* 12, 80-84.
- Petsch, E. J. (1990) Coloured gemstones from Africa, *Europa Star*, 181. 4.
- Peucat, J.J., Ruffault, P., Fritsch, E., Bouhnik-Le Coz, M., Simonet, C. and Lasnier, B. (2007) Ga/Mg ratio as a new geochemical tool to differentiate magmatic from metamorphic blue sapphires. *Lithos* 98, 261-274.
- Pewklian B., Pring A. and Brugger J. (2008) The formation of precious opal: Clues from the opalization of bone. *Canadian Mineralogist*, 46, (1), 139-149.
- Pezzotta, F. (2005a) Pezzottaite ad Ambatovita in Madagascar una scoperta tra avventura e scienza, *Rivista Mineralogica Italiana*, 30. 2. 88-103
- Pezzotta, F. (2005b) Titanite e altri minerali in fessure di tipo "alpino" nel nord est del Madagascar. *Rivista Mineralogica Italiana*, 30, (2), 104-111.
- Pezzotta, F., Adamo I., Diella V., 2011. Demantoid and Topazolite from Antetambato, Northern Madagascar: Review and New Data. *Gems and Gemology*, 47. 1. 2-14.
- Pham, L.V., Hoang, V.Q. and Nguyen, N.X. (2004b) Inclusions in Vietnamese Quy Chau ruby and their origin. *Australian Gemmologist* 22, 67-71.
- Pham, L.V., Hoang, V.Q., Garnier, V., Giuliani, G. and Ohnenstetter, D. (2004a) Marble-hosted ruby from Vietnam. *Canadian Gemmologist* 25, 83-95.
- Philippot E., Plamier D., Pintard M. and Goiffon A. (1996) A general survey of quartz and quartz-like materials: Packing distortions, temperature, and pressure effects. *Journal of Solid State Chemistry*, 123, (1), 1-13.
- Phukan, S. (1966) Studies on inclusions in some Indian gemstones, *Journal of Gemmology*, 10. 1. 1-7
- Pidgeon R.T. (1992) Recrystallization of oscillatory zoned zircon: Some geochronological and petrological implications. *Contributions to Mineralogy and Petrology*, 110, (4), 463-472.
- Pieczka A. (1999) Statistical interpretation of structural parameters of tourmalines: The ordering of ions in the octahedral sites. *European Journal of Mineralogy*, 11, (2), 243-251.
- Pieczka A. (2000) Modeling of some structural parameters of tourmalines on the basis of their chemical composition: I. Ordered structure model. *European Journal of Mineralogy*, 12, (3), 589-596.
- Pienaar, H.S. (1981) African star coral, a new precious stylasterine coral from the Agulhas Bank, South Africa. *Journal of Gemmology* 17, 589-601.
- Pimenta-Romeiro J.C. and Pedrosa-Soares A.C. (2005) Controle do minério de espodumênio em pegmatitos da Mina da Cachoeira, Araçuaí, MG. *Geonomos*, 13, (1/2), 75-81.
- Pinet, M., D. C. Smith and B. Lasnier (1992), Utilité de la microsonde Raman pour l'identification non-destructive des gemmes (compilation d'une selection representative de leurs spectres Raman), *Revue de Gemmologie a.f.g.*, 111, 11-60.
- Pinter, C. (1999) Tränen aus Glas - Tektite berichten von kosmischen Desastern. *Lapis* 24, 21-28.

- Pirsson, L.V. (1890) On the fowlerite variety of rhodonite from Franklin and Sterling, N.J. *American Journal of Science* 140, 484-488.
- Pisutha-Arnond, V., Hager, T., Atichat, W. and Wathanakul, P. (2006) The role of Be, Mg, Fe and Ti in causing colour in corundum. *Journal of Gemmology* 30, 131-143.
- Pisutha-Arnond, V., Somboon, C., Atichat, W., Leelawathanasuk, T., Sutthirat, C., Wathanakul, P., Sriprasert, B., Hager, T. and Boonchai, A. (2009) Toward a better understanding of the orange coloration in beryllium treated sapphires. *31st International Gemmological Congress - Abstracts*, 41-42.
- Pitman, L.C., Hurlbut, C.S. and Francis, C.A. (1995) Euhedral sinhalite crystals from Sri Lanka. *Mineralogical Record* 26, 91-94.
- Piuzana D., Castañeda C., Noce C.M., Pedrosa-Soares A.C. and Silva L.C. (2008) Titanite crystal chemistry and U-Pb isotopic data: A petrogenetic indicator for Precambrian granitoid plutons of the Eastern Brazilian Shield. *Geonomos*, 16, (1), 29-36.
- Pizani, P.S., Terrile, M.C., Farach, H.A. and Poole, C.P. (1985) Color centers in sodalite. *American Mineralogist* 70, 1186-1192.
- Poeter, D. (1999) Peridot Mesa, San Carlos. *Gemkey Magazine* 1, 54-61.
- Pohl, D., Guillemette, R., Shigley, J. and Dunning, G. (1982) Ferroaxinite from New Melones Lake, Calaveras County, California, a remarkable new locality, *Mineralogical Record*, 13. 5. 293-302
- Poinar, G., Archibald, B. and Brown, A. (1999) New amber deposit provides evidence of early paleogene extinctions, paleoclimates, and past distributions, *Canadian Entomologist*, 131. 2. 171-177
- Poirot, J. P. (1983) An unusual ornamental stone: Collophane, *Journal of Gemmology*, 18. 6. 515-519
- Poirot, J. P. (1987) Coatings of imitation pearls. *21st International Geological Congress - Abstracts*.
- Poirot, J. P. (1992) Amber naturel, ambre presse, ambre synthétique, *Revue de Gemmologie a.f.g.*, 113. 25-26
- Poli S. and Schmidt M.W. (1998) The high-pressure stability of zoisite and phase relationships of zoisite-bearing assemblages. *Contributions to Mineralogy and Petrology*, 130, (2), 162-175.
- Pommier C.J.S., Denton M.B. and Downs R.T. (2003) Raman spectroscopic study of spodumene ($\text{LiAlSi}_2\text{O}_6$) through the pressure-induced phase change from $C2/c$ to $P2_1/c$. *Journal of Raman Spectroscopy*, 34, (10), 769-775.
- Ponahlo, J. F. R. (1968) Inclusions in black star-pyroxene, *Journal of Gemmology*, 11. 1. 12-15
- Ponalho, J. (1990) Kathodolumineszenz- und absorptionsspektren gelber Saphir. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 39, 225-228.
- Ponalho, J. (1991) Cathodoluminescence (CL) and CL-spectra of gemstones caused by transition elements. *22nd International Gemmological Conference - Abstracts*.
- Ponalho, J. (1993) Kathodolumineszenz (KL) und KL-Spektren von Edelsteinen. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft* 42, 149-162.
- Ponalho, J. (1995) Cathodoluminescence (CL) of gemstones and ornamental stones. *Analisis Magazine* 23, M30-M33.
- Pongkrapan, S., Wongkokua, W. and Wathanakul, P. (2010) Effects of heat treatment on synthetic gem corundum: An AFM approach. *20th General Meeting International Mineralogical Association - Abstract*.
- Poppe G. T. (1992) *Volutes. L'informatore*, Piceno edition. Ancona, Italy,
- Potapov V.V. and Kamashev D.V. (2006) Synthesis of precious opal in a hydrothermal solution. *Glass Physics and Chemistry*, 32, (1), 89-98.
- Pough, F.H. (1935) The morphology of phenacite from two new occurrences. *American Mineralogist* 20, 863-874.
- Pough, F.H. (1936) Phenakit, seine morphologie und paragenesis. *Neuen Jahrbuch für Mineralogie, Geologie und Paläontologie - Sonder-Abdruck* 71, 291-341.
- Pough, F.H. (1964a) Facetable borates. *Lapidary Journal* 17, 1182-1189.
- Pough, F.H. (1964b), Rare faceting minerals - Beginning of a series on silicates - part 1, *Lapidary Journal*, 18, 7, 730-740.
- Pough, F.H. (1965a) A new hydrothermal synthetic emerald, *Journal of Gemmology*, 9. 12. 426-433
- Pough, F.H. (1965b) A new synthetic emerald, *Lapidary Journal*, 19. 6. 664-669
- Pough, F.H. (1965c) Mallorca and imitation pearls. *Gems and Gemology* 11, 273-280.
- Pough, F.H. (1965d) Rare faceting minerals -- Continuing a series on silicates - part 5, *Lapidary Journal*, 19. 1. 74-79

- Pough, F.H. (1966a) Rare faceting minerals -- Continuing a series on silicates - part 15. *Lapidary Journal* 19, 1238-1239.
- Pough, F.H. (1966b) Rare faceting minerals -- Continuing a series on silicates - part 16. *Lapidary Journal* 19, 1330-1337.
- Pough, F.H. (1966c) Rare faceting minerals -- Continuing a series on silicates - part 18. *Lapidary Journal* 20, 326-333.
- Pough, F.H. (1970) Giant emerald crystals found in Brazil, *Lapidary Journal*, 24. 6. 840-841
- Pough, F.H. (1971) French synthetic emeralds, *Lapidary Journal*, 24. 10. 1322-1327
- Pough, F.H. (1972a) Meet Tanzania's fancy sapphires. *Australian Gemmologist* 11, 19-21.
- Pough, F.H. (1972b) Phenakite. *Lapidary Journal* 26, 4-12.
- Pough, F.H. (1985) General Electric's synthetic jadeite, *Lapidary Journal*, 39. 7. 42-44
- Pough, F.H. (1986) Gem treatment - peridot and sard. *Lapidary Journal* 40, 18.
- Pough, F.H. (1987a) Gem treatment - actinolite and tremolite: a couple of amphiboles, *Lapidary Journal*, 41. 6. 16-18
- Pough, F.H. (1987b) Gem treatment - amblygonite, *Lapidary Journal*, 41. 7. 16-17
- Pough, F.H. (1987c) Gem treatment - anatase, *Lapidary Journal*, 41. 9. 16-17
- Pough, F.H. (1987d) Gem treatment - cordierite, alias dichroite, iolite, and water sapphire, *Lapidary Journal*, 41. 3. 17-18
- Pough, F.H. (1987e) Title: Trophy tourmalines! *Lapidary Journal*, 40, (11), 20-32.
- Pough, F.H. (1988a) Gem treatment - aragonite, *Lapidary Journal*, 42. 3. 15-17
- Pough, F.H. (1988b) Mineral notes - axinite, *Lapidary Journal*, 42. 5. 16-18
- Pough, F.H. (1988c), Gem treatment - andalusite, *Lapidary Journal*, 41, 11, 14-17.
- Pough, F.H. (1996) "La marcasite". *Lapidary Journal* 50, 18, 111-112.
- Pough, F.H. (1997a) Pectolite. *Lapidary Journal* 49, 12, 54.
- Pough, F.H. (1997b) Peridot-olivine. *Lapidary Journal* 51, 289-290.
- Pough, F.H. (1997c) Phenakite. *Lapidary Journal* 49, 14, 70.
- Pough, F.H. (1997d) Phosphophyllite. *Lapidary Journal* 51, 18, 126.
- Pough, F.H. (1997e) Prehnite. *Lapidary Journal* 51, 15, 102.
- Pough, F.H. (1998) Pollucite and petalite. *Lapidary Journal* 52, 273.
- Pough, F.H. and Henderson, E. P. (1945) Brazilianite, a new phosphate mineral, *American Mineralogist*, 30. 9/10. 572-582
- Poupeau, G., Le Bourdonnec, F.X., Carter, T., Delerue, S., Shackley, M.S., Barrat, J.A., Dubernet, S., Moretto, P., Calligaro, T., Milic, M. and Kobayashi, K. (2010) The use of SEM-EDS, PIXE and EDXRF for obsidian provenance studies in the Near East: A case study from Neolithic Çatalhöyük (Central Anatolia). *Journal of Archaeological Science* 37, 2705-2720.
- Pouvreau, S. and Prasil, V. (2001) Growth of the black-lip pearl oyster, *Pinctada margaritifera*, at nine culture sites of French Polynesia: synthesis of several sampling designs conducted between 1994 and 1999. *Aquatic Living Resources* 14, 155-163.
- Povarennykh, A.S., Platonov, A.N., Tarashchan, A.N. and Belichenko, V.P. (1971) The colour and luminescence of tugtupite (beryllosodalite) from Ilimaussaq, South Greenland. *Meddelelser om Gronland* 181, 1-12 (last page missing).
- Povondra P. and Novák M. (1986) Tourmalines in metamorphosed carbonate rocks from western Moravia, Czechoslovakia. *Neues Jahrbuch für Mineralogie Monatshefte*, (6), 273-282.
- Powers, V. (1993) Unusual bicoloured glass simulant, *Canadian Gemmologist*, 14. 4. 114
- Prencipe M., Tribaudino M. and Nestola F. (2003) Charge-density analysis of spodumene (LiAlSi₂O₆) from ab initio Hartree-Fock calculations. *Physics and Chemistry of Minerals*, 30, (10), 606-614.
- Prewitt, C. T. and Burnham, C. W. (1966) The crystal structure of jadeite, NaAlSi₂O₆, *American Mineralogist*, 51. 7. 956-975
- Princivalle F., Martignago F. and dal Negro A. (2006) Kinetics of cation ordering in natural Mg(Al,Cr³⁺)₂O₄ spinels. *American Mineralogist*, 91, (2/3), 313-318.
- Prins, J. F. (2001) Vacancy diffusion and trapping in electron-irradiated type IaA diamonds, *Diamond and Related Materials*, 10. 1. 87-93

- Prins, J. F. (2003) Ion implantation of diamond for electronic applications, *Semiconductor Science and Technology*, 18, 3, S27-S33
- Proctor K. (1985a) Gem pegmatites of Minas Gerais, Brazil: The tourmalines of the Araçuaí Districts. *Gems and Gemology*, 21, (1), 3-19.
- Proctor K. (1985b) Gem pegmatites of Minas Gerais, Brazil: The tourmalines of the Governador Valadares District. *Gems and Gemology*, 21, (2), 86-104.
- Proctor, K. (1988) Chrysoberyl and alexandrite from the pegmatite districts of Minas Gerais, Brazil, *Gems and Gemology*, 24, 1, 16-32
- Proust D. and Fontaine C. (2007a) Amethyst-bearing lava flows in the Paraná Basin (Rio Grande do Sul, Brazil): Cooling, vesiculation and formation of the geodic cavities. *Geological Magazine*, 144, (1), 53-65.
- Proust D. and Fontaine C. (2007b) Amethyst geodes in the basaltic flows from Triz Quarry at Ametista do Sul (Rio Grande do Sul, Brazil): Magmatic source of silica for amethyst crystallizations. *Geological Magazine*, 144, (4), 731-739.
- Prowatke S. and Klemme S. (2005) Effect of melt composition on the partitioning of trace elements between titanite and silicate melt. *Geochimica et Cosmochimica Acta*, 69, (3), 695-709.
- Prowatke S. and Klemme S. (2006) Rare earth element partitioning between titanite and silicate melts: Henry's Law revisited. *Geochimica et Cosmochimica Acta*, 70, (19), 4997-5012.
- Qi L., Yan W. and Yang M. (1998) Turquoise from Hubei Province, China. *Journal of Gemmology*, 26, (1), 1-12.
- Qi, L. (1996) Formation and development of inclusions from ruby in heat treatment. *China Gems* 5, 28-34.
- Qi, L., Xi, J. and Pei, J. (1999) Chatham flux-grown synthetic ruby: A new variety with dark colored cores. *Journal of Gems and Gemmology* 1, 1-8.
- Qi, L., Xia, Y. and Yuan, X. (2002) Channel-water molecular pattern and ^1H , ^{23}Na NMR spectra representation in synthetic red beryl (in Chinese), *Journal of Gems and Gemology*, 4, 3, 8-16
- Qi, L., Yuan, X., Tian, L. and Yuan, Z. (2001) Evolution and colouration of lattice defects in diamonds at high pressure and high temperature, *Journal of Gems and Gemology*, 3, 3, 1-7
- Qian, J., Pantea, C., Voronin, G. and Zerda, T. W. (2001) Partial graphitization of diamond crystals under high-pressure and high-temperature conditions, *Journal of Applied Physics*, 90, 3, 1632-1637
- Querre, G., Herbault, F. and Calligaro, T. (2008) Transport of Neolithic variscites demonstrated by PIXE analysis. *X-ray Spectrometry* 37, 116-120.
- Radlinski A.P., Clauoué-Long J., Hinde A.L., Radlinska E.Z. and Lin J.S. (2003) Small-angle X-ray scattering measurement of the internal microstructure of natural zircon crystals. *Physics and Chemistry of Minerals*, 30, (10), 631-640.
- Ragazzi, E., Roghi, G., Giaretta, A. and Gianolla, P. (2003) Classification of amber based on thermal analysis, *Thermochimica Acta*, 404, 1/2, 43-54
- Rager, H. (1977) Electron spin resonance of trivalent chromium in forsterite, Mg_2SiO_4 , *Physics and Chemistry of Minerals*, 1, 4, 371-378
- Rager, H., Hosoya, S. and Weiser, G. (1988) Electron paramagnetic resonance and polarized optical absorption spectra of Ni^{2+} in synthetic forsterite, *Physics and Chemistry of Minerals*, 15, 4, 383-389
- Rahn M.K., Brandon M.T., Batt G.E. and Garver J.I. (2004) A zero-damage model for fission-track annealing in zircon. *American Mineralogist*, 89, (4), 473-484.
- Rainier, P. W. (1931) The Chivor-Somondoco emerald mines of Columbia, *American Institute of Mining Engineers - Transactions*, General Volume, 204-223
- Rakontondrazafy, A.F.M., Giuliani, G., Ohnenstetter, D., Fallick, A.E., Rakotosamizanay, S., Andriamamonjy, A., Ralantoarison, T., Razanatsiheno, M., Offant, Y., Garnier, V., Maluski, H., Dunaigre, C., Schwarz, D. and Ratrimo, V. (2008) Gem corundum deposits of Madagascar: A review. *Ore Geology Reviews* 34, 135-154.
- Rakov L.T. (2003) Natural and artificially stimulated radiation processes in quartz: Similarities and differences. *Geochemistry International*, 41, (7), 700-710.
- Rakov L.T. and Krylova G.I. (2001) Role of structural impurities in polymorphic transformations in quartz. *Geochemistry International*, 39, (12), 1172-1178.
- Rakov L.T. and Shuriga T.N. (2009) The structural dynamic state of quartz as a criterion of its genesis. *Geochemistry International*, 47, (10), 1021-1035.
- Raman, C. V. and Jayaraman, A. (1950a) The structure of labradorite and the origin of its iridescence, *Proceedings of the Indian Academy of Sciences*, A32, 1-16

- Raman, C. V., Jayaraman, A. and Srinivasan, T. K. (1950b) The structure and optical behavior of the Ceylon moonstones, *Proceedings of the Indian Academy of Sciences*, 32A. 123-140
- Ramdohr, R. and Milisenda, C.C. (2006) A new find of sapphire placer deposits on Nosy-Bé, Madagascar. *Journal of Gemmology* 30, 144-154.
- Ramsey J. L. (1988), Brazil - the ultimate field trip, *Lapidary Journal*, 42, 5, 32-40.
- Ramseyer K., Baumann J., Matter A. and Mullis J. (1988) Cathodoluminescence colours of α -quartz. *Mineralogical Magazine*, 52, (5), 669-677.
- Randriamanga, C. E. (1994) Les gemmes incolores de Madagascar, *University of Nantes - Diploma*, 1-42
- Rao, K. R., Chaplot, S. L., Choudhury, N., Ghose, S. and Price, D. L. (1987) Phonon density of states and specific heat of forsterite, Mg_2SiO_4 , *Science*, 236. 4797. 64-65
- Rase, D. E. and Roy, R. (1955) On the stability and hydrothermal synthesis of benitote, *American Mineralogist*, 40. 5/6. 542-544
- Rauch, F., Ericson, J.E., Wagner, W., Grimm-Leimsner, C., Livi, R.P., Shi, C.G. and Tombrello, T.A. (1992) Hydration of tektite glass. *Journal of Non-Crystalline Solids* 144, 224-230.
- Ream L.R. (1991) Japan-law twin and sceptered quartz localities. *Rocks and Minerals*, 66, (6), 466-476.
- Reban, J. (1984) Moldavite - The gemmy tektites, *Lapidary Journal*, 38. 1. 30-36
- Reddy B.J., Frost R.L., Weier M.L. and Martens W.N. (2006) Ultraviolet-visible, near infrared and mid infrared reflectance spectroscopy of turquoise. *Journal of Near Infrared Spectroscopy*, 14, (4), 241-250.
- Reddy S.L., Maheswaramma K.S., Reddy R.R., Reddy A.V., Nakamura Y., Reddy B.J., Endo T. and Frost R.L. (2011) Electron paramagnetic resonance, NIR studies on zoisite, clinozoisite and chrom-zoisite minerals. *Spectrochimica Acta A*, 78, (4), 1240-1244.
- Redmann, M., Henn, U. and Bank, H. (1990) Changierender Fluorit aus dem Schwarzwald, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 39. 2/3. 169-172
- Reeve, R. J. (1972) Brazilianite, *Australian Gemmologist*, 11. 5. 8-10
- Reiners P.W. (2005) Zircon (U-Th)/He thermochronometry. *Reviews in Mineralogy and Geochemistry*, 58, 151-179.
- Reiners P.W. and Farley K.A. (1999) Helium diffusion and (U-Th)/He thermochronometry of titanite. *Geochimica et Cosmochimica Acta*, 63, (22), 3845-3859.
- Reiners P.W., Spell T.L., Nicolescu S. and Zanetti K.A. (2004) Zircon (U-Th)/He thermochronometry: He diffusion and comparisons with $^{40}\text{Ar}/^{39}\text{Ar}$ dating. *Geochimica et Cosmochimica Acta*, 68, (8), 1857-1887.
- Reinitz I.M. and Rossman G.R. (1988) Role of natural radiation in tourmaline coloration. *American Mineralogist*, 73, (7/8), 822-825.
- Rejl, L. (1977) Gemstones of Czechoslovakia and their use in jewelry, *Lapidary Journal*, 31. 6. 1334-1338
- Remaut, G. and Vochten, R. (1986) Blue-green apatite from Gravelotte, South Africa, *Australian Gemmologist*, 16. 3. 115-116
- Remeshilo, B.G. and Vovk, P.K. (1973) Two types of phenakite crystals from the rock-crystal pegmatites of Volynia. *Doklady Akademii Nauk SSSR* 213, 148-150.
- Ren, F.Z., Wan, X.D., Ma, Z.H. and Su, J.H. (2009) Study on microstructure and thermodynamics of nacre in mussel shell. *Materials Chemistry and Physics* 114, 367-370.
- Renfro N. and Shen A. (2013). Green Kyanite. *Gems and Gemology*, 49. 2.
- Ribbe, P. H. (1979) Titanium, fluorine, and hydroxyl in the humite minerals, *American Mineralogist*, 64. 9/10. 1027-1035
- Ribeiro, C.T.M. and Zanatta, A.R. (2003) Synthesis and spectroscopic investigation of ruby microstructures. *Applied Physics Letters* 83, 2336-2338.
- Rice S.B., Freund H., Huang W.L., Clouse J.A. and Isaacs C.M. (1995) Application of Fourier Transform infrared spectroscopy to silica diagenesis: The opal-A to opal-CT transformation. *Journal of Sedimentary Research*, 65, (4a), 639-647.
- Rice, P. C. (1979) "Amber of Santo Domingo" - Mining in the Dominican Republic, *Lapidary Journal*, 33. 8. 1804-1810
- Rice, P. C. (1981b) Amber mining the the Dominican Republic, *Rocks and Minerals*, 145-152
- Richards R.P. (1990) The origin of faden quartz. *Mineralogical Record*, 21, (3), 191-201.
- Richmond W. E. (1940), Crystal chemistry of the phosphates, arsenates and vanadates of the type $\text{A}_2\text{XO}_4(\text{Z})$, *American Mineralogist*, 25, 7, 441-479.

- Richter K., Leeman W.P. and Hervig R.L. (2006) Partitioning of Ni, Co, and V between spinel-structured oxides and silicate melts: Importance of spinel composition. *Chemical Geology*, 227, (1/2), 1-25.
- Rignanese G.M., Gonze X. and Pasquarello A. (2001) First-principles study of structural, electronic, dynamical, and dielectric properties of zircon. *Physical Review B*, 63, (10), 104305.
- Rimša A., Whitehouse M.J., Johansson L. and Piazzolo S. (2007) Brittle fracturing and fracture healing of zircon: An integrated cathodoluminescence, EBSD, U-Th-Pb, and REE study. *American Mineralogist*, 92, (7), 1213-1224.
- Rimstidt, J.D. and Vaughan, D.J. (2003) Pyrite oxidation: A state-of-the-art assessment of the reaction mechanism. *Geochimica et Cosmochimica Acta* 67, 873-880.
- Rimstidt, J.D. and Vaughan, D.J. (2003) Pyrite oxidation: A state-of-the-art assessment of the reaction mechanism. *Geochimica et Cosmochimica Acta* 67, 873-880.
- Rinaudo C. and Trossarelli C. (1997) Optical and X-ray topographic study of Verneuil-grown spinels. *Journal of Gemmology*, 25, (5), 331-339.
- Ringsrud, R. (1983) The oil treatment of emeralds in Bogotá, Colombia, *Gems and Gemology*, 19. 3. 149-156
- Ringsrud, R. (1988) Muzo emerald, *Lapidary Journal*, 41. 10. 27-34
- Ríos S., Malcherek T., Salje E.K.H. and Domeneghetti C. (2000) Localized defects in radiation-damaged zircon. *Acta Crystallographica B*, 56, (6), 947-952.
- Ríos S., Salje E.K.H., Zhang M. and Ewing R.C. (2000) Amorphization in zircon: Evidence from direct impact damage. *Journal of Physics: Condensed Matter*, 12, (11), 2401-2412.
- Robbins, M. (1996) The crystal faces of fluorescence, *Rocks and Minerals*, 71. 1/2. 57-60
- Robert, D., Fritsch, E. and Koivula, J. I. (1990) "Emeraldolite": A new synthetic emerald overgrowth on natural beryl, *Gems and Gemology*, 26. 4. 288-293
- Roberts, D.L., Sutherland, F.L., Hollis, J.D., Kennewell, P. and Graham, I.T. (2004) Gemstone characteristics, north-east Barrington Plateau, NSW. *Journal and Proceedings of the Royal Society of New South Wales* 137, 99-122.
- Robertson, A. D. (1981) Chrysocola - "A little known gemstone", *Australian Gemmologist*, 14. 6. 127-129
- Robinson G. and Wight W. (1997) Green vanadium-bearing titanite from Chibougamau, Quebec, Canada. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 46, (4), 225-228.
- Robinson, G. (1973) Dekalb diopside, *Lapidary Journal*, 27. 7. 1040-1042, 1058-1059
- Robinson, K., Gibbs, G. V. and Ribbe, P. H. (1973) The crystal structures of the humite minerals. IV. Clinohumite and titanoclinohumite, *American Mineralogist*, 58. 1/2. 43-49
- Roger R. M. P. (1987), Gemmological materials found in Spain, *21st International Gemmological Conference - Transactions*, 79-80.
- Roger, R.M.P. (1991) Coral from the Catalan Costa Brava, Spain. *22nd International Gemmological Conference - Abstracts*.
- Rogers, A. F. and Sperisen, F. J. (1942) American synthetic emerald, *American Mineralogist*, 27. 11. 762-768
- Rohn, K.H. (1998) Lake Superior's north shore. *Rock and Gem* 28, 40-47.
- Rolandi, V., Brajkovic, A., Adamo, I., Bocchio, R. and Landonio, M. (2005) Gem corals: Classification and spectroscopic features. *Australian Gemmologist* 22, 285-297.
- Rondeau B., Fritsch E., Guiraud M. and Renac C. (2004) Opals from Slovakia ("Hungarian" opals): A reassessment of the conditions of formation. *European Journal of Mineralogy*, 16, (5), 789-799.
- Rondeau B., Fritsch E., Mazzero F., Gauthier J.P., Cenki-Tok B., Bekele E. and Gaillou E. (2010) Play-of-color opal from Wegel Tena, Wollo Province, Ethiopia. *Gems and Gemology*, 46, (2), 90-105.
- Rondorf, A. and Rondorf, E. (1988) Jeremejewit von den Wannenköpfen bei Ochtendung (Eifel), *Lapis*, 13. 7/8. 70-73
- Ronneberg, H., Borch, G., Fox, D. L. and Liaaen-Jensen, S. (1979a) Animal carotenoids 19 alloporin: A new carotenoprotein, *Comparative Biochemistry and Physiology B*, 62. 4. 309-312
- Ronneberg, H., Fox, D. L. and Liaaen-Jensen, S. (1979b) Animal carotenoids - carotenoproteins from hydrocorals, *Comparative Biochemistry and Physiology B*, 64. 4. 407-408
- Rosa A.L., El-Barbary A.A., Heggie M.K. and Briddon P.R. (2005) Structural and thermodynamic properties of water-related defects in α -quartz. *Physics and Chemistry of Minerals*, 32, (5/6), 323-331.

- Rosasco, G. J. and Roedder, E. (1979) Application of a new Raman microprobe spectrometer to nondestructive analysis of sulfate and other ions in individual phases in fluid inclusions in minerals, *Geochimica et Cosmochimica Acta*, 43, 12, 1907-1915
- Rose R. L. (1957), Andalusite- and corundum-bearing pegmatites in Yosemite National Park, California, *American Mineralogist*, 42, 9/10, 635-647.
- Rosen, S.A., Tykot, R.H. and Gottesman, M. (2005) Long distance trinket trade: Early Bronze Age obsidian from the Negev. *Journal of Archaeological Science* 32, 775-784.
- Rosenberg P.E. and Foit F.F. (1985) Tourmaline solid solutions in the system $\text{MgO-Al}_2\text{O}_3\text{-SiO}_2\text{-B}_2\text{O}_3\text{-H}_2\text{O}$. *American Mineralogist*, 70, (11/12), 1217-1223.
- Rosenberg P.E., Foit F. and Ekambaram V. (1986) Synthesis and characterization of tourmaline in system $\text{Na}_2\text{O-Al}_2\text{O}_3\text{-SiO}_2\text{-B}_2\text{O}_3\text{-H}_2\text{O}$. *American Mineralogist*, 71, (7/8), 971-976.
- Rosenholtz, J. L. and Smith, D. T. (1950) Crestmore sky blue marble, its linear thermal, expansion and color, *American Mineralogist*, 35, 11/12, 1049-1054
- Rossmann G.R. (1994) Colored varieties of the silica minerals. *Reviews in Mineralogy and Geochemistry*, 29, (1), 433-467.
- Rossmann G.R. and Mattson S.M. (1986) Yellow, Mn-rich elbaite with Mn-Ti intervalence charge transfer. *American Mineralogist*, 71, (3/4), 599-602.
- Rossmann G.R., Fritsch E. and Shigley J.E. (1991) Origin of color in cuprian elbaite from São José de Batalha, Paraíba, Brazil. *American Mineralogist*, 76, (9/10), 1479-1484.
- Rossmann, G. R. (1974) Lavender jade: The optical spectrum of Fe^{3+} and $\text{Fe}^{2+}\text{-Fe}^{3+}$ inter-valence charge transfer in jadeite from Burma, *American Mineralogist*, 59, 7/8, 868-870
- Rossmann, G. R. (1994) Colored varieties of the silica minerals, *Reviews in Mineralogy*, 29, 433-467
- Rossmann, G.R., Grew, E.S. and Dollase, W.A. (1982) The colors of sillimanite. *American Mineralogist* 67, 749-761.
- Rossmann, G.R. (2011) The Chinese Red Feldspar Controversy: Chronology of Research Through July 2009. *Gems and Gemology*, 47, 1, 16-30.
- Rousseau, M. and Rollion-Bard, C. (2012) Influence of the depth on the shape and thickness of nacre tablets of *Pinctada margaritifera* pearl oyster, and on oxygen isotopic composition. *Minerals* 2, 55-65.
- Roy, D. M. (1954) Hydrothermal synthesis of andalusite, *American Mineralogist*, 39, 1/2, 140-143
- Rozsa, P., Szoor, G., Elekes, Z., Gratuz, B., Uzonyi, I. and Kiss, A.Z. (2006) Comparative geochemical studies of obsidian samples from various localities. *Acta Geologica Hungarica* 49, 73-87.
- Ruan, H. D., Frost, R. L. and Klopogge, J. T. (2001) Comparison of Raman spectra in characterizing gibbsite, bayerite, diaspore, and boehmite, *Journal of Raman Spectroscopy*, 32, 9, 745-750
- Rubatto D. (2002) Zircon trace element geochemistry: Partitioning with garnet and the link between U-Pb ages and metamorphism. *Chemical Geology*, 184, (1/2), 123-138.
- Rubatto D. and Hermann J. (2007) Zircon behaviour in deeply subducted rocks. *Elements*, 3, (1), 31-35.
- Rubie D.C. and Ross C.R. (1994) Kinetics of the olivine-spinel transformation in subducting lithosphere: Experimental constraints and implications for deep slab processes. *Physics of the Earth and Planetary Interiors*, 86, (1/3), 223-243.
- Ruff, E. (1950), Jade of the Maori, *London*, Gemmological Association of Great Britain, 89 pp.,
- Rupasinghe M.S. (1985) Anreicherung von radioaktiven elementen und seltenen erd-elementen in zirkon und monazite aus Sri Lanka. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 34, (1/2), 69-75.
- Rupasinghe M.S. and Senaratne A. (1986) A treatment procedure for improving colour and quality of zircons. *Journal of Gemmology*, 20, (3), 168-170.
- Rupasinghe M.S. and Senaratne A. (1996) Zoning in Sri Lankan zircons: Chemically controlled? *Australian Gemmologist*, 19, (7), 288-291.
- Rupasinghe, M.S., Rupasinghe, R.A.P., Dissanayake, C.B. and Ileperuma, O.A. (1993) A tentative classification of heat-treatable corundum (Geuda) stones. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 42, 115-121.
- Ruplinger, P. K. (1983) Topaz and andalusite mining in Brazil, *Journal of Gemmology*, 18, 7, 581-591
- Rusk B., Koenig A. and Lowers H. (2011) Visualizing trace element distribution in quartz using cathodoluminescence, electron microprobe, and laser ablation-inductively coupled plasma-mass spectrometry. *American Mineralogist*, 96, (5/6), 703-708.

- Russell J.K., Groat L.A. and Halleran A.A.D. (1994) LREE-rich niobian titanite from Mount Bisson, British Columbia: Chemistry and exchange mechanisms. *Canadian Mineralogist*, 32, (4), 575-587.
- Russell, M.J., Hall, A.J. and Gize, A.P. (1990) Pyrite and the origin of life. *Nature* 344, 387.
- Rutland, E. (1954) Some inclusions in apatites, *Journal of Gemmology*, 4, 7. 283-287
- Saadi, J.A. (1988) Rodocrosita Argentina - Para la ciencia y el arte. *Boletín del Instituto Gemológico Español*, 8-20.
- Saadi, J.A. and Carlos, J.C. (1992) Rhodochrosite from Argentina. *Australian Gemmologist* 18, 125-132.
- Sabatier, G. (1953) Sur quelques types d'architecture cristalline des coquilles de mollusques, *Bulletin de la Société française de Mineralogie et Cristallographie*, 76. 59-63
- Sack R.O. and Ghiorso M.S. (1991) Chromian spinels as petrogenetic indicators: Thermodynamics and petrological applications. *American Mineralogist*, 76, (5/6), 827-847.
- Safar, A. and Sturman, N. (1998) Notes from the Gem and Pearl Testing Laboratory, Bahrain - 6, *Journal of Gemmology*, 26. 1. 17-23
- Saini, N.L., Srivastava, P., Sekhar, B.R. and Garg, K.B. (1995) New cat's eye find puzzles Jaipur market. *JewelSiam* 6, 90-91.
- Saito, Y., Horie, H. and Suganoma, S. (1991) Coloration of sapphire by Co ion implantation. *Nuclear Instruments and Methods in Physics Research B* 59/60, 1173-1176.
- Sakkaravej, S., Sutthirath, C., Pisutha-Arnond, V., Atichat, W., Wathanakul, P., Pumpeng, S. and Hager, T. (2006) Thermal enhancement of some blue sapphires from Ilakaka-Sakaraha deposits, Madagascar. *1st International Gema and Jewelry Conference - Abstracts*, 76-77.
- Sala, J.D., Fuentes, J.C., Herrero, M., Laserre, N. and Viand, J. (1973) Contribution to the knowledge of the Argentine rhodochrosite. *Gems and Gemology* 14, 141-143.
- Salgueiriño-Maceira V., Rodríguez-González B., Hellweg T. and Liz-Marzán L.M. (2003) Formation of large opals via drying of wet colloidal crystals. *Australian Journal of Chemistry*, 56, (10), 1017-1020.
- Salis M. (1995) Lattice defects in natural α -spodumene. *Il Nuovo Cimento D*, 17, (6), 649-651.
- Salje E.K.H., Chrosch J. and Ewing R.C. (1999) Is "metamictization" of zircon a phase transition? *American Mineralogist*, 84, (7/8), 1107-1116.
- Salje E.K.H., Safarik D.J., Lashley J.C., Groat L.A. and Bismayer U. (2011) Elastic softening of metamict titanite CaTiSiO_5 : Radiation damage and annealing. *American Mineralogist*, 96, (8/9) 1254-1261.
- Salje E.K.H., Safarik D.J., Taylor R.D., Pasternak M.P., Modic K.A., Groat L.A. and Lashley J.C. (2011) Determination of iron sites and the amount of amorphization in radiation-damaged titanite (CaTiSiO_5). *Journal of Physics: Condensed Matter*, 23, (10), 105402.
- Salje E.K.H., Schmidt C. and Bismayer U. (1993) Structural phase transition in titanite, CaTiSiO_5 : A Raman spectroscopic study. *Physics and Chemistry of Minerals*, 19, (7), 502-506.
- Salje E.K.H., Zhang M. and Groat L.A. (2000) Dehydration and recrystallization of radiation-damage titanite under thermal annealing. *Phase Transitions*, 71, (3), 173-187.
- Salviulo G., Russo U., Della Giusta, A. and Carbonin S. (1999) Intracrystalline disorder in spinels: Sensitivity of cell parameter a and Mössbauer data. *Neues Jahrbuch für Mineralogie Monatshefte*, (4), 167-179.
- Saminpanya, S. and Sutherland, F.L. (2011) Different origins of Thai area sapphire and ruby, derived from mineral inclusions and co-existing minerals. *European Journal of Mineralogy* 23, 683-694.
- Sanchez, E.M., Garcia, M., Brito, F.R. and Alvarez-Fregoso, O. (2001) Cathodoluminescence and photoluminescence characteristics of ruby. *Modern Physics Letters B* 15, 760-763.
- Sanchez, J.L., Osipowicz, T., Tang, S.M., Sun, T.T. and Win, T.T. (1997) Micro-PIXE analysis of trace element concentrations of natural rubies from different locations in Myanmar. *Nuclear Instruments and Methods in Physics Research B* 130, 682-686.
- Sanchez, L. (2004) Trade raises questions about chocolate pearls. *Jewellery News Asia*, September, 160.
- Sanero, E. and Gottardi, G. (1968) Nomenclature and crystal-chemistry of axinites, *American Mineralogist*, 53. 7/8. 1407-1411
- Santangelo, G., Abbiati, M., Giannini, F. & Cicogna, F. (1993). Red coral fishing trends in the western Mediterranean Sea during the period 1981-1991. *Scientia Marina*, 57(1), 139-143.
- Sapountzis, E.S. and Christofides, G. (1982) A calcium-poor rhodonite from Xanthi (N. Greece). *Mineralogical Magazine* 46, 337-340.
- Sasowsky, I. D. (1998) Determining the age of what is not there, *Science*, 279. 5358. 1874

- Saucedo, P., Monteforte, M. and Blanc, F. (1998) Changes in shell dimensions of pearl oysters, *Pinctada mazatlanica* (Hanley 1856) and *Pteria sterna* (Gould 1851), during growth as criteria for Mabe pearl implants. *Aquaculture Research* 29, 801-814.
- Saul, J. M. (1987) An unusual glass specimen from East Africa, *21st International Gemmological Conference - Transactions*, 53
- Saul, J. M., Sturman, N. P. G., Castro, A. I. and Harding, R. R. (1991) Characteristics of some gem materials from East Africa, Madagascar and Afghanistan, *22nd International Gemmological Conference - Abstracts*,
- Sautter, V., Lorand, J.P., Cordier, P., Rondeau, B., Leroux, H. and Meibom, A. (2010) Black diamonds: The crustal origin for carbonado. *20th General Meeting International Mineralogical Association - Abstract*.
- Sawakuchi G.O. and Okuno E. (2005) The role of aluminum and titanium in the point defects of gamma irradiated natural quartz. *Physica Status Solidi C*, 2, (1), 588-591.
- Sawlowicz, Z. (1993) Pyrite framboids and their development: A new conceptual mechanism. *Geologische Rundschau* 82, 148-156.
- Sax, M. (1996) Recognition and nomenclature of quartz materials with specific reference to engraved gemstones, *Jewellery Studies*, 7. 63-71
- Scandella, S. (1989) Black diamonds of type IIb. *Journal of Gemmology* 21, 411.
- Scarratt K., Bracher P., Bracher M., Attawi A. Safar A. Saeseaw S., Homkrajae A., Sturan N. (2012) Natural pearls from Australian *Pinctada maxima*. *Gems and Gemology* 48. 4. 236-261.
- Scarratt, K. (1977) A study of recent Chatham synthetic ruby and synthetic blue sapphire crystals with a view to the identification of possible faceted material. *Journal of Gemmology* 15, 347-353.
- Scarratt, K. (1980) Faceted diaspore, *Journal of Gemmology*, 17. 3. 145-148
- Scarratt, K. (1981) Notes from the Laboratory: Plastic impregnated opal. *Journal of Gemmology* 17.
- Scarratt, K. (1983) Notes from the Laboratory: Lapis damaged by acid, *Journal of Gemmology*, 18. 6.
- Scarratt, K. (1984a) Coral. *Journal of Gemmology* 19, 108-109.
- Scarratt, K. (1984b) Notes from the Laboratory: Heat treated yellow to orange sapphire. *Journal of Gemmology* 19.
- Scarratt, K. (1984c) Notes from the Laboratory: Clinohumite, *Journal of Gemmology*, 19. 2.
- Scarratt, K. (1984d) Notes from the Laboratory: Imitation emerald crystal, *Journal of Gemmology*, 19. 2.
- Scarratt, K. (1984e) Notes from the Laboratory: Irradiated yellow sapphire. *Journal of Gemmology* 19.
- Scarratt, K. (1984f) Notes from the Laboratory: Plastic coated coral. *Journal of Gemmology* 19.
- Scarratt, K. (1984g) Notes from the Laboratory: The Angelo imitation pearl. *Journal of Gemmology* 19, 121-123.
- Scarratt, K. (1985a) Barium iron oxide, *Journal of Gemmology*, 19. 8. 658-659
- Scarratt, K. (1985b) Heat treated rubies and sapphires. *Journal of Gemmology* 19, 656-657.
- Scarratt, K. (1985c) Notes from the Laboratory: Magnetic haematite, *Journal of Gemmology*, 19. 8.
- Scarratt, K. (1985d) Notes from the Laboratory: Squids eye lenses as imitations of pearl. *Journal of Gemmology* 19, 651-652.
- Scarratt, K. (1986) Notes from the Laboratory: Glass imitating jadeite, *Journal of Gemmology*, 20. 3.
- Scarratt, K. (1986a) Amber "treatment", *Journal of Gemmology*, 20. 2. 95-97
- Scarratt, K. (1986b) Notes from the Laboratory: Haiüyne, *Journal of Gemmology*, 20. 2.
- Scarratt, K. (1986c) Notes from the Laboratory: Idocrase, *Journal of Gemmology*, 20. 2.
- Scarratt, K. (1986d) Notes from the Laboratory: Imitation "Non nucleated cultured pearls". *Journal of Gemmology* 20.
- Scarratt, K. (1986e) Notes from the Laboratory: Surface coloured amber, *Journal of Gemmology*, 20. 2.
- Scarratt, K. (1986f) Notes from the Laboratory: Yellowish fibrolite. *Journal of Gemmology* 20.
- Scarratt, K. (1986g) Sillimanite. *Journal of Gemmology* 20, 151.
- Scarratt, K. (1986h) Taaffeite. *Journal of Gemmology* 20, 151-153.
- Scarratt, K. (1987a) Blue devitrified glass, *Journal of Gemmology*, 20. 5. 285-286
- Scarratt, K. (1987b) Notes from the Laboratory: Biron synthetic emerald, *Journal of Gemmology*, 20. 5.
- Scarratt, K. (1987c) Emeralds, *Journal of Gemmology*, 20. 5. 289-291
- Scarratt, K. (1987d) Notes from the Laboratory: Plastic filled cavity in synthetic ruby. *Journal of Gemmology* 20.

- Scarratt, K. (1987e) Russian hydrothermal synthetic emeralds, *Journal of Gemmology*, 20. 7/8. 412-420
- Scarratt, K. (1987f) Sapphirine. *Journal of Gemmology* 20, 409-410.
- Scarratt, K. (1987g) Notes from the Laboratory - 11, *Journal of Gemmology*, 20. 7/8. 406-422
- Scarratt, K. (1987h) Saussurite. *Journal of Gemmology* 20, 356-358.
- Scarratt, K. (1988a) Notes from the Laboratory - 12, *Journal of Gemmology*, 21. 3. 131-139
- Scarratt, K. (1988b) Notes from the Laboratory: Lennix synthetic emerald, *Journal of Gemmology*, 21. 3.
- Scarratt, K. (1989a) Coated amber, *Journal of Gemmology*, 21. 6. 344-345
- Scarratt, K. (1989b) Large aquamarine of exceptional color, *Journal of Gemmology*, 21. 5. 296
- Scarratt, K. (1989c) Notes from the laboratory - 13, *Journal of Gemmology*, 21. 5. 294-299
- Scarratt, K. (1989d) Notes from the Laboratory: The Marta Rocha aquamarine crystal, *Journal of Gemmology*, 21. 5.
- Scarratt, K. (1989e) Notes from the Laboratory: The Pool synthetic emerald, *Journal of Gemmology*, 21. 5.
- Scarratt, K. (1989f) Notes from the Laboratory: Amber in resin, *Journal of Gemmology*, 21. 5.
- Scarratt, K. (1989g) Spectroscopy, *Journal of Gemmology*, 21. 6. 339-341
- Scarratt, K. (1989h) Notes from the Laboratory: Coated amber, *Journal of Gemmology*, 21. 6.
- Scarratt, K. (1992a) Cast polyester resin as an imitation of tortoise-shell, horn, ivory, bone and jet - Notes from the Laboratory - 16, *Journal of Gemmology*, 23. 4. 218-220
- Scarratt, K. (1992b) Notes from the Laboratory: Mabe Pearl. *The Journal of Gemmology*, 23, 3, 131-139
- Scarratt, K. (1992c) Notes from the Laboratory: Dyed and plastic impregnated opal. *Journal of Gemmology* 23. 131-139
- Scarratt, K. (1992d) Notes from the Laboratory: Synthetic alexandrite, *Journal of Gemmology*, 23. 3. 131-139
- Scarratt, K. (1992e) Notes from the Laboratory: Imitation pearl. *Journal of Gemmology* 23. 131-139
- Scarratt, K. (1992f) Notes from the Laboratory: Orange melo pearls. *Journal of Gemmology* 23. 131-139
- Scarratt, K. (1994a) Lab Report: Kashan synthetic rubies; synthetic ruby from Russia; hydrothermal synthetic ruby—infrared spectrum. *JewelSiam* 5, 62–69.
- Scarratt, K. (1994b) Pearls from Melo Melo. *Asian Institute of Gemological Sciences (AIGS)* 5, 128-133.
- Scarratt, K. (1996) Pearls and Corals from Asia, in: Superchi, M. (Ed.), *Gemmologia Europa VI*. CISGEM, Milan, pp. 12-27.
- Scarratt, K. (2001a) Chinese HPHT treated diamonds hit market, *Rapaport Diamond Report*, 24. 6. 123-125
- Scarratt, K. (2001b) Gem News International: A statuette containing a large natural blister pearl. *Gems & Gemology*, 37, 3, 231-232.
- Scarratt, K. (2002) Is it pink or is it padparadscha? *Rapaport Diamond Report*, 103-109.
- Scarratt, K. and Charoensrithanakul, S. (1994) Lab Report: Diffusion treated 'star' corundum; hydrothermal synthetic sapphire. *JewelSiam* 5, 64-70.
- Scarratt, K. and Shor, R. (2006) The Cullinan diamond centennial: A history and gemological aspects of Cullinans I and II. *Gems and Gemology* 42, 120-132.
- Scarratt, K., Charoensrithanakul, S., Du Toit, G., Gawenuntavong, S. and Sersen, W.J. (1994) Lab Report: Rubies, natural and synthetic, on the Bangkok market; Montana heat treated sapphires. *JewelSiam* 5, 128–133.
- Scarratt, K., Hänni, H. (2004) Pearls from the Lion's Paw scallop. *The Journal of Gemmology*, 29, 4, 193-203.
- Scarratt, K., Kammerling, R.C. and Koivula, J. I. (1993) Opalite triplest - new imitations of opal. *Journal of Gemmology* 23, 473-480.
- Scarratt, K., Moses, T., Akamatsu, S. (2000) Characteristics of Nuclei In Chinese Freshwater Cultured Pearls. *Gems & Gemology*, Summer, 98-109.
- Schaller, W.T. (1912) The crystallography of variscite. *Journal of the Washington Academy of Sciences* 2, 143-145.
- Schaller, W.T. (1955) The pectolite-schizolite-serandite series. *American Mineralogist* 40, 1022-1031.
- Schärer U., Berndt J. and Deutsch A. (2011) The genesis of deep-mantle xenocrystic zircon and baddeleyite megacrysts (Mbuji-Mayi kimberlite): Trace-element patterns. *European Journal of Mineralogy*, 23, (2), 241-255.

- Scheepers R., Cousin L.E., Przybylowicz W.J. and Prozesky V.M. (1999) Nuclear microprobe (PIXE) analyses of zircons as indicators of granite type. *Nuclear Instruments and Methods in Physics Research B*, 158, (1/4), 599-605.
- Schellnegger J. (2002) Classification of natural opal type 1. *Australian Gemmologist*, 21, (7), 270-277.
- Scherer E.E., Whitehouse M.J. and Munker C. (2007) Zircon as a monitor of crustal growth. *Elements*, 3, (1), 19-24.
- Schlossmacher, K. (1935) Synthetic Emerald, *Gems and Gemology*, 1. 10. 283-284
- Schmetzer, K. (1977) Chrom, eisen und titan - Ursachen für die farben von rubin und saphir. *Lapis* 2, 8-9.
- Schmetzer, K. (1978a) *Heidelberg University - Thesis*, 1-277
- Schmetzer, K. (1978b) Neues zur kristalloptik von kornerupin, *Neues Jahrbuch für Mineralogie Monatshefte*, 12. 554-558
- Schmetzer, K. (1982) Absorptionsspektren und farben vanadium- und chromhaltiger minerale, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 31. 3. 125-130
- Schmetzer, K. (1983) Zur natur der lapis lazuli-imitation von Gilson, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 32. 4. 172-178
- Schmetzer, K. (1984) Pektolith aus der Dominikanischen Republik. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 33, 63-64.
- Schmetzer, K. (1985a) Colourless chrysoberyl - Natural or synthetic?, *Journal of Gemmology*, 19. 8. 682-691
- Schmetzer, K. (1985b) Farbloser chrysoberyll - Natürlich oder synthetisch?, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 34. 1/2. 6-12
- Schmetzer, K. (1985c) Distinction of natural and synthetic rubies by ultraviolet absorption spectroscopy - Possibilities and limitations of the method. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 34, 101-129.
- Schmetzer, K. (1985d) The composition of the lapis lazuli imitation of Gilson, *Journal of Gemmology*, 19. 7. 571-578
- Schmetzer, K. (1986) An improved sample holder and its use in the distinction of natural and synthetic ruby as well as natural and synthetic amethyst. *Journal of Gemmology* 20, 20-33.
- Schmetzer, K. (1987a) Lamellare einschaltungen von diaspor in korund, *Der Aufschluss*, 38. 3. 335-337
- Schmetzer, K. (1987b) Microscopic observation of twinning microstructure in natural amethyst. *Neues Jahrbuch für Mineralogie Monatshefte*, (1), 8-15.
- Schmetzer, K. (1987c) The cause of colour in blue sapphire - A discussion. *Neues Jahrbuch für Mineralogie Monatshefte*, 337-343.
- Schmetzer, K. (1988a) Characterization of Russian hydrothermally-grown synthetic emeralds, *Journal of Gemmology*, 21. 3. 145-164
- Schmetzer, K. (1988b) Thermal stability of yellow colour and colour centres in natural citrine. *Neues Jahrbuch für Mineralogie Monatshefte*, (2), 71-80.
- Schmetzer, K. (1988c) Zur charakterisierung von synthetischen, im hydrothermalverfahren gezüchteten russischen smaragden, *Deutsche Goldschmiede Zeitung*, 86. 11. 97-102
- Schmetzer, K. (1989a) Im hydrothermalverfahren hergestellter synthetischer aquamarin aus der UdSSR, *Goldschmiede Zeitung*, 87. 9. 139-141
- Schmetzer, K. (1989b) Methods for the distinction of natural and synthetic citrine and prasiolite. *Journal of Gemmology*, 21, (6), 368-390.
- Schmetzer, K. (1989c) Types of water in natural and synthetic emerald, *Neues Jahrbuch für Mineralogie Monatshefte*, 1. 15-26
- Schmetzer, K. (1989d) Yellowish-green Gilson synthetic emerald, *Journal of Gemmology*, 21. 5. 305-307
- Schmetzer, K. (1990a) Spectroscopic evidence for heat treatment of blue sapphires from Sri Lanka - Additional data. *Journal of Gemmology* 22, 80-82.
- Schmetzer, K. (1990b) Synthetische Smaragde, Rubine und Sapphire nach Lechleitner, *Deutsche Goldschmiede Zeitung*, 11. 90-93
- Schmetzer, K. (1990c) Two remarkable Lechleitner synthetic emeralds, *Journal of Gemmology*, 22. 1. 20-32
- Schmetzer, K. (1991) Lechleitner synthetic emeralds, rubies and sapphires, *Australian Gemmologist*, 17. 12. 516-523

- Schmetzer, K. (1999a) Clues to the process used by General Electric to enhance the GE POL diamonds, *Gems and Gemology*, 35. 4. 186-190
- Schmetzer, K. (1999b) Ruby and variously coloured sapphires from Ilakaka, Madagascar. *Australian Gemmologist* 20, 282-284.
- Schmetzer, K. (2000) The treatment of "GE POL diamonds", *Deutsche Goldschmiede Zeitung*, 98. June. 85-87
- Schmetzer, K. (2001) Hockdruck-hochtemperatur-Behandlung natürlicher Diamanten und deren Erkennung aus der Sicht zweier Patentanmeldungen von General Electric, *Deutsche Goldschmiede Zeitung*, 99. 7. 75
- Schmetzer, K. (2002) Das neue Screening-System zur Erkennung der HPHT-Behandlung natürlicher Diamanten, *Deutsche Goldschmiede Zeitung*, 100. 5. 88
- Schmetzer, K. (2007) Microscopic properties of blue sapphires from Ilakaka area, Madagascar. *Canadian Gemmologist* 28, 82-88.
- Schmetzer, K. and Bank, H. (1980a) Explanations of the absorption spectra of natural and synthetic Fe- and Ti-containing corundums. *Neues Jahrbuch für Mineralogie Abhandlungen* 139, 216-225.
- Schmetzer, K. and Bank, H. (1980b) Smaragde aus Sambia mit ungewöhnlichem pleochroismus, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 29. 3/4. 149-151
- Schmetzer, K. and Bank, H. (1980c) The alexandrite effect in minerals: Chrysoberyl, gamet, corundum, fluorite, *Neues Jahrbuch für Mineralogie Abhandlungen*, 138. 2. 147-164
- Schmetzer, K. and Bank, H. (1981a) An unusual pleochroism in Zambian emeralds, *Journal of Gemmology*, 17. 7. 443-446
- Schmetzer, K. and Bank, H. (1981b) The colour of natural corundum. *Neues Jahrbuch für Mineralogie Monatshefte*, 59-68.
- Schmetzer, K. and Bank, H. (1982) Untersuchungen an exemplaren der "smaragd-vollsynthese" von Lechleitner, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 31. 1/2. 79-80
- Schmetzer, K. and Bank, H. (1983) Stabilized ceruleite. *Journal of Gemmology* 18, 734-735.
- Schmetzer, K. and Bank, H. (1984) Composition, properties and origin of a new type of hematite, *Journal of Gemmology*, 19. 4. 343-347
- Schmetzer, K. and Bank, H. (1985a) Crystal chemistry of zincian spinels (gahnospinel) from Sri Lanka, *Neues Jahrbuch für Mineralogie Monatshefte*, 8. 353-356
- Schmetzer, K. and Bank, H. (1985b) Gahnospinelle aus Sri Lanka, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 34. 3/4. 92-97
- Schmetzer, K. and Bank, H. (1985c) Intensive yellow tsilaite (manganese tourmaline) of gem quality from Zambia. *Journal of Gemmology*, 19, (3), 218-223.
- Schmetzer, K. and Bank, H. (1986) A re-investigation of gahnospinel from Sri Lanka, *Journal of Gemmology*, 20. 3. 157-160
- Schmetzer, K. and Bartelke, W. (1979) Schleifwürdiger diaspor aus der Türkei, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 28. 2. 69
- Schmetzer, K. and Berdesinski, W. (1974) Das absorptionsspektrum von Mn²⁺-ionen in rhodochrositen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 23, 199-201.
- Schmetzer, K. and Brezina, J. (1975) Smaragde aus Ghana, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 24. 2. 94
- Schmetzer, K. and Glas M. (2003) Multi-star quartzes from Sri Lanka. *Journal of Gemmology*, 28, (6), 321-332.
- Schmetzer, K. and Kiefert, L. (1987) Investigation of a sapphire cat's-eye from Burma. *Journal of Gemmology* 20, 346-349.
- Schmetzer, K. and Kiefert, L. (1990a) Spectroscopic evidence for heat treatment of blue sapphires from Sri Lanka - additional data. *Journal of Gemmology* 22, 80-82.
- Schmetzer, K. and Kiefert, L. (1990b) Water in beryl - A contribution to the separability of natural and synthetic emeralds by infrared spectroscopy, *Journal of Gemmology*, 22. 4. 215-223
- Schmetzer, K. and Krupp, H. (1979) Neue beobachtungen an edelsteinen aus Ostafrika, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 28. 1. 35-38
- Schmetzer, K. and Krupp, H. (1982) Enstatite from Mairimba Hill, Kenya, *Journal of Gemmology*, 18. 2. 118-120

- Schmetzer, K. and Krzemnicki M.S. (2006) The orientation and symmetry of light spots and asterism in rose quartz spheres from Madagascar. *Journal of Gemmology*, 30, (3/4), 183-191.
- Schmetzer, K. and Medenbach, O. (1974) Chrom-diopsid aus Kenya, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 23. 3. 178-179
- Schmetzer, K. and Ottemann, J. (1979b) Zur identität von lawrowit, *Neues Jahrbuch für Mineralogie Monatshefte*, 4. 189-192
- Schmetzer, K. and Peretti, A. (1999) Some diagnostic features of Russian hydrothermal synthetic rubies and sapphires. *Gems and Gemology* 35, 17-28.
- Schmetzer, K. and Peretti, A. (2000) Characterization of a group of experimental Russian hydrothermal synthetic sapphires. *Journal of Gemmology* 27, 1-7.
- Schmetzer, K. and Schwarz, D. (2004) The causes of colour in untreated, heat treated and diffusion treated orange and pinkish-orange sapphires: A review. *Journal of Gemmology* 29, 149-182.
- Schmetzer, K. and Schwarz, D. (2005) A microscopy-based screening system to identify natural and treated sapphires in the yellow to reddish-orange colour range. *Journal of Gemmology* 29, 407-449.
- Schmetzer, K. and Schwarz, D. (2007) The causes of colour variation in Kashan synthetic rubies and pink sapphires. *Journal of Gemmology* 30, 347-356.
- Schmetzer, K., Bank, H. and Stähle, V. (1981a) The chromium content of Lechleitner synthetic emerald overgrowth, *Gems and Gemology*, 17. 2. 98-100
- Schmetzer, K., Bank, H. and Stähle, V. (1981b) Zum chromgehalt in synthetischen smaragdüberzügen von beryllkernen ("synthetische smaragde" der herstellung Lechleitner), *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 30. 3/4. 210-213
- Schmetzer, K., Bernhardt H.-J., Dunaigre C. and Krzemnicki M.S. (2007) Vanadium-bearing gem-quality tourmalines from Madagascar. *Journal of Gemmology*, 30, (7/8), 413-433.
- Schmetzer, K., Bernhardt, H. J. and Biehler, R. (1991) Emeralds from the Ural Mountains, USSR, *Gems and Gemology*, 27. 2. 86-99
- Schmetzer, K., Bernhardt, H.J. and Medenbach, O. (1999) Heat-treated Be-Mg-Al oxide (originally musgravite or taaffeite). *Journal of Gemmology* 26, 353-356.
- Schmetzer, K., Bernhardt, H.-J. and Schwarz, D. (2007) Vanadium- and copper-bearing Tairus hydrothermally-grown synthetic emerald: An update on microscopic properties, *Journal of the Gemmological Association of Hong Kong*, 28. 71-75
- Schmetzer, K., Bosshart, G. and Hänni, H.A. (1983) Naturally-coloured and treated yellow and orange-brown sapphires. *Journal of Gemmology* 18, 607-622.
- Schmetzer, K., Erel, E. and Schwarz, D. (2008) Colour-change beryl from Brazil, *Journal of the Gemmological Association of Hong Kong*, 29. 71-75
- Schmetzer, K., Haxel, C. and Amthauer, G. (1989) Colour of natural spinels, gahnospinel and gahnites, *Neues Jahrbuch für Mineralogie Abhandlungen*, 160. 2. 159-180
- Schmetzer, K., Kiefert, L. and Bernhardt, H.J. (2000) Purple to purplish red chromium-bearing taaffeites. *Gems and Gemology* 36, 50-59.
- Schmetzer, K., Kiefert, L., Bernhardt, H.J. and Burford, M. (2006) The variation in gemmological properties and chemical composition of gem-quality taaffeites and musgravites from Sri Lanka. *Australian Gemmologist* 22, 485-492.
- Schmetzer, K., Kiefert, L., Bernhardt, H.J., Burford, M. and Gunasekara, D.P. (2005) Iron- and zinc-rich gem-quality taaffeites from Sri Lanka. *Journal of Gemmology* 29, 290-298.
- Schmetzer, K., Krzemnicki, M.S., Hanni, H.A., Bernhardt, H.J. and Pettke, T. (2007) Gem-quality taaffeites and musgravites from Africa. *Journal of Gemmology* 30, 367-382.
- Schmetzer, K., Ottemann, J., Bank, H. and Krupp, H. (1979) Transparent bluish-green korerupine from East Africa (Kenya and Tanzania), *Journal of Gemmology*, 16. 7. 455-457
- Schmetzer, K., Peretti, A., Medenbach, O. and Bernhardt, H. J. (1996) Russian flux-grown synthetic alexandrite, *Gems and Gemology*, 32. 3. 186-202
- Schmetzer, K., Peretti, A., Medenbach, O. and Bernhardt, H. J. (1997) Im flussmittelverfahren gezuchteter synthetischer alexandrit aus Russland, *Deutsche Goldschmiede Zeitung*, 95. 181-185
- Schmetzer, K., Radl, W. and Schwarz, D. (2009) Winza - ein neues Rubinvorkommen in Tansania (Winza - a new ruby locality in Tanzania). *Lapis* 34, 41-46.
- Schmetzer, K., Radl, W. and Schwarz, D. (2010) Rubies and sapphires from Winza, Tanzania - Summary of characteristic properties and short update on the mining situation. *Australian Gemmologist* 24, 9-14.

- Schnellrath, J. (1990) Brasilianische andalusite und zink-staurolithe von edelsteinqualität; Chemismus, bildungsbedingungen, optische und krisallographische Eigenschaften, *Kurzmitteilungen aus dem Institut für Edelsteinforschung*, 5. 1/2. 5-8
- Schrader, H. W. (1981) Zur unterscheidung von natürlichen und synthetischen smaragden, *Uhren Juwelen Schmuck*,
- Schrader, H. W. (1983) Contributions to the study of the distinction of natural and synthetic emeralds, *Journal of Gemmology*, 18. 6. 530-543
- Schrader, H. W. (1984) Chromdiopsid aus der UdSSR, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 33. 1/2. 68-71
- Schrader, H. W. (1985) Chrome diopside from U.S.S.R, *Journal of Gemmology*, 19. 3. 213-217
- Schrader, H. W. (1988a) Synthetische smaragde nach dem hydrothermalverfahren aus der UdSSR - Eine ergänzung, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 36. 3/4. 173-174
- Schrader, H. W. (1988b) Violet emeralds?, *Journal of Gemmology*, 21. 4. 237-257
- Schramm, M. (1987) Schleifwürdige grüne diopside aus Indien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 36. 1/2. 81-83
- Schreiber, H. D. (1977) On the nature of synthetic blue diopside crystals: The stabilization of tetravalent chromium, *American Mineralogist*, 62. 5/6. 522-527
- Schreur, C. (1982) Bowenite and the Feather River. *Lapidary Journal* 36, 538-542.
- Schroeder R.A. (2010) Tanzanite as conflict gem: Certifying a secure commodity change in Tanzania. *Geoforum*, 41, (1), 56-65.
- Schubnel, H. J. and Zarka, A. (1971) X-ray topography of a natural emerald and a synthetic emerald, *Journal of Gemmology*, 12. 7. 300-309
- Schuiling, R. D. and Vink, B. W. (1967) Stability relations of some titanium-minerals (sphene, perovskite, rutile, anatase), *Geochimica et Cosmochimica Acta*, 31. 12. 2399-2411
- Schultz-Güttler R., Henn U. and Milisenda C.C. (2008) Grüne Quarze - Farbursachen und Behandlung. *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 57, (1/2), 61-72.
- Schunk, J. E. and Deane, N. (1955) Another mineral in gem quality, *Journal of Gemmology*, 5. 3. 154-156
- Schwarz, D. (1987) Brazilian emerald occurrences and characteristic properties of Brazilian emeralds, *21st International Gemmological Conference - Transactions*, 41-42
- Schwarz, D. (1989a) The discovery of a new emerald occurrence in Brazil: Capoeirana (Nova Era) Minas Gerais, *Australian Gemmologist*, 17. 1. 4-5
- Schwarz, D. (1989b) Smaragdabbau in Kolumbien: Neue Aspekte, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 38. 4. 155-160
- Schwarz, D. (1990a) Die brasilianischen Smaragde und ihre Vorkommen: Santa Terezinha de Goias/Go, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 39. 1. 13-44
- Schwarz, D. (1990b) Die chemischen Eigenschaften der Smaragde I. Brasilien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 39. 4. 233-272
- Schwarz, D. (1990c) New aspects of the emerald workings in Colombia, *Australian Gemmologist*, 17. 5. 168-170
- Schwarz, D. (1991a) Australian emeralds, *Australian Gemmologist*, 17. 12. 488-497, 501
- Schwarz, D. (1991b) The chemical properties of Colombian emeralds, *22nd International Gemmological Conference - Abstracts*,
- Schwarz, D. (1991c) Die chemischen Eigenschaften der Smaragde - III. Habachtal/Osterreich und Uralgebirge/UdSSR, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 40. 2/3. 103-143
- Schwarz, D. (1991d) Geologie und Genese der Smaragdovorkommen in der Cordillera Oriental/Kolumbien, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 40. 4. 201-231
- Schwarz, D. and Eidt, T. (1989) The Brazilian emeralds and their occurrences: Carnaiba, Bahia, *Journal of Gemmology*, 21. 8. 474-486
- Schwarz, D. and Schmetzer, K. (2001) Rubies from the Vatomaniry area, eastern Madagascar. *Journal of Gemmology* 27, 409-416.
- Schwarz, D., Bank, H. and Henn, U. (1988a) Neues smaragdovorkommen in Brasilien entdeckt: Capoeirana bei Nova Era, Minas Gerais, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 37. 3/4. 146-147
- Schwarz, D., Eidi, T. and Couto, P. A. (1990) The Brazilian emeralds and their occurrences: Socoto, Bahia, *Journal of Gemmology*, 22. 3. 147-163

- Schwarz, D., Eidt, T. and Couto, P. A. (1988b) Die smaragde des minegebiets Xocoto, Bahia, Brasilien: Vorkommen und charakteristika, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 37. 3/4. 89-112
- Schwarz, D., Hänni, H. A., Martin, F. L. and Fischer, M. (1988c) The emeralds of Fazenda Boa Esperança, Tauá, Ceará, Brazil: Occurrence and properties, *Journal of Gemmology*, 21. 3. 168-178
- Schwarz, D., Hanni, H. A., Martins, F. L. and Fischer, M. (1988d) Die Smaragde der Fazenda Boa Esperança bei Tauá, Ceara, Brasilien: Vorkommen und Charakteristika, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 36. 3/4. 133-147
- Schwarz, D., Kanis, J. and Schmetzer, K. (2000) Sapphires from Antsiranana Province, northern Madagascar. *Gems and Gemology* 36, 216-233.
- Schwarz, D., Pardieu, V., Saul, J.M., Schmetzer, K., Laurs, B.M., Giuliani, G., Klemm, L., Malsy, A.K., Erel, E., Hauzenberger, C., Du Toit, G., Fallick, A.E. and Ohnenstetter, D. (2008) Rubies and sapphires from Winza, central Tanzania. *Gems and Gemology* 44, 322-347.
- Schwarz, D., Petsch, E.J. and Kanis, J. (1996) Sapphires from the Andranondambo Region, Madagascar. *Gems and Gemology* 32, 80-99.
- Schwieger, R. (1990) Diagnostic features and heat treatment of Kashmir sapphires. *Gems and Gemology* 26, 267-280.
- Sciaguato, R. (2004) *Rare Perle Naturali, Conch and Melo Pearls*, La Piramide, Milano, 111
- Searl, A. (1989) Saddle dolomite: A new view of its nature and origin, *Mineralogical Magazine*, 53. 373. 547-555
- Seemann, R. (1986) Famous mineral localities: Knappenwand, Untersulzbachtal, Austria, *Mineralogical Record*, 17. 3. 167-181
- Segnit, E.R. (1957) Sapphirine-bearing rocks from MacRobertson Land, Antarctica. *Mineralogical Magazine* 31, 690-697.
- Segnit, E.R. (1985) Decorative serpentine from the Marble Bar Area, Western Australia. *20th International Gemmological Congress - Abstracts*.
- Segura, O. and Fritsch, E. (2003). The Santa Maria Variety of Aquamarine: never heated. InColor, Summer 2013, 34-35.
- Seifert A.V., Zacek V., Vrana S., Pecina V., Zacharias J., Zwaan J.C. 2004. Emerald mineralization in the Kafubu area, Zambia. *Bulletin of Geosciences* 79: 1-40.
- Seifert W. (2005) REE-, Zr-, and Th-rich titanite and associated accessory minerals from a kersantite in the Frankenwald, Germany. *Mineralogy and Petrology*, 84, (3/4), 129-146.
- Seifert W., Rhede D., Thomas R., Förster H.J., Lucassen F., Dulski P. and Wirth R. (2011) Distinctive properties of rock-forming blue quartz: Inferences from a multi-analytical study of submicron mineral inclusions. *Mineralogical Magazine*, 75, (4), 2529-2534.
- Seifert, A.V. and Hyrsl, J. (1999) Sapphire and garnet from Kalalani, Tanga Province, Tanzania. *Gems and Gemology* 35, 108-120.
- Seki, Y. (1959) Relation between chemical composition and lattice constants of epidote, *American Mineralogist*, 44. 7/8. 720-730
- Selway J.B., Novak M., Hawthorne F.C., Černý P., Ottolini L. and Kyser T.K. (1998) Rossmanite, $(\text{LiAl}_2)\text{Al}_6(\text{Si}_6\text{O}_{18})(\text{BO}_3)_3(\text{OH})_4$, a new alkali-deficient tourmaline: Description and crystal structure. *American Mineralogist*, 83, (7/8), 896-900.
- Selway, J.B., Smeds, S.A., Cerny, P. and Hawthorne, F.C. (2002) Compositional evolution of tourmaline in petalite-subtype Nykopingsgruvan pegmatites, Uto, Stockholm archipelago, Sweden. *Geologiska Föreningens i Stockholm Förhandlingar* 124, 93-102.
- Sen, S., Stebbins, J. F., Hemming, N. G. and Ghosh, B. (1994) Coordination environments of B impurities in calcite and aragonite polymorphs: A ^{11}B MAS NMR study, *American Mineralogist*, 79. 9/10. 819-825
- Senior B.R. (1996) Weathered-profile-hosted precious opal deposits. *Journal of Australian Geology and Geophysics*, 17, (4), 225-227.
- Serdobintseva V.V. and Kalinin D.V. (2000) Kinetics of supramolecular crystallization in precious opal. *Russian Geology and Geophysics*, 41, (2), 187-192.
- Setkova T., Shapovalov Y. and Balitsky V. (2010) Growth of tourmaline single crystals containing transition metal elements in hydrothermal solutions. *Journal of Crystal Growth*, 318, (1), 904-907.
- Setkova T.V., Shapovalov Y.B., Marakushev A.A. and Balitsky V.S. (2009) Experimental study of stability and crystallization peculiarities of tourmaline in hydrothermal conditions. *Doklady Earth Sciences*, 425A, (3), 490-493.

- Seto Y., Shimobayashi N., Miyake A. and Kitamura M. (2004) Composition and $I4/m-P4_2/n$ phase transition in scapolite solid solutions. *American Mineralogist*, 89, (2/3), 257-265.
- Shabaga B.M., Fayek M. and Hawthorne F.C. (2010) Boron and lithium isotope compositions as provenance indicators of Cu-bearing tourmalines. *Mineralogical Magazine*, 74, (2), 241-255.
- Shankland, T. J. and Hemmenway, K. (1963) Synthesis of forsterite crystals, *American Mineralogist*, 48. 1/2. 200
- Shannon R.D. and Rossman G.R. (1991) Dielectric constant of $MgAl_2O_4$ spinel and the oxide additivity rule. *Journal of Physics and Chemistry of Solids*, 52, (9), 1055-1059.
- Shannon, E. V. (1923) Note on cobaltiferous gahnite from Maryland, *American Mineralogist*, 8. 8. 147-148
- Sharma K.B.N., Moorthy L.R., Reddy B.J. and Vedanand S. (1988) EPR and electronic absorption spectra of copper-bearing turquoise mineral. *Physics Letters A*, 132, (5), 293-297.
- Shaub, B. M. (1979) Genesis of thunder eggs, geodes, and agates of igneous origin, *Lapidary Journal*, 32. 11,12. 2340-2354, 3548-2566
- Shein, I.R., Wilks, R., Moewes, A., Kurmaev, E.Z., Zatsepin, D.A., Kukhareenko, A.I. and Cholakh, S.O. (2008) Energy band structure and X-ray spectra of phenakite Be_2SiO_4 . *Physics of the Solid State* 50, 615-620.
- Shen, A., Fritz, E., DeGhionno, D., McClure, S. (2006) Identification of Dyed Chrysocolla Chalcedony, *Gems & Gemology*, XLII. Fall. 1
- Sheppard, P.J., Irwin, G.J., Lin, S.C. and McCaffrey, C.P. (2011) Characterization of New Zealand obsidian using PXRF. *Journal of Archaeological Science* 38, 45-56.
- Sheriff B.L., Grundy D.H. and Hartman J.S. (1987) Occupancy of T sites in the scapolite series: A multinuclear NMR study using magic-angle spinning. *Canadian Mineralogist*, 25, (4), 717-730.
- Sheriff B.L., Sokolova E.V., Kabalov Y.K., Jenkins D.M., Kunath-Fandrei G., Goetz S., Jäger C. and Schneider J. (2000) Meionite: Rietveld structure-refinement, ^{29}Si MAS and ^{27}Al SATRAS NMR spectroscopy, and comments on the marialite-meionite series. *Canadian Mineralogist*, 38, (5), 1201-1213.
- Sheriff B.L., Sokolova E.V., Kabalov Y.K., Teerstra D.K., Kunath-Fandrei G., Goetz S. and Jaeger C. (1998) Intermediate scapolite: ^{29}Si MAS and ^{27}Al SATRAS NMR spectroscopy and Rietveld structure-refinement. *Canadian Mineralogist*, 36, (5), 1267-1283.
- Shida, J. (1990) Laser tomographic observations of heat treated sapphire from Sri Lanka. *Journal of the Gemmological Society of Japan* 15, 22-27.
- Shida, J. (1991) Treated jadeite, *22nd International Gemmological Conference - Abstracts*,
- Shida, J. (1996) Separation of non-heated and heated corundum using laser tomography. *Journal of the Gemmological Association of Hong Kong* 19, 58-61.
- Shida, J. (1998a) Characteristics of cathodoluminescence for yellow diamonds of various types, *Wahroongai News*, February. 26-27
- Shida, J. (1998b) CL and other characteristics of various type of yellow diamonds, *Gemmology*, 29. 340. 24-26
- Shigley J.E., Cook B.C., Laurs B.M. and Bernardes M.O. (2001) An update on "Paraiba" tourmaline from Brazil. *Gems and Gemology*, 37, (4), 260-276.
- Shigley, J. E. and Koivula, J. I. (1985) Amethystine chalcedony, *Gems and Gemology*, 21. 4. 219-223
- Shigley, J. E. and Stockton, C. M. (1984) "Cobalt-blue" gem spinels, *Gems and Gemology*, 20. 1. 34-41
- Shigley, J.E., Koivula, J. I. and Fryer, C.W. (1987) The occurrence and gemological properties of Wessels Mine sugilite. *Gems and Gemology* 23, 78-89.
- Shipley, R. (1942) Synthetic emeralds appear commercially in small quantities, *Gems and Gemology*, 4. 3. 40 and 42
- Shirai, K., Kawashima, T., Sowa, K., Watanabe, T., Nakamori, T., Takahata, N., Amakawa, H. and Sano, Y. (2008) Minor and trace element incorporation into branching coral *Acropora nobilis* skeleton. *Geochimica et Cosmochimica Acta* 72, 5386-5400.
- Shirai, S. (1994) *Pearls and Pearl Oysters of the World*, Marine Planning Co, Japan, 109
- Sholkovitz, E. and Shen, G.T. (1995) The incorporation of rare earth elements in modern coral. *Geochimica et Cosmochimica Acta* 59, 2749-2756.
- Shouguo, G., Lingyum, S., (2001) The enhancement techniques of pearls. *The Journal of the Gemmological Association of Hong Kong*, 22, 32-36.

- Shtukenberg A., Rozhdestvenskaya I., Frank-Kamenetskaya O., Bronzova J., Euler H., Kirfel A., Bannova I. and Zolotarev A. (2007) Symmetry and crystal structure of biaxial elbaite-liddicoatite tourmaline from the Transbaikalia region, Russia. *American Mineralogist*, 92, (4), 675-686.
- Shuster, W. G. (1998) Fracture-filled diamonds, *Jewelers' Circular Keystone Magazine*, February. 100-110
- Sickafus K.E., Wills J.M. and Grimes N.W. (1999) Structure of spinel. *Journal of the American Ceramic Society*, 82, (12), 3279-3292.
- Sidike A., Kusachi I., Kobayashi S., Atobe, K. and Yamashita N. (2008) Photoluminescence spectra of S²⁻ center in natural and heat-treated scapolites. *Physics and Chemistry of Minerals*, 35, (3), 137-145.
- Sikes, C. S., Wheeler, A. P., Wierzbick, A., Mount, A. S. and Dillaman, R. M. (2000) Nucleation and growth of calcite on native versus pyrolyzed oyster shell folia, *Biological Bulletin*, 198. 1. 50-66
- Simandl, G.J., Paradis, S. and Nelson, J.L. (2001) Jade and rhodonite deposits, British Columbia, Canada. *35th Forum on the Geology of Industrial Minerals - Proceedings*, 163-171.
- Simmons W.B., Falster A.U. and Laurs B.M. (2011) A survey of Mn-rich yellow tourmalines from worldwide localities, and implications for the petrogenesis of granitic pegmatites. *Canadian Mineralogist*, 49, (1), 301-319
- Simmons W.B., Freeman G., Falster A., Laurs B. and Webber K. (2005) New tourmaline production from Mount Mica, Maine - America's first gem pegmatite. *Rocks and Minerals*, 80, (6), 396-408.
- Simmons W.B., Laurs B.M., Falster A.U., Koivula J.I. and Webber K.L. (2005) Mt. Mica: A renaissance in Maine's gem tourmaline production. *Gems and Gemology*, 41, (2), 150-163.
- Simmons W.B., Webber K.L., Falster A.U. and Nizamoff J.W. (2001) Gem tourmaline chemistry and paragenesis. *Australian Gemmologist*, 21, (1), 24-29.
- Simonet C. (2000) Geology of the Yellow Mine (Taita-Taveta District, Kenya) and other yellow tourmaline deposits in East Africa. *Journal of Gemmology*, 27, (1), 11-29.
- Simonetti A., Heaman L.M., Chacko T. and Bannerjee N.R. (2006) In situ petrographic thin section U-Pb dating of zircon, monazite and titanite using laser ablation-MC-ICP-MS. *International Journal of Mass Spectrometry*, 253, (1/2), 87-97.
- Simonetti A., Heaman L.M., Hartlaub R.P., Creaser R.A., MacHattie T.G. and Böhm C. (2005) U-Pb zircon dating by laser ablation-MC-ICP-MS using a new multiple ion counting Faraday collector array. *Journal of Analytical Atomic Spectrometry*, 20, (8), 677-686.
- Simonton T.C., Roy R., Komarneni S. and Breval E. (1986) Microstructure and mechanical properties of synthetic opal: A chemically bonded ceramic. *Journal of Materials Research*, 1, (5), 667-674.
- Singhe B. and Gilkes R.J. (1993) Weathering of spodumene to smectite in a lateritic environment. *Clays and Clay Minerals*, 41, (5), 624-630.
- Sinha A.K., Wayne D.M. and Essex R. (1992) Flux growth of pure and doped zircon. *Journal of Crystal Growth*, 125, (3/4), 431-439.
- Sinha A.K., Wayne D.M. and Hewitt D.A. (1992) The hydrothermal stability of zircon: Preliminary experimental and isotopic studies. *Geochimica et Cosmochimica Acta*, 56, (9), 3551-3560.
- Sinkankas, J. (1955) Some freaks and rarities among gemstones - Part 1 and 2. *Gems and Gemology* 8, 197-202, 219 and 237-241, 254.
- Sinkankas, J. (1965) Spectacular strike of red axinite in Baja California, *Lapidary Journal*, 19. 4. 436-447
- Sinkankas, J. (1977) Historical notes on South American gemstones. *Gems and Gemology* 15, 334.
- Sinkankas, J. (1996) Recent gemstone production in North America. *Canadian Gemmologist* 17, 17-22, 50-53.
- Sinkankas, J. (1998) Axinite from the Little Three Mine, Ramona, San Diego County, California, *Mineral News*, 14. 4. 4
- Sinkankas, J., Koivula, J. I. and Becker, G. (1992) Peridot as an interplanetary gemstone. *Gems and Gemology* 28, 43-51.
- SivaRamaiah G., Lin J.R. and Pan Y.M. (2011) Electron paramagnetic resonance spectroscopy of Fe³⁺ ions in amethyst: Thermodynamic potentials and magnetic susceptibility. *Physics and Chemistry of Minerals*, 38, (2), 159-167.
- Siyanbola W.O., Fasasi A.Y., Funtua I.I., Fasasi M.K., Tubosun I.A., Pelemo D.A. and Adesiyan T.A. (2005) Energy dispersive X-ray fluorescence analysis of samples of the Nigerian zircons. *Nuclear Instruments and Methods in Physics Research B*, 239, (4), 426-432.
- Skalichy, J. (1975) The Czechoslovak moldavites, *Lapidary Journal*, 29. 8. 1560-1562

- Sklavounos S., Ericsson T., Filippidis A., Michailidis K. and Kougoulis C. (1992) Chemical, X-ray and Mossbauer investigation of a turquoise from the Vathi area volcanic rocks, Macedonia, Greece. *Neues Jahrbuch für Mineralogie Monatshefte*, (10), 469-480.
- Skogby H., Bell D.R. and Rossman G.R. (1990) Hydroxide in pyroxene: Variations in the natural environment. *American Mineralogist*, 75, (7/8), 764-774.
- Skogby, H. and Annersten, H. (1985) Temperature dependent Mg-Fe-cation distribution in actinolite-tremolite, *Neues Jahrbuch für Mineralogie Monatshefte*, 5. 193-203
- Sláma J., Košler J., Condon D.J., Crowley J.L., Gerdes A., Hanchar J.M., Horstwood M.S.A., Morris G.A., Nasdala L., Norberg N., Schaltegger U., Schoene B., Tubrett M.N. and Whitehouse M.J. (2008) Plešovice zircon - A new natural reference material for U-Pb and Hf isotopic microanalysis. *Chemical Geology*, 249, (1/2), 1-35.
- Slotznick S.P. and Shim S.H. (2008) In situ Raman spectroscopy measurements of MgAl_2O_4 spinel up to 1400°C. *American Mineralogist*, 93, (2/3), 470-476.
- Smallwood A. (1997) A new era for opal nomenclature. *Australian Gemmologist*, 19, (12), 486-496.
- Smallwood A., Thomas P.S., Ray A.S. and Simon P. (1997b) TMA and SEM characterization of the thermal dehydration of Australian sedimentary opal. *Journal of Thermal Analysis and Calorimetry*, 88, (1), 185-188.
- Smallwood A.G., Thomas P.S. and Ray A.S. (1997a) Characterization of sedimentary opals by Fourier transform Raman spectroscopy. *Spectrochimica Acta A*, 53, (13), 2341-2345.
- Smelik, E. A., Nyman, M. W. and Veblen, D. R. (1991) Pervasive exsolution within the calcic amphibole series: TEM evidence for a miscibility gap between actinolite and hornblende in natural samples, *American Mineralogist*, 76, 7/8. 1184-1204
- Smith G. (1977), Low-temperature optical studies of metal-metal charge-transfer transitions in various minerals, *Canadian Mineralogist*, 15, 4, 500-507.
- Smith J.V., Pluth J.J. and Richardson J.W. (1987) Neutron diffraction study of zoisite at 15 K and X-ray study at room temperature. *Zeitschrift für Kristallographie*, 179, (1/4), 305-321.
- Smith, C.P. (1992) Contributions to the crystal growth analysis of natural and synthetic rubies: Identification of a dominant negative rhombohedral "d" plane (0112) in natural ruby. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 41, 182-183.
- Smith, C.P. (1995) A contribution to understanding the infrared spectra of rubies from Mong Hsu, Myanmar. *Journal of Gemmology* 24, 321-335.
- Smith, C.P. (1996) Introduction to analyzing internal growth structures: Identification of the negative d plane in natural ruby. *Gems and Gemology* 32, 170-184.
- Smith, C.P. (1998) Rubies and pink sapphires from the Pamir Mountain Range in Tajikistan, former USSR. *Journal of Gemmology* 26, 103-109.
- Smith, C.P. and Bosshart, G. (1993) New flux-grown synthetic rubies from Greece. *Jewel Siam* 4, 106-114.
- Smith, C.P., Gubelin, E.J., Bassett, A.M. and Manandhar, M.N. (1997) Rubies and fancy-color sapphires from Nepal. *Gems and Gemology* 33, 24-41.
- Smith, C.P., Kammerling, R.C., Keller, A.S., Peretti, A., Scarratt, K.V., Khoa, N.D. and Repetto, S. (1995) Sapphires from Southern Vietnam. *Gems and Gemology* 31, 168-186.
- Smith, C.P., McClure, S.F., Eaton-Magana, S. and Kondo, D.M. (2007) Pink-to-red coral: A guide to determining origin of color. *Gems and Gemology* 43, 4-15.
- Smith, D.J., Jefferson, D.A. and Mallinson, L.G. (1981) The ultrastructure of pyroxenoid chain silicates. II. Direct structure imaging of the minerals rhodonite and wollastonite. *Acta Crystallographica A* 37, 273-280.
- Smith, D.L. (1994) Any color you like. *Engineering and Science* 58, 2-7.
- Smith, G., Halenius, U. and Langer, K. (1982) Low temperature spectral studies of Mn^{3+} -bearing andalusite and epidote type minerals in the range 30000-5000 cm^{-1} , *Physics and Chemistry of Minerals*, 8, 3. 136-142
- Smith-Gharet, L.R. (1999) In search of variscite. *Rock and Gem* 29, 72-74.
- Smyth, J. R. and Tafto, J. (1982) Major and minor element site occupancies in heated natural forsterite, *Geophysical Research Letters*, 9, 9. 1113-1116
- Snee, L.W. and Ahrens, T.J. (1975) Shock-induced deformation features in terrestrial peridot and lunar dunite. *6th Lunar Science Conference - Proceedings*, 833-842.
- Soares D.R., Beurlen H., de Britto-Barreto S., da Silva M.R.R. and Ferreira A.C.M. (2008) Compositional variation of tourmaline-group minerals in the Borborema pegmatite province, Northeastern Brazil. *Canadian Mineralogist*, 46, (5), 1097-1116.

- Sokolov, S.V., Jarmishko, S.A. and Fedorov, A.V. (2002) Peridot with new types of inclusions. *Gemmological Bulletin*, 49-54.
- Sokolova E. and Hawthorne F.C. (2008) The crystal chemistry of the scapolite-group minerals, I: Crystal structure and long-range order. *Canadian Mineralogist*, 46, (6), 1527-1554.
- Sokolova E.V., Kabalov Y.K., Sherriff B.L., Teerstra D.K., Jenkins D.M., Kunath-Fandrei G., Goetz S. and Jaeger C. (1996) Marialite: Rietveld structure-refinement using ^{29}Si MAS and ^{27}Al satellite transition NMR spectroscopy. *Canadian Mineralogist*, 34, (5), 1039-1050.
- Soldati, A. L., Jacob, D. E., Wehrmeister, U. and Hofmeister, W. (2008) Structural characterization and chemical composition of aragonite and vaterite in freshwater cultured pearls, *Mineralogical Magazine*, 72. 2. 579-592
- Solntsev, V. P., Tsvetkov, E. G., Alimpiev, A. I. and Mashkovtsev, R. I. (2004) Valent state and coordination of cobalt ions in beryl and chrysoberyl crystals, *Physics and Chemistry of Minerals*, 31. 1. 1-11
- Soman, K. and Nair, N. G. K. (1985) Chatoyancy in chrysoberyl cat's-eye from pegmatites of Trivandrum District, Southern India, *Journal of Gemmology*, 19. 5. 412-415
- Sorensen, H., Dano, M. and Petersen, O.V. (1971) On the mineralogy and paragenesis of tugtupite $\text{Na}_3\text{Al}_2\text{Be}_2\text{Si}_8\text{O}_{24}(\text{Cl},\text{S})_2$. *Meddelelser om Gronland* 181, 1-38.
- Souza S.O., Lima A.F. and Lalic M.V. (2009) Optical properties of alpha spodumene: Orientation of its principal optical axes. *Journal of Physics: Conference Series*, 167, (1), 012066.
- Souza S.O., Watanabe S., Lima A.F. and Lalic M.V. (2007) Thermoluminescent mechanism in lilac spodumene. *Acta Physica Polonica*, 112, (6), 1001-1006.
- Spencer, L.J. (1906) Penacite and other minerals from German East Africa. *Mineralogical Magazine* 14, 178-183.
- Spencer, L.J. (1920) Fibrolite (= Sillimanite) as a gem-stone from Burma and Ceylon. *Mineralogical Magazine* 19, 107-112.
- Spencer, L.J. (1934) Beryllium minerals (euclase and phenakite) from Africa. *Mineralogical Magazine* 23, 616-623.
- Spendlove, E. (1987) Red-banded onyx, *Lapidary Journal*, 41. 8. 45-50
- Spicuzza M.J., Valley J.W., Kohn M.J., Girard J.P. and Fouillac A.M. (1998) The rapid heating, defocused beam technique: A CO_2 -laser-based method for highly precise and accurate determination of $\delta^{18}\text{O}$ values of quartz. *Chemical Geology*, 144, (3/4), 195-203.
- Spriggs, M., Reepmeyer, C., Anggraeni, A., Lape, P., Neri, L., Ronquillo, W.P., Simanjuntak, T., Summerhayes, G., Tanudirjo, D. and Tiauzon, A. (2011) Obsidian sources and distribution systems in Island Southeast Asia: A review of previous research. *Journal of Archaeological Science* 38, 2873-2881.
- Spry P.G. (1987) Compositional zoning in zincian spinel. *Canadian Mineralogist*, 25, (1), 97-104.
- Srinivasulu G., Madhu-Sudhana B., Reddy B.J., Natarajan R. and Rao P.S. (1992) Electron microprobe analysis: Optical and electron paramagnetic resonance studies on Mn-rich zoisite (thulite). *Spectrochimica Acta A*, 48, (10), 1421-1425.
- Stachowiak, A. and Schreyer, W. (1998) Synthesis, stability and breakdown products of the hydroxyl end member of jeremejevit in the system $\text{Al}_2\text{O}_3\text{-B}_2\text{O}_3\text{-H}_2\text{O}$, *European Journal of Mineralogy*, 10. 5. 875-888
- Stebbins, J. F. (1996) Magnesium site exchange in forsterite: A direct measurement by high-temperature ^{25}Mg NMR spectroscopy, *American Mineralogist*, 81. 11/12. 1315-1320
- Steele, I. A., Smith, J. V. and Sirius, C. (1985) Cathodoluminescence zoning and minor elements in forsterites from the Murchison (C2) and Allende (C3V) carbonaceous chondrites, *Nature*, 313. 6000. 294-297
- Steffen, G., Seifert, F. and Amthauer, G. (1984) Ferric iron in sapphirine: A Mössbauer spectroscopic study. *American Mineralogist* 69, 339-348.
- Stegger P. and Lehmann G. (1989) The structures of three centers of trivalent iron in α -quartz. *Physics and Chemistry of Minerals*, 16, (4), 401-407.
- Steinen, R. P. (1982) SEM observations on the replacement of Bahaman aragonitic mud by calcite, *Geology*, 10. 9. 471-475
- Steiner A. (2010) Spektakulare titanite vom Graukogel, Habachtal. *Mineralien Welt*, 21, (6), 68-71.
- Steiner, G. (1996) Larimar: Blauer Pektolith aus der Dominikanischen Republik. *Lapis* 21, 39-41.
- Stenina N.G. (2004) Water-related defects in quartz. *Bulletin of Geosciences*, 79, (4), 251-268.
- Stephenson J., Kouznetsov N. (2009). Major deposits of demantoid

- Stern R.A. and Amelin Y. (2003) Assessment of errors in SIMS zircon U-Pb geochronology using a natural zircon standard and NIST SRM 610 glass. *Chemical Geology*, 197,
- Stevens-Kalceff M.A. (2009) Cathodoluminescence microcharacterization of point defects in α -quartz. *Mineralogical Magazine*, 73, (4), 585-605.
- Stockton, C. M. (1984) The chemical distinction of natural from synthetic emeralds, *Gems and Gemology*, 20. 3. 141-145
- Stockton, C. M. (1987) The separation of natural from synthetic emeralds by infrared spectroscopy, *Gems and Gemology*, 23. 2. 96-99
- Stockton, C. M. and Kane, R. E. (1988) The distinction of natural from synthetic alexandrite by infrared spectroscopy, *Gems and Gemology*, 24. 1. 44-46
- Stockton, C.M. and Manson, D.V. (1983) Peridot from Tanzania. *Gems and Gemology* 19, 103-107.
- Stolz A.J. (1987) Fluid activity in the lower crust and upper mantle: Mineralogical evidence bearing on the origin of amphibole and scapolite in ultramafic and mafic granulite xenoliths. *Mineralogical Magazine*, 51, (363), 719-732.
- Stoner, A.W. and Ray, M. (1996) Queen conch, *Strombus gigas*, in fished and unfished locations of the Bahamas: Effects of a marine fishery reserve on adults, juveniles and larval productions. *Fishery Bulletin* 94, 551-556.
- Storey C.D., Jeffries T.E. and Smith M. (2006) Common lead-corrected laser ablation ICP-MS U-Pb systematics and geochronology of titanite. *Chemical Geology*, 227, (1/2), 163-181.
- Strack E. (2006). *Pearls*. Ruhle-Diebener Verlag, Stuttgart, Germany, 707 pp.
- Strack, E. (1975) Die diamantvorkommen der elfenbeinküste bericht über die vorkommen von Tortiya und Séguéla, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 24. 4. 199-229
- Strack, E. (1996) Synthetischer malachite aus Russland, *Strack Kurier*, 80. 13. 7-8
- Strek W., Deren P. and Jezowska-Trzebaitowska B. (1988) Optical properties of Cr^{3+} in MgAl_2O_4 spinel. *Physica B: Condensed Matter*, 152, (3), 379-384.
- Strunz, H. and Wilk, H. (1974) Jeremejewit als edelstein aus SW-Afrika, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 23. 2. 142-150
- Sturm R. (1999) Factors controlling the pyramidal growth of zircon: New results. *Neues Jahrbuch für Mineralogie Monatshefte*, (11), 494-504.
- Sturman N., Homkajae A., Manustrong A., Somsa-ard N., 2014. Observations on pearls reportedly from the Pinnidae Family (Pen pearls). *Gems and Gemology*, 50. 3. 202-215.
- Su, B.X., Zhang, H.F., Hu, Y., Santosh, M., Tang, Y.J. and Xiao, Y. (2012) The genesis of mantle-derived sapphirine. *American Mineralogist* 97, 856-863.
- Subedi B., Oniya E., Polymeris G.S., Afouxenidis D., Tsirliganis N.C. and Kitis G. (2011) Thermal quenching of thermoluminescence of quartz samples of various origin. *Nuclear Instruments and Methods in Physics Research B*, 269, (6), 572-581.
- Suhner, B. (1979) Infrarot-spektren in der gemmologie. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 28, 55-68.
- Sukow, W. W. (1987) Inside Lake Superior agates, *Lapidary Journal*, 40. 10. 50-56
- Sukow, W. W. (1990) Lake Superior agates, *Lapidary Journal*, 44. 5. 81-86
- Sullasi, H.L., Khoury, H.J., Barros, V., Libonati, R., Guzzo, P.L., Asfora, V., De Araujo, R.E., Capriles, M. and Reyes, J. (2010) Thermoluminescence response of the Larimar rocks. *Radiation Measurements*.
- Sun, M. S. (1963) The nature of chrysocolla from Inspiration Mine, Arizona, *American Mineralogist*, 48. 5/6. 649-658
- Sun, T. T. (2005) Jade and its treatment, *Canadian Gemmologist*, 26. 4. 120-128
- Sun, T.T. (1992) Analysis of Burmese and Thai rubies by PIXE. *Deutsche Gemmologische Gesellschaft - 60 Jahre Symposium Proceedings*.
- Sun, T.T. and Guang, Z.C. (1999) Examining flame fusion synthetic ruby with fingerprint inclusions. *Jewellery News Asia*, 104, 106.
- Sunagawa I. (1999) Quartz crystals twinned after Brazil and Japan Laws: Origin of their morphological and textural character. *Journal of the Gemmological Society of Japan*, 20, (1/4), 23-33.
- Sunagawa I., Lu T. and Balitsky V.S. (1990) Generation of Brazil and Dauphiné twins in synthetic amethyst. *Physics and Chemistry of Minerals*, 17, (4), 320-325.

- Sunagawa, I. (1964) A distinction between natural and synthetic emeralds, *American Mineralogist*, 49, 5/6, 785-793
- Sunagawa, I., Bernhardt, H.J. and Schmetzer, K. (1999) Texture formation and element partitioning in trapiche ruby. *Journal of Crystal Growth* 206, 322-330.
- Superchi M., Pezzotta F., Gambini E. and Castaman E. (2010) Yellow scapolite from Ihosy, Madagascar. *Gems and Gemology*, 46, (4), 274-279.
- Superchi, M. (1997) Green magnesite traded as lemon chrysoprase, *International Colored Stone Association - Laboratory Alert*, 88.
- Superchi, M. and Rolandi, V. (1980) A proposal for delimiting ruby (from rose and violet corundum) and emerald (from light green and dark green beryl). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 29, 68-70.
- Superchi, M., Donini, A., Muzzioli, D. and Roman, E. (1997) Sapphire occurrences at Ambondromifehy on the Antsiranana Province, North Madagascar. *26th International Gemmological Conference - Abstracts*, 62.
- Sutherland F.L. and Coenraads R.R. (1996) An unusual ruby-sapphire-sapphirine-spinel assemblage from the Tertiary Barrington volcanic province, New South Wales, Australia. *Mineralogical Magazine*, 60, (4), 623-638.
- Sutherland, F.L. (1994) Ruby-sapphire-sapphirine sources, east Australian basalt fields (abstract), *Diamonds, Sapphires, and Tertiary Volcanics Symposium*. Earth Sciences Foundation, University of Sydney, Sydney, p. December 2.
- Sutherland, F.L. (1996) Alkaline rocks and gemstones, Australia: A review and synthesis. *Australian Journal of Earth Sciences* 43, 323-343.
- Sutherland, F.L. and Coenraads, R.R. (1996) An unusual ruby-sapphire-sapphirine-spinel assemblage from the Tertiary Barrington volcanic province, New South Wales, Australia. *Mineralogical Magazine* 60, 623-638.
- Sutherland, F.L. and Schwarz, D. (2001) Origin of gem corundums from basaltic fields. *Australian Gemmologist* 21, 30-33.
- Sutherland, F.L., Bosshart, G., Fanning, C.M., Hoskin, P.W.O. and Coenraads, R.R. (2002) Sapphire crystallization, age and origin, Ban Huai Sai, Laos: Age based on zircon inclusions. *Journal of Asian Earth Sciences* 20, 841-849.
- Sutherland, F.L., Giuliani, G., Fallick, A.E. and Webb, G.B. (2006) Oxygen isotopes for gem corundums, eastern Australian basalt field: Results and genetic implications. *Geochimica et Cosmochimica Acta* 70, A630.
- Sutherland, F.L., Giuliani, G., Fallick, A.E., Garland, M. and Webb, G. (2009a) Sapphire-ruby characteristics, West Pailin, Cambodia. *Australian Gemmologist* 23, 401-407.
- Sutherland, F.L., Zaw, K., Meffre, S., Giuliani, G., Fallick, A.E., Graham, I.T. and Webb, G.B. (2009b) Gem-corundum megacrysts from east Australian basalt fields: Trace elements, oxygen isotopes, and origins. *Australian Journal of Earth Sciences* 56, 1003-1022.
- Sutherland, M. (1997) Gem quality rhodochrosite - the Inca rose. *South African Gemmologist* 11, 14-16.
- Sutthirath, C., Atichat, W., Leelawatanasuk, T., Poompuang, S., Nilhud, N. and Jakkawanvibul, J. (2011) Pinkish volcanic rock: A new rhodochrosite imitation of a new jewel. *Journal of the Gemmological Association of Hong Kong* 32, 84-89.
- Suzuki S. and Nakashima S. (1999) In-situ IR measurements of OH species in quartz at high temperatures. *Physics and Chemistry of Minerals*, 26, (3), 217-225.
- Suzuki, M., Okumura, T., Nagasawa, H. and Kogure, T. (2011) Localization of intracrystalline organic macromolecules in mollusk shells. *Journal of Crystal Growth* 337, 24-29.
- Swanson S.E. and Fenn P.M. (1986) Quartz crystallization in igneous rocks. *American Mineralogist*, 71, (3/4), 331-342.
- Sweeny, J., and Latendresse, J. (1982) *Freshwater Pearl Culturing in America: A Progress Report*, International Gemmological Symposium, 193-199
- Swoboda, E. R. (1947) Brazilianit - its original source, *Gems and Gemology*, 5, 12, 494-495
- Syassen, K. (2008) Ruby under pressure. *High Pressure Research* 28, 75-126.
- Szenics, T. (1967) The richest find of royal purple apatite in more than fifty years - Made at Pulsifer Quarry, Mt. Apatite, Maine, *Lapidary Journal*, 20, 10, 1178-1189
- Tacker R.C. (2010) "Real" hiddenite and real names. *Rocks and Minerals*, 85, (3), 264-268.
- Taggart, J.E., Foord, E.E. and Shigley, J.E. (1994) Chemical composition and structural formula of manganoan sugilite from the Wessels Mine, Republic of South Africa. *Mineralogical Magazine* 58, 679-681.

- Tagliamonte, N. (1984) History of shell cameos. *Lapidary Journal* 38, 288-290.
- Tajika Y. and Hashimoto T. (2006) Correlation of blue-thermoluminescence (BTL) properties with some impurities in synthetic quartz. *Radiation Measurements*, 41, (7/8), 809-812.
- Takei, H. and Hosoya, S. (1985) Growth of MnSiO_3 and $(\text{Mn,Mg})\text{SiO}_3$ crystals by the floating zone method. *Journal of Crystal Growth* 71, 17-22.
- Taki S. and Hosaka M. (1988) Observations on turquoise, lapis-lazuli and coral, and some of their simulants. *Journal of Gemmology*, 21, (2), 74-80.
- Talanov V.M. (1986) Structural mechanism of the ordering of ions in tetrahedral holes in spinel. *Journal of Structural Chemistry*, 27, (2), 327-330.
- Tan, T.L., Sun, T.T., Khairaman, S.K. and Low, Y.C. (2005) Identification of an imitation of pearl by FTIR, EDXRF, and SEM. *Journal of Gemmology* 29, 316-324.
- Tanaka I., Obuchi T. and Kojima H. (1988) Growth and characterization of titanite (CaTiSiO_5) single crystals by the floating zone method. *Journal of Crystal Growth*, 87, (2/3), 169-174.
- Tang, S. M. and Sun, T. T. (1998) Radioactivity of neutron-irradiated cat's eye chrysoberyl, *Journal of the Gemmological Association of Hong Kong*, 20, 56-61.
- Tang, S.M., Tang, S.H., Mok, K.F., Retty, A.T. and Sun, T.T. (1989) A study of natural and synthetic rubies by PIXE. *Applied Spectroscopy* 43, 219-222.
- Taniguchi Y., Hirao Y., Shimadzu Y. and Tsuneki A. (2002) The first fake? Imitation turquoise beads recovered from a Syrian Neolithic site, Tell el-Kerkh. *Studies in Conservation*, 47, (3), 175-183.
- Tanner C., Geisinger K. and Wusirika R. (2004) Temperature and wavelength dependence of refractive index of zircon and hafnon. *Optical Materials*, 26, (3), 305-311.
- Taran M.N. and Langer K. (1998) Temperature and pressure dependence of intervalence charge transfer bands in spectra of some Fe- and Fe,Ti-bearing oxygen-based minerals. *Neues Jahrbuch für Mineralogie Abhandlungen*, 172, (2/3), 325-346.
- Taran M.N., Koch-Müller M. and Feenstra A. (2009) Optical spectroscopic study of tetrahedrally coordinated Co^{2+} in natural spinel and staurolite at different temperatures and pressures. *American Mineralogist*, 94, (11/12), 1647-1652.
- Taran M.N., Koch-Müller M. and Langer K. (2005) Electron absorption spectroscopy of natural (Fe^{2+} , Fe^{3+})-bearing spinels of spinel s.s.-hercynite and gahnite-hercynite solid solutions at different temperatures and high pressures. *Physics and Chemistry of Minerals*, 32, (3), 175-188.
- Taran M.N., Lebedev A.S. and Platonov A.N. (1993) Optical absorption spectroscopy of synthetic tourmalines. *Physics and Chemistry of Minerals*, 20, (3), 209-220.
- Tay, T.S., Vansteelant, W. and Loke, H.Y. (2012) Synthetic green sapphire. *Gems and Jewellery* 21, 18.
- Taylor, A.M. (1971) Antarctic peridot. *Journal of Gemmology* 12, 333.
- Taylor, S.R. (1962) The chemical composition of australites. *Geochimica et Cosmochimica Acta* 26, 685-722.
- Taylor, S.R. (1973) Tektites: A post-Apollo view. *Earth Science Reviews* 9, 101-123.
- Teertstra D.K. and Sherriff B.L. (1996) Scapolite cell-parameter trends along the solid-solution series. *American Mineralogist*, 81, (1/2), 169-180.
- Teertstra, D.K. and Sherriff B.L. (1997) Substitutional mechanisms, compositional trends, and end-member formulae of scapolite. *Chemical Geology*, 136, (3/4), 233-260.
- Ten, S. T. W. (1989b) How to identify the new jadeite imitation, *Jewelry Circle Magazine*, 12, 6-8.
- Teng, S., Shi, J. and Chen, L. (2006) A novel method to synthesize large-sized hydroxyapatite rods, *Journal of Crystal Growth*, 290, 2, 683-688.
- Tenhagen, J. W. (1972) Muzo emerald mine: A visit, *Gems and Gemology*, 14, 2, 77-81.
- Tenhagen, J. W. (1973) Muzo emerald mine - Colombia's hidden gem, *Lapidary Journal*, 27, 1, 56-58.
- Tennant W.C., Claridge R.F.C., Walsby C.J. and Lees N.S. (2004) Point defects in crystalline zircon (zirconium silicate), ZrSiO_4 : Electron paramagnetic resonance studies. *Physics and Chemistry of Minerals*, 31, (4), 203-223.
- Teshima, K., Kondo, H., Suzuki, T. and Oishi, S. (2005) Growth of large bipyramidal ruby crystals by the evaporation of molybdenum trioxide flux (in Japanese). *Journal of the Ceramic Society of Japan* 113, 733-735.
- Themelis, T. (1992) *The Heat Treatment of Ruby and Sapphire*. Gemlab Inc., No city.
- Themelis, T. (2003) *Beryllium-Treated Rubies and Sapphires*. Ted Themelis, Bangkok.

- Themelis, T. (2005) Glass-filled rubies. *Australian Gemmologist* 22, 360-365.
- Theye T. and A. M. Fransolet (1994), Virtually pure ottrelite from the region of Ottre, Belgium, *European Journal of Mineralogy*, 6, 4, 547-555.
- Thomas P.S., Brown L.D., Ray A.S. and Prince K.E. (2006) A SIMS study of the transition elemental distribution between bands in banded Australian sedimentary opal from the Lightning Ridge locality. *Neues Jahrbuch für Mineralogie Abhandlungen*, 182, (2), 193-199.
- Thomas P.S., Simon P., Smallwood A. and Ray A.S. (2007) Estimation of the diffusion coefficient of water evolved during the non-isothermal dehydration of Australian sedimentary opal. *Journal of Thermal Analysis and Calorimetry*, 88, (1), 231-235.
- Thomas P.S., Smallwood A.S., Ray A.S., Briscoe B.J. and Parsonage D. (2008) Nanoindentation hardness of banded Australian sedimentary opal. *Journal of Physics D: Applied Physics*, 41, (7), 074028.
- Thomas R., Webster J.D. and Heinrich W. (2000) Melts inclusions in pegmatite quartz: Complete miscibility between silicate melts and hydrous fluids at low pressure. *Contributions to Mineralogy and Petrology*, 139, (4), 394-401.
- Thompson, T. J., Keith, J. D., Christiansen, E. H. and Tingey, D. G. (2002) Topaz rhyolite hosted red beryl in the Wah Wah Mountains, Utah: A genetic model and mine update, *Geological Society of America - Annual Meeting Abstracts*,
- Thurm, R.E. (1973) A new deposit of rhodonite in Tanzania. *Journal of Gemmology* 13, 264-265.
- Thy P. (1995) Experimental constraints on the evolution of transitional and mildly alkalic basalts: Crystallization of spinel. *Lithos*, 36, (2), 103-114.
- Tiepolo M. (2003) In situ Pb geochronology of zircon with laser ablation – inductively coupled plasma – sector field mass spectrometry. *Chemical Geology*, 199, (1/2), 159-177.
- Tiepolo M., Bottazzi P., Palenzona M. and Vannucci R. (2003) A laser probe coupled with ICP – double-focusing sector-field mass spectrometer for in situ analysis of geological samples and U-Pb dating of zircon. *Canadian Mineralogist*, 41, (2), 259-272.
- Tiepolo M., Oberti R. and Vannucci R. (2002) Trace-element incorporation in titanite: Constraints from experimentally determined solid/liquid partition coefficients. *Chemical Geology*, 191, (1/3), 105-119.
- Tilley D.B. and Eggleton R.A. (2005) Titanite low-temperature alteration and Ti mobility. *Clays and Clay Minerals*, 53, (1), 100-107.
- Tinney, C.E., Thomson, B. and Johnson, E. (1996) Mid-infrared spectroscopic fingerprinting for plastics identification and recycling. *Spectroscopy* 11, 50-53.
- Titkov, S.V., Zudin, N.G., Gorshkov, A.I., Sivtsov, A.V. and Magazina, L.A. (2003) An investigation into the cause of color in natural black diamonds from Siberia. *Gems and Gemology* 39, 200-209.
- Tomaz-Filho, L., Ferraz, G.M. and Watanabe, S. (2005) EPR and TL studies of phenakite crystal and application to dating. *Nuclear Instruments and Methods in Physics Research B* 229, 253-260.
- Tombs, G. (1974) Synthetic-like fluorescence in a natural sapphire. *Australian Gemmologist* 12, 94-95.
- Tombs, G. (1978) Heat treatment of Australian blue sapphires. *Australian Gemmologist* 13, 186-188.
- Tombs, G.A. (1982) Heat treatment of Australian blue sapphires. *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 31, 41-48.
- Torrents, O., Garrabou, J., Marschal, C. and Harmelin, J.G. (2005) Age and size at first reproduction in the commercially exploited red coral *Corallium rubrum* (L.) in the Marseilles area (France, NW Mediterranean). *Biological Conservation* 121, 391-397.
- Trachenko K., Dove M.T. and Salje E.K.H. (2002) Structural changes in zircon under α -decay irradiation. *Physical Review B*, 65, (18), 180102.
- Traub, J. (1997) Mysterious Pearls. *Smithsonian*, 28, 4, 70-79.
- Traub, J., Zucker, B., Content, D., Scarratt, K. (1999) *Pearl and the Dragon A Study of Vietnamese Pearls and a History of the Oriental Pearl Trade*, Content, Derek J. Rare Books, Incorporated, 125
- Tribaudino M., Nestola F., Prencipe M. and Rundlof H. (2003) A single-crystal neutron-diffraction investigation of spodumene at 54 K. *Canadian Mineralogist*, 41, (2), 521-527.
- Trnka, M. and Houzar, S. (2002) Moldavites: A review, *Bulletin of the Czech Geological Survey*, 77. 4. 283-302
- Trocellier P. and Delmas R. (2001) Chemical durability of zircon. *Nuclear Instruments and Methods in Physics Research B*, 181, (1/4), 408-412.
- Troitzsch U., Ellis D.J., Thompson J. and Fitzgerald J. (1999) Crystal structure changes in titanite along the join TiO–AlF. *European Journal of Mineralogy*, 11, (6), 955-965.

- Tropper P. and Manning C.E. (2008) The current status of titanite-rutile thermobarometry in ultrahigh-pressure metamorphic rocks: The influence of titanite activity models on phase equilibrium calculations. *Chemical Geology*, 254, (3/4), 123-132.
- Trossarelli C. (1985) Hydrothermal growth: The first historical achievement by Giorgio Spezia on quartz. *Journal of Gemmology*, 19, (3), 240-260.
- Trossarelli, C. (1986) Synthetic alexandrite from USSR (in Italian), *La Gemmologia*, 11. 4. 6-22
- Troup, G.J., Hutton, D.R. and Turner, B. (1992) Magnetic resonance distinction between synthetic and natural "padparadscha" sapphires. *Journal of Gemmology* 23, 97-103.
- Trumbull R.B., Krienitz M.S., Gottesmann B. and Wiedenbeck M. (2008) Chemical and boron-isotope variations in tourmalines from an S-type granite and its source rocks: The Erongo granite and tourmalinites in the Damara Belt, Namibia. *Contributions to Mineralogy and Petrology*, 155, (1), 1-18.
- Trumbull R.B., Krienitz M.S., Grundmann G. and Wiedenbeck M. (2009) Tourmaline geochemistry and $\delta^{11}\text{B}$ variations as a guide to fluid-rock interaction in the Habachtal emerald deposit, Taurern Window, Austria. *Contributions to Mineralogy and Petrology*, 157, (3), 411-427.
- Trumper, L. C. (1949) Kornerupine find, *Gemmologist*, 18. 212. 71-72
- Trzcienski, W. E., Perrault, G. and Hebert, P. (1974) A note on apatite from Huddersfield Township, Quebec, *Canadian Mineralogist*, 12. 4. 289-291
- Tsinober, L.I., Khadzhi, V.E., Tsyganov, E.M., Samoilovich, M.I. and Shaposhnikov, A.A. (1986) Growth and structure of synthetic amethyst crystals. *Growth of Crystals* 13, 312-321.
- Tunzi, J. and Pearson, G. (2008) Hackmanite, tugtupite and afghanite: Tenebrescence and fluorescence in some sodalite-related minerals. *Australian Gemmologist* 23, 349-355.
- Uchida H., Lavina B., Downs R.T. and Chesley J. (2005) Single-crystal X-ray diffraction of spinels from the San Carlos Volcanic Field, Arizona: Spinel as a geothermometer. *American Mineralogist*, 90, (11/12), 1900-1908.
- Ugalde, J.A., Chang, B.S.W. and Matz, M.V. (2004) Evolution of coral pigments revisited. *Science* 305, 1433.
- Umari P., Pasquarello A. and Dal Corso A. (2001) Raman scattering intensities in α -quartz: A first-principles investigation. *Physical Review B*, 63, (9), 094305.
- Umegaki, Y. (1966) Infrared absorption of microcline, *Journal of Science of Hiroshima University*, C5. 2. 157-178
- Urmos, J., Sharma, S. K. and Mackenzie, F. T. (1991) Characterization of some biogenic carbonates with Raman spectroscopy, *American Mineralogist*, 76. 3/4. 641-646
- Valley J.W. (2003) Oxygen isotopes in zircon. *Reviews in Mineralogy and Geochemistry*, 53, (1), 343-385.
- Valley J.W., Chiarenzelli J.R. and McLelland J.M. (1994) Oxygen isotope geochemistry of zircon. *Earth and Planetary Science Letters*, 126, (4), 187-206.
- Valley J.W., Kinny P.D., Schulze D.J. and Spicuzza M.J. (1998) Zircon megacrysts from kimberlite: Oxygen isotope variability among mantle melts. *Contributions to Mineralogy and Petrology*, 133, (1/2), 1-11.
- Valley J.W., Lackey J.S., Cavosie A.J., Clechenko C.C., Spicuzza M.J., Basei M.A.S., Bindeman I.N., Ferreira V.P., Sial A.N., King E.M., Peck W.H., Sinha A.K and Wei C.S. (2005) 4.4 billion years of crustal maturation: Oxygen isotope ratios in magmatic zircon. *Contributions to Mineralogy and Petrology*, 50, (6), 561-580.
- Van Bockstael, H. G. and Joppen, F. (1996) Radioactive diamonds risks and legal aspects, *Antwerp Facets*, 43
- Van Bockstael, M. (1998a) Enhancing low quality coloured diamonds, *Jewellery News Asia*, 169. 321-322
- Van Bockstael, M. H. G. (1996) "Fracture-filling"-like diamonds and their evaluation, *Antwerp Facets*, December. 109-117-52
- Van Heurck C., Van Tendeloo G., Ghose S. and Amelinckx S. (1991) Paraelectric – antiferroelectric phase transition in titanite, CaTiSiO_5 . II: Electron diffraction and electron microscopic studies of the transition dynamics. *Physics and Chemistry of Minerals*, 17, (7), 604-610.
- van Hinsberg V.J. (2011) Preliminary experimental data on trace-element partitioning between tourmaline and silicate melt. *Canadian Mineralogist*, 49, (1), 153-163.
- van Hinsberg V.J. and Marschall H.R. (2007) Boron isotope and light element sector zoning in tourmaline: Implications for the formation of B-isotope signatures. *Chemical Geology*, 238, (3/4), 141-148.
- Van Hinsberg V.J. and Schumacher J.C. (2007) Intersector element partitioning in tourmaline: A potentially powerful single crystal thermometer. *Contributions to Mineralogy and Petrology*, 153, (3), 289-301.

- Van Hinsberg V.J. and Schumacher J.C. (2009) The geothermobarometric potential of tourmaline, based on experimental and natural data. *American Mineralogist*, 94, (5/6), 761-770.
- van Hinsberg V.J., Henry D.J. and Marschall H.R. (2011) Tourmaline: An ideal indicator of its host environment. *Canadian Mineralogist*, 49, (1), 1-16.
- van Houten, F.B. (1971) Contact metamorphic mineral assemblages, Late Triassic Newark Group, New Jersey. *Contributions to Mineralogy and Petrology* 30, 1-14.
- Van Pelt, E.L. (1938) Hawaiian peridot. *Gems and Gemology* 2, 162.
- Vance E.R. and Metson J.B. (1985) Radiation damage in natural titanites. *Physics and Chemistry of Minerals*, 12, (5), 255-260.
- Vance, J. A. (1961) Polysynthetic twinning in plagioclase, *Gems and Gemology*, 46, 9/10, 1097-1119
- Vander Putten, E., Dehairs, F., Keppens, E. and Baeyens, W. (2000) High resolution distribution of trace elements in the calcite shell layers of modern *Mytilus edulis*: Environmental and biological controls. *Geochimica et Cosmochimica Acta* 64, 997-1011.
- VanderBogert, C.H., Smith, C.P., Hainschwang, T. and McClure, S.F. (2009) Gray-to-blue-to-violet hydrogen-rich diamonds from the Argyle Mine, Australia. *Gems and Gemology* 45, 20-37.
- Vasconcelos P.M., Wenk H.R. and Rossman G.R. (1994) The Anahí Ametrine Mine, Bolivia. *Gems and Gemology*, 30, (1), 4-23.
- Vassilikou-Dova A.B. (1991) An EPR study of scapolite. *Crystal Research and Technology*, 26, (1), 135-138.
- Vaughan, T.W., Cooke, W., Condit, D.D., Ross, C.P., Woodring, W.P. and Calkins, F.C. (1921) A geological reconnaissance of the Dominican Republic. *Geological Survey of the Dominican Republic* 1, 220-222, 244.
- Vavra G. (1990) On the kinetics of zircon growth and its petrogenetic significance: A cathodoluminescence study. *Contributions to Mineralogy and Petrology*, 106, (1), 90-99.
- Verma, D., Katti, K. and Katti, D. (2006) Photoacoustic FTIR spectroscopic study of undisturbed nacre from red abalone. *Spectrochimica Acta A* 64, 1051-1057.
- Verneuil, A. (1891, 1892) Plis Cachetés, Sur un nouveau procédé de fusion et d'affinage de l'alumine chromée et la production d'une matière possédant la composition, la dureté et la densité du rubis. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences* 151, 131-132.
- Verneuil, A. (1903) Production artificielle du rubis par fusion. *Cosmos* 936, 11-12.
- Verneuil, A. (1911) Process of producing synthetic sapphires, US 988230. L. Heller and Son, New York, NY, United States, p. 2 pp.
- Vilisov V.A., Ryzhkov M.V., Vilisov D.V. and Moloshag V.P. (2002) Investigation of Cr structural positions in spinel with the use of x-ray emission spectra and cluster calculations. *X-ray Spectrometry*, 31, (3), 252-258.
- Vins, V. (2002a) Change of colour produced in synthetic diamonds by β HT-processing, *Gemmological Bulletin*, 5, 26-32
- Vins, V. (2002b) Color changing in synthetic diamonds: Influence of growth conditions (in Russian), *Gemmological Bulletin*, 1, 4, 28-36
- Vins, V. G. and Kononov, O. V. (2003) A model of HPHT color enhancement mechanism in natural gray diamonds, *Diamond and Related Materials*, 12, 3/7, 542-545
- Viti C. and Gemmi M. (2009) Nanostructure and microinfrared behavior of black opal from Gracias, Honduras. *Neues Jahrbuch für Mineralogie Abhandlungen*, 186, (1), 11-20.
- Vochten R., de Grave E. and Zwaan P.C. (1986) Study of scapolite, corundum and spinel crystals from the Tissamaharama area, Sri Lanka. *Australian Gemmologist*, 16, (3), 91-94.
- Volovetsky, M.V., Rusakov, V.S., Chistyakova, N.I. and Lukanin, O.A. (2008) Mössbauer study of tektites. *Hyperfine Interactions* 186, 83-88.
- Von Bezings, K.L., Dixon, R.D., Pohl, D. and Cavallo, G. (1991) The Kalahari manganese field: An update. *Mineralogical Record* 22, 279-297.
- von Goerne G. and Franz G. (2000) Synthesis of Ca-tourmaline in the system CaO-MgO-Al₂O₃-B₂O₃-H₂O-HCl. *Mineralogy and Petrology*, 69, (3/4), 161-182.
- von Goerne G., Franz G. and Heinrich W. (2001) Synthesis of tourmaline solid solutions in the system Na₂O-MgO-Al₂O₃-B₂O₃-H₂O-HCl and the distribution of Na between tourmaline and fluid at 300 to 700°C and 200 MPa. *Contributions to Mineralogy and Petrology*, 141, (2), 160-173.
- von Goerne G., Franz G. and Robert J.L. (1999) Upper thermal stability of tourmaline + quartz in the system MgO-Al₂O₃-SiO₂-B₂O₃-H₂O and Na₂O-MgO-Al₂O₃-SiO₂-B₂O₃-H₂O-HCl in hydrothermal solutions and siliceous melts. *Canadian Mineralogist*, 37, (4), 1025-1039.

- von Goerne G., Franz G. and van Hinsberg V.J. (2011) Experimental determination of Na-Ca distribution between tourmaline and fluid in the system $\text{CaO-Na}_2\text{O-MgO-Al}_2\text{O}_3\text{-SiO}_2\text{-B}_2\text{O}_3\text{-H}_2\text{O}$. *Canadian Mineralogist*, 49, (1), 137-152.
- von Goerne G., Franz G. and Wirth R. (1999) Hydrothermal synthesis of large dravite crystals by the chamber method. *European Journal of Mineralogy*, 11, (6), 1061-1077.
- Vorbach A. (1989) Experimental examinations on the stability of synthetic tourmalines in temperatures from 250°C to 750°C and pressures up to 4 kb. *Neues Jahrbuch für Mineralogie Abhandlungen*, 161, (1), 69-83.
- Vo-Thanh, D. and Hung, D. T. (1985) Theoretical study of the elastic constants of calcite at the transition calcite I - calcite II, *Physics of the Earth and Planetary Interiors*, 39, 1. 62-71
- Voynick S. (1999) New Mexico turquoise - It helped create the image of the American West. *Rock and Gem*, 29, (4), 64-66, 80-81.
- Vrana, S. (1988) The Bohemian moldavite strewnfield: Accumulation and conservation of Ries-related tektites in the erosional cavity of the Sevetin impact structure. *19th Lunar and Planetary Science Conference - Proceedings*, 1222-1223.
- Vysotsky S.V., Barkar A.V., Kuryavy V.G., Chusovitin E.A., Karabtsov A.A. and Safronov P.P. (2010) Hydrothermal noble opal: Structure and genesis. *Geology of Ore Deposits*, 52, (8), 815-820.
- Walker G., El Jaer A., Sherlock R., Glynn T.J., Czaja M. and Mazurak Z. (1997) Luminescence spectroscopy of Cr^{3+} and Mn^{2+} in spodumene ($\text{LiAlSi}_2\text{O}_6$). *Journal of Luminescence*, 72/74, (1), 278-280.
- Walker, A.-M., Mayerson, W., (2001) Gem Trade Lab Notes: Early Assembled Cultured Blister Pearls. *Gems & Gemology*, Summer, 134.
- Walker, G. (1985) Mineralogical applications of luminescence techniques, *Chemical Bonding and Spectroscopy in Mineral Chemistry*, 102-140
- Walmstedt, L.P. (1825) Researches on the composition of peridot. *Philosophical Magazine* 66, 357-368.
- Wang L.M. and Ewing R.C. (1992) Detailed in situ study of ion beam-induced amorphization of zircon. *Nuclear Instruments and Methods in Physics Research B*, 65, (1/4), 324-329.
- Wang L.M., Eby R.K., Janeczek J. and Ewing R.C. (1991) In-situ TEM study of ion-beam-induced amorphization of complex silicate structures. *Nuclear Instruments and Methods in Physics Research B*, 59/60, (1), 395-400.
- Wang Y., Kuang X.Y., Yang X. and Wang H. (2006) EPR investigation of the site symmetry of Fe^{3+} ions in the spinel crystals. *Physica B: Condensed Matter*, 381, (1/2), 260-264.
- Wang, B., Bliss, D.F. and Callahan, M.J. (2009) Hydrothermal growth of Ti:sapphire ($\text{Ti}^{3+} : \text{Al}_2\text{O}_3$) laser crystals. *Journal of Crystal Growth* 311, 443-447.
- Wang, C. and Yang, Y. (1992) Oxidation treatment of the sapphires from Shandong province, China. *Journal of Gemmology* 23, 195-197.
- Wang, F. (1988) The sapphires of Penglai, Hainan Island, China. *Gems and Gemology* 24, 155-160.
- Wang, H., Kuang, X.Y., Mao, A.J. and Huang, X.F. (2007) Optical spectrum and local lattice structure for ruby. *European Journal of Physics B* 55, 1-5.
- Wang, R. and Zhang, W.S. (2011) Application of Raman spectroscopy in the nondestructive analysis of ancient Chinese jades. *Journal of Raman Spectroscopy* 42, 1324-1329.
- Wang, S. Y., Sharma, S. K. and Cooney, T. F. (1993) Micro-Raman and infrared spectral study of forsterite under high pressure, *American Mineralogist*, 78, 5/6. 469-476
- Wang, W., Scarratt, K., Emmett, J.L., Breeding, C.M. and Douthit, T.R. (2006) The effects of heat treatment on zircon inclusions in Madagascar sapphires. *Gems and Gemology* 42, 134-150.
- Wanthanachaisaeng, B., Häger, T., Hofmeister, W. and Nasdala, L. (2006) Raman- und fluoreszenz-spektroskopische eigenschaften von zirkon-einschlüssen in chrom-haltigen korunden aus Ilakaka und deren veränderung durch hitzebehandlung (Raman and fluorescence spectroscopic characteristics of zircon inclusions in corundums from Ilakaka and their modification on heating). *Zeitschrift der Deutschen Gemmologischen Gesellschaft* 55, 119-132.
- Warren M.C., Dove M.T. and Redfern S.A.T. (2000) Disordering of MgAl_2O_4 spinel from first principles. *Mineralogical Magazine*, 64, (2), 311-317.
- Washington, H. S. and Merwin, H. E. (1923) Note on enstatite, hypersthene, and actinolite, *American Mineralogist*, 8, 3. 63-67
- Wasson, J.T. (1991) Layered tektites: A multiple impact origin for the Australasian tektites. *Earth and Planetary Science Letters* 102, 95-109.

- Watabe, N. (1955) Electron-microscopic observations of aragonite crystals on cultured pearls, *Gems and Gemology*, 8. 7. 215-218
- Wathanakul, P. and Atichat, W. (2001) Sapphires from Phrae-Sukhothai gemfield, northern Thailand. *28th International Gemmological Congress*, 97-98.
- Wathanakul, P., Atichat, W., Satitkune, S., Somboon, C. and Leelawathanasuk, T. (2010) The blue-green-yellow sapphires from Nam Khun - Nam Yuen, Thailand, and Garba Tula, Kenya. *20th General Meeting International Mineralogical Association - Abstract*.
- Watson E.B. and Cherniak D.J. (1997) Oxygen diffusion in zircon. *Earth and Planetary Science Letters*, 148, (3/4), 527-544.
- Watson E.B. and Harrison T.M. (2005) Zircon thermometer reveals minimum melting conditions on earliest Earth. *Science*, 308, (5723), 841-844.
- Watson E.B. and Price J.D. (2002) Kinetics of the reaction $\text{MgO} + \text{Al}_2\text{O}_3 \rightarrow \text{MgAl}_2\text{O}_4$ and Al-Mg interdiffusion in spinel at 1200 to 2000°C and 1.0 to 4.0 GPa. *Geochimica et Cosmochimica Acta*, 66, (12), 2123-2138.
- Watson E.B., Cherniak D.J., Hanchar J.M., Harrison T.M. and Wark D.A. (1997) The incorporation of Pb into zircon. *Chemical Geology*, 141, (1/2), 19-31.
- Watson E.B., Wark D.A. and Thomas J.B. (2006) Crystallization thermometers for zircon and rutile. *Contributions to Mineralogy and Petrology*, 151, (4), 413-433.
- Wayne D.M. and Sinha A.K. (1988) Physical and chemical response of zircons to deformation. *Contributions to Mineralogy and Petrology*, 98, (1), 109-121.
- Wdowik U.D., Parlinskiand K. and Siegel A. (2006) Elastic properties and high-pressure behavior of MgAl_2O_4 from ab initio calculations. *Journal of Physics and Chemistry of Solids*, 67, (7), 1477-1483.
- Webb J.A. and Finlayson B.L. (1987) Incorporation of Al, Mg, and water in opal-A: Evidence from speleothems. *American Mineralogist*, 72, (11/12), 1204-1210.
- Webb R. W. (1943), Two andalusite pegmatites from Riverside County, California, *American Mineralogist*, 28, 11/12, 581-593.
- Webb, G. (1993) An important peridot. *Australian Gemmologist* 18, 191-192.
- Webb, G. (1997) Gemmological features of rubies and sapphires from the Barrington Volcano, Eastern Australia. *Australian Gemmologist* 19, 471-475.
- Weber W.J. (1990) Radiation-induced defects and amorphization in zircon. *Journal of Materials Research*, 5, (11), 2687-2697.
- Weber W.J., Ewing R.C. and Wang L.M. (1994) The radiation-induced crystalline-to-amorphous transition in zircon. *Journal of Materials Research*, 9, (3), 688-698.
- Webster, R. (1938) Alexandrite and its counterfeits, *Gemmologist*, 7. 80. 644-645
- Webster, R. (1939) The gemmologist looks at plastics. *Gemmologist* 9, 17-23.
- Webster, R. (1948) Ivory ... or bone? - their distinctive characteristics, *Gems and Gemology*, 6. 4. 105-110
- Webster, R. (1949) Aventurine: glass, feldspar, quartz, *Gems and Gemology*, 6. 7. 207-211, 222
- Webster, R. (1949a) Obsidian or moldavite?, *Journal of Gemmology*, 2. 4. 159-163
- Webster, R. (1949b) Some tests for plastic imitations. *Journal of Gemmology* 2, 87-102.
- Webster, R. (1949c) Vegetable ivory - what is it?, *Gems and Gemology*, 6. 6. 179-183
- Webster, R. (1950) Some notes on Indian emeralds, *Gems and Gemology*, 6. 11. 344-345
- Webster, R. (1951) Stress figures in amber, *Journal of Gemmology*, 3. 2. 72-76
- Webster, R. (1952) Some inclusions in moonstone, *Journal of Gemmology*, 3. 7. 275-278
- Webster, R. (1954) Black coral, *Journal of Gemmology*, 4. 5. 197-199
- Webster, R. (1955) The emerald, *Journal of Gemmology*, 5. 4. 185-221
- Webster, R. (1958a) Coral shell and operculum. *Gemmologist* 27, 7-15.
- Webster, R. (1958b) Imitation pearls - their manufacture and properties. *Gems and Gemology* 9, 144-147.
- Webster, R. (1958c) Marbles and other ornamental stones. *Journal of Gemmology* 6, 297-333.
- Webster, R. (1963) Massive grossularite, *Gems and Gemology*, 11. 3. 35-37 and 61
- Webster, R. (1964) The French synthetic emerald, *Journal of Gemmology*, 9. 6. 191-196
- Webster, R. (1966) "Osmenda Pearls". *The Journal of Gemmology*, 10, 1, 8-9.
- Webster, R. (1967) Ornamental serpentine. *Lapidary Journal* 21, 98-109.

- Webster, R. (1971) Some experiences and investigations into damage to gem materials, *Lapidary Journal*, 25. 8. 1077-1084
- Webster, R. (1973a) A modern survey of imitation pearls. *Journal of Gemmology* 13, 209-219.
- Webster, R. (1973b) Some interesting aspects of gem testing, *Gems and Gemology*, 14. 7. 194-199
- Webster, R. (1974) A kornerupine from East Africa, *Journal of Gemmology*, 14. 2. 73-75
- Webster, R., Andrews, G.F., Cole, L.F., Leak, F.E. and Nathanson, W. (1939) Phosphorescence of gem materials: Ruby. *Gemmologist* 8, 161-163.
- Weeks, R. A., Pigg, J. C. and Finch, C. B. (1974) Charge-transfer spectra of Fe^{3+} and Mn^{2+} in synthetic forsterite (Mg_2SiO_4), *American Mineralogist*, 59. 11/12. 1259-1266
- Weerth, A. (1994) Lapis-lazuli, die unendliche Geschichte, *Lapis*, 19. 11. 20-27
- Weerth, A. and Hammer, V.M.F. (2000) Neue überraschungen aus dem Pamir, dem Karakorum und dem Himalaya. *Lapis* 25, 22-28.
- Wehr, K., Milisenda, C. C. and Wild, M. (2008) Sammlersteine, *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 57. 3/4. 113-132
- Wei, Q.K. and Qiu, Z.L. (2004) Gemmological characteristics and identification of a kind of dyed red coral imitation (in Chinese). *Journal of Gems and Gemmology* 6, 24-26.
- Weibel, M. (1956) Amblygonite, cassiterite, and associated minerals from Cáceres, Western Spain, *American Mineralogist*, 41. 1/2. 41-48
- Weill, D. F. (1963) Hydrothermal synthesis of andalusite from kyanite, *American Mineralogist*, 48. 7/8. 944-947
- Weiner, K.L. (1983) Obsidians and gemmology. *Journal of Gemmology* 18, 745-760.
- Weldon, R. (1996) Treated gems: Improving on nature. *Jewelers' Circular Keystone Magazine*, 42-45.
- Wen, H.B., Gu, R.B., Xu, G.C. and Hua, D. (2007) Morphological comparison and discriminating analysis of North American freshwater mussel *Potamilus alatus* and Chinese freshwater pearl mussels *Hyriopsis cumingii* and *Cristaria plicata* (in Chinese). *Chinese Journal of Zoology* 42, 84-89.
- Wenrich M.L. and Christensen P.R. (1996) Optical constants of minerals derived from emission spectroscopy: Application to quartz. *Journal of Geophysical Research*, 101, (B7), 15921-15931.
- Wentzovitch, R. M. and Stixrude, L. (1997) Crystal chemistry of forsterite: A first-principles study, *American Mineralogist*, 82. 7/8. 663-671
- Wentzel, C. Y. (1998) Cultured Abalone Blister Pearls from New Zealand. *Gems and Gemology*, 34, 3, 184-200.
- Wentzel, C. Y. (2004) Gem News International: Interesting abalone pearls. *Gems & Gemology*, 40, 3, 259-260.
- Wentzel, C. Y., Elen, S. (2005) Pen shell pearls - nacreous and non-nacreous. *Gems and Gemology*, 41, 3, 267.
- Wentzell, C., Tannous, M., Johnson, M. (2000) Gem News: Tahitian and Australian "keshi" pearls. *Gems & Gemology*, 35, 1, 70-71.
- Wentzell, C.Y. (1998) Cultured abalone blister pearls from New Zealand. *Gems and Gemology* 34, 184-200.
- Wentzell, C.Y. (2004a) Gem News International: Interesting abalone pearls. *Gems and Gemology* 40, 259-260.
- Wentzell, C.Y. (2004b) Lab Notes: Imitation clam pearl. *Gems and Gemology* 40, 355-356.
- Wentzell, C.Y. and Elen, S. (2004) Lab Notes: Natural Saltwater Mussel Pearls. *Gems and Gemology* 40, 329-331.
- Werdning, G., Alsumady, K., Schreyer, W. and Medenbach, O. (1981) Low pressure synthesis, physical properties, miscibility, and preliminary stability of sinhalite, MgAlBO_4 . *Neues Jahrbuch für Mineralogie Abhandlungen* 141, 201-216.
- Werner, S. and Plech, A. (1995) Compressibility of tugtupite at high pressure. *Zeitschrift für Kristallographie* 210, 418-420.
- Weselucha-Birczyńska A., Słowakiewicz M., Natkaniec-Nowak L. and Proniewicz L.M. (2011) Raman microspectroscopy of organic inclusions in spodumenes from Nilaw (Nuristan, Afghanistan). *Spectrochimica Acta A*, 79, (4), 789-796.
- White J.S. and Cook R.B. (1990) Amethyst occurrences of the Eastern United States. *Mineralogical Record*, 21, (3), 203-213.
- White, J. S. (2005) Tajikistanian heliodor, *Rocks and Minerals*, 80. 4. 285-286

- White, T. J. and Hyde, B. G. (1982) Electron microscope study of the humite minerals: I. Mg-rich specimens, *Physics and Chemistry of Minerals*, 8, 2. 55-63
- White, W. B. and Keester, K. L. (1966) Optical absorption spectra of iron in the rock-forming silicates, *American Mineralogist*, 51, 5/6. 774-791
- White, W. B., McCarthy, G. J. and Scheetz, B. E. (1971) Optical spectra of chromium, nickel, and cobalt-containing pyroxenes, *American Mineralogist*, 56, 1/2. 72-89
- Whitlock, H. P. (1925) Crystallographic studies of apatite, *American Museum Novitates*, 190. 1-4
- Wiedenbeck M., Alle P., Corfu F., Griffin W.L., Meier M., Oberli F., Von Quadt A., Roddick J.C. and Spiegel W. (2007) Three natural zircon standards for U-Th-Pb, Lu-Hf, trace element and REE analyses. *Geostandards and Geoanalytical Research*, 19, (1), 1-23.
- Wight, W. (1981) "Korite" - fossil ammonite shell from Alberta, Canada, *Journal of Gemmology*, 17, 6. 406-415
- Wight, W. (1990a) Check-list for rare gemstones - Petalite. *Canadian Gemmologist* 11, 78-81.
- Wight, W. (1990b) Check-list for rare gemstones - Sapphirine. *Canadian Gemmologist* 11, 46-49.
- Wight, W. (1990c) Check-list for rare gemstones - diopside, *Canadian Gemmologist*, 11, 4. 110-113
- Wight, W. (1993) Check-list for rare gemstones - Sodalite. *Canadian Gemmologist* 14, 78-81.
- Wight, W. (1996) The gems of Mont Saint-Hilaire, Quebec, Canada. *Journal of Gemmology* 25, 24-44.
- Wight, W. (1997) Diaspore, *Canadian Gemmologist*, 18, 1. 14-17
- Wight, W. (1999) Colourless cordierite, *Canadian Gemmologist*, 20, 2. 57-58
- Wight, W. (2000) Check-list for rare gemstones - Sinhalite. *Canadian Gemmologist* 21, 91-93.
- Wight, W. (2004) *Scallop Pearls from Digby, Nova Scotia, Canada*, 29th International Gemmological Conference, China, 165-168
- Wight, W. and Grice, J. D. (1983) Canadian vesuvianite gems, *Journal of Gemmology*, 18, 8. 738-745
- Wild, G. O. (1935) Synthetic emerald, *Gems and Gemology*, 1, 10. 285-286
- Wilkin, R.T. and Barnes, H.L. (1997) Formation processes of framboidal pyrite. *Geochimica et Cosmochimica Acta* 61, 323-339.
- Wilkins, R. W. T. and Sabine, W. (1973) Water content of some nominally anhydrous silicates, *American Mineralogist*, 58, 5/6. 508-516
- Willard, H.M. (1981) The Yogo sapphire, Montana's elusive treasure. *Lapidary Journal* 35, 868-872.
- Willems, B., De Corte, K. and Van Tendeloo, G. (2004) Why does polycrystalline natural diamond turn black after annealing? *Physica Status Solidi A* 201, 2486-2491.
- Williams L.A. and Crerar D.A. (1985) Silica diagenesis, II: General mechanisms. *Journal of Sedimentary Petrology*, 55, (3), 312-321.
- Williams L.A., Parks G.A. and Crerar D.A. (1985) Silica diagenesis, I: Solubility controls. *Journal of Sedimentary Petrology*, 55, (3), 301-311.
- Williams, O.A., Jackman, R.B. and Nebel, C.E. (2002) Hydrogenated black diamond: An electrical study. *Physica Status Solidi A* 193, 577-584.
- Williams-Thorpe, O. (1995) Obsidian in the Mediterranean and the Near East: A provenancing success story. *Archaeometry* 37, 217-248.
- Willigers B.J.A., Baker J.A., Krogstad E.J. and Peate D.W. (2002) Precise and accurate in situ Pb-Pb dating of apatite, monazite, and sphene by laser ablation multiple-collector ICP-MS. *Geochimica et Cosmochimica Acta*, 66, (6), 1051-1066.
- Willing, M. J. and Stöcklmayer, S. M. (2003) A new chrome chalcedony occurrence from Western Australia, *Journal of Gemmology*, 28, 5. 265-279
- Willing, S., Stöcklmayer, S. and Wells, M. (2008) Ornamental variscite: A new gemstone resource from Western Australia. *Journal of Gemmology* 31, 111-124.
- Wilson W.E. (1989) The Anjanabonoina pegmatite Madagascar. *Mineralogical Record*, 20, (3), 191-200.
- Wilson W.E. (1999) Lavra Berilo Branco - The original "Sapucaia" rose quartz occurrence Minas Gerais, Brazil. *Mineralogical Record*, 30, (5), 361-366.
- Wilson W.E. (2002) Cuprian elbaite from the Batalha mine, Paraiba, Brazil. *Mineralogical Record*, 33, (2), 127-137.
- Wilson W.E. (2007) Tourmaline from the Minh Tien pegmatite, Luc Yen mining district, Yen Bai Province, Vietnam. *Mineralogical Record*, 38, (6), 453-457.

- Wilson W.E., Saul J.M., Pardieu V. and Hughes R.W. (2009) Famous mineral localities: The Merelani tanzanite mines, Lelatema Mountains, Arusha Region, Tanzania. *Mineralogical Record*, 40, (5), 346-408.
- Wilson, A.F. and Hudson, D.R. (1967) The discovery of beryllium-bearing sapphirine in the granulites of the Musgrave Ranges (Central Australia). *Chemical Geology* 2, 209-215.
- Wilson, A.T., Hendy, C.H. and Taylor, A.M. (1974) Peridot from Ross Island - Antarctica. *Australian Gemmologist* 12, 124-125.
- Wilson, B.S. (2007) Canada reveals its great colored gemstone wealth. *InColor*, 16-24.
- Wilson, W. E., Johnston, C. L. and Swoboda, E. R. (2002) Jeremejevite from Namibia, *Mineralogical Record*, 33. 4. 289-301
- Wilson, W.E. (1976) Famous mineral localities: Saint John's Island, Egypt. *Mineralogical Record* 7, 310-314.
- Wilson, W.E. (2010) Famous mineral localities: The Clay Canyon variscite mine, Fairfield, Utah. *Mineralogical Record* 41, 321-349.
- Wilson, W.E. and Dunn, P.J. (1978a) Famous mineral localities: The Kalahari manganese field. *Mineralogical Record* 9, 137-153.
- Wilson, W.E. and Dunn, P.J. (1978b) Kalahari - Die manganerz-vorkommen in der Kalahari. *Lapis* 3, 29-39.
- Wilson, W.E. and Petrov, A. (1999) Famous mineral localities: Cerro Rico de Potosi, Bolivia. *Mineralogical Record* 30, 9-36.
- Win, U.K.K. and Themelis, T. (2003) Gem quality petalite from Myanmar (Burma). *Australian Gemmologist* 21, 409.
- Winchell, A. N. (1926) Relations between properties and composition in the amblygonite-montebrazite series, *American Mineralogist*, 11. 9. 246-249
- Winkler B. and W. Buehrer (1990), Lattice dynamics of andalusite: Prediction and experiment, *Physics and Chemistry of Minerals*, 17, 5, 453-461.
- Winkler B., Langer K. and Johannsen P.G. (1989) The influence of pressure on the OH valence vibration of zoisite: An infrared spectroscopic study. *Physics and Chemistry of Minerals*, 16, (7), 668-671.
- Winkler, B., M. T. Dove and M. Leslie (1991), Static lattice energy minimization and lattice dynamics calculations on aluminosilicate minerals, *American Mineralogist*, 76, 3/4, 313-331.
- Winkler, W., Kirchner, E. C., Asenbaum, A. and Musso, M. (2001) A Raman spectroscopic approach to the maturation process of fossil resins, *Journal of Raman Spectroscopy*, 32. 1. 59-63
- Winotai, P., Limsuwan, P., Tang, I.M. and Limsuwan, S. (2004) Quality enhancement of Vietnamese ruby by heat treatments. *Australian Gemmologist* 22, 72-77.
- Winotai, P., Wichan, T., Tang, I.M. and Yaokulbodee, J. (2000) Heat treatment of Tanzanian ruby as monitored by ESR spectroscopy. *International Journal of Modern Physics B* 14, 1693-1700.
- Wintle A.G. and Murray A.S. (1997) The relationship between quartz thermoluminescence, photo-transferred thermoluminescence, and optically stimulated luminescence. *Radiation Measurements*, 27, (4), 611-624.
- Wise M.A. (2009) Chabazite in spodumene-bearing Alpine-type fissure veins from Hiddenite, North Carolina, USA. *Mineralogy and Petrology*, 96, (3/4), 213-220.
- Wise M.A. and Anderson A.J. (2006) The emerald- and spodumene-bearing quartz veins of the Rist Emerald Mine, Hiddenite, North Carolina. *Canadian Mineralogist*, 44, (6), 1529-1541.
- Wise, W.S.T., R. W. (1978) Habit, crystal forms and composition of thomsonite. *Canadian Mineralogist* 16.
- Wollaert E., Vochten R. and van Landuyt J. (1990) Characterisation of gem opal and inferior opal qualities by means of electron microscopy. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 39, (4), 211-223.
- Wood S.A. and Williams-Jones A.E. (1993) Theoretical studies of the alteration of spodumene, petalite, eucryptite and pollucite in granitic pegmatites: Exchange reactions with alkali feldspars. *Contributions to Mineralogy and Petrology*, 114, (2), 255-263.
- Woodhead J., Hergt J., Shelley M., Eggins S. and Kemp R. (2004) Zircon Hf-isotope analysis with an excimer laser, depth profiling, ablation of complex geometries, and concomitant age estimation. *Chemical Geology*, 209, (1/2), 121-135.
- Woodhead J.A., Rossman G.R. and Silver L.T. (1991) The metamictization of zircon: Radiation dose-dependent structural characteristics. *American Mineralogist*, 76, (1/2), 74-82.
- Woodhead J.A., Rossman G.R. and Thomas A.P. (1991) Hydrous species in zircon. *American Mineralogist*, 76, (9/10), 1533-1546.
- Woodruff, R.E. (1986) Larimar: beautiful, blue - and baffling. *Lapidary Journal* 39, 26-32.

- Woodruff, R.E. (1987) The new Caribbean gem. *Aboard* 11, 6,35,58-59.
- Woodruff, R.E. and Fritsch, E. (1989) Blue pectolite from the Dominican Republic. *Gems and Gemology* 25, 216-225.
- Wu Y.B. and Zheng Y.F. (2004) Genesis of zircon and its constraints on interpretation of U-Pb age. *Chinese Science Bulletin*, 49, (15), 1554-1569.
- Wyart, J., Bariand, P. and Filippi, J. (1981) Lapis-Lazuli from Sar-E-Sang, Badakhshan, Afghanistan, *Gems and Gemology*, 17, 4. 184-190
- Wye, K. R. (1991) *The Encyclopedia of Shells*, 2000. Quato Publishing plc, London, 288
- Wyon C. and Aubert J.J. (1986) Czochralski growth and optical properties of magnesium-aluminum spinel doped with nickel. *Journal of Crystal Growth*, 79, (1/3), 710-713.
- Xirouchakis D. and Lindsley D.H. (1998) Equilibria among titanite, hedenbergite, fayalite, quartz, ilmenite, and magnetite: Experiments and internally consistent thermodynamic data for titanite. *American Mineralogist*, 83, (7/8), 712-725.
- Xirouchakis D., Fritsch S., Putnam R.L., Navrotsky A. and Lindsley D.H. (1997) Thermochemistry and the enthalpy of formation of synthetic end-member (CaTiSiO₅) titanite. *American Mineralogist*, 82, (7/8), 754-759.
- Xirouchakis D., Kunz M., Parise J.B. and Lindsley D.H. (1997) Synthesis methods and unit-cell volume of end-member titanite (CaTiOSiO₄). *American Mineralogist*, 82, (7/8), 748-753.
- Xu, Z. and Sherriff, B.L. (1994) ²³Na ²⁷Al ⁹Be ²⁹Si solid state NMR study of tugtupite. *Canadian Mineralogist* 32, 935-943.
- Yada K., Tanji T. and Sunagawa I. (1987) Radiation induced lattice defects in natural zircon (ZrSiO₄) observed at atomic resolution. *Physics and Chemistry of Minerals*, 14, (3), 197-204.
- Yamamoto, K., Suehara, S., Ando, T., Hishita, S., Kamo, M. and Sato, Y. (1995) Valence-band spectra of hydrogenated diamond (111) surface, *Diamond and Related Materials*, 4, 4. 520-523
- Yan, G., Jingzhi, L. and Beili, Z. (1995) The infrared microscope and rapid identification of gemstones. *Journal of Gemmology* 24, 411-414.
- Yang X.Y., Zheng Y.F., Yang X.M., Liu X. and Wang K. (2003) Mineralogical and geochemical studies on the different types of turquoise from Manshan area, East China. *Neues Jahrbuch für Mineralogie Monatshefte*, (3), 97-112.
- Yang, C.O. (1993) Gem deposits in the People's Republic of China. *JewelSiam* 4, 70-71.
- Yang, R.Z., Yang, Y. and Xu, H.G. (2005) Sapphire diffusion treatment and the behavior of iron and titanium. *Journal of Gemmology* 29, 455-460.
- Yao, N., Epstein, A. and Akey, A. (2006) Crystal growth via spiral motion in abalone shell nacre. *Journal of Materials Research* 21, 1939-1946.
- Yarmack, W. (1964) Nephrite jade in British Columbia, *Lapidary Journal*, 18, 6. 696-699
- Yost, J.L. and Weidenhamer, J.D. (2008) Lead contamination in inexpensive plastic jewelry. *Science of the Total Environment* 393, 348-350.
- Yu, S., Lee, J. and Wu, S. (1996) Raman spectroscopic analysis in the identification of bleached and polymer impregnated jadeite, *Journal of the Gemmological Association of Hong Kong*, 19, 21-26
- Yuan H.L., Gao S., Liu X.M., Li H.M., Günther D. and Wu F.Y. (2004) Accurate U-Pb age and trace element determinations of zircon by laser ablation – inductively coupled plasma – mass spectrometry. *Geostandards and Geoanalytical Research*, 28, (3), 353-370.
- Yuan, J. C. C. (1998) Filled diamond test by Raman spectroscopic system, *China Gems*, 7, 2. 53-54
- Yui, T.F., Zaw, K. and Wu, C.M. (2008) A preliminary stable isotope study on Mogok ruby, Myanmar. *Ore Geology Reviews* 34, 192-199.
- Zachariasen, W. H. (1930) The crystal structure of benitoite, BaTiSi₃O₉, *Zeitschrift für Kristallographie*, 74, 139-146
- Zagorowski V.E., Peretyazhko I.S., Schiryevna V.A. and Bogdanova L.A. (1989) Tourmalines from miarolitic pegmatites of the Malkhan Range. *Mineralogicheskii Journal*, 11, (5), 44-55.
- Zagorsky V.Y. (2010) Malkhan gem tourmaline deposit: Types and nature of miaroles. *Doklady Earth Sciences*, 431, (1), 314-317.
- Zagorsky V.Y. and Peretyazhko I.S. (1996) Tourmaline deposits in Russia and Tajikistan. *Russian Geology and Geophysics*, 37, (10), 34-46.

- Zaiser, M., Lyutovich, Y. and Banhart, F. (2000) Irradiation-induced transformation of graphite to diamond: A quantitative study, *Physical Review B*, 62, 5. 3058-3064
- Zaitsev, A. M. (2008) On the way to mass-scale production of perfect bulk diamond, *Proceedings of the National Academy of Sciences*, 105, 46. 17591-17592
- Zakharov, A. G., Varichenko, V. S. and Gontar, A. G. (1997) The effect of ion irradiation on natural diamond SHF photoconductivity, *Journal of Superhard Materials*, 19, 2. 7-12
- Zakrevskaya, E. Y. (1995) Remarkable pyrite pseudomorphs after ammonites, *World of Stones*, 7, 24-25
- Zalishchak, B.I., Pakhomova, V.A., Karabtsov, A.A. and Ushkova, M.A. (2007) Precious serpentine of Liaoning province, China. *Journal of the Gemmological Association of Hong Kong* 28, 104-107.
- Zambonini, F. and Garobbi, G. (1932) Contributo allo studio dei minerali vesuviani. Ricerche sulla forsterite e sullo spinello (Boll. Soc. dei Naturalisti Napoli 41, 1930), *Fortschritte der Mineralogie, Kristallographie, und Petrographie*, 20.
- Zaremba, C.M., Belcher, A.M., Fritz, M., Y., L., Mann, S., Hansma, P.K., Morse, D.E., Speck, J.S. and Stucky, G.D. (1996) Critical transitions in the biofabrication of abalone shells and flat pearls. *Chemistry of Materials* 8, 679-690.
- Zeitner, J.C. (1980) More soft stones for lapidaries. *Lapidary Journal* 34, 1452-1464.
- Zeitner, J.C. (1980) The softest lapidary materials, *Lapidary Journal*, 34, 6. 1236-1246
- Zeitner, J.C. (1982) Any way it's royal - the story of sugillite. *Lapidary Journal* 36, 1316-1324.
- Zeitner, J.C. (1986) Rare among rare. *Lapidary Journal* 39, 26-34.
- Zeitner, J.C. (1987) Four American beauties. *Lapidary Journal* 41, 34-41.
- Zeitner, J.C. (1988) The Proctor beryl, *Lapidary Journal*, 41, 10. 42-47
- Zeitner, J.C. (1990) Gems of antiquity. *Lapidary Journal*, 44, (5), 22-27.
- Zemann-Hedlik, A. and Zemann, J. (1955) Die kristallstruktur von petalit, $\text{LiAlSi}_4\text{O}_{10}$. *Acta Crystallographica* 8, 781-787.
- Zhang B. (1992) Gem-quality scapolite from Sinjiang Region, West China. *Australian Gemmologist*, 18, (4), 115-117.
- Zhang M. and Salje E.K.H. (2001) Infrared spectroscopic analysis of zircon: Radiation damage and the metamict state. *Journal of Physics: Condensed Matter*, 13, (13), 3057-3072.
- Zhang M. and Salje E.K.H. (2003) Spectroscopic characterization of metamictization and recrystallization in zircon and titanite. *Phase Transitions*, 76, (1/2), 117-136.
- Zhang M., Salje E.K.H., Bismayer U., Groat L.A. and Malcherek T. (2002) Metamictization and recrystallization of titanite: An infrared spectroscopy study. *American Mineralogist*, 87, (7), 882-890.
- Zhang M., Salje E.K.H., Bismayer U., Unruh H.G., Wruck B. and Schmidt C. (1995) Phase transition(s) in titanite CaTiSiO_5 : An infrared spectroscopic, dielectric response and heat capacity study. *Physics and Chemistry of Minerals*, 22, (1), 41-49.
- Zhang M., Salje E.K.H., Capitani G.C., Leroux H., Clark A.M., Schlüter J. and Ewing R.C. (2000) Annealing of α -decay damage in zircon: A Raman spectroscopic study. *Journal of Physics C: Solid State Physics*, 12, (13), 3131-3148.
- Zhang M., Salje E.K.H., Ewing R.C., Daniel P. and Geisler T. (2004) Applications of near-infrared FT-Raman spectroscopy in metamict and annealed zircons: Oxidation state of U ions. *Physics and Chemistry of Minerals*, 31, (7), 405-414.
- Zhang M., Salje E.K.H., Farnan I., Graeme-Barber A., Daniel P., Ewing R.C., Clark A.M. and Leroux H. (2000) Metamictization of zircon: Raman spectroscopic study. *Journal of Physics: Condensed Matter*, 12, (8), 1915-1925.
- Zhang M., Salje E.K.H., Malcherek T., Bismayer U. and Groat L.A. (2000) Dehydration of metamict titanite: An infrared spectroscopic study. *Canadian Mineralogist*, 39, (1), 119-130.
- Zhang Q., Yang B., Wood R.A., White D.R.R., Townsend P.D. and Luff B.J. (1994) Thermoluminescence spectra of amethyst. *Radiation Measurements*, 23, (2/3), 423-431.
- Zhang X.Y., Cherniak D.J. and Watson E.B. (2006) Oxygen diffusion in titanite: Lattice diffusion and fast-path diffusion in single crystals. *Chemical Geology*, 235, (1/2), 105-123.
- Zhang, C., Li, S., Ma, Z., Xie, L. and Zhang, R. (2006) A novel matrix protein p10 from the nacre of pearl oyster (*Pinctada fucata*) and its effects on both CaCO_3 crystal formation and mineralogenic cells, *Marine Biotechnology*, 8, 6. 624-633

- Zhang, G., Xie, X., Qi, S. and Hu, P. (2002) X-ray diffraction study of nacre in shell of *Hyriopsis cumingii* (Lea). *Journal of Mineral Petrology* 22, 8–11 [in Chinese with English abstract].
- Zhang, X. A., Wu, W. J. and Wang, J. F. (2007) Dynamic analysis of preferential orientation of aragonite crystals in nacre from mollusk shell, *Chinese Science Bulletin*, 52. 24. 3452-3456
- Zhao, S.B., Wang, H.S. and Zhou, K.W. (1986) A simplified strong-field scheme and the absorption spectrum of Mn²⁺ in rhodonite. *Journal of Physics C: Solid State Physics* 19, 2729-2740.
- Zharinov, A. A., Ponomarenko, V. V. and Pekov, I. V. (2008) Color-change apatite from Kazakhstan, *Rocks and Minerals*, 83. 2. 148-151
- Zhou, G. T., Q.Z., Y., Ni, J. and Jin, G. (2009) Formation of aragonite mesocrystals and implications for biomineralization, *American Mineralogist*, 94. 2/3. 293-302
- Zhu, X.M. and Wadsworth, M.E. (1994) Characterization of surface layers formed during pyrite oxidation. *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 93, 201-210.
- Zigovecki-Gobac, Z., Scholz, R. and Bermanec, V. (2010) Rhodonite group mineral from Morro da Mina mine, Conselheiro Lafaiete, Minas Gerais, Brazil. *20th General Meeting International Mineralogical Association - Abstract*.
- Zilbershteyn, A.K. (1985) Reflection of light by cubic crystals that have undergone hydrostatic compression. *Doklady Akademii Nauk SSSR* 284, 448-451.
- Zilio, S.C. and Bagnato, V.S. (1984) Infrared spectra of natural sodalite. *Journal of Physical Chemistry* 88, 1373-1376.
- Zolensky M.C., Sylvester P.J. and Paces J.B. (1988) Origin and significance of blue coloration in quartz from Llano rhyolite (Ilanite), north-central Llano County, Texas. *American Mineralogist*, 73, (3/4), 313-323.
- Zolotarev A.A. (1993) Gem scapolite from the Eastern Pamirs. *Proceedings of the Russian Mineralogical Society*, (2), 90-102.
- Zolotarev A.A., Frank-Kamenetskaya O.V. and Rozhdestvenskaya I.V. (2007) Crystallochemical formulas and definition of species of tourmaline-group minerals. *Geology of Ore Deposits*, 49, (7), 547-553.
- Zolotarev A.A., Petrov T.G. and Moshkin S.V. (2003) Peculiarities of chemical composition of the scapolite group minerals. *Zapiski Vserossiyskogo Mineralogičeskogo Obščestva*, 132, (6), 63-84.
- Zolotarev, A. A., Dzheuraev, Z. T., Pekov, I. V. and Mikhailova, K. V. (2000) Jeremejevit from pegmatite veins of the Eastern Pamirs, *Zapiski Vsesoyuznoye Mineralogičeskoye Obshchestvo*, 129. 2. 64-70
- Zolotaryov, A.A., Buiko, A.K., Buiko, A.A. and Ovchinnikov, N.O. (2003) Features of the chemical composition and optical properties of peridot (in Russian). *Gemmological Bulletin*, 14-20.
- Zook, T.F. (1972) Unusual and unusual inclusions in a peridot specimen. *Journal of Gemmology* 13, 133-138.
- Zook, T.F. (1973) Obsidian and some observations on this type of natural glass. *Journal of Gemmology* 13, 220-225.
- Zook, T.F. (1974) A moldavite some typical inclusions and theories, *Journal of Gemmology*, 14. 2. 60-68
- Zoysa, E.G. (1985a) Colourless enstatite from Embilipitiya, Sri Lanka, *Journal of Gemmology*, 19. 5. 419-425
- Zoysa, E.G. (1985b) Scheelite, green feldspar orthoclase, fibrolite (sillimanite) from Ratnapura Area, Sri Lanka, *Journal of the Gemmological Association of Sri Lanka*, 2. 18-23
- Zoysa, E.G. (1987) An account of chrysoberyl-bearing pegmatite near Pattara, Sri Lanka, *Journal of Gemmology*, 20. 7/8. 486-489
- Zoysa, E.G. (1991) Gem deposits of Sri Lanka with special emphasis on unusual gem minerals, 22nd International Gemmological Conference - Abstracts,
- Zoysa, E.G. (1995) Gem deposits in Sri Lanka with special emphasis on unusual types of gems. *Journal of the Gemmological Association of Hong Kong* 18, 27-33.
- Zoysa, E.G. and Rahuman, S. (2012) Sapphire rush in Kataragama. *InColor*, 56-61.
- Zwaan J.C. (2006) Gemmology, geology and origin of the Sandawana emerald deposits, Zimbabwe. *Scripta Geologica* 131: 1-211.
- Zwaan J.C. (2014a) Gem Notes: Bicoloured Grossular from Kambanga, Kenya. *Journal of Gemmology* 34: 195-197.
- Zwaan J.C. (2014b) Gem Notes: Blue Kyanite from Tanzania. *Journal of Gemmology* 34: 198-200.
- Zwaan J.C. (2014c). Gem Notes: Green Fluorite from Stak Nala, Pakistan. *Journal of Gemmology* 34: 192-194.

- Zwaan J.C. (2015a) Apatite from Kenya. *Journal of Gemmology* 34: 289-290.
- Zwaan J.C. (2015b) Green Prase Opal from the Kondoa District, Tanzania. *Journal of Gemmology* 34: 658-660.
- Zwaan J.C. (2015c) Purple Tourmaline from Maraca, Mozambique. *Journal of Gemmology* 34: 666-667.
- Zwaan J.C. (2015d) Rhodochrosite from Brazil. *Journal of Gemmology* 34, 473-475.
- Zwaan J.C. (2015e) Stabilized Shattuckite and Bisbeeite from the Democratic Republic of Congo. *Journal of Gemmology* 34: 663-666.
- Zwaan J.C. and E. A. J. Burke (1998) "Emeralds from Sandawana, Zimbabwe: the use of Raman microspectroscopy in identification of their solid inclusions." *Journal of Gemmology* 26(3): 174-
- Zwaan J.C. and J.L.R. Touret (2000) Emeralds in Greenstone belts: the case of Sandawana, Zimbabwe. *Münchener Geologische Hefte*, A 28, pp. 245-258.
- Zwaan J.C. and Zoysa, E.G. (2008) New primary gem occurrences in Sri Lanka, *Gemmologie - Zeitschrift der Deutschen Gemmologischen Gesellschaft*, 57. 1/2. 23-32
- Zwaan J.C., Cheilletz A., Taylor B.E. (2004) Tracing the emerald origin by oxygen isotope data: the case of Sandawana, Zimbabwe. *Comptes Rendus Geoscience* 336: 41-48.
- Zwaan J.C., Hawthorne F.C. (2015) Tremolite from Mwajanga, Tanzania. *Journal of Gemmology* 34: 569-571.
- Zwaan J.C., J. Kanis, and J. Petsch (1997) "Update on emeralds from the Sandawana Mines, Zimbabwe." *Gems & Gemology* 33(2): 80-100.
- Zwaan J.C., Jacob D.E., Haeger T., Cavalcanti Neto M.T.O., Kanis J. (2012) Emeralds from the Fazenda Bonfim Region, Rio Grande do Norte, Brazil. *Gems & Gemology* 48: 2-17.
- Zwaan J.C., Seifert A.V., Vrana S., Laurs B.M., Anckar B., Simmons W.B.S., Falster A.U., Lustenhouwer W.J., Muhlmeister S., Koivula J.I., Garcia-Guillermín H. (2005) Emeralds from the Kafubu area, Zambia. *Gems & Gemology* 41: 116-148.
- Zwaan J.C.; Buter, E.; Mertz-Kraus, R.; Kane, R.E. (2015) Alluvial Sapphires from Montana: Inclusions, Geochemistry and Indications of a Metasomatic Origin. *Gems & Gemology* 51, 370-391.
- Zwaan P.C. (1955) Some unusual gemstones in the collection of the Rijksmuseum van Geologie en Mineralogie of Leiden. *Leidse Geologische Mededelingen* 20, 225-237.
- Zwaan P.C. (1965) Apatite crystals in a Ceylon spinel, *Journal of Gemmology*, 9. 12. 434-440
- Zwaan P.C. (1974) Gem minerals from Umba, Tanzania. *Scripta Geologica* 20, 19-30.
- Zwaan P.C. (1981) Gemstones from the Tissamaharama area in Sri Lanka, 18th International Gemmological Conference - Proceedings (*Journal of the Gemmological Society of Japan*), 8. 1/4. 51-60
- Zwaan P.C. (1982) Sillimanite cat's-eyes from Kangayam, Madras, India. *Journal of Gemmology* 18, 227-281.
- Zwaan P.C. (1986) Gem minerals from the Embilipitiya and Kataragama areas in Sri Lanka. *Australian Gemmologist*, 16, (2), 35-40.
- Zwaan P.C. (1992) La kornerupine d'Embilipitiya, Sri Lanka, *Revue de Gemmologie a.f.g.*, 110. 5-6
- Zwaan P.C. (1996) Enstatite, cordierite, kornerupine, and sacpolite with unusual properties from Embilipitiya, Sri Lanka, *Gems and Gemology*, 32. 4. 262-269

Index

Accommodation	ii, 15	Identification.....	8, 12, 13, 14, 16, 17, 18, 27, 67
Amendments	iii, 18	Integrity	11
Anonymous	23, 25, 28, 40, 43, 44, 51, 62, 63	Internal Audits.....	ii, 14
Approved Documents	12	Internal Calibration/s ..	ii, vi, 7, 9, 11, 13, 14, 15, 16, 17
Audit.....	ii, 8	Interpretations	18
Authorized	16	Investors	11
Calibration	ii, 8	ISO/IEC 17025	vi, 7, 12
Certified Reference Materials.....	ii, 8, 16	Job Descriptions	15
CIBJO	i, iv, v, vi, 7, 8, 10, 14, 16, 18	Judgement	11
CIBJO Secretariat	v	Key Personnel	11
Commercial	iv, v, 9, 10, 11	Laboratory.....	i, ii, vi, 7, 9, 12, 14, 16, 18
Competent Subcontractor	ii, 8	Laboratory Personnel	11, 16
Complaints	ii, 13, 14	Laboratory Planning System.....	15
Confidentiality.....	13	Legally Responsible	10
Conflicts of Interest.....	11	Location/s.....	12, 16, 17
Consensus Standards	16	Maintenance	12, 14, 16
Corrective Actions	13	Malfunction	16
Correctness	15	Management.....	i, ii, 10, 11, 14
Customer/s	vi, 11, 12, 13, 18	Management Meetings	15
Damage	16, 62, 63, 64, 65, 66, 67, 68,	Management Requirements	ii, 10
Defined	10, 11, 12, 15	Management Review/s	ii, 14, 15
Demonstrated Skills.....	15	Management System	ii, 7, 9, 10, 11, 12, 13
Descriptions.....	v	Measurement.....	10, 15, 17, 70
Diamond	v, 7, 8, 27, 28	Measurement Traceability.....	15
Discussions	12	Method Validation.....	15
Environmental	175, 215	Modification.....	16
Equipment	ii, 16	Partly Owned	11
Ethics.....	v	Pearl.....	v, 8, 61, 62, 63, 64, 65, 66, 67, 68
Executive Committee.....	iv, v	Permanent Control	16
Experiments	221	Personnel.....	ii, 11, 14, 15, 16, 17
Feedback.....	13, 14	Policies And Procedures	9, 13, 14
Financial	11	Political/Administrative Borders	11
Format	18	Precious Metals	v, 8
Gem Materials	ii, iii, 8, 9, 10, 11, 12, 13, 59	Pressures.....	11
Gemmological	i, ii, v, vi, 7, 8, 12, 14, 15, 16	Preventive actions	14
Gemmological Commission.....	vi	Primary Customer	13
Gemmology	ii, 9,	Procedure/s	8, 10, 12, 13, 14, 16, 17
Gemology	ii, 9,	Profession/Professional	v, 9
Grading	ii, vi, 7, 8, 9, 11, 15, 16, 17, 27	Purchase.....	16
Human Factors.....	15		

Quality	ii, 9, 14	Subcontractor	13
Record/s	12, 13, 16	Subcontracts	13
Reference Materials.....	ii, 8, 9, 16	Technical.....	i, ii, 15
Reference Standards	ii, 9, 16	Technical Characteristics.....	10
Registration.	11	Technical Judgement	11
Reliability	8, 15	Technical Operations	7, 13
Repair	16	Technical Record	ii, 9, 14
Report/s	ii, 10, 17, 18, 33	Technical Requirements	15
Resolution of Complaints	13	Technical Staff	11
Responsibilities	11	Test Protocols.....	11
Samples.....	10, 15, 62, 63, 64, 65, 66, 67, 70	Test Reports	iii, 15, 18
Sampling	ii, 10, 17	Test Results	vi, 7, 18
Scientific Research	8	Testing	ii, 11, 16
Secondary Customer	13	Traceability	ii, 8, 9, 10, 16, 17
Sectors and Commissions.....	iv, v	Trained and Qualified	14
SI Units	ii, 10, 16	Unambiguous	17
Specific Methods.....	18	World Jewellers Vigilance	v
Statistical Methods.....	17		