EMAS 2014

11th EMAS Regional Workshop on

ELECTRON PROBE MICROANALYSIS OF MATERIALS TODAY - PRACTICAL ASPECTS

including a session on

Rare and noble elements: from ore deposits to high-tech materials

21 - 24 September 2014
Leoben, Austria

ANNOUNCEMENT AND PROVISIONAL PROGRAMME

Organised in collaboration with:

Montan Universität Leoben
UCAG - University Centre for Applied Geosciences
1. AIMS AND SCOPE

The EMAS Regional Workshops are biennial events designed to provide postgraduate-level and research workers in materials science, material engineering and related subjects, with basic knowledge of the capabilities and limitations of electron probe X-ray microanalysis. The workshops are organised as low budget meetings with lectures on practical and theoretical aspects of EPMA given by internationally recognised experts. The format and content of the meetings are tailored to the needs of the practical microanalyst routinely dealing with problems of instrumental procedures, specimen preparation, data collection and quantification, as well as those of research workers keen to obtain a deeper understanding of the physics underlying X-ray production, measurement and analysis.

Past EMAS Regional Workshops were held in Finland (1994), Hungary (1996), Spain (1998), the Czech Republic (2000), Poland (2002), Slovenia (2004), Germany (2006), Italy (2008), The Netherlands (2010), and Italy (2012).

The core topics of the 11th EMAS Regional Workshop are:

- Electron beam - specimen interactions
- X-ray spectroscopy (WDS and EDS)
- Light element analysis
- Quantitative electron probe microanalysis
- X-ray microanalysis in the (S)TEM
- Basic electron energy loss spectroscopy (EELS) in the TEM
- Sample preparation
- Electron backscatter diffraction (EBSD)

UCAG - the University Centre for Applied Geosciences is a consortium of three universities: Montan Universität Leoben, the Karl Franzes University Graz, and the Graz University of Technology. Thanks to this consortium, a Superprobe JEOL JXA 8200 was installed at the Leoben University in the Eugen F. Stumpfl laboratory in 2007.

Because the University of Leoben has an on-going interest in ore deposits, materials sciences, materials physics, metallurgy and ceramics, a special session entitled “rare and noble elements: from ore deposits to high-tech material” will be organized including two technical sessions dedicated to this subject.
Topics covered in these two sessions will include:

*Session on mineralogy / geochemistry of ore deposits:*
- Introduction to MLA
- Occurrence of rare and noble elements in sulphides
- Application of combined µ-Raman and EPMA to identify rare minerals
- Gold mineralogy
- Quantification in LA-ICPMS for trace element PGE’s

*Session on applications to high-tech materials:*
- Trace element analysis by means of EPMA of ceramics
- Analysis of refractory materials
- Analysis of PGE-based catalysts
- Analysis of zirconolite
- Copper and noble metals in medicine

# 2. SCIENTIFIC PROGRAMME

The programme will consist of invited lectures delivered by renowned experts, and two poster sessions. Three round-table discussions will also be held during the workshop. The invited lectures and poster abstracts will be published in the Workshop *Book of Tutorials and Abstracts*. The official language of the workshop will be English.

**Preliminary programme**

**Sunday 21 September 2014**

13h30  Optional field trip to the Eisenerz, one of the biggest iron ore mines in Europe. Departure: in front of the University main building.
Field trip leader: Oskar Thalhammer

17h00  Registration

18h00  Welcome reception

**Monday 22 September 2014**

08h00  Registration

09h00  **Welcome and Opening Addresses**

- Wilfried Eichlseder, Rector of the Montan Universität Leoben, Austria
- Federica Zaccarini, Montan Universität Leoben, Department of Applied Geosciences and Geophysics, Leoben, Austria
- Michael B. Matthews, EMAS President
### Session I

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenter/Location</th>
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<tbody>
<tr>
<td>09h30</td>
<td>Introduction to EPMA and SEM, Hans Dijkstra, Thermo Fisher Scientific BV, Breda, The Netherlands</td>
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<tr>
<td>10h10</td>
<td>Coffee</td>
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<tr>
<td>10h40</td>
<td>Sample preparation for EPMA (generic), Silvia Richter, R.W.T.H., Gemeinschaftslabor für Elektronenmikroskopie (GFE), Aachen, Germany</td>
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<tr>
<td>11h20</td>
<td>Performance characteristics of EDS detectors, Michael B. Matthews, AWE Plc., Aldermaston, Great Britain</td>
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<tr>
<td>12h00</td>
<td>Lunch</td>
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### Session II

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<tr>
<td>13h30</td>
<td>Performance characteristics of WDS detectors, Michael B. Matthews, AWE Plc., Aldermaston, Great Britain</td>
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<tr>
<td>14h10</td>
<td>Light element analysis, Hans Dijkstra, Thermo Fisher Scientific BV, Breda, The Netherlands</td>
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<td>14h50</td>
<td>Quantification in EPMA, Xavier Llovet, University of Barcelona, Centres Científics i Tecnològics (CCiT), Barcelona, Spain</td>
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<td>15h30</td>
<td>Refreshment break / Poster Session I</td>
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<td>16h00</td>
<td>Introduction to EBSD, François Brisset, Université Paris-Sud, Institut de Chimie Moléculaire et des Matériaux d’Orsay, Orsay, France</td>
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<tr>
<td>16h40</td>
<td>Introduction to (S)TEM and electron diffraction in the TEM, János L. Lábár, Hungarian Academy of Sciences, Research Institute for Technical Physics &amp; Materials Science, Budapest, Hungary</td>
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<tr>
<td>17h20</td>
<td>X-ray microanalysis and electron energy loss spectroscopy (EELS) in the TEM, János L. Lábár, Hungarian Academy of Sciences, Research Institute for Technical Physics &amp; Materials Science, Budapest, Hungary</td>
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<tr>
<td>18h00</td>
<td>Round-table discussion: EPMA - EDS/WDS - Light element analysis - quantification - EBSD - (S)TEM - EELS</td>
<td>Moderator: Romano Rinaldi, Università di Perugia, Dipartimento di Scienze della Terra, Perugia, Italy</td>
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<tr>
<td>18h30</td>
<td>End of session</td>
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Tuesday 23 September 2014

Session III

09h00  Introduction to MLA, Veronika Králová, Tescan, a.s., Brno, Czech Republic

09h30  Electron microprobe analysis, platinum-group minerals, interpretation and application to the Freetown Intrusion, Sierra Leone, John F.W. Bowles, University of Manchester, School of Earth, Atmospheric and Environmental Sciences, Manchester, Great Britain

10h00  Coffee

10h30  Rare elements in sulphides from the Iberian Pyrite Belt, Fernanda Guimarães, Laboratório Nacional de Energia e Geologia, I.P., Laboratório Ciência e Tecnologia Mineral, S. Mamede de Infesta, Portugal

11h00  Application of combined μ-Raman and EPMA to identify platinum group minerals, Ronald J. Bakker, Montan Universität Leoben, Department of Applied Geosciences and Geophysics, Leoben, Austria

11h30  Mineralogy of gold, Oskar Thalhammer, Montan Universität Leoben, Department of Applied Geosciences and Geophysics, Leoben, Austria

12h00  Lunch

13h30  Commercial: 6 x 15min. presentations (EDAX, Thermo Fisher Scientific, Bruker Nano and Cameca, have already confirmed their participation)

15h00  Refreshment break / Poster Session II

15h30  In-situ quantitative determination of PGE concentrations in komatiitic chromites: application to nickel-sulphide targeting, Marco Fiorentini, The University of Western Australia, School of Earth and Environment, Crawley, WA, Australia

16h00  Round-table discussion: Mineralogical / geochemical application of electron probe microanalysis
          Moderator: Federica Zaccarini, Montan Universität Leoben, Department of Applied Geosciences and Geophysics, Leoben, Austria

18h15  Departure for guided city tour followed by workshop dinner at the Arkadenhof
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Presenter/Institution</th>
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<tbody>
<tr>
<td>09h00</td>
<td>Microanalysis on functional ceramics: complementary investigation techniques on ZnO-based varistor ceramics</td>
<td>Peter Supancic, Montan Universität Leoben, Institut für Struktur- und Funktionskeramik, Leoben, Austria</td>
</tr>
<tr>
<td>09h30</td>
<td>Quantitative EPMA of ((1-x)\text{Pb(Mg}<em>{1/3}\text{Nb}</em>{2/3})\text{O}_3 \times x\text{PbTiO}_3) (PMNT) ferroelectric ceramics</td>
<td>Zoran Samardžija, Jožef Stefan Institute, Department for Nanostructured Materials, Ljubljana, Slovenia</td>
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<tr>
<td>10h00</td>
<td>Coffee</td>
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<tr>
<td>10h30</td>
<td>Microanalysis on coarse ceramics: application of microprobe analysis in combination with EBSD and Raman spectroscopy on refractory material</td>
<td>Christoph Bauer, RHI AG, Technology Centre, Leoben, Austria</td>
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<tr>
<td>11h00</td>
<td>Occurrence and chemical composition of zirconolite ((\text{CaTiZrO}_n))</td>
<td>Reto Gieré, Albert-Ludwigs Universität, Institut für Geowissenschaften, Freiburg, Germany</td>
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<tr>
<td>11h30</td>
<td>Analysis of PGE-based catalysts, Gareth D. Hatton, Johnson Matthey Technology Centre, Reading, Great Britain</td>
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<tr>
<td>12h00</td>
<td>Copper and noble metals in medicine: application, diseases and occurrence in the human body, Reinhard Moser, LKH - Hospital of Leoben, Austria</td>
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<tr>
<td>12h30</td>
<td>Round-table discussion: High-tech materials application of electron probe microanalysis</td>
<td>Moderator: Miran Čeh, Jožef Stefan Institute, Department for Nanostructured Materials, Ljubljana, Slovenia</td>
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<tr>
<td>13h15</td>
<td>Closing ceremony</td>
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Posters presentations

All participants to the workshop are invited to make a poster presentation. Abstracts must be submitted electronically to the workshop secretariat at the address given below before 1 June 2014. The International Scientific Committee will review all submitted abstracts. Authors will be notified of the acceptance of their poster(s) by 30 June 2014.

Abstract format

Abstract format: One camera-ready A4 page (3 cm all-round margins, no indents, 12-point font size, single line spacing) containing:

TITLE OF ABSTRACT
N. Ames, O.F. Authors
Affiliations
(free line)
Text of abstract without figures, photographs or tables.

Abstracts should be sent in Word or WordPerfect or Rich Text Format (RTF) by e-mail to the workshop secretariat with an accompanying electronic version of a passport-style photograph of the presenting author (in either tiff- or jpeg-format; 300 dpi resolution at a size of approx. 5 cm high by 4 cm wide). The photograph will be reproduced in the Book of Tutorials and Abstracts to assist other participants to contact the author during the Workshop.

Proceedings

Authors of contributions related to the topic of the workshop’s special session are invited to submit a manuscript for publication in an issue of the journal Microscopy and Microanalysis, to appear some months after the Workshop. All submitted papers will be peer-reviewed. Manuscripts will have to be submitted using the journal’s on-line submission procedure.

EMAS grants and support for participants

Some EMAS grants are available to undergraduate and Ph.D. students, young scientists (< 30 years of age) and technicians. Applicants need to be (student) members of EMAS. Applications should be made to the workshop secretariat as soon as possible, and not later than 1 June 2014, enclosing a copy of their student ID if applicable, and a letter of recommendation from their supervisor. Grant recipients are required to present a poster (the abstract should be included with the application). Included in the EMAS grant is a free registration and a maximum of 3 nights hotel accommodation in a shared twin room assigned by the workshop organizers. Grant recipients will have to submit a duly completed registration form by the early registration deadline of September 1st, 2014.
3. REGISTRATION

Participants are requested to complete and return the attached registration form to the workshop secretariat as soon as possible, preferably before 1 September 2014.

Workshop registration fees

<table>
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<tr>
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<th>Early registration (before 1 September)</th>
<th>Late registration (after 1 September)</th>
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<tbody>
<tr>
<td>EMAS member</td>
<td>€ 350</td>
<td>€ 400</td>
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<tr>
<td>Non-member</td>
<td>€ 400</td>
<td>€ 450</td>
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<tr>
<td>Student (ID required)</td>
<td>€ 175</td>
<td>€ 200</td>
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<tr>
<td>EMAS grant</td>
<td>free</td>
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<tr>
<td>Accompanying person</td>
<td>€ 125</td>
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<tr>
<td>1-day ticket</td>
<td>€ 150</td>
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The registration fee for respectively EMAS members, non-members, students and EMAS Grant recipients, includes a copy of the workshop’s *Book of Tutorials and Abstracts* (invited lectures manuscripts and poster abstracts), two lunches, and coffee/refreshment breaks during the workshop, the welcome reception (Sunday 21 September), and the workshop dinner (Tuesday 23 September).

The accompanying person fee includes all lunches and coffee/refreshment breaks during the workshop, the welcome reception (Sunday 21 September), and the workshop dinner (Tuesday 23 September).

The 1-day ticket includes a copy of the workshop’s *Book of Tutorials and Abstracts*, lunch and the coffee/refreshment breaks on the day of attendance.

Payment

Payment of the registration fee, without charges to the beneficiary, should be made to the European Microbeam Analysis Society. Payment can be made by:

a) bank transfer to EMAS 2014 IBAN account no. BE72 9530 3981 3516, BIC/Swift code: CTBKBEBX, at the Beobank (Statielei 95, BE-2640 Mortsel, Belgium);

b) a bank cheque in Euro, drawn on a Belgian bank, to the order of EMAS 2014 (attn. Luc Van’t dack) and mailed to the workshop secretariat;

c) credit cards: Visa, Mastercard, American Express (please complete and sign the relevant part on the registration form).
Cancellation policy

A refund of the registration fee (less € 50 administration costs) will be granted only if notification of cancellation is given to the workshop secretariat before 1 September 2014. After this date no refund will be made. Refunds will be processed after the Workshop.

Personal data

Personal information supplied to EMAS will be held on computer and will be used only for purposes connected with the activities of the European Microbeam Analysis Society.

Insurance

The organisers cannot be held responsible for any personal accident or damage to the property of the participants.

Hotel accommodation

Hotel accommodation is widely available in Leoben. However, it is recommended that hotel bookings are made as soon as possible. Some possibilities are:
- Falkensteiner Hotel and Asia Spa Leoben (4-star): In der Au 1, 8700 Leoben (distance to the workshop: about 500 meters)
  URL: www.falkensteiner.com/de/hotel/leoben
- Hotel Kongress (4-star): Hauptplatz 1, 8700 Leoben (distance to the workshop: about 300 meters)
  URL: www.hotelkongress.at
- Hotel Kindler (3-star): Straussgasse 7-11, 8700 Leoben (distance to the workshop: about 300 meters)
  URL: www.kindler.at
- Gasthof zum Greif: Waassenstrasse 5, 8700 Leoben (distance to the workshop: about 500 meters)
  URL: www.zum-greif.at
- Gasthof Altmann (2-star): Südbahnstrasse 32, 8700 Leoben (distance to the workshop: about 700 meters)
  URL: www.members.aon.at/gasthof-altmann/index.htm
4. LOCATION

The workshop will be held at the University of Leoben’s lecture hall building, Franz Jozef Strasse, Leoben.

How to get to Leoben …

- **By air:** Vienna or Graz international airports.
- **By train:** The distance from Vienna Airport (Schwechat) to Leoben is 171 km (3 hours by train); the distance from Graz Airport (Feldkirchen) to Leoben is 71 km (1 hour by train). Train connections can be consulted on the following website: URL: www.oebb.at/en/index.jsp.
- **By car:** Leoben can be easily reached by car; free parking places will be available at the University (from Monday to Thursday). In case of need, please contact us: federica.zaccarini@unileoben.ac.at.
Sightseeing

After having explored the city of Leoben, you can also visit its immediate surroundings.
Tourist Information: Peter-Tunner Strasse 2, 8700 Leoben
tel: +43-(0)3842-48.148, fax: +43-(0)3842-481.48.13
e-mail: office@tourismus-leoben.at
URL: www.tourismus-leoben.at

About the Department of Applied Geosciences and Geophysics, Montan Universität Leoben

The Department of Applied Geosciences and Geophysics consists of the following chairs: 1) Applied Geophysics, 2) Petroleum Geology, 3) Geology and Economic Geology, and 4) Resource Mineralogy. The department hosts the Eugen F. Stumpfl electron microprobe laboratory. The laboratory is equipped with a Superprobe JEOL JXA 8200 purchased in 2007 and was officially opened November 22, 2007. The instrument belongs to the UCAG consortium that comprises the following three Austrian universities: University of Leoben, Karl Franzes University of Graz, and Graz University of Technology.

For more information see the department’s websites:
URL: www.unileoben.ac.at/content/view/18/388/lang,en/
URL: www.unileoben.ac.at/content/view/578/1225/lang,de/

5. KEY DATES

1 June 2014 deadline for submission of abstracts for poster presentations
1 June 2014 deadline for applications for grants and financial support
30 June 2014 notification of acceptance of poster contributions
30 June 2014 notification of decisions on grants and financial support
1 September 2014 early registration deadline
21-24 September 2014 EMAS 2014 Workshop, Leoben, Austria
### 6. WORKSHOP COMMITTEES, SECRETARIAT, WEBSITE

#### International Scientific Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Country</th>
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<tbody>
<tr>
<td>François Brisset</td>
<td>FR</td>
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<tr>
<td>Hans Dijkstra</td>
<td>NL</td>
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<td>János L. Lábár</td>
<td>HU</td>
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<td>Xavier Llovet</td>
<td>ES</td>
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<tr>
<td>Michael B. Matthews</td>
<td>UK</td>
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<tr>
<td>Silvia Richter</td>
<td>DE</td>
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<tr>
<td>Romano Rinaldi (Chairperson)</td>
<td>IT</td>
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<tr>
<td>Oskar Thalhammer</td>
<td>AT</td>
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<td>Federica Zaccarini</td>
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#### Local Organising Committee

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<tr>
<td>Judith Bergthaler</td>
<td>AT</td>
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<tr>
<td>Martin Dietzel</td>
<td>AT</td>
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<tr>
<td>Georg Hoinkes</td>
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<td>Helmut Muhlans</td>
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<td>Luc Van’t dack</td>
<td>BE</td>
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<tr>
<td>Federica Zaccarini (Chairperson)</td>
<td>AT</td>
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#### Workshop Secretariat

European Microbeam Analysis Society (EMAS)  
c/o University of Antwerp  
Department of Chemistry, Research group PLASMANT  
Mr. Luc Van’t dack  
Campus Drie Eiken, Universiteitsplein 1  
BE-2610 Antwerp-Wilrijk, Belgium  
tel: +32-3-265.23.43, fax: +32-3-265.23.43  
e-mail: luc.vantdack@uantwerpen.be  
URL: http://www.emas-web.net/

This Workshop is sponsored by: