

Institute *of* **Physics**

**Electron Microscopy and
Analysis Group**

Newsletter

December 2000

ELECTRON MICROSCOPY AND ANALYSIS GROUP

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ELECTRON MICROSCOPY AND ANALYSIS GROUP

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EMAG COMMITTEE - 2000/2001 SESSION/ contd.

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ELECTRON MICROSCOPY AND ANALYSIS GROUP

Dear EMAG Member

Since the June Newsletter there have been a number of changes in the committee membership (see below). We thank Drs Angus Wilkinson, Judith Mantell, Peter Nellist and Bill Richardson for all their efforts as committee members. We particularly thank Chris Kiely for his excellent chairpersonship of the EMAG committee and welcome Steve McVitie into the new role. Furthermore we welcome new members Drs Rik Brydson (who has taken over as Secretary/ Treasurer), Amanda Petford-Long, Simon Galloway, Rod Shipley and Martin Strangwood.

There has been lots of good news since June ! The efforts and financial backing of EMAG in securing a UK ultra-high resolution SuperSTEM user facility have been rewarded with the announcement of large scale funding for the project which firmly places the UK back at the frontiers of international microscopy. Further details are given on page 8.

A number of excellent meetings have taken place since June, which have involved the EMAG committee. The one day meeting on "Device Microscopy" at the IoP in London was sponsored by EMAG and organised by Dr Paul Brown. Two further meetings have been held in which EMAG acted as co-sponsor namely: "New Developments in FEGTEM" at Oxford and "Self-Organisation Phenomena of Nanoparticles" at Liverpool both held in July. Reports on these meetings, together with others taking place over the busy summer and autumn period appear later in the Newsletter. The committee has also been involved in the planning of several future meetings the details of which you can read about in the newsletter.

Members are reminded that EMAG bursaries are available for research students and younger postdocs (usually under 30 years of age) who wish to attend relevant conferences either in the UK or abroad. Preference will be given to those who are presenting papers and have shown that they have tried to obtain part of their funding from other suitable sources. In general, only one bursary per year can be awarded to each person. A completed application form (see the back cover of this *Newsletter*) as well as a short reference from a research supervisor confirming eligibility and suitability should be sent to the new Chairman of the Bursary Sub-Committee, Dr Paul Brown.

Dr Rik Brydson
EMAG Secretary/Treasurer

ELECTRON MICROSCOPY AND ANALYSIS GROUP

COMMITTEE ELECTIONS

Following the retirements/ resignations of Chris Kiely, Angus Wilkinson, Judith Mantell, Peter Nellist and Bill Richardson from the EMAG Committee (see June 2000 EMAG newsletter), at the EMAG AGM on Wednesday, 6 September 2000, the following new members of the committee were elected unopposed:

Rod Shipley	FEI UK Limited
Simon Galloway	Gatan/ Oxford Instruments
Amanda Petford-Long	University of Oxford
Martin Strangwood	University of Birmingham

Dr Rod Shipley began work in the Laboratory of a Midlands Iron Foundry in 1978, where he was sent on a day release scheme to West Bromwich College where he qualified to HND level in Materials Science. He had various Metallurgy based jobs in Midlands Manufacturing Companies through the 80's, finishing as the Chief Metallurgist specialising in Residual Stress Analysis on Aerospace Bearings. He joined Philips Analytical in 1991 as a Field Salesman and worked through the organisation to become X-Ray Diffraction Product Manager in 1996. In 1998 he joined FEI UK Limited (formally Philips Electron Optics) as the UK Sales Manager with total responsibility for running the UK Sales Business. As well as his commitments with EMAG, he also serves on the RMS Trade Advisory Committee.

Dr Simon Galloway studied Metallurgy and Science of Materials at Trinity College, Oxford, with first significant exposure to electron microscopy during doctorate at the Department of Materials, Oxford. Two years post doctoral research was spent at the Physics Department at Durham University, concentrating on advanced SEM, and SOM techniques. In 1996, Simon returned to Oxfordshire to work as CL product manager at Research Instruments division of Oxford Instruments. Simon continues in an expanded product management role after the transition of the EM group to GatanUK.

Dr Amanda Petford-Long is currently a Reader in Materials in the Department of Materials, University of Oxford, having held a Royal Society University Research Fellow from 1993-1999. She received her D.Phil from Oxford in 1985. Her research interests are in the relationship between microstructure and magnetic or optical properties in novel information storage materials. She is a specialist in the development and application of advanced electron microscopy techniques to the analysis of the microstructure and magnetisation reversal of thin films. She is involved in a number of collaborations with both academic and industrial partners including Hewlett Packard, Seagate Technology, IBM and Nordiko.

ELECTRON MICROSCOPY AND ANALYSIS GROUP

FORTHCOMING EMAG RELATED MEETINGS

ADVANCES IN FOCUSED ION BEAM MICROSCOPY : FIB 2001

Friday 30th March 2001

Department of Materials, Oxford University, U.K.

The EMAG group is co-sponsoring this meeting along with the RMS.

Focused ion beam (FIB) microscopy is a unique interactive tool for the *in-situ*, site-specific nanomachining and microstructural analysis of nanodevices. There is dramatic growth in FIB activity in areas such as direct device processing, micromachining for microelectromechanical systems (MEMS) devices and nanostructured materials analysis. The growth of these applications complements the more established fields of semiconductor failure analysis and microscopy. This meeting is aimed at both current and future FIB users, covering the latest exciting FIB developments in the areas of nanoprocessing and nanoanalysis, and state-of-the-art instrumental development.

Important topics will be highlighted in keynote presentations. Abstracts for both oral and poster contributions (200-250 words in length) are invited, including in the FIB technology areas of:

- Semiconductor devices and failure analysis
- Novel 3D micromachining applications and tool manufacture
- Specimen preparation methods for nanoanalysis
- Instrumentation development

FIB2001 follows on from Microscopy of Semiconducting Materials MSM XII 25-29 March 2001

For further details contact the organisers:

Dr. Beverley Inkson: beverley.inkson@materials.ox.ac.uk

Dr. Mark Blamire: mb52@cam.ac.uk

Ms Jenny Bogg: jenny@rms.org.uk <http://www.rms.org.uk>

EUROPEAN UNION OF GEOSCIENCES ELEVENTH MEETING (EUG XI)

8 - 12 April 2001.

Palais de la Musique et des Congrès, Strasbourg.

Co-sponsored by EMAG and RMS.

Symposium J5:

High Spatial Resolution Microanalysis In The Transmission Electron Microscope: Applications For The Geosciences.

The high spatial resolution available within the new generation of TEMs (particularly those with field emission sources) allows for the detailed analysis of mineral intergrowths, inclusions, oscillatory zoning, exsolution textures and grain boundaries on the scale of nanometres. Energy dispersive X-ray (EDX) analysis and electron energy loss spectroscopy (EELS) permit full elemental quantification across virtually the whole periodic table enabling the analysis of the detailed geological evolution of mineral reactions including diffusion/advection paths and rates within geological systems. Associated techniques such as EDX mapping and particularly energy filtered TEM (EFTEM) provide rapid high resolution imaging of elemental distributions. Additional benefits of EELS include the ability to determine nearest neighbour coordinations, valencies and bond lengths associated with atomic species in mineralogical samples, examples include the determination of multivalent element ratios (e.g. Fe²⁺ and Fe³⁺) to determine redox states for mineral crystallisation and the elucidation of changes in structure, bonding and composition of minerals throughout the

crust and mantle. EELS and EDX combined with Atom location by Channelling Enhanced Microanalysis (ALCHEMI) enhances the crystallographic site specificity of such information.

This symposium aims to attract users of these (and related) techniques to present the current state-of-the-art in high spatial resolution geological microanalysis. In addition to applications-based contributions, we are also interested in developmental technique-based work..

For further details contact the organisers: Rik Brydson, Geoff Lloyd & Clair Calvert (Leeds) – email: [**mtlrmdb@leeds.ac.uk**](mailto:mtlrmdb@leeds.ac.uk) or see the EUG website: [**http://eost.u-strasbg.fr/EUG**](http://eost.u-strasbg.fr/EUG)

ELECTRON MICROSCOPY AND ANALYSIS GROUP

EMAG News

SuperSTEM funded !

The SuperSTEM project – an ultra high resolution imaging and analytical scanning transmission electron microscope has been awarded £4.2 million by the Smith Committee for North West Regeneration. The project to build two new super STEMs at Daresbury Laboratories in Cheshire originated from the work of Prof Mick Brown and Dr Ondrej Krivanek on objective lens aberration correction in the STEM at the Cavendish Laboratory in Cambridge funded by the Royal Society. Following the EMAG '97 conference, under the guidance of Prof Brown, EMAG set up a working group to investigate funding opportunities. After an unsuccessful JIF bid, the current proposal includes principal investigators from the Universities of Cambridge (Prof Mick Brown and Dr Andrew Bleloch), Liverpool (Profs Chris Kiely and Peter Goodhew) and Leeds (Dr Rik Brydson), together with co-investigators from a large number of UK academic institutions and industry.

The principle of SuperSTEM is based on computer controlled aberration correction of a STEM objective lens to form a sub-Angstrom probe for simultaneous ultra high resolution high angle annular dark field (Z-contrast) imaging and atomic-column EELS analysis. The exceptional geological and environmental stability of the Daresbury site is paramount in this respect. Two machines: a user instrument and a developmental instrument are planned. SuperSTEM will operate as a UK and international user facility rivalling current STEM- and TEM-based aberration corrector projects in the US and Germany.

Following an initial meeting of the Steering Group to be held on December 7th at Daresbury Laboratories, it is planned to hold the first SuperSTEM User Workshop in association with EMAG 2001. We look forward to news and possibly the first results from this exciting project prior to the main conference in Dundee. We encourage EMAG members to attend and to learn about the quantum leap in imaging and analytical resolution which is promised by this project.

Rik Brydson
(*SuperSTEM subcommittee*)

ELECTRON MICROSCOPY AND ANALYSIS GROUP

REPORTS FROM MEETINGS

New Developments in FEGTEM, Monday 3 July 2000 Department of Materials, University of Oxford

A second 1-day meeting, 'FEGTEM II', was held at the Department of Materials in Oxford, organised by myself (Materials, Cambridge) and John Hutchison (Materials, Oxford) and sponsored jointly through the Royal Microscopical Society and EMAG. Generous sponsorship was also obtained from FEI UK and JEOL UK Ltd. There were a total of 66 registrants including 12 speakers.

As last year the theme of the meeting was to review and discuss the progress that had been made in the installation and application of the new generation of field-emission gun transmission electron microscopes (FEGTEMs). As before, the meeting started with an excellent key-note lecture, this year given by Professor Manfred Ruhle from the Max-Planck Institute at Stuttgart. He gave a broad review of what he saw as the critical problems in materials science and how FEGTEMs can be used to solve them.

Following the key-note lecture the audience heard about progress in the Life Science field with speakers from Sheffield, Imperial College and the MRC in Cambridge. Those of us who deal with relatively simple inorganic structures are often in awe at what can be achieved with seemingly noise-ridden images. The ability to resolve viral and protein structures in 3 dimensions and at such high resolution is remarkable and only now possible with the introduction of the new FEGTEMs.

The flavour then switched to the inorganic and solid state. Eight further talks from materials-based groups around the UK gave a full picture of the developments and applications taking place at the moment. Much of the research dealt with the ability of the new FEGTEMs to act as STEM instruments to yield composition line profiles and maps and high resolution spectra. Comparisons were made with energy-filtered TEM and the need for both approaches. The information in FEGTEMs at high frequencies was shown beautifully in a talk given by Jeremy Sloan on the structure of KI inside carbon nanotubes. The introduction of objective mini-lenses that allow magnetic microstructure to be examined was discussed in two of the talks and new results presented which showed the advantages of the new instruments for high resolution magnetic microscopy.

The meeting was concluded with a look to the future and the possible new generation of instruments with monochromators and aberration correctors and an echo of a warning given by Prof Ian Jones last year of the need for better sample preparation and improved vacuum in most TEMs if the advances in electron-optics are to be exploited fully.

Paul Midgley
(Co-Organiser)

Self-Organisation Phenomena of Nanoparticles Liverpool University July 10 2000

This highly successful one-day meeting was co-sponsored by EMAG, the Royal Society of Chemistry and the Institute of Nanotechnology. The 80 delegates who attended were treated to six superb invited lectures by world renowned experts in the field on nanoparticle self-assembly. The invited speakers and topics covered were;

Professor Jim Heath (UCLA): Designing exchange coupled quantum dot solids: ionic and covalent insulators, metals, and superconductors."

Professor Richard Palmer (Birmingham University): "Creation and Investigation of Nanostructured Surfaces."

Professor Stephen Mann (Bristol University): "Higher-order synthesis and self-assembly of organized nanostructures in complex fluids."

Dr. Frank Caruso (MPI of Colloids and Interfaces, Potsdam): "Nanoengineering of core-shell particles and hollow capsules."

Dr. Peter Bishop (Johnson Matthey): "Some industrial uses for gold and silver nanoparticles."

Dr. Mathias Brust (Liverpool University): "Self-organised nanostructures from gold and silver particles: template effects, controlled destabilisation and nanopatterning."

REPORTS FROM MEETINGS /contd..

The crammed programme also encompassed another five high quality contributed talks as well as a poster session which had fifteen contributions. By the end of the day the delegates were tired but buzzing with enthusiasm about the prospects for nanoparticle technology.

Chris Kiely
(*Symposium Organizer*)

Device Microscopy, Wednesday September 6th 2000 The Institute of Physics, 76 Portland Place, London.

Some 30 academics and industrialists attended this first meeting on Device Microscopy. The underlying theme was that of continued refinement of microelectronic device structures and the continued need to advance techniques for microanalytical characterisation. Thus, the primary aim of the meeting was simply to bring together research workers with an interest in the fine scale assessment of functional device structures. Accordingly, developments of beam injection and dopant profiling techniques within SEM were discussed alongside issues related to TEM sample preparation and the chemical microanalysis of devices. In particular, presentations by Paul Edwards (Durham / Strathclyde), Cordelia Sealy (Academic Press / Oxford) and Sarah Elliott (Cambridge) complemented by talks from Martin Castell (Oxford) and Mohamed El-Gomati (York) generated a lively discussion on the mechanisms of dopant contrast formation in SEM. A useful perspective on the rapid preparation of device structures for TEM assessment was given by Richard Beanland (Caswell), complemented by a couple of focused ion beam case studies given by Paul Brown (Nottingham / Cambridge). Valuable perspectives on the TEM assessment of magnetic devices (Amanda Petford-Long, Oxford), and the chemical microanalysis of photonic device structures (Nikhil Sharma, Cambridge) framed the scientific programme. Consideration of the future integration of these varied device perspectives generated a brief discussion on the determination of dopant concentration, using TEM-based techniques such as holography, to conclude the meeting. The success of any such gathering can be gauged by the efficient organisation (many thanks to Jasmina Bolfek-Radovani et al at the IOP) and the level of active discussion during the meeting and informal discussion over lunch and coffee. The feedback I obtained from delegates indicated that it had indeed been a useful day all round. My thanks to all those who attended.

Paul D Brown
(*Symposium Organizer*)

Euro Summer School, Nanoanalysis 2000, Nanoscale diagnosis in condensed matter with high energy electron beams, Cargèse, Corsica, 22nd May- 3rd June 2000

Part I

The Nanoanalysis summer school in Cargèse, Corsica was the inaugural event in a new series of schools supported by the European Commission. It was intended to introduce, explain and where possible demonstrate a wide range of analytical electron microscopy tools available with the to research students. To fit such a broad remit the lecturers and guest speakers were drawn from a wide range of specialist fields and came from all over Europe. The day was split equally between lectures and lab classes, evenings were given over to guest speakers and round table discussions. A further goal of the school was to foster communication between different research groups and the organisers thoughtfully allowed plenty of time over the excellent lunches and during free sessions for many lively discussions.

The core of the school was the morning lecture series; fundamental physics was revised (Glas), nanoanalysis technique's covered; HREM (Thibault, Van Dyck), CBED (Midgley), EDX (Titchmarsh), EELS (Colliex, Botton, Mayer, Kohl), Z-Contrast (Nellist). Approaches to computer analysis and modelling were covered (Bonnet, Lagarde, Elsässer), as well as microscope design (Kruit, Rose) and the importance of specimen preparation (Craven). Of these the most notable talks, for my research, included those of Peter Kruit, Noel Bonnet, Jochaim Mayer and Peter Nellist. Peter Kruit covered fundamentals of electron sources (Schottky vs. cold-field emssion) & aberrations as well as presenting Philips research into the use of C nanotubes as field emitters. Noel Bonnet's coverage of data processing techniques

REPORTS FROM MEETINGS /contd..

included his work on multivariate statistical analysis (MSA), of both image and spectral series, which shows great promise for unbiased removal of noise and identification of spectral components. Joachim Mayer covered the advances in EFTEM technique, and with a particular interest in the area of ESI data processing. Peter Nellist delved into the incoherent approach to high-resolution STEM imaging, using high angle annular detectors, giving a fine overview into the technique and it's strengths.

The Lab classes covered diverse topic areas and several ran in parallel restricting what could be attended; the numbers in each session were also small due to practical constraints. Marcel Tence demonstrated additions to EL/P to process spectral traces, as well as the application of Noel Bonnet's MSA routines to such datasets. Noel himself demonstrated his software for MSA processing of image series, including impressive examples of unbiased noise removal. Jo Mayer worked through his additions to Digital Micrograph (DM) for processing image series, allowing comparison with our software tools. Gerald Kothleitner also previewed Gatan's own ESI plugin to DM.

Many of the discussions and questions were themed, like the entire meeting, towards the next generation of electron microscopes in Europe. The subjects of monochromators, C_s correctors and high stability energy loss spectrometers were raised repeatedly throughout two weeks in lectures, lab classes and round tables. Different countries approaches to this issue were explained, examined closely and opinions tabled from many different standpoints.

This first Nanoanalysis summer school was a resounding success with attendance being excellent, involvement from students and lecturers outstanding and the content well balanced (not to mention the weather and beaches!). I look forward to future meeting in the series.

Matt Weyland
(sponsored by an EMAG bursary)

Euro Summer School – Nanoanalysis 2000

Read any travel guide and it will say the best time to visit Corsica is May/June. The sun is out, the olives are ripening and the tourists have not yet arrived en masse. Not a bad time for a summer school then. The venue, the Institut d'Études Scientifique (de Cargèse) is a small but idyllic complex right next to the sea and just a short stroll from the village of Cargèse. This region of Corsica is fantastic, azure seas with golden beaches nested in rugged coastline and with stunning views into the island's granite peaked interior. I just can't talk it up enough.

The school itself was aimed at PhD students and researchers relatively new to the field. With a mission statement, *to provide a solid basis to do nanoscale diagnosis in condensed matter with high energy electron beams*. The format, lectures in the morning, lab sessions in the afternoon and conference type seminars in the evenings was well balanced. I think this left me with an excellent overview of what techniques you can use with TEM/STEM and how they can be successfully applied, but with detail enough to take me right up to the current benchmarks. Including the lecturers there were 120 or so participants from all over Europe, thus providing plenty of opportunity to pinpoint the expertise of the different European microscopy facilities.

I think socially the school was extremely successful. The wonderful setting, the quality beach time worked into the timetable, the mix of nationalities and dare I say it, the Cargèse bar scene all contributed to the entertainment. I have never seen so many scientist-types looking so relaxed!

Thanks to Christian Colliex and co for the idea, the choice of venue and all the hard work to make happen what I think everyone agreed was a brilliant summer school. Finally, thank you to EMAG for the bursary to lessen the blow of attending.

Dr Andy Brown
(sponsored by an EMAG bursary)

EMAG Report on Nanoanalysis 2000

Part III

Nanoanalysis 2000 was a European summer school held at the Institute of Scientific Studies in Cargese, Corsica, from 22nd May – 3rd June 2000. The participants included around 80 students and 25 invited speakers from all over Europe. The aim of the school was to discuss the capabilities and limitations of transmission electron microscopy for electronic, structural and chemical characterisation of materials at a near-atomic level. The general structure of the programme was lectures in the morning on theoretical and practical aspects of quantitative and analytical electron microscopy. In the afternoons participants could choose from a selection of computer-based lab sessions to explore some of the software available for extracting and interpreting information from microscopy data. Conference-type seminars were held in the evenings, which often gave practical applications of the techniques described in the morning lectures. There were also two lively “round-table discussions” where the future of electron microscopy was discussed.

As well as the intensive learning side of the school, students also benefited from having the opportunity to get to know each other, and many leading microscopists, which does not often happen at conferences. This may have been during coffee breaks, swimming at the beach, or at the five-a-side Microscopy World Cup, where France again proved they are the best footballing nation.

All in all, Nanoanalysis 2000 was a hugely successful and enjoyable summer school, which students who attended will benefit from for years to come.

Frances Docherty
(Sponsored by EMAG bursary)

The 4th International Conference on Thin Film Physics & Applications, Shanghai, P. R. China, 8 May - 11May 2000

The 4th International Conference on Thin Film Physics & Applications was held in Shanghai from 8 May to 11 May 2000. With an EMAG bursary, I attended this conference. This conference offered a good opportunity for people to exchange science and technology information in the field of semiconductor films, metal films, superconductor films, insulator films etc. I gave an oral presentation in the morning of 10 May and presented a poster in that evening, which were entitled “Power Influence on Carbon Nitride Films Prepared by rf Magnetron Sputtering” and “A Study of Cubic Boron Nitride Films Prepared With Different Deposition Time”, respectively. Both my talk and my poster aroused lots of researcher’s interest in the related fields. I have also got lots of inspiration from other people’s presentations. For example, the presentations entitled “Nitrogen Doped PECVD Amorphous Carbon: Processes and Properties” by Steven Voight et al. and “Study on Sputtering Deposition and Optical Properties of SiCN Films,” by Xiao Xingcheng et al. gave me some new ideas for my next step research work.

Invited talks almost covered most of the fields of thin films. Personally, I think some of them were very interesting. The talk about “Characterization of Thin Films by Surface Mass Spectrometry” by Hubert Gnaser suggested that mass spectrometric techniques are very useful to achieve detailed results in thin-film analyses. In addition, the talk entitled “Actuators From Carbon Nanotube Films” by Siegmur Roth et al. attracted lots of people’s interest because the results are very interesting and very promising for microactuators in integrated micromechanical devices.

The submitted papers will be selected to be published in the conference proceeding by SPIE-The International Society for Optical Engineering.

Liudi Jiang
(sponsored by an EMAG bursary)

REPORTS FROM MEETINGS /contd..

**Eurem XII 12th European Congress on Electron Microscopy, 9-14 July 2000
Brno, Czech Republic**

Eurem XII – The 12th European Congress on Electron Microscopy was held in Brno, the Czech Republic during the week of Sunday 9th July to Friday 14th July. Brno is a University City with a long history of electron microscopy and is the gateway to the picturesque Moravian countryside.

The scientific programme was highlighted by eight plenary “keynote” lectures and also contained 52 symposia, 124 invited lectures, 178 oral contributions and 481 posters. Five tutorials and three satellite workshops complemented the programme. The topics of the “keynote” lectures were Nanoscale analysis by energy-filtering EM (J Mayer), Electron Microscopy at the Millenium (P Hawkes), Structural and chemical surface electron microscopy with slow electrons (E Bauer), State of the art electron microscopy in cell biology (G W Griffiths), Probe microscopes: complimentary tools to the EM (A Engel), Prospects of quantitative high resolution electron microscopy (D van Dyck), TEM of nanostructured materials (G van Tendeloo), and High performance electron microscopes of the future (H Rose).

The trade exhibition was held in Pavilion E of the excellent Brno trade fair area. The hall was quite large and it proved difficult to fill all of the available space due to the relatively high costs. Despite this, there were 43 commercial stands present with all of the major manufacturers showing several “live” instruments both scanning electron microscopes and transmission electron microscopes on their stands. Congress numbers were around 900 delegates which was disappointing but this was not reflected in the level of activity in the exhibition area with all companies “fully booked” for instrument demonstrations particularly during the first three days of the event.

The social programme began with the Welcome Party on Sunday 9th July with Moravian wine, food and dulcimer-band music. A theatre evening was held on Thursday 13th July in the Janacek Opera House in Brno City centre. This gave everyone the opportunity to try out the local trams and navigate across the city. In the theatre there was a performance of classical music lasting approximately 90 minutes followed afterwards by a banquet in the foyer. The middle three evenings gave delegates the chance to either attend one of the various trade receptions or to explore the city centre where the old monastery, Mendel Museum and the famous “U Kralovny Erlisky” Wine Cellar were just a few of the many attractions.

In general the numbers were disappointing but the feelings were of a well-organised congress with an excellent scientific programme, wee supported by the trade and enjoyed by all who attended.

Rod Shipley
(Exhibitor)

**Microscopy and Microanalysis 2000, 13-17 August 2000
Philadelphia, USA.**

On my very first attendance at an MSA meeting, I was initially amazed at the sheer size of

the conference, but rapidly realised that this was a very cross-disciplinary event with very intense focussed sessions, in some ways very similar to EMAG but somewhat lacking the overall sense of community. In the physical science sessions, the US STEM community was very much in evidence and the Prof Mick Brown's talk on the UK SuperSTEM project was extremely well received. There was also a very stimulating session on catalysts in honour of Prof Sir J.M. Thomas as well as many technique based sessions which cut across traditional scientific divides. One aspect which was encouraging was the industrial interest and involvement in the meeting – surely a sign of things to come in Europe one hopes.

Suprisingly for an ignorant bohemian like myself, Philadelphia appeared to be an attractive, relaxed and interesting city with a justifiable, yet reserved sense of history (not all of which was puritanical) – which I found endearing. I even had the chance to chat with professional, historical celebrity look-alikes such as Benjamin Franklin and Thomas Jefferson !

Rik Brydson
(contributor)

ELECTRON MICROSCOPY AND ANALYSIS GROUP

FUTURE MEETINGS OF INTEREST

Institute of Physics meetings and meetings which are closely connected with EMAG (via sponsorship or organisation) are in bold type.

2000

19 - 20 December

CMMP 2000 EMAG sponsored Nanoscale Science and Technology Symposium

Bristol

Organizer: Quanmin Guo: qguo@nprl.ph.bham.ac.uk

2001

17 January

Microscopy of Ceramics

Sheffield

RMS

Organizer: Mark Rainforth

25 - 29 March

Microscopy of Semiconducting Materials XII

Oxford

Organiser: A. G. Cullis

30 March

Advances in Focused Ion Beam Microscopy: FIB 2001

Oxford

RMS/EMAG

Organiser: beverley.inkson@materials.ox.ac.uk

4 – 5 April

Ceramics Industry Convention: Developments in Characterisation Techniques

Cirencester

Institute of Materials

Organizer: m.lewis@warwick.ac.uk, <http://www.materials.org.uk>

8-12 April

European Union of Geosciences XI Symposium: High Spatial Resolution Microanalysis In The Transmission Electron Microscope: Applications For The Geosciences.

Strasbourg

EMAG/RMS

Organiser: mtlrmdb@leeds.ac.uk EUG website: <http://eost.u-strasbg.fr/EUG>

6-10 May

EMAS 2001 - 7th European Workshop on Modern Developments and Applications in Microbeam Analysis

Tampere, Finland

Sect, Univ Antwerp: Fax: +32 3 820 23 76,

vantdack@uia.ua.ac.be

www.emas.ac.uk

5-9 August

Microscopy & Microanalysis 2001
Long Beach, CA, USA
Mary Rebedeau, Chicago: Fax +1 708 361 6166
msa@tradeshownet.com
website: msa.microscopy.com

FUTURE MEETINGS OF INTEREST /contd..

4 September
SuperSTEM 1st User Workshop
Dundee, Scotland
IoP
Contact: a.beckerl@liv.ac.uk

4 September
Advanced School for EMAG 2001
"Quantitative Analysis in Scanning Probe and Electron Microscopy"
Dundee, Scotland
IoP

2001

5-7 September
EMAG 2001
Dundee, Scotland
IoP

2002

9 - 11 July
Micro 2002 – Microscopy at Life Science/ Physical Science Interface
EXCEL exhibition Centre, London Docklands
RMS

Contact Points

IoP: Institute of Physics, Conference Dept., 76 Portland Place, London, W1N 4AA.
Tel: +44 171 470 4800, Fax: +44 171 470 4900
Email: conferences@iop.org
<http://www.iop.org/IOP/Confs/>

MRS: Materials Research Society, 9800 McKnight Road, Pittsburgh,
PA 15237, USA.
Tel: +1 412 779 3003, Fax: +1 412 779 8313
<http://www.mrs.org/meetings/>

MSA: Microscopy Society of America, 4 Barlows Landing Road, Suite 8, Pocasset,
MA 02559, USA.
Tel: +1 508 563 1155, Fax: +1 508 563 1211
<http://www.MSA.microscopy.com/>

RMS: Royal Microscopical Society, 37/38 St. Clements, Oxford, OX4 1AJ.
Tel: +44 1865 248 768 Fax: +44 1865 791 237
Email: meetings@rms.org.uk <http://www.rms.org.uk/events/>

EMAG BURSARY APPLICATION FORM

PERSONAL DETAILS			
Name		Email	
Address			
Title		Age	
IoP/EMAG Member	Yes	No	Applying for Membership
Current Status	FT Student	Postdoc	Other - specify

CONFERENCE DETAILS		
Name of Meeting		
Date of Meeting		
Place of Meeting		
Title of Paper/Poster		
Has paper been accepted for presentation?	Yes	Don't know yet

SHORT COURSE DETAILS	
Title of Course	
Date of Course	
Place of Course	

FINANCIAL DETAILS		
Estimated Expenditure	Registration Fee	
	Travel Costs	
	Accommodation	
	Subsistence	
	Total	£

Have you been promised a contribution towards your funding from any other sources?	Yes / No
If so, please specify the source and the amount they are prepared to contribute	

Have you received an EMAG bursary within the last 12 months?	Yes / No
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SIGNATURE		DATE	
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Please send completed form and

- a letter of support from your academic supervisor and
- a copy of your paper abstract (if applicable)

to : Dr. PD Brown, School of Mechanical, Materials, Manufacturing Engineering and Management, University of Nottingham, Nottingham NG7 2RD.