European
Microbeam Analysis Society

EMAS 2018

13th EMAS Regional Workshop

MICROBEAM ANALYSIS IN THE EARTH SCIENCES

4 - 7 September 2018

University of Bristol, Wills Hall, Bristol, Great Britain

ANNOUNCEMENT AND PROVISIONAL PROGRAMME

Organised in collaboration with:
Mineralogical Society of Great Britain and Ireland
and
University of Bristol

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 microbeam analysis. The 2018 meeting will focus on the specific requirements of microbeam analysis as utilised by the Earth Science community. The meeting is organised in collaboration with the Mineralogical Society of Great Britain and Ireland who presented the workshop “Microbeam Techniques in Geosciences” at Imperial College, London in 1998. Here we revisit the subject to look at the range of techniques now available and the technological advances made in the intervening two decades.

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), Italy (2012), Austria (2014), and France (2016).

The core topics of the 13th EMAS Regional Workshop are:

- Scanning electron microscopy (SEM) – Imaging and X-ray microanalysis
- Electron probe microanalysis (EPMA)
- Cathodoluminescence (CL)
- Electron backscatter diffraction (EBSD)
- Transmission electron microscopy (TEM)
- Laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS)
- Secondary ion mass spectrometry (SIMS)
- NanoSIMS
- Synchrotron-based microanalysis (XANES, XRF)
- Sample preparation and ion beam preparation including focussed ion beam (FIB)
- Raman spectroscopy
- Fourier-transform infra-red spectroscopy (FT-IR)
- Micro-computed tomography (MicroCT)
- Atom probe tomography (APT)

A technical tutorial by analytical experts on each of the subject areas will consider the essential purpose and limitations of the technique and outline the recent advances. Applications talks by renowned Earth Scientists will then describe how individual and combined techniques are applied to a range of Earth Science research fields such as:

- *Volcanology*
- *Palaeobiology*
- *Petrology*
- *High pressure experimental petrology*
- *Geochemistry – high and low temperature*
- *Isotope geochemistry*
- *Cosmochemistry*

2. SCIENTIFIC PROGRAMME

The programme will consist of technical tutorials given by analytical experts and invited lectures delivered by renowned Earth Science researchers, three sessions of contributed talks and two poster sessions. 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

Tuesday 4 September 2018

17h00 Registration (at Wills Hall, Parry's Lane, Stoke Bishop, Bristol)

18h00 Welcome buffet

Wednesday 5 September 2018

08h00 Registration

08h45 **Welcome and Opening Addresses**
- *Kevin Murphy*, Mineralogical Society of Great Britain and Ireland
- *Stuart L. Kearns*, University of Bristol
- *Michael B. Matthews*, EMAS President

Session I

09h00 **Macro-micro-nanoscale SEM/EDS of earth and planetary materials**, *Tobias SALGE*, Natural History Museum, Core Research Laboratories, London, Great Britain

09h30 **The application of novel SEM imaging techniques to the study of rare fossils**, *Patrick J. ORR*, University College Dublin, School of Earth Sciences, Dublin, Ireland

10h00 **SEM element mapping: strengths, limitations and applications to petrography of volcanic rock**, *Duncan MUIR*, University College of Wales, School of Earth and Ocean Sciences, Cardiff, Great Britain

10h30 Refreshment break

11h00 **EPMA in the Earth Sciences**, *Richard D. WALSHAW*, University of Leeds, School of Earth and Environment, Leeds Great Britain

11h30 **Analysing silicate melt inclusions**, *Ery C. HUGHES*, University of Bristol, School of Earth Sciences, Bristol, Great Britain

12h00 **EPMA and cosmochemistry: trace element analysis of refractory olivine**, *Timothy GREGORY*, University of Bristol, School of Earth Sciences, Bristol, Great Britain

12h30 Lunch

Session II

13h30 **Transmission electron microscopy: mineralogy at the nanoscale**, *Martin R. LEE*, University of Glasgow, Department of Geographical and Earth Sciences, Glasgow, Great Britain

14h00 Contributed talk - **The effect of X-ray energy overlaps on the results of chevkinite (Ce, La, Ca, Th)$_4$(Fe^{2+}, Mg)$_2$(Ti, Fe^{3+})$_3$Si$_4$O$_{22}$ microanalysis using SEM EDS-WDS**, *Alicja M. LACINSKA*, British Geological Survey, Environmental Science Centre, Keyworth, Great Britain

14h15 Contributed talk - **Accuracy of semi-analytical calculations of secondary fluorescence across phase boundaries in electron probe microanalysis**, *Xavier LLOVET*, Universitat de Barcelona, Centres Científics i Tecnològics (CCiTUB), Barcelona, Spain

14h30 Contributed talk - **An empirical comparison of stoichiometrically calculated values of H, Li, Be, B and O, obtained by EPMA with determined values of Li, Be and B obtained by LA-ICPMS from a suite of minerals from the collection of the Natural History Museum, London**, *John SPRATT*, Natural History Museum, Core Research Laboratories, London, Great Britain

14h45 Contributed talk - **Application of automated mineralogy and EPMA for the quantification of metasomatic processes: case study of secondary scandium minerals from pegmatite**, *Jakub VÝRAVSKÝ*, TESCAN Brno s.r.o, Brno, Czech Republic

15h00 Refreshment break

15h30 **Cathodoluminescence in SEM and EPMA – applications in geology and material sciences**, *B. Matat JABLON*, University of Strathclyde, Department of Physics, Semiconductor Spectroscopy & Devices, Glasgow, Great Britain

16h00 **High-angular resolution electron backscatter diffraction as a new tool for mapping lattice distortion in geological materials**, *David WALLIS*, University of Oxford, Department of Earth Sciences, Oxford, Great Britain

16h30 Oral poster presentations I

17h00 Poster session I

18h00 End of session

Thursday 6 September 2018

Session III

08h30 **Isotopic imaging of minerals with NanoSIMS**, *Matt KILBURN*, University of Western Australia, Centre for Microscopy, Characterisation and Analysis (CMCA), Crawley, WA, Australia

09h00 **SIMS of synthetic and biological carbonates**, *Nicola ALLISON*, University of St. Andrews, School of Earth and Environmental Sciences, St. Andrews, Great Britain

09h30 **Application of secondary ion mass spectrometry (SIMS) to the study of volatile behaviour and global volatile cycles**, *Cees-Jan DE HOOG*, University of Edinburgh, School of Geosciences, Edinburgh, Great Britain

10h00 Refreshment break

10h30 **Laser ablation ICP-MS – From craters to calculations**, *Ashley NORRIS*, University of Oxford, Department of Earth Sciences, Oxford, Great Britain

11h00 **A multi-technique for determining sulphur concentration and speciation in silicate glasses**, *Duane SMYTHE*, University of Oxford, Department of Earth Sciences, Oxford, Great Britain

11h30 **Pb and Sr isotopes in mineral inclusions to unravel crustal evolution processes: a comparison between LA-MC-ICP-MS and SIMS techniques**, *Bruno DHUIME*, Université Montpellier 2, Géosciences Montpellier, Montpellier, France

12h00 **Synchrotron µ-X-ray absorption spectroscopy in the Earth Sciences**, *Tina GERAKI*, Diamond Light Source Ltd., Didcot, Great Britain

12h30 **Determining the redox state of iron in silicate glasses using XANES**, *Andrew MATZEN*, University of Oxford, Department of Earth Sciences, Oxford, Great Britain

13h00 Lunch

Session IV

14h00 **X-ray tomography analysis and applications of µ-CT techniques for 3D visualisation in palaeobiology**, *Tom DAVIES*, University of Bristol, School of Earth Sciences, Bristol, Great Britain

14h30 Contributed talk - **Seawater chloride and bromide distribution and structural state within aragonite and calcite marine bivalve mollusc shells: Exploring a potential palaeosalinity proxy**, *Leon J. CLARKE*, Manchester Metropolitan University, School of Science and the Environment, Manchester, Great Britain

14h45 Contributed talk - **Characterising shock deformation of the Martian crust by electron backscatter diffraction analysis of the nakhlite meteorites Governador Valadares and NWA 998**, *Sammy GRIFFIN*, University of Glasgow, Department of Geographical and Earth Sciences, Glasgow, Great Britain

15h00 Contributed talk - **Optimisation and implementation of a new LA-ICP-MS setup: Reconstructing Miocene sea surface temperature using Mn-rich foraminifera**, *Michael G. NAIRN*, Cardiff University, School of Earth and Ocean Sciences, Cardiff, Great Britain

15h15 Contributed talk - **Application of X-ray photoelectron spectroscopy in the Earth Sciences**, *Martin SMITH*, University of Brighton, School of Environment and Technology, Brighton, Great Britain

15h30 Contributed talk - **Insights into magma storage and edifice instability from Kilauean crystal clots: An integrated geochemical and crystallographic approach**, *Penny WIESER*, University of Cambridge, Department of Earth Sciences, Cambridge, Great Britain

15h45 Oral poster presentations II

16h15 Poster session II

17h15 End of session

19h00 Workshop dinner at the Bristol Museum of Art & Gallery (Queens Road, Bristol)

Friday 7 September 2018

Session V

08h45 **Chemical and ultrastructural characterisation of pigmented soft tissues in fossil vertebrates and insects**, *Maria MCNAMARA*, University College Cork, School of Biological, Earth & Environmental Sciences, Cork, Ireland

09h15 Contributed talk - **Quantitative joint analysis of backscattered electron and cathodoluminescence images of natural zircons**, *Dmitry A. ZAMYATIN*, Zavaritsky Institute of Geology and Geochemistry, Laboratory of Physical and Chemical Research Methods, Yekaterinburg, Russia

09h30 Contributed talk - **Extracting mineralogical and textural data through multi-scale and multi-dimensional imaging techniques**, *Glacialle TIU*, Luleå University of Technology, Civil, Environmental and Natural Resources Engineering/Ore Geology, Luleå, Sweden

09h45 Contributed talk - **Estimating sub-surface biological activity through the abundance of superparamagnetic grains in a continental ophiolite complex: A multiscale correlative study**, *Joshua F. EINSLE*, University of Cambridge, Department of Earth Sciences, Cambridge, Great Britain

10h00 Refreshment break

Session VI

10h30 **The use of micro-ATR (FTIR) and Raman spectroscopy to measure volatiles in silicate glasses**, *Richard BROOKER*, University of Bristol, School of Earth Sciences, Bristol, Great Britain

11h00 **Atom probe tomography: providing new insights into geological materials**, *Paul BAGOT*, University of Oxford, Department of Materials, Oxford, Great Britain

11h30 **Preparation of Earth Science materials for microbeam analysis**, *Jon WADE*, University of Oxford, Department of Earth Sciences, Oxford, Great Britain

12h00 Lunch

Session VII

13h00 **A forward look in applications of high-spatial resolution LA-ICP-MS U Th Pb geochronology**, *Matthew HORSTWOOD*, British Geological Survey, Geochronology and Tracers Facility, Keyworth, Great Britain

13h30 **New frontiers in isotope ratio measurement using collision cell, multi collector plasma mass-spectrometry**, *Tim ELLIOTT*, University of Bristol, School of Earth Sciences, Bristol, Great Britain

14h00 **Quantitative chemical analysis of diamond anvil cell experiments and other tiny samples**, *Eleonor JENNINGS*, University of Bayreuth, Bayerisches Geoinstitut, Bayreuth, Germany

14h30 **High spatial resolution analysis of chemical zoning in volcanic crystals**, *Jon BLUNDY*, University of Bristol, School of Earth Sciences, Bristol, Great Britain

15h00 **Closing ceremony**

Contributed talks and posters presentations

All participants to the workshop are invited to present their work in the form of either a poster or a contributed talk. Abstracts to be presented during the workshop must fit no more than two A4 pages, using the Word-template available on the EMAS website (www.microbeamanalysis.eu/abstract-submission). Detailed guidelines are mentioned on the template. Online submission details are given on the workshop webpage.

Those presentations selected for contributed talks will have a 15-minute platform presentation. A further 12 posters will be selected for a lightning '3-minute' platform presentation in two dedicated sessions.

Late poster abstract submission deadline is August 15th.

Poster and contributed talk prizes

A jury will decide on two prizes: One awarded by EMAS for the best poster contribution and the second by MinSoc for the best contributed talk.

EMAS Bursaries

A number of EMAS bursaries are available to **student members** of the Society. They include a free "student" registration and 3 nights free accommodation package for the duration of the Workshop at Wills Hall assigned by the Workshop. The conditions for the award of an EMAS bursary are as follows:

- the applicant must submit an abstract for an oral or poster contribution;
- the applicant must be a student member of EMAS;
- a letter from the applicant's supervisor supporting the application must accompany the application (see further).

A number of EMAS bursaries are available to **technician members** of the Society. They include a free "student" registration and 3 nights free accommodation package for the duration of the Workshop at Wills Hall assigned by the Workshop. The conditions for the award of an EMAS bursary are as follows:

- the applicant must submit an abstract for an oral or poster contribution;
- the applicant must be a member of EMAS and <30 years of age at the time of application;
- a letter from the applicant's supervisor/manager supporting the application must accompany the application (see further).

The quality and relevance of the work presented in the abstract are the main criteria on which successful applications will be judged. Previous bursary awardees may apply; however, a maximum of 2 bursaries per person is imposed.

Bursary applications must be sent to the Workshop Secretariat referring to the relevant poster contribution abstract, reaching it before 15 May 2018. Applicants will be notified of the allocation of an EMAS bursary by 15 June 2018.

Mineralogical Society Bursaries

The MinSoc is also making bursaries available. They include a free "student" registration and 3 nights free accommodation package for the duration of the Workshop at Wills Hall assigned by the Workshop, valued at £ 350 each.

As for the EMAS bursaries above, those applying for the MinSoc Bursaries should note the following:

- the applicant must submit an abstract for a poster contribution;
- the applicant must be a member of the MinSoc and <30 years of age at the time of application;
- a letter from the applicant's supervisor/manager supporting the application must accompany the application (see further).

The quality and relevance of the work presented in the abstract are the main criteria on which successful applications will be judged.

Bursary applications must be sent to the Workshop Secretariat referring to the relevant poster contribution abstract, reaching it before 15 May 2018. Applicants will be notified of the allocation of a MinSoc bursary by 15 June 2018.

3. REGISTRATION

Online registration is available on the EMAS website (www.microbeamanalysis.eu/workshop-registration). Participants are encouraged to complete registration and arrange for their payment, preferably by 30 June 2018 to qualify for reduced rates. Please note there is a limit to the total number of registrations so participants are encouraged to register early.

Workshop registration fees

The registration fee for respectively EMAS & MinSoc members, non members, students and EMAS Bursary recipients, includes:

- A PDF copy of the workshop's Book of Tutorials and Abstracts (extended abstracts of the invited lecturers and abstracts of the oral and poster contributions).
- Three lunches (Wednesday to Friday).
- Refreshment breaks during the workshop.
- The welcome buffet (Tuesday 4 September).
- The workshop dinner (Thursday 6 September.
- Accommodation for 3 nights (4-7 September) in an en-suite room at Wills Hall including breakfast. In case of non-resident, a discount of £ 90 applies on all rates.

	Early registration (by 30 June)	**Late registration** (as of 1 July)	**Non-resident discount**
Student (ID required)	£ 350	£ 400	-£ 90
EMAS / MinSoc member	£ 500	£ 550	-£ 90
Non-member	£ 600	£ 650	-£ 90
EMAS / MinSoc Bursary	free		n/a
Extra workshop dinner ticket	£ 55		

Payment

Payment of the registration fee should be preferentially made through the EMAS website (www.microbeamanalysis.eu) using the online PayPal system (no account necessary); no credit card information will be stored on the EMAS website; various payment options are available (e.g., credit cards) depending on your country. An invoice/receipt will be generated by the system.

Alternatively, if you prefer to pay by bank transfer or any other offline payment method, please choose the "pay offline" button and follow the instructions; this will generate your invoice, which includes bank transfer and contact details.

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 01 August 2018. After this date no refund will be made. Refunds will be processed after the Workshop.

Insurance

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

Personal data

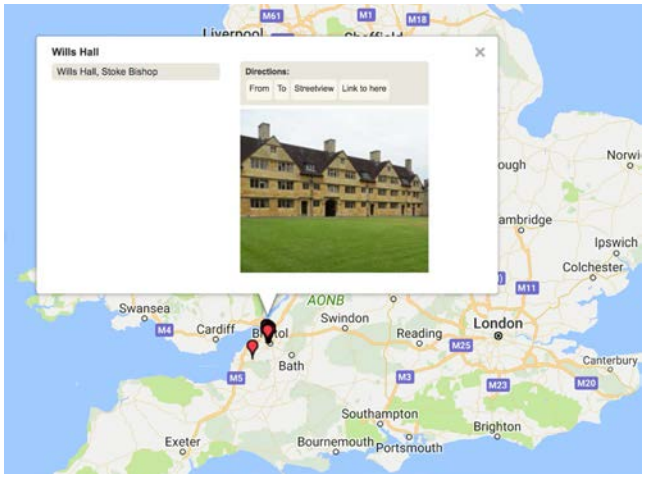
Personal information supplied to EMAS will be held on computer and will be used only for purposes connected with the activities of the European Microbeam Analysis Society.

Hotel accommodation

Wills Hall offers en-suite rooms on a bed and breakfast basis. Other hotels in Bristol can be accessed via normal booking and travel agent services.

4. LOCATION

The workshop will be held at Wills Hall, Parry's Lane, University of Bristol, UK.



Bristol is the largest city in the South West of England and was recently named the "Best place to live in the UK", 2017 (The Sunday Times). Famed for its engineering and naval history, hot air balloons and modern gritty graffiti. It is 90 minutes from London by train and has its own international airport.

How to get to Bristol

- By air

Bristol Airport is eight miles (13 km) south of the city and has scheduled flights to many UK and European cities. To get to the University from Bristol Airport:

- The Airport Flyer Express bus (service A1) runs approximately every ten minutes at peak times between the airport and Bristol Bus and Coach Station near the University campus.
- Checker Cars offer taxis from Bristol Airport. The journey should take around 30 minutes.
- Further travel information is available from the Bristol Airport website.
  Also rail services will connect to both London Heathrow and London Gatwick airports.

- By train

Bristol has two mainline train stations. Visitors should travel to Bristol Temple Meads as it is closer than Bristol Parkway. To get to Wills Hall from Bristol Temple Meads:

- The no. 3 bus will connect from city centre bus station to Parry's Lane.
- Taxis are available from the exit to the station. The journey should take about 25 minutes.

Find out more about rail services via National Rail Enquiries.

- By coach

Coaches from a range of UK cities arrive and depart from Bristol Bus and Coach Station on Marlborough Street in the centre of Bristol.
For information about coach times and fares, consult the National Express Coaches or Megabus websites.

- By car

The M4 and M5 motorways put both London and Birmingham within a two-hour drive, while the M32 allows direct access from the M4 to the heart of the city.
Directions to the University campus from the M32 (also available as a Google Map):

- Exit the M4 at junction 19 marked for the M32
- Follow the M32 southwest into Bristol
- Continue onto the A4032
- Continue straight onto Bond Street / A4044
- At St. James Barton roundabout, take the 2nd exit onto Marlborough Street / B4051
- Continue to follow B4051
- Turn right at Woodland Road
- At the top of the hill is a crossroad, turn right into Tyndall Avenue
- Senate House (the University's central administration building) is the tall building on the corner.

If travelling from the South and South West, the A4, A38 and A37 provide direct access to the city centre (see Google map for A4, Bath Road).

5. KEY DATES

15 May 2018	deadline for submission of abstracts for poster presentations.
15 May 2018	deadline for applications for EMAS Bursaries.
15 June 2018	notification of acceptance of oral and poster contributions.
15 June 2018	notification of decisions on EMAS Bursary applications.
22 June 2018	deadline for submission of abstracts for poster presentations.
30 June 2018	early registration deadline.
15 August 2018	deadline for submission of late poster abstracts.
4-7 September 2018	EMAS 2018 Workshop, Bristol, Great Britain.

6. WORKSHOP COMMITTEES, SECRETARIAT, WEBSITE

International Scientific Committee

Fernanda Guimarães	PT
Stuart L. Kearns (Chair)	UK
Michael B. Matthews	UK
Kevin Murphy	IR
Peter Trelaor	UK

Local Organising Committee

Stuart L. Kearns (Chair)	UK
Michael B. Matthews	UK
Luc Van't dack	BE
Jon Wade	UK

Workshop Secretariat

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