

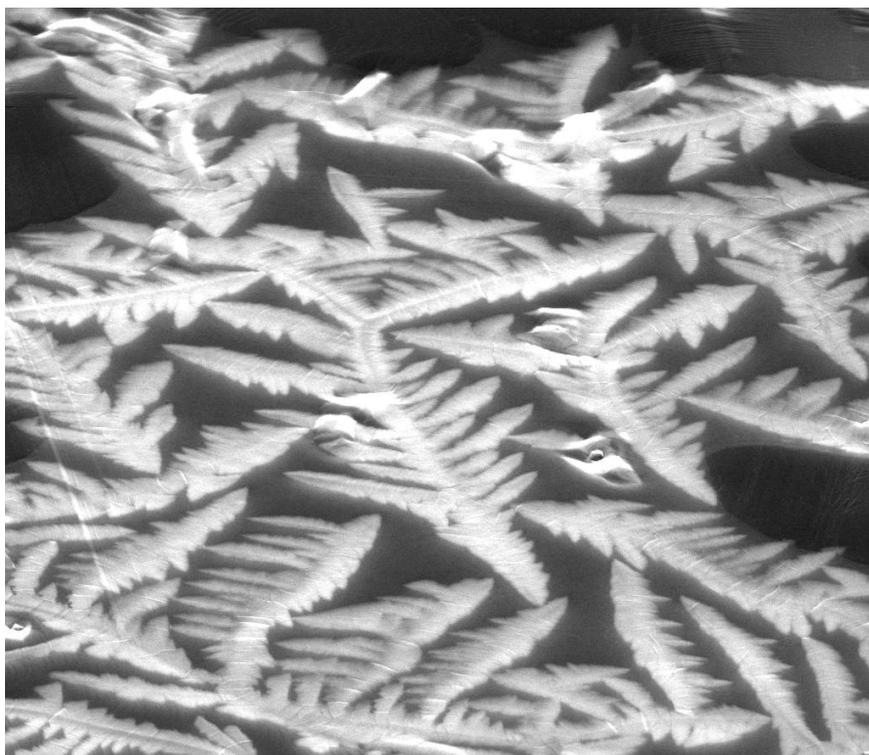
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**IOP** | Institute of Physics  
**Electron Microscopy and  
Analysis Group**

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**NEWSLETTER**

**January 2013**



*Boron nitride dendrites on a cobalt surface, SE image (C. Ducati)*

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Dr Peter O'Toole

Dr Roland Kröger

Prof Steve Tear

Dr Vlado Lazaro

Prof Jun Yuan

## LETTER FROM THE CHAIR

Dear friends and colleagues,

First of all I would like to take this opportunity to wish you all the best for an enjoyable and fruitful 2013. Those of us on the EMAG committee obviously have the forthcoming EMAG2013 conference in York very much in our thoughts, and we hope to see many of you joining us in September. We will be inviting contributions across a wide range of subject areas in electron microscopy. Additionally, EMAG2013 will include a special day-long celebration of the contribution of Prof. Archie Howie to electron microscopy in honour of his 80<sup>th</sup> birthday, with a special focus on *in-situ* microscopy. All in all, it promises to be an excellent scientific meeting and, we hope, a worthy addition to the longstanding EMAG conference series.

Thinking back over the last year, I was very impressed with the European Microscopy Congress in Manchester in September and others I have spoken to since had very much the same impression. Certainly, the oral sessions were very well attended and, in some cases, it was standing room only at the back! The poster sessions were similarly well attended and the exhibition was excellent. Finally, the venue was a great find, combining a good range of symposium halls with an excellent exhibition, poster and catering space. This all reflected very well on the microscopy community in the UK, and whilst the lead organisation was undertaken by the RMS, EMAG was certainly well represented in the organisation.

In view of this, there have been suggestions that this could serve as a template for future broader-based microscopy conferences in the UK. An initial discussion between key members of the EMAG and RMS was held recently, and there was broad agreement that this should be explored in more detail. Such ideas will be discussed further at RMS council and the EMAG committee and more concrete proposals will be developed in the coming months, but this could, for example result in a joint EMAG-RMS meeting in 2015. Watch this space for further information...

Looking slightly further back in the year, EMAG organised a joint meeting at the University of Oxford in honour of Prof. Mike Whelan, including a day conference on *Quantitative Interpretation of TEM Imaging and Diffraction Data* followed by talks about Mike's career from his former colleagues, and a dinner in his college, Linacre College. I think those of us who were able to attend this found it an excellent focused scientific meeting, followed by a very enjoyable celebration and dinner with many humorous anecdotes from the earlier days of electron microscopy in the UK.

Finally, 2012 has been an excellent year for the inauguration of new microscopes in the UK, with new instruments installed in Glasgow, Manchester and Warwick, each with unique capabilities that the local academics will be delighted to tell you about. There are mechanisms for getting access to these world-leading machines and they are there to benefit nanoscience across the UK and not just the individual universities. If I had a wish for 2013, it would be that the UK microscopy community continues to build on its excellent collaborative nature so that we can make the most of the fantastic facilities provided by our research funders to do some truly novel and world leading science.

With all best wishes

Ian MacLaren

## EMAG ANNUAL GENERAL MEETING

The AGM of the EMAG group was held in Oxford on Friday 20<sup>th</sup> July 2012 at 4 pm, alongside the 1-day meeting in honour of Mike Whelan. At the meeting Ian MacLaren was elected Chair and Cate Ducati was elected Secretary / Treasurer of the Group.

## EMAG2013

EMAG 2013 will take place at the University of York between the 3<sup>rd</sup> and the 6<sup>th</sup> of September 2013. Please put this date in your diaries! The local organisers are:

Prof Ed Boyes  
Prof Pratibha Gai  
Dr Roland Kröger  
Dr Vlado Lazarov  
Dr Peter O'Toole  
Prof Steve Tear  
Prof Jun Yuan

The conference website is at <http://www.emag-iop.org/>

Plenary speakers for this event have been confirmed as Prof. Ahmed Zewail (Caltech, USA), Prof. Pratibha Gai (University of York), Prof Archie Howie (University of Cambridge). One of the highlights of the meeting will be the Symposium on “*In situ* microscopy: developments and applications”, to be held in honour of Prof. Archie Howie’s 80<sup>th</sup> birthday.

The deadline for submission abstracts is the 15<sup>th</sup> of March 2013, with conference papers to be submitted by 30<sup>th</sup> of June 2013.

We will also be running three Short Courses in advance of the main conference, which will this time concentrate on Aberration Correction (full day), Spectroscopy (half day), and Image Simulation (half day). These will be ideal for students and postdocs looking for further training in the latest techniques and will combine talks from acknowledged experts with practical exercises using the excellent facilities present at the University of York. Please register early to avoid disappointment.

## MAGTEM OPENING AT GLASGOW

The official opening and launch meeting for the new JEOL ARM200F at Glasgow, MagTEM was held on 2<sup>nd</sup> July 2012 with the opening performed by Dr Alasdair Allan, Scottish Government Minister for Learning, Science and Scotland's Languages. Invited talks were given by Prof. Sir Colin Humphreys and Prof. Christian Colliex, and Dr Masashi Iwatsuki and a scientific symposium was held with speakers from several institutions within SUPA, the Scottish Universities Physics Alliance.



L-R: Dr Alasdair Allan MSP, Prof. John Chapman, Dr Masashi Iwatsuki (JEOL Ltd.), Prof. Christian Colliex (Université Paris-Sud), Prof. Sir Colin Humphreys FRS (University of Cambridge), Prof. Alan Craven

The new microscope offers unprecedented STEM resolution in field free space for magnetic studies, as well as providing an excellent platform for atomic resolution STEM imaging, EEL spectroscopy, EDX spectroscopy and simultaneous EDXS/EELS. Since Glasgow is a member of the SuperSTEM consortium, it is possible for any UK-based scientist to apply for time to utilise the unique features of this microscope via a SuperSTEM proposal.

## WARWICK MICROSCOPY OPENING SYMPOSIUM

The new microscopy centre in the Department of Physics at the University of Warwick was celebrated by a day of presentations and discussion on 4 July 2012. The speakers were Rafal Dunin-Borkowski (Jülich), Ursel Bangert (Manchester), Peter Nellist (Oxford), Andy Brown (Leeds) Thomas Walther (Sheffield), Kazu Suenaga (AIST, Japan) and Paul Midgley (Cambridge). The event was well attended, with over 150 people at the meeting coming from across the UK. The centrepiece of the new centre is a doubly-corrected ARM200F TEM with a Gatan Quantum EELS spectrometer and Oxford Instruments SDD-EDX detector (pictured). All of those in the microscopy group at Warwick (Richard Beanland, Jeremy Sloan, Ana Sanchez and Neil Wilson) are very grateful to JEOL and Gatan for their sponsorship of the event.



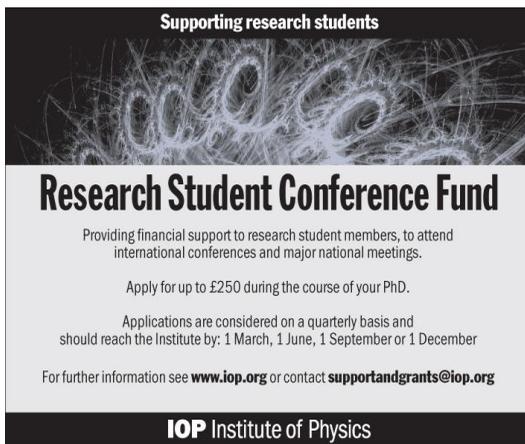
The new Jeol ARM200 installed at Warwick (R. Beanland)

## SUPERSTEM UPDATE

It is now more than a year since SuperSTEM was funded for a further five years by the EPSRC, as one of its mid-range facilities. In that time, more than 50 proposals for research projects have been received, covering a diverse range of topics in nanoscience. The SuperSTEM team were also successful in winning additional capital investment from the EPSRC to allow the purchase of a new monochromated / chromatic aberration corrected STEM. This has been ordered and is due for delivery in late 2013. Initial results from NION suggest that energy resolutions of  $< 20$  meV will be possible, which will enable a whole range of spatially-resolved studies of low energy excitations such as vibrational spectroscopy, electronic transitions, and surface and interface plasmons. Initial results from monochromation suggest that the resolution at low energies down to 40 kV will be significantly improved, which will allow true atomic resolution in a variety of relatively soft materials. It may be an opportune moment to consider what new science could be enabled by such a world-leading instrument and to start considering how to make use of this once it is installed.

## IoP RESEARCH STUDENTS CONFERENCE FUND

If you are a student member and are looking for funding to attend a meeting or conference, please apply for an RSCF bursary, which may give you up to £250 towards your costs. We have several of these bursaries to give away each year. Check eligibility criteria and download the form at [http://www.iop.org/about/grants/research\\_student/page\\_38808.html](http://www.iop.org/about/grants/research_student/page_38808.html)



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## EMS MEMBERSHIP

EMAG members are reminded that they are all 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.

Send your e-mail address (and preferably your other details, postal address, phone & fax numbers) to:

[secr@eurmicsoc.org](mailto:secr@eurmicsoc.org)

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 dispatch of information by the EMS secretary (Prof. Dr. D. Schryvers).

The EMS web page can be viewed at: <http://www.eurmicsoc.org/>

EMAG members are also reminded of the availability of EMS Bursaries. For more details, see

<http://www.eurmicsoc.org/scholarships.htm>

## MEETING REPORTS

### 1-DAY MEETING “QUANTITATIVE INTERPRETATION OF TEM IMAGING AND DIFFRACTION DATA” AND MIKE WHELAN CELEBRATION

Oxford, 20<sup>th</sup> July 2012

Prof. Pratibha Gai, University of York, photo by Prof. Ed Boyes

The EMAG one-day meeting on “Quantitative Interpretation of TEM Image and Diffraction Data” was held on Friday 20 July 2012 at the Department of Materials, University of Oxford. This meeting was organized by Professor Peter Nellist (Oxford) and Dr. Ian MacLaren (Glasgow) and was dedicated to Professor Mike Whelan, FRS, for his 80<sup>th</sup> birthday and to celebrate his pioneering contributions to electron microscopy. Excellent speakers and participants from across the UK and abroad attended the international meeting. The aim was to bring together Mike’s colleagues and collaborators to share the richness of working with Mike and highlight his many scientific contributions to electron microscopy.

Prof. Nellist welcomed the participants and opened the scientific symposium. Among the invited speakers, Professor Paul Midgley (Cambridge) considered recent developments in precession electron diffraction and its use in the determination complex crystal structures routinely. Professor John Rodenberg (Sheffield) charted the course of ptychographic electron microscopy using high angle dark field scattering for sub nano-metre resolution imaging and lensless imaging via iterative solution of the diffraction phase problem. Professor Sandra Van Aert (Antwerp) described advances in model-based (S)TEM, with examples of quantitative STEM. Professor Angus Kirkland spoke of his research on through-focus imaging and exit wave reconstruction in the aberration corrected high resolution TEM. Other speakers provided equally compelling glimpses of their leading edge research: Rowan Leary, a research student at the Department of Materials, Cambridge, on his latest work on compressed sensing electron tomography for quantitative 3-Dimensional nano-metrology; Dr. Richard Beanland (Warwick) on digital electron diffraction; Dr. Budhika Mendis (Durham) on Bloch wave scattering by dopant atoms; Dr Vlado Lazarov (York) on atomic scattering by half-metal Heuslers by EM; Dr. Ian MacLaren (Glasgow) on quantitative 3D atomic structural recovery in oxide nanostructures; Prof. Pratibha Gai and Prof. Ed Boyes (York) on their recent developments of aberration

corrected (AC) environmental electron microscopy at the sub-Angstrom level; and Dr. Jeremy Sloan on AC-TEM of carbon nanotubes. All the presentations (invited and contributed) were outstanding.

After the mid-break, Prof. Sir Peter Hirsch, FRS (Oxford), highlighted Mike's important contributions to diffraction contrast transmission electron microscopy (TEM), including his observations of dislocations at the Cavendish Laboratory. Professor Archie Howie, CBE, FRS, (Cambridge) introduced Mike's illustrious career stages, his pioneering work on quantitative TEM, including on dislocations and their motion and the important collaborations between them which led to the development of the Howie-Whelan equations for understanding diffraction contrast in the TEM. Dr. Sergei Dudarev (visiting professor) described his collaboration with Mike on high energy electron microscopy and his current interests on nano-scale dynamics. Some examples of the day's proceedings can be seen in the attached photographs: (photographs: courtesy of Professor Ed Boyes, University of York).

The international symposium was a great success and this was followed by an enjoyable dinner at the Linacre College, Oxford, with an after-dinner speech by Prof. John Steeds, FRS (Bristol). The organisers thanked the IOP for their kind sponsorship of the symposium, the attendees for their informative contributions and participation, and Katherine Hartwell of the Materials Department, Oxford, for ensuring the smooth running of the proceedings.



*Prof. Archie Howie and Mike Whelan at the meeting*

## EUROPEAN MICROSCOPY CONGRESS

Manchester, 16<sup>th</sup>-21<sup>st</sup> September 2012

By Katherine MacArthur, University of Oxford

This summer I had the pleasure of attending both the congress and the satellite SuperSTEM summer school running beforehand. After a year of training to use a STEM I really learnt a lot from the summer school and especially enjoyed meeting some of the leaders in the field.

The conference itself was well attended with well over 3000 people through the doors in total, accumulating to 1200 contributed papers. I contributed a poster to the Professor David Cockayne Memorial Symposium on advances in EM instruments and methods. The talks of this session showed a great variety of directions for improvements including low voltages, progresses in corrector technology and scanning confocal electron microscopy.

I personally found it very useful, not only because this was my first international conference, but also due to the variety of groups now genuinely tackling the problem of quantified STEM imaging. The main focus of quantification appears to be looking at semi-conductor materials, in particular looking at the interfaces between different types.

The 3D/4D imaging was a particularly well attended sessions with an overflow of people needing to stand at the back. I believe this is indicative of the current trend in electron microscopy where people are no longer satisfied with a two dimensional image. The session was opened by invited speaker Sara Bals from the University of Antwerp where she discussed their work on atomic-scale electron tomography.

## FUTURE MEETINGS OF INTEREST

Microscopy of Semiconducting Materials, MSM XVIII, 7-11 April 2013, University of Oxford, UK

[http://www.rms.org.uk/events/Forthcoming\\_Events/msm2013](http://www.rms.org.uk/events/Forthcoming_Events/msm2013)

EMAG2013, 3-6 September 2013, University of York, UK

<http://www.emag-iop.org/>

18<sup>th</sup> International Microscopy Conference, 7-12 September 2014, Prague, Czech Republic

<http://www.imc2014.com/>

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<http://www.eurmicsoc.org/index.html>

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, 12100 Sunset Hills Rd., Suite 130,  
Reston, VA 20190, USA.

Tel: +1 703 234 4115, Fax: +1 703 435 4390

<http://www.microscopy.org/>

RMS: Royal Microscopical Society, 37/38 St. Clements, Oxford, OX4 1AJ.

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Email: [meetings@rms.org.uk](mailto:meetings@rms.org.uk) <http://www.rms.org.uk/events/>

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