

COMMISSION ON ORE MINERALOGY

International Mineralogical Association

<http://www.gsf.fi/domestic/com/ima-com.htm>

Annual Report, 10th December 2009

This report covers aspects of IMA-COM activities since the date of the last annual report (November 2008).

COM Officials 2006-2010

The following nominations of officials to serve COM in the period 2006-2010 were accepted at the IMA-COM Business meeting held during the IMA meeting in Kobe, Japan, July 2006:

Chairman: Nigel J. Cook nigelc@nhm.uio.no

Vice-Chairman: Kari K. Kojonen kari.kojonen@gsf.fi

Federica Zaccarini was appointed as COM Secretary during 2007;

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Objectives and activities of COM

The Commission on Ore Mineralogy of the International Mineralogical Association was set up in 1962 to serve the interests of ore mineralogists in universities, research institutions, museums, and the minerals industry across the world. Our goals are to promote ore mineralogy within the scientific community, to train fellow members in investigative skills through a series of short courses, and to support the activities of other IMA commissions by providing advice and expert opinion on issues related to our fields of research. Through its regular short courses, regional meetings, scientific sessions, other symposia and field excursions, as well as its website, COM offers a platform to ore mineralogists to share their knowledge with others, exchange information, and to speak with a collective voice on issues that affect our branch of science. As one of the commissions of IMA, the COM supports the goals of international cooperation and collaborative research in pure and applied mineralogy.

Financial support

COM has no direct financial support for its activities. Limited financing for meeting participation has been possible via association with other groups, e.g., Applied Mineralogy Group of the Mineralogical Society (U.K.).

Interface with IMA activities and other international projects

COM participates in all major IMA events and interacts with other commissions, particularly CNMMN and CAM. COM is also enthusiastically involved in International Geoscience Project (IGCP) 486, with which it co-sponsored a session at the 32nd International Geological Congress (IGC). IMA-COM worked with the organizing committee of the 33rd IGC (2008) in the preparation of three scientific sessions at the conference. Presently COM is working with the committee of the 20th General meeting of the International Mineralogical Association in the organization on three scientific sessions and one short course.

COM activities in 2009

The last business meeting took place during the 33rd IGC in Oslo. Minutes will be available on the commission webpage shortly: <http://www.gsf.fi/domestic/com/ima-com>.

During this meeting the decision to update the list of national representative was taken and also to nominate Dr. Louis Cabri as an Honorary Member of the COM. The list of the national representative has been updated on February 2009. (see the appendix at the end of this report)

COM activity in 2009 has focussed on the organization of the following scientific sessions and short course for the 20th General meeting of the International Mineralogical Association, 21-27 August 2010, Budapest, Hungary.

Scientific sessions:

1) EG51: Crustal fluids and gold

Convenors: *Hartwig FRIMMEL, Georges BEAUDOIN, Pasi EILU*

Sponsored by: IMA Commission on Ore Mineralogy (IMA-COM)

Brief description of the session:

Variable types of gold deposits at different crustal levels: implications on gold transport and recycling by different crustal fluids.

Details:

Fluids in the continental crust are capable of concentrating gold into ore bodies in a wide variety of settings, ranging from intrusion-related, disseminated porphyry Cu-Au (-Mo) associations, epithermal (low- and high-S), volcanogenic massive sulfide, Carlin, to orogenic shear zone-hosted deposits. In combination and together with the Archaean to Palaeoproterozoic palaeoplacer deposits that were derived from primary shallow crustal gold sources, they account for more than 90 % of all known gold. Considerable efforts have been made in characterizing the various kinds of crustal gold deposits in terms of their mineralogy, mineral chemistry as well as their fluid inclusion characteristics. Nonetheless the ultimate questions of the source of the gold and the source of the gold-transporting fluids remain without definite answers. The extent to which orogenic gold deposits formed in response to magmatic activity and/or metamorphic fluid circulation remains ambiguous as does the extent to which gold has been continuously recycled by crustal fluids over the past three billion years or periodically added to the continental crust from juvenile sources. A focus specifically on epithermal gold seems most appropriate at this meeting, considering that the region around Rosia Montana in west-central Romania, the previous Hungarian Verespatak, has been the most important gold-producing province in Europe for more than 2000 years. Today one of Europe's largest known gold deposits is located in Chelopech, west-central Bulgaria. Both are epithermal deposits (low- and high-sulphidation, respectively) and highlight the enormous significance of crustal fluids, here in Upper Cretaceous to Tertiary volcanic arcs, for the concentration of gold into ore bodies.

2) EG52: Platinum group minerals in the new millenium

Convenors: *Andrew M. McDONALD, Aberra MOGESSIE, Oskar THALHAMMER*

Sponsored by: IMA Commission on Ore Mineralogy (IMA-COM)

Brief description of the session:

A session dedicated to expanding our current state of knowledge on a variety of topics relating to the crystal chemistry, synthesis, geochemical character, geological occurrence and beneficiation of platinum group minerals.

Details:

Platinum group minerals, the important reservoirs of platinum-group elements at the earth's surface, are represented by rather limited number of species (<110). Given the high demand for PGE from the technology sector owing to their application as catalysts, biomedical tools (e.g., anti-cancer drugs) resistance to corrosion, high electrical conductivity, etc., the interest in better understanding the chemistry, mineralogy and geological occurrences of these minerals has been growing at an exponential rate. While it has been more than 250 years following the discovery of the first PGM (platinum, from the Choco district, Columbia) and scientists have come to better understand certain facets regarding the formation and redistribution of PGE in mafic to ultramafic environments in the form of PGM, a tremendous number of questions still remain unresolved. For example, is the occurrence of PGM nanoparticles entirely responsible for the incredible variety of PGM that may be found growing as submillimetric aggregates in chromites from S-poor, ultramafic environments? What are the mechanisms by which PGM in sulphide-saturated systems crystallize? How does hydrothermal alteration impact on the chemistry of PGM that develop? With so many of the known PGM being poorly characterized and lacking crystal-structure data, how diverse is this group? As we still know little regarding chemical variations that occur in PGM solid solutions, how does this impact on defining the conditions under which synthetic PGM are generated? Do all PGM necessarily behave under the same beneficiation processes? This session is broadly directed at all researchers interested in PGM from a large number of perspectives. We invite perspective participants who are working on the chemistry, mineralogy, synthesis and beneficiation of platinum group minerals, along with those studying the myriad of geological occurrences of these minerals (mafic-ultramafic, hydrothermal, alteration) to consider contributing presentations to the session. Given that world demand for PGE still remains high, that mechanisms relating to the manner in which PGE are fractionated and redistributed from the mantle to the crust is still lacking, and that knowledge of the types and variety of PGM that accommodate PGE remains poor, we anticipate considerable interest in this session. It should also be clearly stated that the overriding goal of this session is to provide a forum that will stimulate discussion, debate and a broader appreciation for the complexities associated with PGM.

3) GP81: Volcanoes: The mineral factory

Convenors: *Alexandru SZAKÁCS, Masaaki SHIMIZU, Yuri TARAN*

Sponsored by: IMA Commission on Ore Mineralogy (IMA-COM)

Brief description of the session:

The session addresses all topics related to mineral occurrence and genesis in volcanic environments, including rock-forming minerals, minerals of the hydrothermal alteration, ore minerals and minerals formed from volcanic and post-volcanic exhalations.

Details:

Volcanoes and their vicinity represent a very special geologic environment for mineral genesis on Earth. Magmatic processes related to magma ascent, storage and eruption operate at various levels of the volcanic system and result in the formation of both intrusive and extrusive rocks consisting of common rock-forming major and accessory minerals of a wide spectrum of compositions, crystal sizes and morphology depending on magma composition and evolution. They are important carriers of information about deep processes of magma evolution, as well as eruptive processes. Mineral physics and chemistry studies are indispensable tools of the modern volcano research. Volcanic edifices and their shallow basement commonly host hydrothermal systems displaying a large spectrum of features related to hydrothermal alteration of both magmatic and non-magmatic rocks, and to ore-forming processes, all of them resulting in complex mineral assemblages. Contributions related to all aspects of mineral genesis in the volcano hydrothermal system are welcomed. Gas-phase emanations of erupting, quiescent or even extinct volcanoes are the source of another important class of mineral genetic phenomena. Volcanic sublimates may contain sometimes exotic populations of rare minerals governed by gas compositions and local deposition conditions

Short course

WSC5: Mineralogy, geochemistry and ore deposits of platinum group elements (PGE)

Details:

Date: August 28-September 1 (post-conference)

Venue: Dept. of Applied Geological Sciences and Geophysics, University of Leoben (Austria)

Sponsors: IMA-COM, NAWI-Graz, University Centre of Applied Geosciences Styria (UZAG)

Contact person: Federica Zaccarini (University of Leoben, Federica.Zaccarini@unileoben.ac.at)

Convenors: Aberra Mogessie, Christoph Hauzenberger, Oskar A.R. Thalhammer, Federica Zaccarini, Ferenc Molnár,

Invited speakers: R. Bakker, C. Ballhaus, L. Cabri*, N. Cook*, G. Garuti, C. Hauzenberger, M. Ohnenstetter*, A. McDonald, T. Meisel, A. Mogessie, F. Molnár, M. Tredoux, O. Thalhammer, F. Zaccarini (* not yet confirmed)

Length (days): 4

Brief summary: The course will include:

- Description of the most important PGE deposits, their genesis, mineralogy and geochemistry
- Practical sessions: optical microscopy, electron microprobe, Raman spectroscopy
- Field trip to the mafic-ultramafic massif of Kraubath

No. of sessions: to be announced later

No. of participants: maximum 25

Web: <http://institute.unileoben.ac.at/mineralogie/IMA/Home.html>

COM's website is hosted at the Geological Survey of Finland; <http://www.gsf.fi/domestic/com/ima-com.htm>. The website provides a central source of information on COM activities, with a mission statement, a brief history of the commission, list of national representatives, details of past and future activities and publication reports. During 2009, the website has been updated. Regarding COM website development, the person responsible, Kari Kojonen, during the Oslo meeting, explained that the COM virtual ore microscopy is still under construction. Andy McDonald, Hassan Helmy and other national representatives present at the meeting, offered their help for the development of this important aspect of the COM web site. Kari Kojonen will be sending instructions to all the national representatives regarding format and accompanying descriptions, as soon as possible.

Report of COM Selenide-Tellurides

A draft report of the Selenide-Telluride' sub-commission will be prepared for the next Business Meeting of IMA-COM (Budapest, 2010).

Summary of main activities in the period 2003-2009

Business meetings

COM holds a Business Meeting every two years, coinciding with the International Geological congress (Florence 2004, Oslo 2008) and the General Meeting of the International Mineralogical Association (Kobe, 2006).

COM website

COM created an independent website hosted at the Geological Survey of Finland.

Scientific sessions at international meetings and short courses

(A) VGP 30, EGS-AGU-EUG Joint Assembly, in Nice, France, 7th-11th April 2003.

Scientific session 'Gold and Platinum Group Minerals: from experimental mineralogy and microanalysis to deposit Modelling'.

(B) Scientific sessions at the 32nd International Geological Congress, Florence, August 2004

COM organised three scientific sessions for the 32nd IGC, Florence, Italy, 20-28 August 2004.

'Gold deposits in diverse geological environments' (co-proposed by COM and IAGOD). This symposium session received 108 contributions and was held as an all-day session on Saturday 21st August.

'Telluride and selenide minerals related to gold and platinum group element deposits', co-sponsored by IGCP project 486. The session received 52 contributions and was held as an all-day session on Sunday 22nd August.

'Mineral Deposits' session on 'Conventional and unconventional platinum group mineral deposits'. The session was held on Friday 27th August.

(C) Joint meeting of IMA-COM and the Applied Mineralogy Group of the Mineralogical Society (U.K.), 7th January 2005

A session "Platinum metals in the urban environment - should we worry?" formed part of the larger meeting of the Mineralogical Society of Great Britain and Ireland (6-7th January 2005, Bath, U.K.) with the title "Environmental Mineralogy, Geochemistry and Human Health". COM Chairman Roland K.W. Merkle gave a keynote lecture 'Large scale PGE anomalies in South Africa and possible mechanisms for the release of PGE to the environment'.

(D) Short Course during the 10th International Platinum Symposium, Oulu, Finland, August 2005

A Short course 'Current methods in applied mineralogy of platinum-group element ores and products' was co-sponsored by COM and held during the International Platinum Symposium, Oulu, Finland (August 6th 2005), organized by Prof. Louis J. Cabri. Five invited speakers delivered the lectures.

(E) Scientific session at 19th General Meeting of the International Mineralogical Association, Kobe, Japan, July 23-28th 2006

Session 16: 'Mineralogy of Ore Deposits'.

(F) Scientific session at 33th Geological congress, Oslo, Norway, August 23-28th 2008

Sessions: MPM 04, Platinum Group Minerals (2 invited speakers, 12 talks and 4 posters), MRD 09 (8 talks and 5 posters) and MPM 03 Metals in the Earth: from vital resource to environmental hazards (jointly with CAM). Conveners: David Vaughan, Dogan Pactunc, Kari Kojonen.

(G) Field workshop at Espoo (Finland), 26-31 August 2007

'The Au–Ag telluride–selenide deposits' field workshop was organized in Espoo, Finland, from 26 to 31 of August 2007. A volume of extended abstracts (Geological Survey of Finland Guide number 53) Au–Ag telluride–selenide deposits (Eds: K.K. Kojonen, N.J. Cook and J. Ojala) was published by the Geological Survey of Finland.

Short courses

During the 1990's, IMA-COM held several short courses in advanced ore mineralogy. The last such course was held in Finland in 2000. The difficulty of ensuring appropriate funding for future short courses has led to several attempts in the past few years to be abandoned. Two COM short course venues were proposed in 2006 (Nanjing, Peoples Republic of China; Kharagpur, India) for

2008/2009, but there has, regrettably, been little progress during 2008 to develop business plans for the first of these.

Reports of COM sub-commissions

The sulphosalt sub-commission of COM presented their full-length report.

Involvement in IGCP project

A number of COM 'members' joined the vice-chairman and secretary in proposing the IGCP project "*Au-Ag-telluride-selenide deposits in Europe and in developing countries*" (IGCP 486; 2003-2008).

Other activities/initiatives

IMA-COM has attempted to take a more active role in ensuring quality control of reported ore mineralogical data. The IMA-COM President Roland Merkle (2002-2006) made a call for COM 'members' to become involved in international initiatives of the International Standards Organisation (ISO) aimed at establishing guidelines for standardisation of microbeam data acquisition routines.

IMA-COM has called for valuable – and often irreplaceable collections of polished ore mineral specimens to be deposited in museums and mineralogical institutions to be preserved, and catalogued for future researchers. Discussion among various institutions has been initiated on the optimal way to ensure a systematic and common approach.

The initiative of the COM to organize a standard set of ore minerals abbreviation was briefly discussed. The chairman explained that this is a difficult target and suggested to use the abbreviations recommended by the Canadian Mineralogist.

COM has also continued to promote 'Virtual Ore Mineralogy', in which a series of descriptions of ore minerals with optical images will be available free of charge on the IMA-COM website.

Workplan for 2009, with perspectives for 2010-2012

In the next term (2009-2012), COM will continue to organize scientific sessions within large international scientific meetings, such as the IGC, Goldschmidt meeting and IMA General Meetings. COM will redouble its efforts to organise short courses where they have not been held previously (particularly in developing countries).

COM Short courses

During the business meeting of Oslo, was discussed the possibility to organize the following short courses:

1) Nigel Cook reported on plans to hold a COM short course in India in November 2009. A tentative schedule has been agreed and list of proposed guest lecturers and budget is now in preparation.

2) COM short course in Leoben (Austria) dealing with mineralogy, geochemistry and ore deposits of Platinum group elements (date: from 28th August to 1st September 2010 - after the 20th IMA General Meeting of Budapest) organized by Aberra Mogessie, Oskar Thalhammer and Federica Zaccarini. The preliminary program is now available:

Web: <http://institute.unileoben.ac.at/mineralogie/IMA/Home.html>

3) COM workshop hosted Camborne School of Mines, University of Exeter, United Kingdom. Process mineralogy of metalliferous ores: An introduction for geologists. (date 22nd – 25th June 2010). Conveners: Jens Andersen, Rob Fairhurst, Richard Pascoe, Gavyn Rollinson, Maria Boni, Herrington.

Programme and registration information:

<http://tinyurl.com/yekprkn>

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4) The secretary of COM had received the proposals by Prof. Joaquin Proenza (University of Barcelona, Spain) and Prof. Antoni Camprubi i Cano (National University of Mexico) to organize a COM short course on ore minerals in Mexico in 2011, and by Prof. Basilios Tsikouras (University of Patras, Greece) and Dr. Federica Zaccarini (University of Leoben) to organize a COM workshop in Greece on ophiolites with special regard to their industrial and ore minerals (date not yet specified). These proposals will be discussed during the next COM business meeting.

Other projected activities

(1) Reporting by the COM sub-commission on ‘selenide and telluride mineralogy’ within the period 2006-2010, with final reporting at the 20th IMA General meeting in Budapest, 2010.

(2) Further development of the ‘Virtual Ore Mineralogy’ website.

(3) A more proactive role in ensuring quality control of reported ore mineralogical data in the future.

(4) Greater emphasis on the preservation of valuable - and often irreplaceable - collections of polished ore mineral specimens, depositing them, ideally in museums and mineralogical institutions. IMA-COM needs to prepare a set of guidelines for wide distribution. Closer contact with the IMA Commission on Museums would appear to be essential.

(5) Following the suggestion of Dr. Louis Cabri, the IMA-COM should promote itself by writing a short article in the journal ‘Elements’ showcasing its activities.

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Secretary, IMA-COM

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List of National Representatives (updated February 2009)

Entries in **RED** are cases where the national mineralogical society has been contacted regarding a new appointment. The 'old' names are retained until such an appointment is formalised.

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