

SULFUR IN MAGMAS AND MELTS AND ITS IMPORTANCE FOR NATURAL AND TECHNICAL PROCESSES

Dates: Short Course sessions are Sunday through Tuesday, August 21-23, 2011 (following the Goldschmidt Conference 2011 in Prague). The Short Course will start at 9:00 AM on Sunday, August 21, and end 5:30 PM the evening of Tuesday, August 23rd. An introductory ice-breaker celebration will be held 7:00 PM on Saturday, August 20. The historical mining at the UNESCO World heritage site at Rammelsberg (<http://www.rammelsberg.de>) will be visited on August 22.

A summer school is offered to students and young researchers which includes the short course at Goslar and two practical courses on August 20 in Hannover, Germany, and on August 24 in Clausthal, Germany.

Location: Short Course sessions are at the *Hotel der Achtermann*, Rosentorstrasse 20, D-38640 Goslar, Germany; Tel: +49 5321/7000-0; Fax: +49 5321/7000-999; e-mail (for reservations): reservierung@der-achtermann.de. The short course location can be reached within two hours from the airport Hannover-Langenhagen, Germany, with a change of the train at Hannover Central Station. From the railway station in Goslar you go about 200 m to reach the conference hotel which is located near the historic center of Goslar. Participants who come by car have to note that parking lots are rare in the environment of the hotel. An option is the parking garage *Am Zentrum* nearby the hotel which has currently a charge of 9 € per night.

Convenors: *Harald Behrens*: Institut für Mineralogie, Leibniz Universität Hannover, Callinstr. 3, D-30167, Hannover, Germany; Tel. + 49 511/762-8054; email: h.behrens@mineralogie.uni-hannover.de. *James D. Webster*: Department of Earth and Planetary Sciences, AMNH, Central Park West at 79th St., New York, NY 10024-5192 USA; Tel: +1 (212) 769-5401; jdw@amnh.org. *Joachim Deubener*: Institut of Nonmetallic Materials, TU Clausthal, Zentnerstr. 2a, D-38678 Clausthal-Zellerfeld, Germany; Tel. + 49 5323/72- 2463; email: joachim.deubener@tu-clausthal.de.

Fees:	<i>on or before July 20, 2011</i>	<i>after July 20, 2011</i>
Professional Registration		
Industry:	\$ 520	\$ 570
Academic & Government:	\$ 380	\$ 430
Student Registration:	\$ 240	\$ 290
Abstract/Poster	\$ 40	
Extension of short course to summer school (Additional cost)	\$ 40	

Short course speakers must register and pay the fee for scientists. This fee will be partially reimbursed during the short course, depending on external funding. Requests are pending for funding to support students, and there may be a chance for partial reimbursement of fees of students later on.

Registering: Online registration is at <https://msa.minsocam.org/shortcourses.html>. Printable registration forms are also available online at http://www.minsocam.org/msa/sc/sulfur_reg.pdf, as well as from the MSA Business Office, 3635 Concorde Pkwy Suite 500, Chantilly, VA 20151-1110 USA. phone: +1 (703) 652-9950; fax: +1 (703) 652-9951; e-mail: jaspeer@minsocam.org. Registration forms with payment must be returned to the MSA Business Office. Registration fees will be partially refunded if cancellation is received in writing on or before August 10, 2011. All participants and speakers must register. The short course is limited to 120 participants.

Practical: Registration fee includes MSA/GS short course sessions, *Reviews in Mineralogy and Geochemistry* volume, and refreshments at the following times: mid-morning and mid-afternoon coffee breaks and lunch and dinner on Sunday-Tuesday. Registration fees do not include room or any transportation costs to or from the short course site (breakfast expense covered by hotel room

charges). A special price for accommodation per night of 59 € in a single room and 47 € in a double room is offered by the conference hotel. Both participants and speakers must make arrangements and pay their own lodging and transportation. Participants may contact the Hotel der Achtermann, Rosentorstrasse 20, D-38640 Goslar, Germany; Tel: +49 5321/7000-0; Fax: +49 5321/7000-999; e-mail: reservierung@der-achtermann.de to make reservations and pay for rooms. Please note the keyword “sulfur workshop” in your reservation.

Short Course Description: Sulfur is one of the most abundant volatiles in terrestrial magmas, and it plays key roles in processes of magma evolution, volcanic degassing and eruption, metasomatism and mineral deposit formation, and atmosphere evolution. During large volcanic eruptions, massive amounts of sulfur are released, mostly as SO₂, which have important climatic impacts. Sulfur is also an important component of processes used to manufacture high-quality glasses and steel for industry. In recent decades, various new investigations were started in the geosciences and material sciences using modern spectroscopic, analytical, and experimental techniques in order to improve our understanding of the complex behavior of sulfur in natural and synthetic melts, but these different research initiatives were often not interconnected. One of the major goals of this course is bridging the gap between research on sulfur in melts in earth science and in material sciences. In addition to exchanging information and ideas, the purpose of the short course is to serve as a forum for discussion of future research tasks and initiatives.

Short course attendees will learn and discuss:

- 1) Modern methods for analyzing sulfur concentrations, isotopes, speciation, and coordination in glasses, minerals, rocks, and fluids.
- 2) Rates of sulfur diffusion and details on oxidation-reduction reactions involving sulfur in a broad variety of melts.
- 3) Kinetics of melting raw materials for industrial glass production.
- 4) The determination of sulfur solubility in commercial molten glasses and in the broad variety of magmatic melts and sulfur solubilities as a function of melt composition, oxygen fugacity, pressure and temperature.
- 5) Sulfur partitioning between geologically relevant melts and chemically simple to complex fluids comprised of C-O-H-S-Cl.
- 6) The identities and importance of sulfur-bearing minerals in magmatic systems.
- 7) The role of sulfur in extraterrestrial bodies and in magmatic processes of the deep Earth.
- 8) The crucial role of sulfur for fining of molten commercial glasses and the related redox reactions.
- 9) Sulfur degassing from volcanoes with respect to source conditions in the magma, the surveillance of volcanic activities, the chemical composition of released gases, and global impacts of volcanic sulfur release.
- 10) Application of sulfur's stable isotopes to the study of magmatic and hydrothermal processes in natural systems.
- 11) Use of slag to sequester sulfur from molten steels to produce high-quality metals.
- 12) The crucial role of sulfur in the evolution of magmas and related processes of concentrating, transporting, and depositing a wide variety of chalcophile ore metals.

For additional information see the MSA web site: <http://www.minsocam.org> and the site: <http://www.msasulfurinmelts.org>.

Short Course Topics and Chapter Titles for RiMG Volume

Analytical and Spectroscopic Methods

- 1) Analytical Methods for Sulfur Determination in Glasses, Rocks,
E. M. Ripley, C. Li, C.H. Moore, E.R. Elswick, J.B. Maynard, R.L. Paul, P. Sylvester, J.H. Seo, N. Shimizu
- 2) Spectroscopic Studies on Sulfur Speciation in Synthetic and
Natural Glasses *M. Wilke, K. Klimm, S. Kohn*

Physical and Chemical Properties of S-Bearing Silicate Melts

- 3) Diffusion and Redox Reactions of Sulfur in Silicate Melts *H. Behrens, J. Stelling*
- 4) The Role of Sulfur Compounds in Coloring and Melting Kinetics
of Industrial Glass *R. Falcone, S. Ceola, A. Daneo, S. Maurina*
- 5) The Solubility of Sulfur in Simple and Industrial Glass Melts at

- Near-Ambient Pressure *L. Backnaes, J. Deubener*
6) Modeling the Solubility of Sulfur in Magmas: a 50-year old
Geochemical Challenge *D.R. Baker, R. Moretti*

Constraints from Natural and Experimental Systems

- 7) The Sulfur Budget in Magmas: Evidence from Melt Inclusions,
Submarine Glasses, and Volcanic Gas Emissions *P. J. Wallace, M. Edmonds*
8) Distribution of Sulfur Between Melt and Fluid in S-O-H-C-
Cl-Bearing Magmatic Systems at Shallow Crustal Pressures and
Temperatures *J.D. Webster, R.E. Botcharnikov*
9) Sulfur-Bearing Magmatic Accessory Minerals *F. Parat, F. Holtz, M. Streck*
10) Sulfur in Melts of the Deep Earth and Planetary Systems *D.S. Ebel*

Natural and Technical Applications

- 11) Fining of Glass Melts *H. Müller-Simon*
12) Sulfur Degassing from Volcanoes: Source Conditions,
Surveillance, Atmospheric Chemistry and Impacts *C. Oppenheimer, B. Scaillet, R.S. Martin*
13) Sulfur isotopes in Magmatic-Hydrothermal Systems, Melts
and Magmas *L. Marini, R. Moretti, M. Accornero*
14) Interactions between Metal and Slag Melts: Steel Desulfurization *J. Lehmann, M. Nadif*
15) The Role of Sulfur in the Formation of Magmatic Ore Deposits *A.C. Simon, E.M. Ripley*

Poster session: Participants of the short course can present their actual research as a poster. Posters must be related to one of the following general topics: “Sulfur in Silicate Fluids and Melts”, “Magmatism/Volcanism”, “Glass Sciences and Technology”. An extra fee of 40 \$ has to be added to the registration fee for each poster and only one poster can be presented by each participant. Abstracts of posters have to be sent via E-mail to Harald Behrens (e-mail: h.behrens@mineralogie.uni-hannover.de) until July 10, 2011.

Field Trip: The historical mining at the UNESCO World heritage site Rammelsberg (<http://www.rammelsberg.de>) will be visited on August 22. The transport from the conference to the mining site is by bus and no special attire is required for visiting the mining.

Summer School Description: For students and young researchers, a summer school is offered which includes the short course and two practical workshops held immediately before and after the short course:

- experimental studies on volcanism (August 20 at the University of Hannover, Germany)
- glass making and glass properties (August 24 at the Technical University of Claustal, Germany).

Both workshops involve active participation of the students in laboratory work, and the number of participants is limited to 36 (six groups comprising six participants in each group). The summer school requires preparation and presentation of a scientific abstract and poster, participation in both workshops, and writing a short report on one of the exercises in the workshops. For additional information about the summer school see: <http://www.msasulfurmelts.org>.

Applications for the Summer School: PhD students, advanced master students and young researchers (post doc) can apply for a place in the summer school. The application includes your contact information, your curriculum vitae, a short support letter of an established researcher and the abstract (one page) of the poster to be presented at the short course. Send applications in the form of an e-mail message to Harald Behrens (e-mail: h.behrens@mineralogie.uni-hannover.de) until **July 20, 2011**. The choice of participants of the summer school will be made on the basis of the submitted application and abstract. Once you are accepted for the workshop, you may then register for the short course and the workshops. It is emphasized that students can participate in the short course also without the extension to summer school, i.e. without of participation in the practical workshop.