

## **MPM Mineralogy**

### **MPM-01 General contributions to mineralogy** *Kari Kojonen, Chris Stanley (IMA)*

This session is meant for various fields of the science of mineralogy dealing with naturally occurring elements and compounds, especially those which are not represented by some other symposium in the IGC 2008. These could include: New minerals species; Minerals in the human body; Toxic minerals; Minerals and health; Intelligent minerals; Energy minerals; Minerals for new materials; ColTan minerals; Ore minerals; Industrial minerals; Strategic minerals; Physical properties of minerals; Crystal structure of minerals; Modern analytical methods of minerals.

### **MPM-02 Frontiers in quartz research: The genesis, crystal chemistry and economic importance of igneous, metamorphic and hydrothermal SiO<sub>2</sub>-polymorphs** *Peter M. Ihlen, Rune B. Larsen, Axel Müller*

Although quartz is a major constituent of the Earth's crust, relatively few attempts were made to use quartz for petrogenetic interpretations because the textures, the trace element concentration and lattice position were poorly resolved by common analytical techniques. The emergence of better and more affordable in situ microprobe techniques, together with the improvement of conventional methods (SIMS, LA-ICP-MS, EMP, SEM-CL) over the past decade, has provided an avalanche of new data on textures and trace elements comprising quartz. These analytical advances allow for high precision estimates of the abundance of trace elements in quartz, the micro texture, e.g. growth zoning, recrystallisation, preferred crystal orientation and the structural characterisation of defect centres in the crystal lattice. Therefore, the igneous, metamorphic and hydrothermal petrogenesis of quartz, as well as the quality and formation of economic quartz deposits can be better constrained. Accordingly, quartz may become important in the perception of both rock- and mineral deposit-forming processes. The entire spectrum of Earth scientists working on SiO<sub>2</sub>-polymorphs are cordially invited to share their results at this session where we hope to define the frontiers of quartz research.

### **MPM-03 Metals in the Earth: From vital resource to environmental hazard** *David Vaughan, Dogan Paktunc, Kari Kojonen (IMA)*

Mineral resources are crucial for sustaining quality of life and economic development. Extraction of metals from ores, however, poses risks to human health and ecology. Preventing and reducing adverse impacts of metals in the environment require a comprehensive understanding of the full metal cycle including both natural and industrial processes involved in the formation and distribution of minerals, extraction of metals and disposal of wastes. The symposium aims to explore the links between the fundamental and applied aspects of research dealing with minerals and metals in mineral exploration, metals extraction and disposal of wastes. In consideration of the fact that not only human activities but also natural processes concentrate and redistribute metals and modify their forms in the environment, the symposium also

aims to discuss releases of metals from natural sources. This will also help to improve long-term predictions on metal releases from the wastes. Presentations will include the following topics: 1. Geochemistry and mineralogy of metallic mineral deposits emphasizing the distribution of hazardous or toxic elements such as Pb, Zn, Ni, Co, As, Cr, Hg, Pd and Pt. 2. Weathering of metallic mineral deposits and mineral-water interactions at the Earth's surface (e.g. water and soil contamination from natural sources). 3. Releases of metals during mineral processing (communion, beneficiation, flotation) and extractive metallurgy (smelting and refining) operations. 4. Geochemistry and mineralogy of mining and metallurgical wastes (waste rock, tailings, sludge, effluents, acid mine drainage, hydrometallurgical residues, and dust and stack emissions) with emphasis on their stabilities. 5. Metals in the environment (background concentrations, natural vs.. anthropogenic contributions, water, soil and air quality around mine and metallurgical sites, bioavailability, human health and ecological risk assessment). 6. Sustainable development.

**MPM-04 Platinum-group mineralogy** *Andy McDonald, Kari Kojonen (COM)*

Due to major advances in the technological applications of platinum-group elements, associated exploration programs have recently attracted incredible attention. Ironically, relatively little is known regarding the true chemical formulae, atomic arrangements and chemical diversity that exist amongst platinum-group minerals. This session is devoted to expanding our current knowledge base of the crystal-chemistry of PGM. It invites contributions from participants working on one or more of the many aspects involved in studying PGM: mineral synthesis, crystal-structure determination, chemical variation, new data on poorly described species and the characterization of potentially new PGM. All workers analyzing PGM from the myriad of possible geological environments (reef complexes, magmatic and hydrothermally altered deposits, placers, laterites, etc.) are welcome to provide submissions. The principle goal of this session is to provide a means by which individuals researching PGM, and those involved in their exploration and beneficiation, can be exposed to the current state-of-knowledge of this geologically, economically and technologically relevant mineral group.

**MPM-06 Melts and glasses in mineralogy and petrology** *Daniel Neuville et al. (IMA-CMP)*

Glasses and melts play an important role in the formation and evolution of the earth, as well as, in glass processing and for the storage of nuclear wastes. The structure and properties of glasses and silicates melts are becoming more well known but some aspects remain poorly understood; for example, the glass transition, and the relationship between short and medium range order. Contributions to this symposium are invited on diverse aspects of glasses and melts, in relation to properties, structure and dynamics.

**MPM-10 Fluids and melts in the Earth's mantle: From natural observation to HT-HP experiment** *Leonid L. Perchuk, Oleg G. Safonov (IMA-WGME)*

We expect contributions from researchers who provide petrological, geochemical, and experimental evidences for activity of alkaline deep-seated fluids and melts in the Earth's mantle. Presentations that describe evidences for alkalic silicate, carbonate-silicate, chloride-carbonate liquids from mantle xenoliths from basalts and kimberlites, as well as from diamond inclusions, are highly solicited. A special attention is to be paid to experimental studies of alkali-rich melts and fluids at the HP-HT conditions, including equilibria of mantle minerals with alkalic liquids, synthesis and stability of specific alkaline HP phases, partitioning of major, trace and volatile components between minerals, melts, and fluids, diamond growth in the melts, physical and mechanical properties of the alkalic liquids at the mantle conditions, etc. The symposium is directed to create a tool for better understanding of the deep-seated processes such as mantle metasomatism, which provoke kimberlitic and carbonatitic magmatism.

**MPM-11 Phase transformations and geodynamics** *Taras V.Gerya, Leonid L.Perchuk (IMA-WGME)*

Phase transformations and geodynamics are inherently interrelated. On the one hand all large scale geodynamic processes involve and are strongly affected by various phase transformations in the Earth's crust, mantle and core. On the other hand mineral reactions recorded by rocks are broadly used by petrologists for deciphering evolution of physical parameters (e.g. P-T-time-deformation paths) related to large scale geodynamic changes. Our intension is to organize a cross-disciplinary symposium involving observers, experimentalists and modelers in order to discuss three principal issues: 1. How phase transformations affect geodynamic processes at various depths and scales? 2. How natural observations and experimental data on phase transitions can be used for deciphering geodynamic evolution? 3. How can we include effects of phase transformations in numerical models of geodynamic processes and what can we gain out of this? We encourage contributions from petrologists, structural geologists, geophysicists and numerical modelers discussing recent advances and problems in linking phase transformations and geodynamics.

**MPM-12 New developments in microbeam techniques** *Jan Kosler, John Hanchar, Martin Whitehouse*

Recent advancements in microanalytical techniques, including SIMS, laser ablation ICP-MS, laser assisted gas source mass spectrometry, electron and x-ray microbeam analysis, have opened new possibilities to study elemental and isotopic variations with previously unmatched spatial resolution, detection capabilities and analytical precision. Contributions are sought both in analytical technique development and new applications of microbeam analysis, including elemental concentration measurements, analysis of radiogenic and stable isotopes and use of microbeam

techniques for studying spatial variations in chemical and isotopic composition of geological and environmental materials.

**MPM-13 Inclusions in minerals** *Sergey Smirnov, Pei Ni, Matti Poutiainen (IMA-WGIM)*

Minerals contain a variety of different phases that were entrapped in the course of their formation and then isolated as inclusions. All of them can be divided into three groups: mineral inclusions, fluid, and melt inclusions. Recently they are believed to be an important source of geochemical and petrological information. They give to geologists an opportunity to trace past geological processes from the nano- and microscale up to the rock formation scale. As isolated phases the inclusions frequently bring geological information that was erased from rocks by later overprinting processes. In spite of the fact that the inclusions were studied for more than 150 years, they still trigger hot discussions on their origin, properties and importance. On the other hand they proved their importance in revealing P-T-X conditions of mineral and rock formation from the Earth mantle depths to the surface of the Earth and even in the Solar system. The session is addressed to those who deal with inclusions in minerals for reconstruction of geological processes - magma evolution, metamorphism, ore formation, sedimentary basin evolution, etc. We invite papers that are dedicated to advances of the inclusion microanalysis, thermodynamics of the fluid systems, paragenetic analysis, use of inclusions for oil, gas and ore prospecting, and experiments with inclusions in minerals.

Prepared by Kari Kojonen (21 February 2008)