Institute *of* **Physics**

Electron Microscopy and Analysis Group

Newsletter

December 1999

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Dear EMAG Member

EMAG'99

This year's conference was held at the University of Sheffield and the response from colleagues indicates that it was indeed a successful meeting. The number of registered delegates actually increased from the previous extended meeting in Cambridge suggesting a high level of interest and activity is being maintained in the subject. As always the success of these meetings depends on the hard work of those responsible for organisation both scientifically and locally. Many thanks are due to those involved.

The scientific programme was organised by Rik Brydson who produced a diverse and stimulating range of sessions. As in previous years the standard of oral and poster presentations was very high. Attendees will be glad to hear that Chris Kiely, the proceedings editor, hopes that the proceedings should be ready and delivered by Christmas.

The trade exhibition was ideally situated in the Octagon centre under the charge of Ian Reaney and Peter Korgul. Virtually every stand had been sold and a large number of day visitors were attracted by the exhibition. Feedback from the exhibitors was positive and business was noted to be comparable to other meetings.

Local organisation and social events were excellently co-ordinated by Mark Rainforth with assistance from Beccy Chapple at the IoP. Quite often the local organisation provides the biggest headaches but the smooth running of events was in a large part due to the tireless efforts of Mark and Beccy. A lot of delegates seemed able to relax after a hard day's conferencing in the bar at Tapton Hall!

A highly successful one day Advanced School preceded the main conference. This year the subject was High Resolution Electron Microscopy and was organised by Crispin Hetherington. The school was attended by the maximum number of 32 delegates and provided a very useful introduction to the subject with more advanced topics also being covered.

Other group matters

The group AGM was held on 25 August 1999 during the EMAG conference. Uschi Bangert, Richard Beanland and Rik Brydson retired as committee members this summer and the committee thanks them for all their efforts over the past 3 years. Chris Kiely was elected as Chairman to replace Mark Aindow who is now working in the States and I was re-elected as Secretary/Treasurer. Three new committee members were elected: Paul Brown, Peter Nellist and Paul Spellward. Furthermore Sandy Fitzgerald and Tony Tooke from Dundee have been co-opted onto the committee to help organise the next EMAG which will be held at the University of Dundee in 2001. Brief biographies of the new members appear later in this newsletter.

DR STEPHEN MCVITIE
EMAG SECRETARY/TREASURER

NEW COMMITTEE MEMBERS

Dr. Paul D. Brown was appointed senior lecturer in materials characterisation (as of Jan. 1999) in the School of Mechanical, Materials, Manufacturing Engineering and Management at the University of Nottingham. He was previously Senior Research Associate in the Department of Materials Science and Metallurgy, University of Cambridge, working in the group of Prof. Colin Humphreys since 1991. Paul originally gained his PhD from the University of Durham in 1989. His main research interest is the area of TEM assessment of semiconductor epitaxial growth (110+ papers). After 10 years of postdoctoral research, he has finally settled down and bought a concert grand piano.

Dr. Paul Spellward undertook his PhD work in the EM group at Bristol University, studying III-V and II-VI semiconductors, especially new diffraction techniques for composition determination. He remained at Bristol as a post-doc until 1993 working on coherent electron diffraction. In 1994 he joined the electron optics team at the former Berkeley Nuclear Laboratories (then part of Nuclear Electric plc and now part of BNFL Magnox Generation Division). Since 1998 he has been team leader, electron optics, responsible for seven microscopists, four SEMs, four TEMs, Auger, SIMS and XRD and work on a wide range of materials, including radioactive steels and ceramics, as well as project management and business development. He has retained links with Universities, being industrial supervisor on (currently) three CASE PhDs, and participating in forums such as EMAG.

Dr. Peter Nellist received his PhD in 1995 from Cambridge University for his work on super-resolution imaging by phase retrieval and reconstruction in the diffraction plane. He went on to a post-doctoral research position at Oak Ridge National Laboratory to continue his work in scanning transmission electron microscopy. In 1996 he returned to Cambridge as a Magdalene College Research Fellow, and was awarded a Royal Society University Research Fellowship in 1997. He transfered this Fellowship to the Nanoscale Physics Research Laboratory at The University of Birmingham in May 1998, where he also holds a Proleptic Lectureship position. He is currently interested in the application of high spatial-resolution STEM to the imaging and analysis of nanostructures.

Prof. Sandy Fitzgerald received his PhD from Cambridge University in 1964. He continued his research in the electron microscopy and diffraction of semiconductors in the Physics and Chemistry of Solids Sub-Department at the Cavendish Laboratory until 1966. He moved to the Lawrence Berkeley Laboratory at the University of California in 1966 as a Research Fellow. In 1968 he joined the Carnegie Laboratory of Physics in the University of Dundee as a Lecturer and he has subsequently been promoted to Senior Lecturer, Reader and Professor at Dundee. He received his DSc degree from the University of Dundee in 1990 and he was elected a Fellow of the Royal Society of Edinburgh in 1998. Over the past fifteen years he has worked in x-ray microanalysis and in the electron spectroscopy of surfaces (Auger and X-ray Photoelectron Spectroscopy) where he has been involved in the development of software for surface composition analysis by these techniques and by Secondary Ion Mass Spectrometry. His current interests include scanning probe microscopy of diamond films and nanolithography using electron beams.

NEW COMMITTEE MEMBERS contd

Dr. Tony Tooke was awarded a B.Sc in 1962 and a Ph.D in 1966 both from Nottingham University where his research was based on an investigation of relaxation mechanisms in transition metal ions using pulse-recovery ESR techniques. He then took up a teaching post at the University of St. Andrews, Queen's College Dundee, later to become Dundee University, where he remains. His research interests have centred on the preparation and appraisal of magnetic oxide materials having low microwave losses (particularly YIG) and the analysis and simulation of ESR spectra from oxide materials. He teaches at all levels with specialisms in solid state physics and magnetic materials and is particularly interested in the admission of mature and other students with non-standard qualifications.

EUREM 2000 BURSARIES

The former British Joint Committee for Electron Microscopy (BJCEM) set up a fund to provide financial assistance for students wishing to attend one of the major European or International Electron Microscopy Congresses. The next such event will be the XIIth European Congress on Electron Microscopy, to be held in Brno, Czech Republic on July 9–14, 2000. (Website: http://www.eurem2000.isibrno.cz)

A number of bursaries are available and applications from students at British Universities are now being considered. Those wishing to apply should write to:

Professor Chris Kiely
Department of Materials Science & Engineering
University of Liverpool
Liverpool L69 3BX.

Letters should include details of the total likely cost, amounts either promised or being sought elsewhere, and should be countersigned by the student's supervisor. It is expected that successful applicants will be presenting either a paper or a poster at the congress. Applications must be received by **January 22, 2000**.

BURSARIES

Members are reminded that bursaries are available for research students and postdocs (under the age of 30) who wish to attend relevant conferences either in the UK or abroad. Preference is usually given to those who are presenting papers and have shown that they have tried to obtain part of their funding from other suitable sources. The committee has agreed that applicants must be members of EMAG if they are to qualify for a possible bursary. A completed application form (see last page of Newsletter) as well as a short reference from a research supervisor confirming eligibility and suitability should be sent to the Chairman of the Bursary Sub-Committee. In general, only one bursary per year can be awarded to each person, however this rule does not include attendance at one-day meetings where only a small expense for travel and subsistence is requested. Additionally each successful applicant must submit a short report on the meeting that they attended to the Chairman of the Bursary Sub-Committee (Dr Paul Midgley). Bursaries for the EUREM meeting are available through the BJCEM as advertised elsewhere in this newsletter.

CMMP 99, 20-22 December 1999, University of Leicester.

Symposium on Nanoscale Physics and Technology
Symposium Organiser: P D Nellist (University of Birmingham)
Chairmen: P D Nellist (University of Birmingham), C J Kiely (University of Liverpool)
Invited Speakers:

- **Ordering and Spectroscopy of Passivated Clusters**
  K Svensson (University of Birmingham)
- **Thin Film Structures Formed from Metallic Nanoparticles; Manipulation of the Self Assembly Process**
  C J Kiely (University of Liverpool)
- **Adventures in Catalytic Nanospace: Spillover from Supported Nanoparticles Observed for the First Time using High Temperature STM**
  M Bowker (University of Reading)
- **Theory of Current-Induced Molecular Manipulation by Scanning Tunneling Microscope**
  M Persson (Chalmers/Goteborg University, Sweden)

This symposium comprises two oral sessions and one poster session. Further details can be obtained from Dr. P D Nellist, Nanoscale Physics Research Laboratory, School of Physics and Astronomy,University of Birmingham, Edgbaston, Birmingham B15 2TT.

MICRO 2000, 11-13 April 2000, Novotel London

A 1-day meeting entitled *Future Trends in Microscopy* to be co-sponsored by the RMS and EMAG will be held within the MICRO conference. At the moment there are 5 invited speakers,

A. Petford-Long *Magnetic Materials and Holography*
K. Takayanagi *STM / HREM*
O Krivanek *Sub-Å HREM*
R Henderson *Cryo-FEGTEM*
F Hofer *Compositional Imaging*

IoM Congress 2000, 12-14 April 2000, Cirencester

"Nanostructured Materials" session at Materials 2000
Royal Agricultural College, Cirencester, Gloucs, UK
A one day session co-sponsored by the EMAG group on “Nanostructured Materials” takes place within this congress. There are 6 invited speakers, one on electron microscopy (Dr Rainforth). Please note that EPSRC students have free registration for this meeting.
For further details contact Dr A Cerezo, Department of Materials, University of Oxford.

Joint RMS / EMAG One–Day Meeting entitled 'Recent Developments in FEGTEM' Department of Materials, University of Oxford, 12 July 1999

The advent of commercial FEGTEM instruments with stable field emission guns and relatively easy operation has seen interest in these instruments in the UK grow enormously. With the number of FEGTEM machines in the UK alone touching double figures, a meeting to discuss the relative merits of the machines now available seemed timely and worthwhile.

A 1-day meeting was held at the Department of Materials in Oxford, organised by myself (Materials, Cambridge) and John Hutchison (Materials, Oxford) and jointly through the Royal Microscopical Society and EMAG. Generous sponsorship was also obtained from FEI UK Ltd, Hitachi Instruments and JEOL UK Ltd. Dr Hutchison was unable to co-chair on the day but his shoes were filled ably by John Titchmarsh of the same department.

The meeting started with an excellent key-note lecture from Werner Kuehlbrandt from Frankfurt, who spoke about Cryo-FEG/TEM of protein molecules. The meeting then continued with two more talks from the biological community (John Berriman from the MRC in Cambridge and Brent Gowan from Imperial College) which highlighted the problems with this type of electron microscopy and how a field emission instrument is essential for high resolution studies of viruses, protein structures and so on.

The rest of the morning and indeed the rest of the day was taken up with talks with more of an inorganic flavour as speakers from Materials Science, Physics and Engineering Departments gave us insights into their FEGTEM instruments. John Chapman (Glasgow Physics) and John Steeds (Bristol Physics) spoke of their machines which both have had for some years and told of the remarkable experiments that have been achieved to date in those laboratories. The machines installed recently at Sheffield (Tony Cullis), Cambridge (myself) and Oxford (Rafal Dunin-Borkowski) were discussed and their relative merits explored.

Ian Jones (Birmingham) and Rik Brydson (Leeds) then spoke of their machines which were soon to be delivered. In addition, Prof Jones reminded the meeting of the problems of contamination in FEG machines and the need for specimen cleanliness and the advantages of plasma cleaners in this regard.

The official part of the meeting concluded with a wine reception but many stayed to hear the RMS Annual Guest Lecture entitled "The promised land of SuperSTEM" given by Professor Mick Brown (Cambridge Physics). Prof Brown spoke of the exciting times ahead for STEM with the introduction of monochromators and spherical aberration correctors and the ability to produce 0.1nm probes with 0.3eV resolution or better. The SuperSTEM concept was explained to the audience and we all await the outcome of the grant application for this new generation of instruments with baited breath!

Paul Midgley
(Co-organiser)

16th meeting of The North American Catalysis Society, Boston, 30May-4June 1999

The Fifth Anniversary of The Catalysis Society was held at The Western Hotel, Boston, USA, between May 30 and June 4, 1999. It comprised a number of topics, of which environmental catalysis was my main interest.

A poster presentation session was held on the evening of May 31st, where I presented my work entitled "Detoxification of Halogen Rich Gas Streams using Supported Nickel Catalysts". The poster described two topics.

- The hydrodehalogenation of chlorinated and brominated aromatics, the rate of conversion and the deactivation of the catalyst.
- The growth of carbon nanotubes and filaments as a consequence of catalyst pretreatment.

My poster received considerable attention from both academics in the field, and industrialists.

I found many aspects of the conference to be both interesting and exciting. Two particular presentations were of particular relevance to my research. The first, entitled "Genesis of Durable Catalyst for Hydrodehalogenation of CCl_4 to $CHCl_3$" desribed work very similar in nature to my own, and the second, "Corellation of Catalytic and Electronic Properties of Ni/Pt(111) Bimetallic Surface: Unique Surface Reactivity at the Monolayer Ni Coverage", explained the change of catalytic behaviour with the electronic structure of the metal site.

At the meeting I made many contacts with people in my field of research, with whom I hope to meet in the future, at later events, and which may bear fruitful career opportunities after the completion of my PhD. I also took full advantage of the organised trip to The Museum of Fine Art.

Claudia Menini
(sponsored by an EMAG bursary)

Microscopy and Microanalysis ’99 meeting, Portland, USA, 1-5 August 1999.

This is a report on the Microscopy and Microanalysis meeting in Portland, USA, which I recently attended with an EMAG bursary. Approximately half of the conference was devoted microscopy of materials and techniques, the other half being on biological materials. The Archie Howie symposium over the first day and a half, consisted entirely of invited speakers, all of them "big names" in the field. In this way, the audience received a review of the history of most areas of analytical electron microscopy as well as the latest developments. The symposium on Atomic Structure and Microchemistry of Interfaces contained a few interesting papers. Most notably that of Z L Wang, using energy filtered TEM to map valance states. In this symposium, and also some others, there were some very nice presentations from the group of N. D. Browning. It is encouraging to see that such excellent atomic resolution "z-contrast" images can be obtained on a commercially available TEM/STEM systems, although the EELS results have yet to obtain atomic resolution. D. A. Muller presented some very nice work on SiO2 gates in Si, which were certainly approaching the atomic scale. The Compositional Imaging and Spectroscopy session on Thursday afternoon was both interesting and surprisingly well attended, given the late billing in the conference. The main focus was on z-contrast imaging and EFTEM. P. A. Midgley et al and J. A. Hunt et al both demonstrated the advantages of the more sophisticated approaches to acquiring EFTEM data. The poster sessions were somewhat disappointing in that it was not very well attended and many of the posters appeared to be missing. The quality of the posters, particularly in presentation, was not as good as those at the at the smaller UK meetings, such as the recent EMAG meeting in Sheffield.

Vicki Keast
(sponsored by an EMAG bursary

FUTURE MEETINGS OF INTEREST

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

1999

20-22 December
Condensed Matter and Materials Physics (CMMP99)
Leicester University
IoP

2000

3-4 February
Millennium Microscopy Meeting
Open University, Milton Keynes
Dr Jill Lewis: Tel/Fax: 0181 428 4264, email: cglewis@surfaid.org

9 February
Reference Materials and Quality Procedures for Composition Determination
Institute of Physics, London
Materials and Characterisation Group, Institute of Physics

29 February
YORMIC 2000 Microscopy into the Millennium
York Microscopy Group, UK
Annabel Bailey: yormic@sngrc.demon.ac.uk
Smith & Nephew Group Research Centre, York Science Park, Heslington, York YO10 5DF

3-4 April
Intl Conf on Microscopy of Composite Materials V
Oxford
RMS and Oxford Centre for Advanced Materials and Composites
Email: jenny@rms.org.uk

11-13 April
Micro 2000 International Conference and Exhibition
London
RMS

12-14 April
IoM Congress 2000,
Cirencester
IoM

17-20 May
EMAS 2000 Regional Workshop: Electron Probe Microanalysis Today - Practical Aspects
Trest, Czech Republic
Secretariat: Fax: +420-2-688 60 95
Email: masek@mbox.troja.mff.cuni.cz
Web: www.mff.cuni.cz/eng/news/emas2000.htm

26-30 June
7APEM - The 7th Asia-Pacific Conference on Electron Microscopy;
SUNTEC City, Singapore; 7APEM
Secretariat, c/o Electron Microscopy Unit, Faculty of Medicine, National University of Singapore, Kent Ridge Cresent, Singapore 119260.
Email: micngml@nus.edu.sg
http://www.med.nus.edu.sg/micsoc/7apem/

9-14 July
EUREM12 - 12th European Congress on Electron Microscopy;
Brno, Czech Republic; EUREM2000, Královopolská 147, CZ - 612 64 Brno, CZECH REPUBLIC.
Email: eurem2000@isibrno.cz
http://www.eurem2000.isibrno.cz/

31 July-3 August
Microscopy & Microanalysis 2000, Philadelphia, USA
Mary Rebedeau, Chicago.
Fax +1 708 361 6166,
msa@tradeshownet.com
http://www.msa.microscopy.com

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			
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

SIGNATURE		**DATE**	

Please send completed form and

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

to : Dr. PA Midgley, Department of Materials Science and Metallurgy, University of Cambridge, Pembroke Street, Cambridge, CB2 3QZ.