

Institute *of* **Physics**

**Electron Microscopy and
Analysis Group**

Newsletter

December 2002

ELECTRON MICROSCOPY AND ANALYSIS GROUP

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ELECTRON MICROSCOPY AND ANALYSIS GROUP

EMAG COMMITTEE - 2002/2003 SESSION

Chairman: Dr Rik Brydson
Department of Materials
University of Leeds
Leeds LS2 9JT
Tel: 0113 233 2369
Fax: 0113 242 2531
Email: mtlrmdb@leeds.ac.uk

**Hon. Secretary:
/Treasurer** Dr Paul D Brown
School of Mechanical, Materials, Manufacturing
Engineering and Management
University of Nottingham
Nottingham NG7 2RD.
Tel: 0115 9513748
Fax: 0115 9513764
Email: paul.brown@nottingham.ac.uk

Members: Dr Andrew Bleloch
Microstructural Physics
Cavendish Laboratory
Madingley Rd
Cambridge CB3 0HE
Tel: 01223 337333
Fax: 01223 337333
Email: ab122@cam.ac.uk

Dr Andy Burrows
Department of Materials Science and Engineering
University of Liverpool
Liverpool L69 3GH
Tel: 0151 7945372
Fax: 0151 7944675
Email: ab0895@liv.ac.uk

Dr Simon Galloway
Gatan UK, Ferrymills 3
Osney Mead
Oxford OX2 0ES
Tel: 01865 253 630
Fax: 01865 253 639
Email: sgalloway@gatan.com

Dr David McComb
Department of Chemistry
Joseph Black Building, University of Glasgow
Glasgow G12 8QQ
0141 330 4486
0141 330 4888
D.McComb@chem.gla.ac.uk

Dr Ciara Mullan
Hewlett Packard
Filton Road
Bristol BS34 8QZ
Tel: 0117 312 9908
Fax: 0117 979 4011
Email: ciara_mullan@hp.com

Prof. Amanda Petford-Long
Department of Materials,
University of Oxford, Parks Road
Oxford, OX1 3PH
Tel: 01865 273 656
Fax: 01865 283 333
Email: amanda.petford-long@materials.oxford.ac.uk

Dr Tiesheng Rong
School of Engineering, Metallurgy and Materials
The University of Birmingham, Edgbaston
Birmingham B15 2TT
Tel: 0121 414 6731
Fax: 0121 414 5232
Email: T.Rong.Met@bham.ac.uk

Dr Rod Shipley
FEI UK Ltd
Cambridge Business Park, Cowley Road
Cambridge CB4 0HF
Tel: 01223 468 555
Fax: 01223 468 599
Email: rjshipley@uk.feico.com

EMAG COMMITTEE - 2002/2003 SESSION/ contd.

Co-Opted Members

Prof. David Cockayne FRS
Department of Materials
University of Oxford, Parks Road
Oxford OX1 3PH

Tel: 01865 273 654
Fax: 01865 283 333
Email: david.cockayne@
materials.oxford.ac.uk

Mr. Ron Doole
Department of Materials
University of Oxford, Parks Road
Oxford OX1 3PH

Tel: 01865 273 701
Fax: 01865 283 333
Email: ron.doole@
materials.oxford.ac.uk

ELECTRON MICROSCOPY AND ANALYSIS GROUP

Dear EMAG Member,

Since the June 2002 Newsletter there has been several changes to the committee membership. Steve McVitie has completed his term of office (many thanks Steve for all your hard work over the years); Rik Brydson has been elected Chairman; I've acquired the role of secretary / treasurer; Andy Burrows has resigned from the committee (due to pressure of work); and David McComb and Tieshong Rong have joined the committee (welcome!).

The present focus of the committee is preparations for the EMAG conference, 3-5 September 2003, hosted by Oxford. Please see the enclosed Call for Papers for more details.

As ever, there have been a number of meetings since June which have involved members of the EMAG committee. Reports on these meetings are presented, in addition to conference reports from research workers supported by EMAG / RMS bursaries. Particular attention is given to reports on the 15th International Congress on Electron Microscopy, Durban, South Africa.

The Cambridge SuperSTEM I has now been moved from Cambridge to a purpose built building at the Daresbury Laboratories. The official opening ceremony was held on 13th December 2002. Plans for the design of a second-generation machine SuperSTEM II continue. Progress with the SuperSTEM project is described later in this Newsletter. Also, please see:
<http://www.superstem.org.uk>.

Further information on EMAG activities are available at the IoP website at the address:
<http://www.iop.org/IOP/Groups/EM/>.

BURSARIES

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 of this 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, Dr David McComb. Additionally each successful applicant must submit a short report on the meeting they attended to the Chairman of the Bursary Sub-Committee.

*Dr Paul D Brown, Nottingham
EMAG Secretary / Treasurer*

ELECTRON MICROSCOPY AND ANALYSIS GROUP

New Committee Members

Dr Tiesheng Rong got his BSc in Physics and MSc in Physical Metallurgy from the University of Science and Technology Beijing. He then joined the School of Metallurgy and Materials, the University of Birmingham to work for a PhD degree in 1991. After the award of a PhD in 1995, he remained at Birmingham as a postdoctoral research fellow working on creep of intermetallics. In 2000, he took up a University Research Fellowship at Birmingham University. His research work has been focused on microstructural characterisation using transmission electron microscopy and recently on high spatial resolution chemical analysis.

European Microscopy Society (EMS) News

IMPORTANT INFORMATION – Please respond !!

Dear EMAG member

May we remind you that all members of EMAG are automatically members of the European Microscopy Society, at no cost to themselves.

However, in order to receive information from the EMS, it is essential to send your e-mail address to the EMS secretary - this cannot be sent by the IoP due to the Data Protection Act. This is important, since almost all communications from the EMS are sent by e-mail, including information for voting for the next Executive Board.

If you have not responded already, please send your e-mail address (and preferably your other details, postal address, phone & fax numbers) to

wisse@cyto.vub.ac.be and to hawkes@cemes.fr

and indicate whether you agree to include this information in the EMS Yearbook. If you do NOT wish to appear in the Yearbook, your e-mail address will be used solely for the despatch of information by the EMS secretary (Prof. Dr E. Wisse, Free University of Brussels).

*Dr Rik Brydson
Chairman of EMAG*

ELECTRON MICROSCOPY AND ANALYSIS GROUP

SuperSTEM

Official Opening of SuperSTEM

The new SuperSTEM atomic resolution analysis facility at Daresbury Laboratories was officially opened by Lord Sainsbury of Turville, the Minister of Science and Technology, on Friday 13th December 2002. Other speakers at the event included Prof Graeme Davies from HEFCE and two key members of the SuperSTEM team: Prof. Mick Brown FRS and Prof. Peter Goodhew. Around a hundred guests drawn from international academia, industry and UK research funding bodies were present and saw SuperSTEM I, the first aberration-corrected instrument, in action resolving single, isolated gold atoms on a carbon support film. This first instrument had initially been commissioned in Spring 2002 in Cambridge and moved to the new purpose-built facility in October this year. Current performance at Daresbury Laboratories has demonstrated a resolution in high angle annular dark field imaging of 1.2 Angstroms at 100 kV. This instrument will be fully commissioned within the next 3 months and will be joined by a second improved machine in the next few years.

The whole proceedings were reported at length on BBC North West regional news. Lord Sainsbury stressed that the government was extremely pleased to see the presence of a world class scientific facility that had arisen from a collaborative effort, in no small part due to the support of EMAG! Prof. Goodhew made the important analogy that SuperSTEM was akin to aiming a laser pointer from Daresbury Laboratories at an object the size of a tomato in Copenhagen and then analysing the pips within the tomato. Quite a feat of engineering! The SuperSTEM team based at Daresbury Laboratories: Prof. Gareth Jones, Dr Andrew Bleloch, Drs Uwe and Meiken Falken, Peter Shiels and Will Costello (with great help from Anne Beckerlegge at Liverpool) should be congratulated on the organisation of this impressive event. We look forward to news of the new facility in 2003 and envisage it will be of great benefit to EMAG members and UK microscopists in general.

For further details about the facility see the SuperSTEM website: <http://www.superstem.org>
or contact Dr Andrew Bleloch ab122@cam.ac.uk
or Prof Peter Goodhew goodhew@liverpool.ac.uk

Rik Brydson

ELECTRON MICROSCOPY AND ANALYSIS GROUP

REPORTS FROM ICEM 15

15th International Congress on Electron Microscopy, Sept. 1-6, 2002, Durban, South Africa.

7 joint RMS / EMAG bursaries for this meeting were awarded Steffi Friedrichs (Oxford), Crispin Hetherington (Oxford), Annette Kolodzie (Cambridge), Sergio Lozano-Perez (Oxford), Will McBride (Oxford), Christopher Marsh (Oxford) and BG Mendis (Birmingham).

ICEM15

This summer, the Republic of South Africa not only hosted the World Summit, but also the 15th International Congress on Electron Microscopy, attracting a large number of microscopists to the province of KwaZulu-Natal.

The 1200 submitted papers were organised in parallel half-day sessions, covering a wide range of different aspects of microscopy techniques, developments and applications. Each session was opened by a series of invited talks, followed by several oral presentations given by scientists from all over the world. The extensive scientific programme was accompanied by an informative exhibition, displaying the latest available microscopes, tools and computer software for electron microscopy.

My particular interest lies in the field of carbon nanotubes and the microscopic techniques used to image these materials. As carbon nanotubes attract a large amount of scientific interest at present, numerous contributions were concerned with this novel material. The session entitled 'Carbon and carbon based materials' consisted nearly exclusively of contributions about these materials. It was divided into two parts and included the investigation of the growth mechanism of carbon nanotubes, using TEM techniques, and their characterisation by HRTEM and EELS. The session furthermore covered a wide range of investigations of the physical properties of carbon nanotubes, including their mechanical behaviour and electron transport properties. Carbon nanotubes were furthermore discussed in the session entitled 'Electron lenses and aberration correctors', where they were presented as exemplary phase objects for C_s-corrected HRTEM imaging and image reconstruction techniques.

The numerous plenary lectures formed some of the highlights of ICEM 15. In the 'Boris Balinsky Lecture', Professor Sir Aaron Klug outlined the important rôle electron microscopy plays in the development and achievements of the biological sciences, while the progress in the investigation of inorganic materials, using electron microscopy, was demonstrated by Professor Colin Humphreys during his presentation of the 'John Matthews Memorial Lecture'.

Overall, ICEM 15 was a culturally and scientifically valuable experience. I would like to thank the EMAG and the RMS for their financial support for this conference.

Steffi Friedrichs, Oxford

ICEM15

This year, the 15th International Congress on Electron Microscopy was held in Durban, South Africa. In spite of the long journeys required for most attendees, and in spite of the competition for seats on flights from the Johannesburg Earth Summit, more than 1200 scientific delegates and trade exhibition personnel converged on Durban's International Convention Centre (ICC). The world experts were there to give the workshops and plenary lectures and invited talks. On top of that, there were submitted talks to attend and posters to study, nearly 1200 in total. Alongside the scientific programme, the trade exhibition had as many as 43 companies participating. So with the days filled from 8am to 6pm, and the evenings filled with numerous receptions and parties, one was guaranteed

an event both memorable and exhausting. In addition, many if not most delegates took the opportunity to indulge in pre and post-conference expeditions to places such as the nearby Drakensburg Mountains or the Kruger National Park.

But we should start with scientific matters. The Monday morning session on Electron Lenses and Aberration Correction was, as expected, a popular one. The 110 chair room nearly burst at the seams as the 155 delegates squeezed in to listen to Max Haider of CEOS, Ondrej Krivanek and Pete Nellist of Nion and S Mentik of FEI discuss the latest results from correcting Cs and other aberrations in TEM, STEM and LVSEM. Correction has been achieved already on a few select machines, such as the CM200 in JYlich, and many other groups have plans afoot - none more ambitious than the Oxford-JEOL project with their new FEG(S)TEM microscope due to be delivered in late 2003. When asked why both correctors (for the probe-forming and the image-forming lenses) were to be installed on the same machine, John Hutchison claimed penury: there wasn't the money for two machines! Andrew Bleloch then presented the latest results from the Superstem project, which does have two machines - a couple of venerable VG-STEM microscopes with newly-fitted aberration correctors. Fittingly for the South African meeting, diamond had replaced silicon as the high resolution standard and it was the 0.108nm fringes from a diamond lattice that Dr Bleloch showed off, with promises of dumb-bells soon. Angus Kirkland rounded off the symposium with a talk on the methods for measuring the wave aberration function. One might wonder if he had missed the boat rather, with all these aberration-correctors appearing on the scene. His general method, however, will be extremely useful for characterising aberrations before correction, as well as providing a means for generating aberration-free exit-wavefunctions from the remaining aberration-afflicted microscopes.

Among the other contributions that attracted my attention were the following. Anstis, Etheridge and Möbus gave consecutive talks that considered the scattering of a sub-Angstrom probe in a TEM specimen. It was pointed out that the smallest probes might be expected to spread rather alarmingly in the specimen due to the much increased convergence angles required to form them, so that the volume of material probed could be larger than initially hoped for. There was the thought-provoking comment of Van Dyke that if you cannot use amorphous silicon to test the resolution (it doesn't scatter strongly enough at higher angles) then, logically, you cannot use TEM to obtain the atomic structure of amorphous silicon. More straightforward was Putterill's comment that "there is a paucity of information on the interior of the mouth of the crocodile" - not hard to understand why! Dahmen had the clever idea of repeating with video technology the original experiment of Brown who, two hundred years ago, observed pollen moving in water. This was a suitable project for a high school student, and the results were indeed closely related to Dahmen's observations of the Brownian motion of lead inclusions in aluminium. For the simplest specimen preparation, join Berti's group in Italy and study particulate emissions from vehicles: you only have to leave your TEM grid out by a roadside before it's ready to put into the column. For the trickiest TEM maintenance, join Fuller's group in Oxford (about a mile from the RMS offices, incidentally) where HIV and Foot and Mouth virus are put into the microscopes and later destroyed, hopefully, by flushing the column with hydrogen peroxide. Did you know that, at 1 EM/square kilometre, Singapore probably has the highest density of electron microscopes in the world? The chance to listen to talks on such a variety of subjects and from all corners of the globe is certainly one of the joys of attending an ICEM.

During the Congress, IFSEM decided to drop its "E" and become the International Federation of Societies for Microscopy, David Cockayne was elected President of IFSM, and Sapporo, Japan was chosen to host the International Congress on Microscopy, ICM16 (also minus the "E") in 2006.

Crispin Hetherington, Oxford

ICEM15

The ICEM15 was a great success from my point of view. The organization did a great job and, because of the exceptional conditions of South Africa, rose the standards to a level typical of a "Prime Ministers Meeting". The conference centre was one of the best examples as it had everything (and much more) than one would expect for a scientific meeting. The atmosphere of the conference was extremely friendly. Most of the attendants took advantage to meet old colleagues and friends and

it could be said that the most interesting discussions occurred outside the Lecture Rooms, in the corridors or cafeterias. It was useful to have some informal discussions with many of the authors I am referring to in my thesis.

As usual in these kinds of conferences, the main problem was to decide which talk to attend. There were usually eight parallel sessions running at the same time and the chairmen had a hard time trying to make each talk finish at the same time.

On the social side, the night parties sponsored by the manufacturers were one of the strong points. We had the chance to enjoy different aspects of the South African culture thanks to them, from the food to the music. They also gave us a very good excuse to meet and talk about something else (not science!).

Sergio Lozano-Perez, Oxford

ICEM15

The conference, attended by 1200 delegates, was held in the excellent purpose built International Convention Centre (ICC) in Durban. The conference was divided into three areas Physics and Materials, Biology and Medicine and Interdisciplinary. Within these areas the conference covered a wide range of microscopies and applications and included 5 plenary lectures on new materials, scanning probe microscopies, ribosome, biomolecular assemblies and proteins, one public lecture on the virus causing HIV/AIDS, a symposium on general trends and developments in microscopy and approximately 1200 oral and poster presentations. The scientific sessions were well attended despite the sometimes early starts, several were so well attended there was standing room only. The interdisciplinary sessions on aberration correction, electron tomography and TEM automation in particular generated significant interest and discussions. The conference was widely regarded by delegates as a scientific success. The conference was accompanied by an excellent trade exhibition and thanks to the conference organisers and three of the trade exhibitors a good social program in the evenings, the highlight of which was Ladysmith Black Mambazo singing at the conference dinner.

The conference concluded with two announcements, the next conference would be held in Sapporo, Japan in 2006 and to reflect the true content of the conference in future the specific reference to electron microscopy in the title would be dropped and conferences in the series would in future be called the International Congress on Microscopy.

Christopher Marsh, Oxford

ICEM15

The 15th International Congress on Electron Microscopy (ICEM-15) was held during 1-6 September 2002 at the International Convention Centre in Durban, South Africa. Over a thousand delegates attended this major conference, which covered many aspects of electron microscopy. The topics varied over many disciplines and were broadly divided into the physical sciences, biological sciences and interdisciplinary.

Physical sciences included the use of electron microscopy in the characterisation of functional materials, nanostructures, polymers, ceramics, minerals and metallic alloys, with individual symposia being devoted entirely to each class of material. In addition several symposia covered in depth some of the more common characterisation techniques, such as chemical microanalysis using electron energy loss spectroscopy and ALCHEMI as well as high resolution electron microscopy, HAADF imaging and electron holography. Cryo-EM of membrane proteins, tomography of cells and organelles as well as the use of high voltage TEM and analytical EM in biological research were discussed as part of the life sciences.

Several recent developments in instrumentation such as lens aberration correction, improvements in X-Ray detectors, remote microscopy, low voltage SEM and environmental SEM were presented as interdisciplinary topics. It is clearly evident from the above list that the future of electron microscopy

is as promising as when Knoll and Ruska first developed their microscope in the 1930s. Only this time the information available to the microscopist is much more varied. We can expect microscopes with 1Å resolution, where spherical aberration is removed with the use of Cs correctors, thereby greatly simplifying image interpretation. Microscopists also have the option of performing chemical analysis on a nanometre scale and with the use of a suitable instrument set up gather phase information of the material using holography. Another exciting development is the ever growing use of the ESEM in scientific research. This enables the study of bulk materials under controlled environments and variable temperatures, a valuable tool for corrosion and phase transformation studies to name but a few. The technical exhibition provided the opportunity to experience first hand some of these exciting new breakthroughs in technology and was of immense practical value.

Whilst ICEM-15 provided an excellent opportunity for world leading microscopists to share new ideas and recent innovations all under one roof, the scenic setting of Durban together with the numerous diversities of South Africa added a pleasant touch to what was a very successful and enjoyable conference.

BG Mendis, Birmingham

REPORTS FROM OTHER MEETINGS

CMD19/CMMP2002 April 7-11, 2002 Brighton, UK

On Monday morning, after registering for CMMP and putting up my poster, I dotted about various sessions attending talks of interest. With so many sessions running simultaneously it was easy to find something of interest. At lunchtime packed lunch provided a welcome opportunity to sit on the beach and get some sea air. In the afternoon I attended the Electronic Structure and Spectroscopy session. This session was a good opportunity for experimentalists and theorists from different spectroscopic fields to get together and exchange information. The presentations covered a good mix of topics but for me the most educational was FMF de Groot's invited talk on 'The electronic structure of transition metal ions in solids investigated by (Selective) X-ray absorption Spectroscopy'. The talks in the session seemed fairly well attended but I was disappointed at the distinct lack of people going round the Electronic Structure and Spectroscopy posters later that afternoon. This may have had something to do with the fact that most of the CMMP posters and perhaps more importantly the tea and the coffee were downstairs next to the exhibition. As I was only at the conference for one day, I'm not sure if more people made their way upstairs as the week progressed. I would like to thank EMAG for providing me with a bursary.

*Maureen MacKenzie, Glasgow
sponsored by EMAG bursary*

Strategies and Advances in Atomic Level Spectroscopy and Analysis (SALSA), Guadeloupe, French West Indies. 5-9 May 2002.

You may be forgiven for thinking it was the venue of SALSA 2002 that attracted so many of the leading names in electron microscopy, but for those of us that were there, the programme proved to be extremely interesting and of an extremely high level.

Sessions of particular relevance to Fiona Loughran were Interfaces, Spectroscopic mapping and Nanotechnology. It was in the Interfaces section that she gave her first conference presentation. In spite of being extremely nervous, it was felt that her talk went well and she can now build on the experience.

One of the conference highlights for Andy Brown was the excitement around the potential of and the early results from the new C_s corrected TEM / STEMs. Coupled with this was the demonstration that careful and thorough experiments can lead to, or at least near to, single atom image and analytical signals on conventional machines (the so called C_s afflicted machines). These results and the corresponding theoretical limits that were discussed suggest that these are exciting times for electron microscopy.

The poster exhibition consisted of well-presented posters, not only in content but also in appearance. This session allowed discussions to take place on a one to one level, and permitted opinions to be exchanged and new approaches to existing problems to be formulated. As at many conferences, this session proved to be one of the most helpful and informative of the conference.

With the morning presentations beginning at 11am many people found time to relax with an early morning swim, or even an hour of sailing. The hour and a half lunch break consisted of an excellent 3 course meal carried out in true French style i.e. it always over ran! Presentations then continued through until half past seven, when a glass of the white rum was gratefully received if not needed!

The social excursion to Basse Terre was also extremely well organised. It began with a rum distillery, complete with tastings which would have been more appetising had it not been 10am! Next up was a walk in the rain forest. True to form we were subjected to a tropical downpour, which could only add to the experience. It was therefore a very soggy group of people that were dropped off for another superb meal overlooking the beach. It was on the beach that we dried off and watched the sun go down. A fantastic day!

In our opinion the venue for this workshop was ideal. The intensity of the programme was balanced perfectly with the relaxed backdrop of the Caribbean, so our thanks must go out to everyone who was involved in the organising of such a stimulating conference.

*Fiona Loughran, Charlotte Dennis and Howard Daniels, Leeds
sponsored by EMAG bursary*

8th International Conference of Aluminium Alloys, Cambridge, July 2-5, 2002

Over 300 people from many different countries took part in the ICCA8 conference. The main topics of this conference covered liquid metal processing, thermo-mechanical processing, recrystallisation and texture, alloy development, phase transformations, mechanical properties, fatigue, creep and fracture, corrosion, wear and fabrication.

Several keynote papers introduced the application of aluminium in the rail transportation market, in the packaging market and in the construction industry. Transportation in general accounts for about 28% of the global aluminium consumption per year. This is mainly in the automotive and aerospace industries. Rail transportation presently has a very low (3%) aluminium consumption, but applications include wheel, suspension parts, brace equipment, traction equipment, body structure and interior trim. Improved metal forming and metal formability, to increase cost competitive packaging, to improve corrosion protection, integrity performance and convenience and functionality were also common themes. Strength, stiffness, durability, formability lightness and jointing are the important issues for the use of aluminium in the Civil Engineering and Building Industries, with applications in space frames, domes, cranes, bridge towers, roofing and cladding.

Many papers were concerned with the modification of the aluminium alloy, e.g. through grain refinement, aging and precipitation, with due regard for the structure-property relationship between the precipitation phase and the matrix. Aspects of fatigue creep and fracture were also covered, along with the microstructure of precipitation in the context of stress corrosion. Aluminium welding was an important topic at this conference. The optimisation of friction welding laser welding, spot impact welding and other manufacturing methods were introduced. Aspects of the conference dealt with new processing techniques combined with computer simulation. My own work concerned the development of Al-Sn alloy shell bearing coatings, using the new technique of high velocity oxy-liquid fuel thermal spraying.

The proceedings of the conference are published in a special issue of the Materials Science Forum, Vol. 396-402, entitled 'Aluminium Alloys, Their Physical and Mechanical Properties.'

*Chang-Jing Kong, Nottingham
sponsored by EMAG bursary*

Gordon Research Conference on Physical Metallurgy 2002, Holderness, New Hampshire, USA 21-26 July, on 'Interfaces: Properties, Kinetics, Mechanisms.'

Gordon conferences are different. The most obvious difference, now that I come to write this report, is that I cannot write about what was presented at the conference. The Gordon Conferences aim to be "at the frontiers of science" and therefore must generate an atmosphere in which researchers are prepared to discuss their work-in-progress and propose their controversial or part-formed theories. To achieve this, all attendees must agree that everything they hear or see at the conference is a private communication and is not to be repeated or referred to outside.

A good range of speakers (<http://www.grc.uri.edu/programs/2002/physmet.htm>) was present at this year's conference. You can also see that each presentation is scheduled for a full hour - with a generous (but still insufficient!) 20 minutes reserved for questions and discussion. These discussions were very interesting, with some presentations generating a very useful debate on what is not known.

Another oddity is the schedule itself, with sessions running far later into the evening than other conferences and (apparently) nothing happening during the bulk of the afternoon. In fact there is quite a lot going on in the afternoon. The conference was on a rural boarding school campus away from the distractions of a city and with a great many recreational facilities. So if (for instance) a relative newcomer to the field (like myself) wanted to spend the afternoon in the company of a couple of leaders in the field, this could be done while walking around Rattlesnake Mountain (so named because there are no rattlesnakes anywhere near it, apparently).

As you may have guessed, the unstructured time in the conference schedule gave me the richest rewards, generating some good ideas for myself and others and making valuable contacts. I presented a poster on my research, specifically on the problems and possible solutions for generating channelling / crystal orientation contrast from hot (>400°C) metal specimens in the SEM (the object being to directly image moving grain boundaries). The poster seemed to be well received. I would not hesitate to go to a Gordon conference in future, if there should happen to be one relevant to my work at the time. You can find a listing of topics for 2003 at www.grc.uri.edu (Three Dimensional Electron Microscopy looks like it may be of interest to EMAG members).

I would like to thank The EMAG group, the Gordon organisation and my wife for their contributions toward the cost of my attendance at this conference. It would not have been possible otherwise.

*Iain Fielden, Sheffield Hallam
sponsored by EMAG bursary*

Microscopy and Microanalysis 2002, 4-9 August, Quebec

Microscopy and Microanalysis 2002 was held in Quebec, Canada between the 4th and 8th August. A wide range of symposia covered both biological and physical science applications of electron microscopy. My main interest in this conference was the excellent symposia arranged to honour the contributions of Akira Tonomura and Hannes Lichte in the field of electron holography. The conference attracted considerable interest in this field, and prompted some interesting discussions, in particular on the application of electron holography to real materials problems. I gave an oral presentation in one of the holography sessions, and all of the main research groups working in this field also presented their recent work. Additional sessions of interest included the symposia on recent developments using the focused ion beam as a sample preparation technique for electron microscopy. Quebec provided an interesting setting for the conference, although rather hilly for those used to Cambridge!

*Alison Twitchett, University of Cambridge
sponsored by EMAG bursary*

13th International Conference on Textures of Materials, Seoul, Korea, 24-31/08/02

The International Conference on Textures of Materials (ICOTOM) series has taken place every three years since 1968. The conference themes focus on all issues related to texture including texture measurement, texture evolution and texture control. Therefore, the conferences are attended by researchers involved with texture issues from a wide range of disciplines and both from academic and industrial backgrounds.

This year, ICOTOM was held in Seoul, Korea and covered a number of broad themes including sessions on measurement and instrumentation, deformation and annealing textures as well as computer modelling. Many materials were included such as aluminium, steel, rocks, ceramics, polymers, intermetallics, composites and thin films. During the week there were six plenary lectures covering each of the major topics. In my opinion, of particular interest was a presentation on the "3DXRD" microscope (Risø National Laboratory, Denmark), which generates three dimensional orientation maps using high energy x-rays from a synchrotron source (ESRF, Grenoble). Although in the early stages of development, the results compare favourably with orientations measured by other methods, and the scope for generating insightful results using this technique feels, to me, almost

boundless. I look forward to hearing more about it, and hopefully, having the opportunity to make use of it in the future.

My own interest at the ICOTOM conference was primarily concerned with the application of Electron Backscatter Diffraction (EBSD) on the SEM. Researchers now routinely use EBSD to solve problems related to, for example, the mesotexture, microstructure as well as for bulk texture measurements. Because of the recent improvements to EBSD software and hardware, the time taken to produce an orientation map has reduced dramatically. Some of the presentations were reporting on EBSD measurements taken during in situ heat treatment, for instance. These newer techniques are clearly useful for providing evidence for particular mechanisms of the annealing behaviour. However, because of the greater level of detail provided by the EBSD data, it seems that new questions to old problems can also be generated.

Despite the progress of the EBSD technique, a key feature of the conference was the problem of mismeasurement by the EBSD software. This is especially relevant to my work, the application of EBSD to permanent NdFeB magnetic materials. Even for materials that are traditionally easy for the EBSD software to calculate such as simple aluminium alloys and low alloy steels, it is apparent that some orientations may be more difficult to measure than others, giving lower quality and to some degree, less reliable measurements. I had many useful discussions on these topics with my fellow delegates both from academic backgrounds as well as from the EBSD software companies. I was lucky enough to secure three possible future collaborations with EBSD experts who are keen to get involved in the new application of NdFeB magnets. This would be a great benefit to myself, as well as others in my research group at Birmingham.

In general, I found my attendance at the conference a valuable opportunity to reflect on the present status of EBSD and texture measurement in the international community and I look forward to being involved in its exciting and varied future. I am very grateful to EMAG for supporting my trip.

*Sarah Lillywhite, Birmingham
sponsored by EMAG bursary*

17th European Conference on Biomaterials, including the Second Young Scientists Forum, 11-14 September 2002, Barcelona, Spain

The scope of the conference was biomaterials and more specifically the bioactivity of biomaterials, their mechanical properties and their interaction with the human body, e.g. contact with blood, cells and bone, in addition to the mechanisms of cell adhesion and proliferation. Also, several possible modifications of existing biomaterials were introduced and discussed alongside novel methodologies for biomaterials characterisation. Exploitation of tissue engineering technology and drug delivery in the context of biocompatibility issues, e.g. with the risk of implants producing of an inflammatory response from the human body, was also incorporated into the oral and poster presentations.

Interesting presentations included the 'preparation of bioactive metal by anodic oxidation treatment'; 'microstructural characterisation of the multilayered titanium - based alloys'; 'cellular response to titanium discs during the first implantation week in bone'; 'TEM investigations of the microstructure of surface treated Ti - based alloys for prosthesis applications'; 'lateral and depth distribution of alloying elements in anodic oxide layers on Ti6wt%Al4wt%V and Ti6wt%Al7wt%Nb'; 'bioactive sol - gel derived titania and silica coatings on titanium' and 'effect of surface stresses on the biocompatibility of NiTi'.

Participation at this conference constituted a great opportunity at the most appropriate time during my final year of Ph.D. study to present my work to a broad society of researchers in this field. My studies are concerned with the rapid near surface characterisation of Ti- and NiTi-based biocompatible coatings. It was particularly useful to participate in the 2nd Young Scientists Forum, held for the benefit of European Ph.D. researchers in biomaterials science. Voluntary oral presentations for five minutes were suggested for every poster presentation, which gave me the opportunity to present my work to a small audience and thus, to receive valuable feedback. Following discussion, very good agreement was found to exist between my results and those from other studies, such as the

identification of elements or the persistent abnormal absence of others in biocompatible coatings, which introduced the basis for a constructive dialogue. The conference supplied me with a wider awareness of the application of biomaterials.

*Spyridoula Marlafeke, University of Nottingham
sponsored by EMAG bursary*

COMMITTEE MEMBER REPORTS FROM MEETINGS

Report on EMAG sponsored sessions at RMS Microscience 11 July 2002

ExCel Exhibition Centre, London Docklands, U.K.

The biennial RMS Conference Microscience 2002 took place in a new venue of the ExCel Centre at London Docklands between 9th and 11th of July 2002. The major highlight for general microscopists was the impressive exhibition and associated manufacturer and academic workshops which we expect to form a significant part of EMAG 2003 in Oxford. It also provided an opportunity to see the shell of the Millennium Dome across the Thames and to consider how many microscopes and microscopists that would have funded!

EMAG aided in the organisation and finance of two scientific sessions which formed part of the scientific programme on one of the conference days devoted to the Physical Sciences, Thursday July 11th. The first session was on Energy Filtered Imaging in the TEM and attracted around 55 delegates, here the expertise of Prof Christian Colliex from Orsay in France and Dr Paul Midgley from Cambridge outlined the two principle techniques for data acquisition: Spectrum Imaging in a scanning TEM which records a complete energy loss spectrum at every scanned specimen pixel (which will be the mode of operation of the new SuperSTEM facility), and the alternative Imaging Spectrum technique in a conventional TEM. The latter employs a stack of images recorded at progressively increasing energy loss. After appropriate data processing, both techniques allow for the complete mapping of the micro- and nanostructural variations in the recorded energy loss spectrum within a given sample area. Good discussion on the relative merits of these two techniques for the imaging, analysis and energy filtered tomography of different specimens ensued. Clearly these techniques are well placed for the full characterisation of nanostructures, including biological systems.

Later in the day the second SuperSTEM workshop was also held and followed on from the first workshop at EMAG 2001 in Dundee. Dr Pete Nellist from the NION company in Seattle and Dr Andrew Bleloch, the technical director of the UK SuperSTEM project, outlined the design, fitting and performance of the new aberration corrector installed on SuperSTEM I a few months prior to the conference. We also heard news of aberration correctors installed on two machines at IBM and Oak Ridge National Laboratories in the US. Around 40 delegates attended this late session which later continued in a Dockland's hostelry. All in all a scientifically successful day and a good chance to hear some very interesting workshops from the major manufacturers about their latest products and to visit a number of stands and catch up on new developments.

Rik Brydson

EMAG One Day Meeting

**Microscopy of Biomedical Materials and Biocompatible Thin Films (*plus EMAG AGM*),
Wednesday 18 September 2002, The Institute of Physics, 76 Portland Place, London W1N 3DH**

Some 20 academics and industrialists attended this first EMAG meeting on The Microscopy of Biomaterials and Biocompatible Thin Films. The aim of the meeting was to bring together research workers with an interest in the fine scale assessment of biomaterials and of biological cell / engineering template interactions in particular. Accordingly, developments in the assessment of bone analogues were discussed alongside metallic implant materials, with contributions covering aspects of ESEM, HREM, tilt series-SEM, EPMA, nanoSIMS, AFM, X-ray microtomography and confocal laser scanning microscopy. In particular, excellent presentations by Serena Best (Cambridge),

'Looking at Apatites'; Jan Czernuszka (Oxford), 'Examination of bone analogues'; Colin Scotchford (Nottingham), 'Microscopical investigations of biological responses to orthopaedic materials'; and Alan Brain (Smith and Nephew), 'Biomaterial Surface Characterisation' framed the day. In addition, Karen McKinlay (Nottingham) compared SEM, ESEM and confocal imaging of human osteoblast / titania interactions, which was complemented by a theoretical view of the modelling of cell-material interactions c/o Jim Oliver (Nottingham) presented in his typically enthusiastic, inspirational style. Further, presentations by Alan Boyde and Karen Hing enabled comparison of an improved depth of field tilt series SEM technique with X-ray microtomography for the assessment of osseointegration and osteoporosis. The success of any such gathering can be gauged by the efficient organisation (many thanks to Sara Sommerville and 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 Organiser

ELECTRON MICROSCOPY AND ANALYSIS GROUP

FUTURE MEETINGS OF INTEREST

Forthcoming Institute of Physics and Royal Microscopical Society meetings of interest are briefly listed:

2003

20-24 January
Early Spring School of Electron Microscopy (RMS event)
University of Manchester

31 March – 4 April
Microscopy of Semiconducting Materials
University of Cambridge
<http://physics.iop.org/IOP/Confs/MSM>

4 April
NanoFIB 2003 (RMS event)
University of Cambridge

6-9 April
CMMP 2003 – EMAG sponsored Nanoscale Physics and Technology Symposium
Queen's University, Belfast.

7-8 April
Scanning Probe Microscopy Meeting (RMS event)
University of Swansea
<http://www.swansea.ac.uk/ukspm2003>

9-10 April
EBSM 10th Anniversary Meeting (RMS event)
University of Wales, Swansea

22-24 April
Biomaterials IV (RMS event)
Aberystwyth

14 July
FEGTEM V (RMS event)
Leeds

3-7 August
Microscopy and Microanalysis 2003
San Antonio, USA
<http://www.msa.microscopy.com>

2 September
EMAG Advanced School
Oxford University

3-5 September
Electron Microscopy and Analysis Group Conference
Oxford University
<http://physics.iop.org/IOP/Confs/EMG/>

ELECTRON MICROSCOPY AND ANALYSIS GROUP

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/>

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

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Title of Course	
Date of Course	
Place of Course	

FINANCIAL DETAILS		
Estimated Expenditure	Registration Fee	
	Travel Costs	
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	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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Please send completed form and

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

to : Dr. DW McComb, Department of Chemistry, Joseph Black Building, University of Glasgow, Glasgow, G12 8QQ.