

SIG5

Reported Period: September 2016- August 2017

Report Date: August 14th, 2017

Reported by: Oleg Siidra

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1. Introduction.

In 2016-2017, main activity of the SIG5 was devoted to the organization of microsymbosia at ECM31 in Oviedo.

2. SIG web site:

SIG5 <http://sig5.ecanews.org/>

We are in the process of creating Group page on Facebook.

3. Number of ECA individual members registered with the SIG according to (<http://www.xray.cz/eca/im-payment.htm>)

SIG5 Mineral and Inorganic Crystallography ~120

4. Existence of a SIG mailing list Yes (general renewal is required)

Number of members in the SIG mailing list: 164

5. Approximate total number of researchers involved in the SIG (please indicate the basis for the estimate) 164 (this is the number of members of the mailing list, *i.e.* number of researchers who explicitly indicate their involvement in the SIG)

6. List of MS organized by the SIG at the ECM 31

The following proposals for ECM 31 were done:

a) Microsymbosia

MS proposed in collaboration with SIG08 (Powder Diffraction):

Title: "New insights on minerals and related materials diffraction study"

Synopsis: Many present and future advances of minerals and materials characterization are linked to evolution of characterization methods. This MS will be exclusively dedicated to recent advances in diffraction methods using conventional and synchrotron X-ray radiation as well as neutrons.

Possible chairs: Nicolas Barrier (Caen, France), Giuseppe Cruciani (Ferrara, Italy), Roland Tellgren (Uppsala, Sweden)

MS proposed in collaboration with SIG03 (Aperiodic Crystals) and SIG04 (Electron Crystallography):

Title: "Combined approaches for structure characterization of modulated and complex structures"

Synopsis: The MS is dedicated to contributions about structure characterization of modulated and complex structures including minerals and related compounds, and about related analytical methodologies. Particular focus is given to works combining different

scientific approaches, among which diffraction, microscopy and spectroscopies.

Possible chairs: Philippe Boullay (Caen, France); Joke Hadermann (Antwerp, Belgium), Artem Abakumov (Skoltech, Russia) and Lukas Palatinus (Praha, Czech Republic)

MS proposed in collaboration with SIG11 (Crystallography under Extreme conditions):
Title: "Crystallography in space and earth"

Synopsis: This MS is dedicated to the structural characterization of minerals and their evolution in space and also in Earth's mantle with the ulterior motive of identifying their growth conditions, a key point to understand the story of planets and space.

Possible chairs: David Blake (Washington, USA), Mark Van Zuilen (Paris, France)

MS proposed in collaboration with SIG12 (Crystallography of functional materials):

Title: "From mineral to functional materials",

Synopsis: this MS deals with the prediction, synthesis and characterization of novel complex functional materials directly inspired from minerals architectures and from their growth conditions.

Possible chairs: Oleg Siidra (Saint Petersburg, Russia), Olivier Mentré (Lille, France)

MS proposed in collaboration with SIG04 (Electron Crystallography):

Title: "Mineralogy at the nanoscale: from nature to applications"

Synopsis: One of the most inspiring challenge for nowadays Mineralogy is the study of nanocrystalline phases, which are crucial for the understanding of alteration or nucleation processes, of ultra-localized deformation mechanisms (like earthquake slips or impact deformation) and of abiotic-biotic interaction. Moreover, many materials may be recovered only as polyphasic nanocrystalline mixtures (e.g. cosmic samples, pollution ashes or floating agents, products of HP-HT experimental geology), and specific analytical techniques are necessary for disclose their structure and chemical features.

Possible chairs: Ute Kolb (Mainz, Germany); Wulf Depmeier (Kiel, Germany); Enrico Mugnaioli (Pisa, Italy),

MS proposed by SIG05:

Title: "Minerals and related Materials"

Synopsis: Minerals and related Materials are the main concern of SIG05. Particularly, this MS focus on newly characterized minerals and related compounds, identification of their synthesis growth conditions and development of characterization methods to solve their complex structures.

Possible chairs: Christian Biagioni (Pisa, Italy) and Marie Colmont (Lille, France)

MS proposed by SIG05:

Title: “Biominerals and bioinspired materials”

Possible chairs: Manuel Garcia Ruiz (Grenada, Spain) and Wolfgang Schmahl (München, Germany)

Synopsis: Bioinspired materials are synthetic materials whose structure, properties or function mimic those of biominerals. The possible fields of applications are various, ranging from physics to medicine. The aim of this MS is to show how bioinspired materials may be obtained from understanding of the synthesis and self-assembly of building blocks of natural materials.

b) Proposed keynote lectures:

Keynotes may be chaired by Prof. Sergey Krivovichev (Saint Petersburg)

1- David Blake

David Blake is a renowned researcher working on mineralogy and crystallography at NASA (Washington, USA). He is especially expert in the study of interstellar ice, interplanetary dust, meteorites and the condition of the early solar system, existence of life in Martian Meteorites and robotic mineral analysis on Mars. Through all of these projects, he developed innovative portable X-ray diffraction instrument for use of planetary missions or geological works on Earth... His research is a direct example of using crystallography for societal subjects. He presented his results in the opening ceremony of IUCr2014 in Paris.

[1] J. E. French and D. F. Blake. Discovery of Naturally Etched Fission Tracks and Alpha-Recoil Tracks in Submarine Glasses: Reevaluation of a Putative Biosignature for Earth and Mars.

International Journal of Geophysics, 2016, 2016, p. 1-50

[2] J. P. Grotzinger et al. Deposition, Exhumation, and Paleoclimate of an Ancient Lake Deposit, Gale crater, Mars. *Science*, 2015, 350, p. aac7575-1 - aac7575-12.

2- Olivier Mentré

Olivier Mentré has a long experience and a recognized knowhow for prospection and characterization of new materials with complex physical properties. This includes some targeted materials based on transition metals including their synthesis using innovative concepts, their crystal structure and physical properties study. Using advanced characterization tools he solved complexed crystal structures and show unusual behaviors on oxides: selective metal exsolution in $\text{BaFe}_{2-y}\text{M}_y(\text{PO}_4)_2$ ($\text{M} = \text{Co}^{2+}, \text{Ni}^{2+}$) solid solutions [1-2], evidence of electrically charged crystal structures balanced by pair in $\text{Fe}^{2+/3+}_{13.5}(\text{AsO}_4)_8(\text{OH})_6$ [3], topochemical reduction of YMnO_3 and derivatives [4] or Reduction of $\text{Ln}_2\text{Ti}_2\text{O}_7$ Layered Perovskites [5]... All these crystallographic studies are assorted with adequate structure-properties relation establishment. In that sense, he's developing a modern crystallochemistry going from prospection to concrete applications.

[1] *Angewandte Chemie - International Edition*, Volume 53, Issue 49, 1 December 2014, Pages 13365-13370

- [2] Inorganic Chemistry, Volume 54, Issue 17, 8 September 2015, Pages 8733-8743
- [3] Evidence of electrically charged crystal structures balanced by pair in $\text{Fe}^{2+/3+}_{13.5}(\text{AsO}_4)_8(\text{OH})_6$, O. Mentré et al, SPSSM, 1st to 6th July 2016, Nantes, France
- [4] Topochemical Reduction of YMnO_3 into a Composite Structure, H. Kabbour, G. Gauthier, F. Tessier, M. Huvé, T. Pussacq, P. Roussel, M. A. Hayward, Z. L. Moreno B., M. Marinova, M. Colmont, S. Colis, O. Mentré, Chemistry of Materials, 2017, submitted
- [5] Chemistry of Materials, Volume 29, Issue 3, 14 February 2017, Pages 1047-1057

c) Poster Prize

SIG05 proposes to organize a poster prize in collaboration with IMA (International mineralogical association) for the poster from young scientist devoted to mineralogical crystallography.

8. Past Activities other than Microsymposia at ECM

Title: **2nd European Mineralogical Conference**

Number of Participants: 1000

Level of involvement of SIG in the activity: SIG5 gave his support and organization of 2 MS.

3 ECA Individual members registered with the SIG involved in the organizing committee

4 ECA Individual members registered with the SIG involved as lecturers

O endorsed (SIG logo on the web page/leaflets) No

Sponsored by ECA? No

Other Sponsors/Organizers: National Mineralogical Societies

Short Description: (25 words max.) 2nd European Mineralogical Conference was held between the 11th and 15th of September 2016 at the Palacongressi of Rimini, Italy. This meeting is a joint conference amongst the European mineralogical societies.

9. Future/Programmed Activities.

Title: **XXII Meeting of The International Mineralogical Association**

<http://www.ima2018.com/about-ima-2018/>

Number of Participants: 2000

Level of involvement of SIG in the activity: SIG5 will give his support and organization of ~5 MS.

5 ECA Individual members registered with the SIG involved in the organizing committee

4 ECA Individual members registered with the SIG involved as lecturers

O endorsed (SIG logo on the web page/leaflets) No

Sponsored by ECA? No

Other Sponsors/Organizers: IMA

Short Description: (25 words max.) The International Mineralogical Association congress will be held from 13 to 17 August 2018 in Melbourne, Australia and devoted to large number of disciplines related to Mineralogy.

10. Other matters. (50 words max.)

None.

11. Brief annual activity report (100 words max.)

SIG5 is involved in the organization of the ECM31–Oviedo. Seven microsymbiosia in collaboration with the other SIGs were done. Several plenary speakers are proposed.

12. List SIG officers, name and e-mail, and specify their main function in the SIG:

Chair Prof. Dr. S.V. Krivovichev skrivovi@mail.ru

Vice-chair Dr. Frédéric Hatert fhatert@ulg.ac.be

Secretary Dr. Oleg Siidra o.siidra@spbu.ru