Conference Programme

This Conference Programme booklet is kindly sponsored by:

JEOL
Executive Scientific Organising Committee

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RMS Honorary Secretary Biological Science

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Professor Ana Sanchez
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Dr Alison Dun
Chair, Scottish Microscopy Society

General Information

Registration
The Registration Desk in the entrance hall of Manchester Central will be open during the following times:
Monday 1 July: 0930 – 1930
Tuesday 2 July: 0800 – 1800
Wednesday 3 July: 0800 – 1800
Thursday 4 July: 0800 – 1500

Organisers Office
The Organisers Office is located by the Registration Desk. It can also be contacted by telephone: +44 (0)161 827 7641.

Badges
Participants and exhibitors are kindly requested to wear their badges during all congress events. Admittance to the scientific sessions, exhibition and social events may be refused if the required badge cannot be presented.

Wifi
Free wifi is available throughout Manchester Central. Details are available at the Registration Desk.

Congress App
The mmc2019 Congress App gives you access to the full conference and exhibition programmes and all the talk and poster abstracts. You can plan your own schedule of talks, add notes to each of them which you can send to yourself so they will be waiting in your inbox when you get back to work.

The app will also allow you to find out more about the exhibiting companies, vote for your favourite micrograph in the RMS Scientific Imaging Competition and network with other delegates who may have heard speak or who have authored a poster that stood out.

The mmc2019 Congress App is available to download for free from your app store, just search for mmc2019.

Refreshment Breaks
Tea, coffee, water and catering areas for lunch are available throughout the day in the exhibition hall. Thank you to JEOL for their sponsorship of the tea and coffee and to TESCAN for sponsoring the reusable water bottles and water coolers.

Transport and Parking
Information on travelling to and around Manchester is available on the Visit Manchester website – www.visitmanchester.com/travel

Exhibition Opening Times
The exhibition will be open as follows:
Tuesday 2 July: 0915 – 1800
Wednesday 3 July: 0915 – 1800
Thursday 4 July: 0900 – 1500

Poster Sessions
The poster sessions will take place in the exhibition hall at the following times:
1. Tuesday 2 July: 1600 – 1800
2. Wednesday 3 July: 1600 – 1800
3. Thursday 4 July: 1200 – 1315

A selection of refreshments will be available during the poster sessions. Thank you to JEOL for sponsoring these sessions.
Meetings & Workshops

Monday 1 July 2019, Workshops

Three mmc2019 workshops will take place on Monday 1 July in Manchester Central. They are a great way to learn the most up-to-date tips and techniques to help with your research. The three confirmed workshops are:

**ImageJ Workshop**

1330 - 1630, Cobden Rm 3
Scientific Organiser: Dr Kees Straatman (University of Leicester, UK)

ImageJ is a powerful public domain image processing and analysis program written in Java, freely available for download from the internet. Fiji is an ImageJ distribution focused on the visualization and analysis of microscope images in 2D, 3D, 4D and 5D.

This workshop gives a brief introduction on the use of ImageJ/Fiji and will account for all learning styles as a mix of lectures, demonstrations and hands-on sessions.

**SPM Workshop**

1330 - 1630, Cobden Rm 4
Scientific Organisers: Professor Sonia Cantera (University of Oxford, UK), Dr Charles Clifford (National Physical Laboratory, UK) & Dr Oleg Kolosov (Lancaster University, UK)

This workshop provides an advanced introduction to Scanning Probe Microscopy (SPM) at a level suitable for graduate students who have started using or developing SPM in their own research, and for experienced electron and optical microscopists who would like to know how they could use SPM. The workshop will cover imaging and force measurements in atomic force microscopy, the most ubiquitous form of SPM, with an emphasis on the practical knowledge and tips required for effective application in the areas of material science, energy materials, and biomedicine.

The workshop will include presentations and associated hands on practical demonstrations, supported by SPM instrument manufacturers. There will also be ample opportunity to discuss your specific applications and problems with the expert presenters.

**EMAG Workshop - Deep Learning**

1330 - 1630, Cobden Rm 2
Scientific Organiser: Dr Donald MacLaren (University of Glasgow, UK)

With recent advances in detector and camera technologies, the rapid acquisition of images, diffraction patterns or spectroscopic signals is propelling advanced electron microscopy to enter a new phase. The practice of working with a few images or spectra is increasingly being replaced by rapid acquisition and analysis of large datasets of images and multidimensional spectra, with gigabyte dimensions. Examples are time-lapse movies of In Situ experiments, systematic images series in ptychography, exit wave reconstructions and tomography, or hyperspectral imaging for elemental and functional localization.

An emerging trend is to take advantage of increased hardware capabilities and the equally rapid advance in data science to analyse these huge datasets more efficiently and to providing statistically meaningful information about the analysed materials to yield insights that were not previously possible.

This workshop introduces the concepts, applications and practical details of applying some of these data science techniques to the analysis of microscopy images and spectra. It will begin with an overview by Prof. Paul Rees of Swansea University, who will demonstrate applications of data science in image analysis. This will be followed by a hands-on demonstration of deep learning for image, text and sound analysis to provide a taste of building your own machine learning model for pattern recognition, facilitated by Dr Coorous Mohtadi, Deep Learning Engineer at Mathworks. A web-based version of MATLAB will be provided for the participants of the workshop.

Monday 1 July 2019, Meetings

The Microscience Microscopy Congress brings together a number of smaller meetings, allowing you to meet and discuss with colleagues working in your field as well as with cross-disciplinary peers, all at the same event.

As part of mmc2019 these will include:

**BiolImagingUK Meeting - Monday 1 July**

1330 - 1630, Central 3, 4
Scientific Organiser: Professor Maddy Parsons (King’s College London, UK)

This meeting provides an opportunity for the UK Bioimaging community to discuss priorities and strategies in training, development, careers and ways to share knowledge across different disciplines. The session will consist of short talks from members of the BiolImaging UK organising committee, BBSRC, and industrial/institute collaboration partners (Royce, RFL, Faraday) to update on progress, new opportunities and initiatives. There will be interactive Q&A sessions to encourage discussion and enable emerging priorities and ideas to be highlighted.

The meeting is open to everyone with an interest in bioimaging.

**Early Career Pre-Congress Symposium - Monday 1 July**

1400 - 1630, Central 5, 6, 7
Scientific Organiser: Rebecca Thompson (University of Leeds, UK)

The RMS Early Career Pre-Congress Symposium is an event for early career microscopists (students and post docs) to network and present their work ahead of the main mmc conference.

The meeting will also include a keynote lecture, an introduction to the newly-formed RMS student council, and a networking activity. Overall this will be a fantastic opportunity to meet fellow microscopists ahead of mmc2019.

Tuesday 2 July 2019, Meeting

**Quality Control Focussed Interest Group Meeting**

1600 - 1800, Workshop 3
Scientific Organiser: Alex Laude (Newcastle University, UK)

With this inaugural Quality Control FIG Meeting we hope to kick-start discussions within the UK light microscopy community to address the issue of microscope QC initially focussing on widefield and confocal platforms but later expanding to super-res. The aim is to agree on what QC measurements to make, with what standard samples at what frequency to make them. We hope to incorporate standard QC sample manufacturers (Argolight, GATTAquant & Alex Corbett (Uni of Exeter)) as well as microscope manufacturers and image analysts. The goal is firstly to agree on QC practices but also automate the process of image capture, analysis and archive. To succeed will require a community effort and buy-in from all microscope manufacturers.

This meeting is free to attend, there is no need to book in advance nor register for the conference.
Friday 5 July, Satellite Meeting

Super-resolution Workshop - Friday 5 July, University of Leeds

Scientific Organiser: Professor Michelle Peckham (University of Leeds, UK)

Designed to talk about the current challenges in developing and using super-resolution microscopy with lots of time for discussion, this year the workshop will focus on the topic of labelling. Thoughts and ideas are encouraged to help define what is good/best practice around these challenging techniques, and give an insight into future potential developments.

Confirmed speakers include:
• Sian Culley, University College London
• Ulrike Endesfelder, MPI, Marburg
• Marisa Martin-Fernandez, UK Research and Innovation
• Izzy Jayasinge, University of Leeds
• Sebastian van de Linde, University of Strathclyde
• Brian Patton, University of Strathclyde

The cost of this workshop is £35. To register please visit the event page on the RMS website.

Associated Meetings

One of the great features of the Microscience Microscopy Congress Series is that it embraces established popular meetings to bring together different groups under one roof to network, learn, collaborate and of course, to enjoy one of Europe’s largest microscopy and imaging events.

The meetings and groups incorporated with mmc2019 are:

Frontiers in BioImaging 2019

The 8th meeting in the successful Frontiers in BioImaging series will be held during mmc2019.

Focusing on the latest biological applications and optical imaging developments, it brings together technology developers, application specialists and end users to share their work and future vision. The aim of the meeting is to create a network of multidisciplinary scientists focused on aspects of advanced imaging and its application.

With a mix of leading research leaders, their postdoctoral, PhD and technical staff, this is an ideal event for researchers to engage with a broad range of image approaches and to make useful contacts with key groups using similar technologies. We hope that this will lead to many future collaborations and ensure that recent funding awards are well promoted and benefits maximised.

The Frontiers in BioImaging sessions take place on 2 & 3 July, they are:
• Label-free Quantitative Optical Microscopy
• Biological Applications of Fluorescence Microscopy Beyond the Diffraction Limit
• Developments in Super-resolution Microscopy
• Light Sheet Microscopy: Imaging Complex Biological Samples in Time and Space
RMS SPM Meeting
The Annual RMS Scanning Probe Microscopy (SPM) Meeting will be held during mmc2019. This meeting is unmissable for anyone using SPM in their work or studies and will cover a wide range of topics associated with SPM including main techniques such as atomic force microscopy and scanning tunnelling microscopy as well as more specialised versions.

The SPM conference sessions at mmc2019 are taking place on 2 & 3 July, they are:

- Advancing Materials Science via Scanning Probes (This session is sponsored by Bruker & Scanwel Ltd)
- SPM of Soft and Biological Matter
- SPM: A tool for Pharmaceutical and Applied Biological/Biomedical Research
- Nanomechanics for Biology and Biomedicine

In keeping with the established EMAG traditions, EMAG 2019 will include:

- Three days of talks each with two parallel streams covering various electron microscopy themes in the life and physical sciences.
- Lively poster sessions.
- An impressive list of world class EMAG invited speakers.
- Plenty of social activities with opportunities to catch up with old friends and to make new ones.

But by being a part of mmc2019, EMAG delegates can enjoy:

- A larger than usual trade exhibition of microscopy and imaging equipment, with an expected one hundred companies demonstrating the widest range of equipment and consumables.
- Benefit from the opportunities for interaction and cross disciplinary discussions with participants from other complementary meetings occurring simultaneously in the same venue including Scanning Probe Microscopy and BioImaging UK.
- Links with more workshops and training events than were possible with a stand-alone EMAG, as well as opportunities for participants to contribute to the RMS International Scientific Imaging Competitions.

SMG & MSI Sessions
The Scottish Microscopy Society (SMG) & Microscopy Society of Ireland (MSI) are combining at mmc2019 to bring together sessions featuring research in life and material sciences.

Invited talks by members of both societies will be complemented by short presentations selected from submitted abstracts. The SMG and MSI hope to see not only members of their societies at the session, but also those who want to find out more about the work done by their members using the fabulous range of microscope facilities available in Ireland and Scotland.

The SMG & MSI sessions are taking place on Tuesday 2 July, they are:

- Applications of Super-resolution from the Nano to the Atomic Scale
- Trials and Tribulations of Electron and Light Beam Induced Radiation Effects

EMAG 2019
Organised by the Institute of Physics’ Electron Microscopy and Analysis Group (EMAG), the 2019 EMAG conference will be part of mmc2019.
The conference at mmc2019 will consist of six parallel streams comprising 35 sessions, with excellent speakers and vibrant supporting poster sessions.

The conference sessions are as follows:

**Scottish Microscopy Society (SMG) & Microscopy Society of Ireland (MSI) Sessions**

**SMG & MSI: Applications of Super-resolution from the Nano to the Atomic Scale**

Tuesday 2 July, 1000 – 1200, Central 5, 6, 7

All microscopy techniques come with their caveats; bleaching due to powerful lasers, cytotoxic effects, sample deformation due to sample prep or acquisition method. However many of these caveats can be transformed into an advantage to better resolve structure in both biological and non-biological materials. Some great examples of this include the use of: mechanical probes to examine the structure of small and soft natural polyhedral structures called Clathrin in AFM, highly powerful lasers to bypass resolution and reveal structure in super-resolution microscopies such as STED and RESOLFT as well as electron-beam probe effects in Electron Microscopy techniques. In this session we will hear more about these techniques and learn how accessible they are for you in your research.

Session Chair: Charlotte Buckley (University of Strathclyde, UK)

Invited Speakers: Ilaria Testa (KTH Royal Institute of Technology, Sweden) & Michael Lherbette (Heriot-Watt University, UK)

**SMG & MSI: Trials and Tribulations of Electron and Light Beam Induced Radiation Effects**

Tuesday 2 July, 1400 – 1600, Central 5, 6, 7

This session will address ways to overcome probe and dose induced issues, and moreover, to advantageously exploit beam and physical probes of varied properties (e.g., regarding dose, energy, strength) for characterisation of samples across the entire materials spectrum, using assessment by all types of (e.g., physical probe, light, electron) microscopy. Contributions are furthermore invited to demonstrate direct effects and result outcomes from visualising, imaging and spectroscopically assessing materials, ranging from inorganic to organic and bio materials.

Session Chair: Ursel Bangert (University of Limerick, Ireland)

Invited Speakers: Iike Arslan (Argonne National Laboratory, USA) & Patricia Abellan (Superstern and University of Leeds, UK)

**Frontiers in Biolumining Sessions**

**Frontiers in Biolumining: Label-free Quantitative Optical Microscopy**

Tuesday 2 July, 1000 – 1200, Charter 2

The session will cover methods to image biological cells and tissues label-free, including quantitative phase imaging, quantitative differential interference contrast microscopy (qDIC), vibrational microscopy (spontaneous Raman, coherent Raman), Brillouin microscopy, second and third harmonic generation microscopy, autofluorescence. Specific emphasis will be on quantitative techniques and image analysis methodologies.

Session Chair: Paolo Borri (Cardiff University, UK)

Invited Speakers: Daniele Fioretto (Università degli Studi Di Perugia, Italy) & Gabriel Popescu, (University of Illinois Urbana-Champaign, USA)

**Frontiers in Biolumining: Biological Applications of Fluorescence Microscopy Beyond the Diffraction Limit**

Tuesday 2 July, 1400 – 1600, Charter 2

The rise of super-resolution has involved the development of probes, labelling strategy, hardware acquisition software and analysis algorithms. With super-resolution system now commercially and widely available, new insight is now being generated on a range of biological frontiers. These include neuroscience, immunology, microbiology and others. This session will showcase this new understanding and is open to anyone developing, or just using, super-resolution to make new biological discoveries.

Session Chair: Dylan Owen (King’s College London, UK)

Invited Speakers: Daniel Davis (University of Manchester, UK) & Ulrike Endesfelder (Max Planck Institute for Terrestrial Microbiology, Germany)

**Frontiers in Biolumining: Developments in Super-resolution Microscopy**

Wednesday 3 July, 1000 – 1200, Charter 2

All the latest developments in light microscopes that beat the diffraction limit (STORM, PALM, SIM, STED etc.). Including the latest improvements in high resolution, high speed, multicolour, multimodal or correlative super-resolution microscopy. As well as developments in probes and algorithms. Plus anything else that involves making microscopes less blurry.

Session Chair: Seamus Holden (Newcastle University, UK)

Invited Speakers: Suliana Manley (EPFL, Switzerland) & Sebastian Van De Linde (University of Strathclyde, UK)

**Frontiers in Biolumining: Light Sheet Microscopy: Imaging Complex Biological Samples in Time and Space**

Wednesday 3 July, 1400 – 1600, Charter 2

The great potential of light sheet imaging is the ability to image dynamic biological events in 3D samples. This session will focus on the application of light sheet and other advanced microscopy techniques to imaging dynamic processes within complex 3D samples. It will cover the challenges of imaging fast events (such as the beating heart), events which occur over long periods of time (e.g. angiogenesis, embryonic development) or imaging biomolecules in thick tissue sections. It will also cover the multiplexing of light sheet with other modalities, such as super-resolution or multiphoton microscopy to help overcome these challenges.

Session Chair: Steve Thomas (University of Birmingham, UK)

Invited Speakers: Willy Supatto (Ecole Polytechnique, France) & Katrin Heinze (University of Würzburg, Germany)

**SPM Sessions**

**SPM: Advancing Materials Science via Scanning Probes**

Tuesday 2 July, 1000 – 1200, Central 3, 4

Development of modern materials and devices increasingly relies on their nanoscale structure and local properties. Scanning Probe Microscopy (SPM) plays a critical role in establishing connections between
the structure, physical and chemical traits on materials at the nanoscale and the final material performance. SPM is vital to both fundamental and applied research, creating paradigms for novel materials and guiding development of engineering devices. This symposium will report on the latest scanning probe developments advancing wide areas of materials science and engineering, and link the champions in the SPM field and leading material scientists establishing new synergetic collaborations.

This session is sponsored by Bruker & Scanwel Ltd

SPM: A tool for Pharmaceutical and Applied Biological/Biomedical Research

Wednesday 3 July, 1000 – 1200, Central 3, 4

The applications of scanning probe microscopy in Pharmaceutical and Biomedical research, in both industry and academia, are diverse. From studies into the fundamental basis of disease and the identification of new biological targets, to the characterization of physiochemical properties of drug-substances, the optimization of novel drug-delivery formulations and development new materials for cellular therapies and regenerative medicine. This session aims to provide an opportunity for researchers to present their latest research in this area. Abstracts are encouraged in all of the above areas.

Session Chair: Oleg Kolosov (Lancaster University, UK)
Invited Speakers: Cyrus Hirjibehedin (MIT Lincoln Laboratory, USA), Franco Dinelli (Istituto Nazionale Di Ottica, CNR-INQ, Italy) & Olga Kazakova (National Physical Laboratory, UK)

SPM of Soft and Biological Matter

Tuesday 2 July, 1400 – 1600, Central 3, 4

Scanning probe microscopy (SPM) techniques have unique capabilities for exploring the properties of soft matter and biological systems. These systems frequently have heterogeneous structural, mechanical and chemical properties that vary over length scales of just a few nanometres, can combine ordered and disordered regions, and often change dramatically with time, all impacting on their ultimate properties and function. This session will showcase the capabilities of SPM to help understand such complex systems, including applications to polymer and biological systems of imaging, measurement of mechanical and chemical properties, force spectroscopy and high speed scanning.

Session Chair: Jamie Hobbs (University of Sheffield, UK)
Invited Speakers: Alice Pyne (University College London, UK) & Felix Rico (Aix-Marseille University, France)

SPM: Nanomechanics for Biology and Biomedicine

Wednesday 3 July, 1400 – 1600, Central 3, 4

Nanomechanics using AFM offers the possibility to characterize biological samples at the nanonewton and picoforce scale in physiological conditions, often in conjunction with advanced light-based imaging. Given the multiparametric outputs and mapping possibilities of the latest instruments, larger areas can be explored and more mechanical estimates found, providing a richer mechanical picture that can be extended up to tissue and organ levels. Similarly, faster and more precise systems also have expanded the possibilities of force spectroscopy approaches to better characterize the mechanical behaviour of individual proteins or biomolecules. Finally, while nanomechanics expands its range towards smaller and larger scales, more complex mechanics models are being proposed to better characterize these increasingly-specialized experiments.

Session Chair: Stephanie Allen (University of Nottingham, UK)
Invited Speakers: Dimitrios Lamprou (School of Pharmacy, Queen’s University Belfast, UK) & Polina Prokopovich (Cardiff University, UK)

Life/Physical Sessions

Bio Applications: Imaging in Disease

Thursday 4 July, 0930 – 1130, Charter 2

Imaging cells in fixed samples and living tissue is transforming our view of disease progress from neurological disorders to cancer. This session aims to highlight the latest developments at high resolution and in vivo imaging with an emphasis on highlighting advances in the field. Contributions to this symposium are solicited from any area of research where imaging techniques are being applied to the study of human disease.

Session Chair: Claire Wells (King’s College London, UK)
Invited Speakers: Milka Sarris (University of Cambridge, UK) & David Entenberg (Albert Einstein College of Medicine, USA)

Imaging the Immune System

Thursday 4 July, 1330 – 1530, Charter 2

The immune system is a highly sophisticated and dynamic group of cells and organs that constantly have to adapt to maintain healthy tissues in the body. While, traditionally, flow cytometry has been the stalwart fluorescence workhorse of the immunology community, fluorescence microscopy techniques now provide fantastic platforms to enable researchers to delve into the behaviour of live immune cells, study population traffic, homing and signalling both in vitro and in vivo. This session will showcase the latest developments using imaging at high resolution and in vivo. Contributions to this symposium are solicited from any area of research where imaging techniques are being applied to the study of immunology.

Session Chair: Theresa Ward (London School of Hygiene & Tropical Medicine, UK)
Invited Speakers: Cristina Lo Celso (Imperial College London, UK) & Olivier Theodoly (CNRS, France)
Using Cryo-electron Microscopy to Investigate Macromolecular Structure

Tuesday 2 July, 1000 – 1200, Charter 4

The recent advances in cryo-electron microscope hardware and software have revolutionised the field. This session focuses on how both single particle and tomography data collection approaches, combined with method developments, are enabling cryo-EM to tackle increasingly complex biological questions.

Session Chair: Rebecca Thompson (University of Leeds, UK)
Invited Speakers: Holger Stark (Max Planck Institute for Biophysical Chemistry, Germany) & Werner Kühlbrandt (Max Planck Institute of Biophysics, Germany)

Correlative Microscopy

Tuesday 2 July, 1400 – 1600, Charter 4

Correlative microscopy is a combination of different microscopy techniques to observe the same object/event, enabling to extract more information and details than from a single method on its own. This has allowed the understanding of the dynamic behavior of cellular components and tissues, and their connections in different scales. This session will reflect the latest developments and applications of Correlative Microscopy in different research studies and areas.

Session Chair: Leandro Lemgruber (University of Glasgow, UK)
Invited Speakers: Wanda Kukulski (MRC Laboratory of Molecular Biology, UK) & Gaia Pigino (Max Planck Institute of Molecular Cell Biology and Genetics, Germany)

Imaging in the Big Data era: Large Data Sets Rich in Information

Wednesday 3 July, 1000 – 1200, Charter 4

Advances in technology are allowing us to image at unprecedented resolution with enormous fields of view. Where once relied on piecing together information from 2-dimensional images we are now capable of imaging in multiple dimensions across a multitude of length scales. With the increase in data acquisition capability the apparent complexity of the techniques is increasing. However, the imaging community is made up of people with differing, complementary, skill sets which are working together to make the techniques easier to interpret. Material scientists have been moving the technology forward increasing throughput and the number of layers of information. Biologists are developing and adapting specimen preparation techniques to maximise information gained from their samples. New techniques are increasing the amount of information that can be gleaned from the large data sets. Beyond the data collection, advances in computational techniques are allowing users to interrogate their data to find the new truths. New analysis techniques harness the power of large-scale computing resources and the latest computational methods, including machine learning. This session will highlight some of the ongoing development in 3D imaging techniques along with methods that allow us to interpret and extract meaning from huge complex imaging data sets.

Session Chairs: Tobias Starborg (The University of Manchester, UK) & Martin Jones (The Francis Crick Institute, UK)
Invited Speakers: Timothy Burnett (University of Manchester, UK), Louise Hughes (Oxford Instruments, UK), Minh Doan (Broad Institute, USA) & Anna Kreshuk (European Molecular Biology Laboratory, Germany)

Believing is More than Seeing: Learning and Models in Quantitative Imaging

Wednesday 3 July, 1400 – 1600, Charter 4

A new generation of supervised learning tools have emerged that may become the methods of choice for advanced image processing and analytics. Where once sophisticated edge detection algorithms were cutting edge, convolutional neural networks (CNNs) now rule. Applications for CNNs in segmentation, restoration, classification, and perhaps most exotically, content-based image retrieval are all demonstrated and may become routine. This session will explore applications for this new approach to computational modelling and will aim to assess whether it is time for widespread adoption across biological imaging.

Session Chair: Jason Swedlow (University of Dundee, UK)
Invited Speakers: Virginia Uhlmann (European Bioinformatics Institute - EMBL-EBI, UK) & Florian Jug (Max Planck Institute of Molecular Cell Biology and Genetics, Germany)

UK Applied Image Analysis (NEUBIAS UK and IAFIG-RMS)

Thursday 4 July, 0930 – 1130, Charter 4

The theme of this session is to highlight and showcase image analysis and to publicise some of the resources and opportunities available to this community from within the UK and beyond. Abstracts are invited to present any form of microscopy image analysis to the community although the emphasis is on shareable technology which is of practical interest. It could be a state-of-the-art technique provided as a shareable plugin or even a reimplementation or optimisation of existing code for example. Innovative pipelines of image analysis are also invited for presentation.

Session Chair: Dominic Waithe (University of Oxford, UK)
Invited Speakers: Gabriella Rustici (University of Cambridge, UK) & Shoaib Sufi (Software Sustainability Institute, UK)

In Situ Electron Microscopy Applied to Inorganic Materials

Tuesday 2 July, 1000 – 1200, Charter 3

Imagine being able to harness the imaging power of an electron microscope under the conditions of the systems that you would like to study, be it in liquid, gas, at temperature of with an applied electric field. Until recently this was the preserve of a few specialised labs, however, the rise of In Situ EM fuelled by MEMS device sample holders has seen a wave of research that was previously out of reach or considered not feasible. In this session we will explore the use of such technology, in particular with heating and biasing stages for research in materials sciences.

Session Chair: Chris Parmenter (University of Nottingham, UK)
Invited Speakers: Layla Mehdi (University of Liverpool, UK) & Marc Willinger (ETH Zurich, Switzerland)

In Situ Electron Microscopy Applied to Soft Matter and Biological Systems

Tuesday 2 July, 1400 – 1600, Charter 3

Imagine being able to harness the imaging power of an electron microscope under the conditions of the systems that you would like to study, be it in liquid, gas, at temperature of
FIB Microscopy and Sample Preparation

Wednesday 3 July, 1000 – 1200, Central 5, 6, 7

FIB microscopy has become highly flexible micro-laboratories, enabling high resolution sample preparation, 2D and 3D characterisation, nano-fabrication and rapid prototyping, in applications spanning from physical to biological sciences. This session will cover two important areas: (1) Novel FIB methodologies and applications and (2) Sample preparation systems/applications. Effective sample preparation is often the key to successful microscopy, and we encourage contributions that use FIB or a wide range of other techniques. The in-cooperated FIB & Prep User Group meeting provides an open forum to share experimental, theoretical and instrumentation advances and tips.

Session Chair: Xiang li Zhong (The University of Manchester, UK)
Invited Speakers: Joseph Michael (Sandia National Laboratories, USA) & Nabil Bassim (McMaster University, Canada)

Multimode Ion Beam Microscopy: Hybrid-techniques and Spectroscopy

Wednesday 3 July, 1400 – 1600, Central 5, 6, 7

The ability to combine focused ion beam (FIB) methods with the wide range of scanning electron microscopy (SEM) associated techniques, and advanced spectroscopies such as SIMS, has made modern FIB/FIB-SEMs multi-dimensional tools for nano-scale fabrication and chemical/structural analysis. In this symposium, we welcome contributions spanning analytical FIB imaging and spectroscopy (including EDS/SIMS), Xe, He and Ne FIB, hybrid FIB-SEM techniques, micro or nano-scale milling and 3-dimensional tomography/reconstruction, as well as electron- and ion-beam induced deposition. Innovative developments and novel studies from a variety of fields including engineering, Earth and material science, for fundamental research or technological applications, are intended to demonstrate the true versatility of modern FIB instruments.

Session Chair: Trevor Almeida (University of Glasgow, UK)
Invited Speakers: Amalio Fernandez-Pacheco (University of Glasgow, UK) & Annalena Wolff (Queensland University of Technology, Australia)

X-ray Microscopy: Beyond Attenuation Contrast Tomography

Thursday 4 July, 1330 – 1530, Central 5, 6, 7

X-ray microscopy encompasses projection, tomographic, scattering, and spectroscopic imaging techniques, of static or dynamic specimens. This session will explore imaging approaches and results that exploit physical properties of X-rays and microscopic objects, in modes other than static attenuation contrast. Studies using cutting edge synchrotron beamlines and more accessible laboratory systems and protocols will be welcomed.

Session Chair: Michael Doube (City University of Hong Kong’s College of Veterinary Medicine and Life Sciences)
Invited Speakers: Richard Johnston (Swansea University, UK) & Virginie Chamard (Institut Fresnel, France)

Quantitative Microscopy in Earth, Planetary and Archaeological Sciences

Thursday 4 July, 0930 – 1130, Central 5, 6, 7

Quantitative microscopic investigation is critical for advancing our understanding of scientific problems today. Researchers have access to a broad range of analytical equipment including, but not limited to, light, electron, and ion microscopy, secondary ion mass spectrometry, 3-D correlative microscopy, X-ray tomography and associated spectroscopic techniques. We invite presentations on examples from Earth, Planetary and Archaeological Sciences where novel microscopy techniques have been used to help construct quantitative datasets preferably with practical outcomes and applications which advance scientific and/or technical understanding.

Session Chair: Duncan Muir (Cardiff University, UK)
Invited Speakers: Cees-Jen De Haag (University of Edinburgh, UK) & Jennifer Murgatroyd (RSK Environment, UK)

Microscopy of Materials for Health Care

Thursday 4 July, 0930 – 1130, Central 3, 4

Material Science in Health Care has become an integral part of research aiming to develop new approaches e.g. for cellular level treatments of diseases such as cancer or for the development of mineralised tissue for bone or tooth replacements. Increasing advances in treatments, devices and diagnostics have been accompanied by increasingly stringent regulatory demands. This research area requires excellent control of materials’ properties and robust characterisation tools to visualise structure and composition with high spatial resolution. Therefore advanced electron microscopy as well as X-ray and light based characterisation tools will be in the focus of this session.

Session Chair: Roland Kröger (University of York, UK)
Invited Speakers: Henrik Birkedal (Aarhus University, Denmark) & Natalie Reznikov (Object Research Systems, Canada)

Tissue Cytometry

Thursday 4 July, 1330 – 1530, Charter 4

Conventional microscopy of tissue sections allows the visualisation of tissue architecture but the definition of complex phenotypic signatures via labelled probes in individual cells is challenging. Recently the power of multiplexing that has been used in flow cytometry for some time has been translated to sections by techniques such as imaging mass cytometry, multiplexed ion beam imaging and laser scanning cytometry. This session will bring together these technologies to explore how 2D and 3D reconstruction of tissues can provide new insights into the relationship between cell types in health and disease.

Session Chair: Derek Davies (The Francis Crick Institute, UK)
Invited Speakers: Febe Van Maldegem (The Francis Crick Institute, UK) & Dario Bressan (Cancer Research UK, University of Cambridge, UK)
EMAG 2019 Sessions

EMAG: Electron Microscopy of Functional Materials
Tuesday 2 July, 1000 – 1200, Charter 1
Session Chair: Donald MacLaren (University of Glasgow, UK)
Invited Speakers: Arnaud Arbouet (CEMES-CNRS, France)

EMAG: Advanced Scanning Electron Microscopy
Tuesday 2 July, 1400 – 1600, Charter 1
Session Chair: Cornelia Rodenburg (University of Sheffield, UK)
Invited Speakers: Mathieu Kociak (Universite Paris Sud, France) & Carol Trager-Cowan (University of Strathclyde, UK)

EMAG: Electron Microscopy of Functional Oxides
Wednesday 3 July, 1000 – 1200, Charter 3
Session Chair: Ana Sanchez (University of Warwick, UK)
Invited Speakers: Elizabeth Dickey (North Carolina State University, USA)

EMAG: In Situ Microscopy Techniques
Wednesday 3 July, 1000 – 1200, Charter 1
Session Chair: Jun Yuan (University of York, UK)
Invited Speakers: Grace Burke (University of Manchester, UK)

EMAG: Electron Crystallography and Diffraction
Wednesday 3 July, 1400 – 1600, Charter 3
Session Chair: Andy Brown (University of Leeds, UK)
Invited Speakers: Richard Beanland (University of Warwick, UK)

EMAG: Structural Materials and Metallurgy
Wednesday 3 July, 1400 – 1600, Charter 1
Session Chair: Larry Stoter
Invited Speakers: Randi Holmestad (NTNU, Norway) & Laurence Marks (Northwestern University, USA)

EMAG: Phase Sensitive Techniques
Thursday 4 July, 0930 – 1130, Charter 3
Session Chair: Ana Sanchez (University of Warwick, UK) & Richard Beanland (University of Warwick, UK)
Invited Speakers: Rafal Dunin-Borkowski (Forschungszentrum Juelich GmbH, Germany)

EMAG: Low Dimensional Materials (2D and 1D)
Thursday 4 July, 0930 – 1130, Charter 1
Session Chair: Sarah Haigh (The University of Manchester, UK)
Invited Speakers: Ute Kaiser (Ulm University, Germany)

EMAG: Spectroscopy
Thursday 4 July, 1330 – 1530, Charter 3
Session Chair: Thomas Slater (Diamond Light Source Ltd. UK)
Invited Speakers: Raynald Gauvin (McGill University, Canada)

EMAG: Electron Microscopy of Nanomaterials
Thursday 4 July, 1330 – 1530, Charter 1
Session Chair: Andy Brown (University of Leeds, UK)
Invited Speakers: Caterina Ducati (University of Cambridge, UK)

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Plenary Speakers

Confirmed Plenary Speakers at mmc2019:

**Professor Dr Wolfgang Baumeister, Max Planck Institute of Biochemistry**

**Cryo-Electron Tomography: The Promise and the Challenges of Doing Structural Biology in situ**

*Monday 1 July, 1700 – 1745, Charter 1*

Wolfgang Baumeister studied biology, chemistry and physics at the Universities of Muenster and Bonn, Germany, and he obtained his Ph.D. from the University of Dusseldorf in 1973. From 1973-1980 he was Research Associate in the Department of Biophysics at the University of Dusseldorf. He held a Heisenberg Fellowship spending time at the Cavendish Laboratory in Cambridge, England. In 1982 he became a Group Leader at the Max-Planck-Institute of Biochemistry in Martinsried, Germany and in 1988 Director and Head of the Department of Structural Biology. He is also an Honorary Professor on the Physics Faculty at the Technical University in Munich. In 2000 he spent time at the California Institute of Technology as a Moore Distinguished Scholar.

Wolfgang Baumeister made seminal contributions to our understanding of the structure and function of the cellular machinery of protein degradation, in particular the proteasome. Moreover, he pioneered the development of cryo-electron tomography. His contributions to science were recognised by numerous awards including the Otto Warburg Medal, the Schleiden Medal, the John M. Cowley Medal, the Louis-Jeantet Prize for Medicine, the Stein and Moore Award, the Harvey Prize in Science and Technology and the Ernst Schering Prize. He is a member of several academies including the US National Academy of Sciences and the American Academy of Arts and Sciences.

Wolfgang is the recipient of an RMS Honorary Fellowship, this will be presented at mmc2019.

**Professor Jody Rosenblatt, King’s College London**

**Epithelial Cell Extrusion and its Misregulation in Disease**

*Monday 1745 – 1830, Charter 1*

Jody Rosenblatt is Professor of Cell Biology in the Faculty of Life Sciences & Medicine, School of Basic & Medical Biosciences and School of Cancer & Pharmaceutical Sciences who has recently moved her lab from the Huntsman Cancer Institute at the University of Utah. During her Ph.D. at the University of California, San Francisco with Dr. Timothy Mitchison, she studied actin filament turnover and as a post-doc at the MRC-LMB at University College London, she discovered epithelial cell extrusion, a process that eliminates dying cells without forming any gaps. Her lab studies how epithelia maintain constant cell numbers through cell death and cell division and have found that mechanical forces control each process; when cells become too crowded, they extrude some cells that later die and when cells are too sparse stretch activates cells to rapidly divide. Surprisingly, both opposing processes require the same stretch-activated calcium channel, Piezo1, depending on the force encountered. Extrusion is critical for regulating epithelial cell number, as they find that aggressive metastatic cancers and asthma can result from defective extrusion signalling. Understanding the basic cell biology of cell death is now revealing new aetiologies for diseases that currently lack treatments. We believe that understanding the roots of a disease will better pave the way to finding its cure, rather than merely managing its symptoms.

**Professor Helen Saibil, Birkbeck, University of London**

**Malaria Parasites Breaking out of Red Blood Cells**

*Tuesday 2 July, 0845 – 0930, Charter 1*

Helen Saibil established the cryo electron microscopy lab at Birkbeck College, in the prehistoric era when electron micrographs were recorded on photographic film. Her research focuses on macromolecular machines, both in vitro and in their cellular context. A major area of interest is the action of molecular chaperones in assisting protein folding, unfolding and disaggregation. In addition, her group studies membrane pore formation by bacterial toxins and immune system pore-forming proteins, and the actions of intracellular pathogens on host membranes. The main approach is three-dimensional reconstruction of protein complexes in solution or interacting with liposomes, or of cellular samples, by single particle analysis, electron tomography and correlative light and electron microscopy. She has also been involved in the establishment of the national facility for biological cryo electron microscopy at the Diamond synchrotron.

**Dr Sergei Kalinin, Oak Ridge National Laboratory**

**The Lab On A Beam: Learning Physics And Assembling Atomic Structures Via Deep Learning In Scanning Transmission Electron Microscopy**

*Wednesday 3 July, 0845 – 0930, Charter 1*

Sergei Kalinin is the director of the Institute for Functional Imaging of Materials (IFIM) and distinguished staff member at the Center for Nanophase Materials Sciences at Oak Ridge National Laboratory. He received his MS degree from Moscow State University in 1998 and Ph.D. from the University of Pennsylvania (with Dawn Bonnell) in 2002.

His research presently focuses on the applications of big data and artificial intelligence methods in atomically resolved imaging by scanning transmission electron microscopy and scanning probes, as well as mesoscopic studies of electromechanical and transport phenomena via scanning probe microscopy.

Sergei has co-authored >600 publications, with a total citation of >25,000 and an h-index of >78. He is a fellow of MRS, APS, IoP, IEEE, Foresight Institute, and AVS; a recipient of the RMS medal for Scanning Probe Microscopy (2015); Blavatnik Award for Physical Sciences (2018), Presidential Early Career Award for Scientists and Engineers (PECASE) (2009); Burton medal of Microscopy Society of America (2010); 3 R&D100 Awards (2008, 2010, and 2016); and a number of other distinctions.
Keith Riles is the H. Richard Crane Professor of Physics at the University of Michigan and a founding member of the LIGO Scientific Collaboration. Originally a high energy experimentalist working at electron-positron colliders, Riles was drawn to the then-nascent field of gravitational waves in 1997 by the intriguing science and by the precision technology needed to carry out that science. He initially led the LIGO detector characterization group and more recently has led searches for continuous gravitational waves from galactic neutron stars. The LIGO discovery in September 2015 of gravitational waves from the collision and merger of two massive black holes 1.3 billion years ago and the detection in August 2017 of colliding neutron stars have created a new scientific realm of gravitational wave astronomy, one which Riles looks forward to exploring for years to come.

Klaus Hahn obtained his B.S in biochemistry from the University of Pennsylvania, a doctorate in Chemistry from the University of Virginia, and was a postdoctoral fellow at the Center for Fluorescence Research at Carnegie Mellon University. In his lab at Scripps Research Institute, and now at UNC-Chapel Hill Medical School, he develops molecular approaches to visualize and control signaling in living cells. Using these tools, he and his colleagues ask how the rapid spatio-temporal dynamics of signaling control immune cell interactions, platelet production, and adhesion dynamics/structure. They strive to produce broadly applicable new approaches, including biosensors based on minimally perturbing designs, engineering allosteric networks in proteins to confer control by light or small molecules, and probing conformational changes of individual molecules in living cells. Klaus Hahn is the Thurman Distinguished Professor of Pharmacology at UNC and a fellow of the AAAS. He is a recipient of the NIH’s James Shannon Director’s Award and an NIH Transformative Grant. His lab’s work on biosensors was named one of the “10 Breakthroughs of the Decade” by Nature Reviews Molecular Cell Biology.

Klaus is the recipient of the 2019 Pearse Prize, this will be presented at mmc2019.
### Programme Overview

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<td>SPM Workshop, Cobden Rm 4</td>
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<tr>
<td>1655</td>
<td>Welcome to mmc2019 by Professor Rik Brydson and Professor Maddy Parsons</td>
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<tr>
<td>1700</td>
<td>Plenary Speaker - Professor Dr Wolfgang Baumreister</td>
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<td>1745</td>
<td>Plenary Speaker - Professor Jody Rosenblatt</td>
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<td>1830</td>
<td>Welcome Drinks</td>
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<tr>
<td><strong>Tuesday 2 July</strong></td>
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<tr>
<td>0845</td>
<td>Plenary Speaker - Professor Helen Saibil</td>
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<tr>
<td>1200 - 1400</td>
<td>Exhibition and Lunch</td>
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<tr>
<td>1600 - 1800</td>
<td>Exhibition, Posters and Drinks - Poster Session 1</td>
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<td>1600 - 1800</td>
<td>Quality Control Focused Interest Group Meeting Alex Low, Workshop 3</td>
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<tr>
<td>1615</td>
<td>RMS EM Section AGM, RMS EPS Section AGM, Workshop 1</td>
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<td>1730</td>
<td>RMS Life Sciences Section AGM, RMS LM Section AGM, RMS Flow Cytometry AGM, Workshop 2</td>
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<td>1930</td>
<td>SPM Dinner - Don Giovannis</td>
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<tr>
<td>0845</td>
<td>Plenary Speaker - Dr Sergei Kalinin</td>
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<tr>
<td>1000 - 1200</td>
<td>EMAG: In Situ Microscopy Techniques, Jun Yan, EMAG: Electron Microscopy of Functional Oxides, Ana Sanchez</td>
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<td>1200 - 1320</td>
<td>EMAG AGM</td>
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<td>1400 - 1600</td>
<td>EMAG: Low dimensional Materials and InSitu, Sarah High, EMAG: Phase Sensitive Techniques, Ana Sanchez, Richard Beakland</td>
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<tr>
<td>1600 - 1800</td>
<td>Exhibition, Posters and Drinks - Poster Session 2</td>
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<td>1800</td>
<td>Pre-Dinner Talk - Marty Jopson</td>
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<td>1900</td>
<td>Congress Dinner - Pre-Banquet Drinks and Congress Banquet at The Principal Manchester Hotel</td>
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<td><strong>Thursday 4 July</strong></td>
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<tr>
<td>0930 - 1130</td>
<td>EMAG: Low dimensional Materials (2D and 1D), Sarah High, EMAG: Phase Sensitive Techniques, Ana Sanchez, Richard Beakland</td>
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<td>1130 - 1330</td>
<td>Exhibition and Lunch</td>
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<tr>
<td>1200 - 1315</td>
<td>Poster Session 3</td>
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<tr>
<td>1330 - 1530</td>
<td>EMAG: Electron Microscopy of Nanomaterials, Andy Brown, EMAG: Spectroscopy Thomas Slater</td>
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<tr>
<td>1500</td>
<td>Exhibition Closes</td>
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<tr>
<td>1545</td>
<td>Plenary Speaker - Professor Keith Riles</td>
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<tr>
<td>1630</td>
<td>Presentation of Poster Prizes</td>
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<tr>
<td>1640</td>
<td>Plenary Speaker - Professor Klaus Hahn</td>
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<tr>
<td>1725</td>
<td>Closing Drinks Reception, End of Congress</td>
</tr>
</tbody>
</table>
| Session Time | Session Title | Chair(s) | Room | Invited: Development of a High Brightness Ultrafast Transmission Electron Microscope based on a Laser-driven Cold Field Emission Source  
Arnaud Arbouet  
CEMES-CNRS, France |
|--------------|---------------|----------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1000 - 1030  | EMAG: Electron Microscopy of Functional Materials | Donald MacLaren  
University of Glasgow, UK,  
Chris Parmenter  
University of Nottingham, UK,  
Paola Borri  
Cardiff University, UK | Charter 1 | Invited: Quantitative Observation of Interface Dynamics in Next Generation Batteries  
B.Layla Mehdi  
University of Liverpool, UK |
| 1030 - 1045  | In Situ Electron Microscopy Applied to Inorganic Materials | | Charter 3 | Invited: Brillouin-Raman Micro-spectroscopy for Bioimaging of Cells and Tissues  
Daniele Fioretto  
University of Perugia, Italy |
| 1045 - 1100  | Frontiers in BioImaging: Label-free Quantitative Optical Microscopy | | Charter 2 | Application of a Liquid TEM Cell to Study a 4SSS Bioactive Glass Dissolution  
Elkin Lopez-Fontal  
University of Cambridge, UK |
| 1100 - 1115  | | | | Flash: In Situ Studies for Understanding Intragranular Nanopore Evolution in Ni-rich Layered Oxide Cathode Material  
Anuj Pokle  
University of St Andrews, UK |
| 1115 - 1130  | | | | Flash: Local Optical Properties Resolved in Organic and Metal-organic Materials by Electron Energy Loss Spectroscopy  
Sean Collins  
University of Cambridge, UK |
| 1130 - 1145  | | | | Flash: Atomic-scale Mapping of Plasma Modes in Nanopatterned Ultraviolet Plasmonic Nanocavities  
Kenan Elibol  
Trinity College Dublin, Ireland |
| 1145 - 1200  | | | | Flash: Influence of GaAsSb Capping Layers on the Vertical-alignment in Coupled Stack InAs/GaAs Multi Quantum Dots  
Nazaret Ruiz Marin  
Universidad de Caida, Spain |

Flash: Measuring Sub-nanometre Thickness Changes in Supported Lipid Bilayers with Quantitative Differential Interference Microscopy  
David Regan  
Cardiff University, UK |
| 1145 - 1200  | | | | Flash: Enhanced Raman-Based Cancer Diagnosis using Hyperspectral Tissue Pre-Characterisation and Optimised Segmentation Techniques  
Anneliese Jarman  
King's College London, UK |
| 1145 - 1200  | | | | Flash: New Approach to Increase Information Content in Polarised Light Microscopy of Skeletal and Dental Tissues  
Alan Boyde  
Queen Mary University of London, UK |
| 1145 - 1200  | | | | Flash: Measuring Sub-nanometre Thickness Changes in Supported Lipid Bilayers with Quantitative Differential Interference Microscopy  
David Regan  
Cardiff University, UK |
| 1145 - 1200  | | | | Flash: Measuring Sub-nanometre Thickness Changes in Supported Lipid Bilayers with Quantitative Differential Interference Microscopy  
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David Regan  
Cardiff University, UK |
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<th>Speaker(s)</th>
<th>Institution/Location</th>
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<tr>
<td>9:30 AM</td>
<td>Using Cryo-electron Microscopy to Investigate Macromolecular Structure</td>
<td>Rebecca Thompson Digital Science Ltd. UK</td>
<td></td>
</tr>
<tr>
<td>9:45 AM</td>
<td>SMG &amp; MSI: Applications of Super-resolution from the Nano to the Atomic Scale</td>
<td>Charlotte Buckley University of Strathclyde, UK</td>
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</tr>
<tr>
<td>10:00 AM</td>
<td>SPM: Advancing Materials Science via Scanning Probes</td>
<td>Oleg Kolosov Lancaster University, UK</td>
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<tr>
<td>10:15 AM</td>
<td>Invited: Measuring the Energy Dependence of Contrast and Damage for Cryo-EM</td>
<td>Mathew Peet MRC Laboratory of Molecular Biology, UK</td>
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<tr>
<td>10:30 AM</td>
<td>Invited: Calicivirus VP2 Forms a Portal-like assembly following Receptor Engagement</td>
<td>Michaela Conley MRC - University of Glasgow Centre for Virus Research, UK</td>
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<tr>
<td>10:45 AM</td>
<td>Invited: Revealing a Hidden Antigen: Cryo-EM of a Novel Architecture Protease Complex Conserved across Roundworm Parasites</td>
<td>Charlotte Scarff University of Leeds, UK</td>
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<tr>
<td>11:00 AM</td>
<td>Invited: Flash: Single Particle Analysis Workflow Productivity Enhancements</td>
<td>Fanis Grollios Thermo Fisher Scientific, Netherlands</td>
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<tr>
<td>11:15 AM</td>
<td>Invited: Flash: 3D Structure And Functionality Of Cocalith Basoplates Revealed By Cryo-Electron Tomography And Super-Resolution Microscopy</td>
<td>Fabio Nudelman University of Edinburgh, UK</td>
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<tr>
<td>11:30 AM</td>
<td>Invited: Flash: The Electron Bio-Imaging Centre (eBIC) at Diamond Light Source</td>
<td>Alistair Siebert eBIC at Diamond Light Source, UK</td>
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<tr>
<td>11:45 AM</td>
<td>Invited: Flash: Contact Mode High Speed-atomic Force Microscopy in a Microalgae-virus System</td>
<td>Christopher Evans Plymouth Marine Laboratory / University of Bristol, UK</td>
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<tr>
<td>12:00 PM</td>
<td>Invited: Flash: Latest Advances in Nanoscale IR Spectroscopy and Imaging</td>
<td>Miriam Unger Bruker Nano Surfaces, Germany</td>
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<tr>
<td>12:15 PM</td>
<td>Invited: Flash: Revealing the Complexity of Stacking Order in Graphite Films</td>
<td>Yaping Yang The University of Manchester, UK</td>
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<tr>
<td>12:30 PM</td>
<td>Invited: Flash: Mapping Nanoscale Flow Charts at Solid-Aquad Interfaces</td>
<td>Kislon Voitchovsky Durham University, UK</td>
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<tr>
<td>1:00 PM</td>
<td>Invited: Invited: High-resolution Structure Determination of Dynamic Macromolecular Complexes by Cryo-EM</td>
<td>Holger Stark Max Planck Institute for Biophysical Chemistry, Germany</td>
<td></td>
</tr>
<tr>
<td>1:15 PM</td>
<td>Invited: Invited: Using Atomic Force Microscopy to Measure the Nanomechanical Properties of Clathrin</td>
<td>Michael Lherbette Heriot Watt University, UK</td>
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</tr>
<tr>
<td>1:30 PM</td>
<td>Invited: Invited: Local Functional Studies of 2D Materials and Heterostructures</td>
<td>Olga Kazakova National Physical Laboratory, UK</td>
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<tr>
<td>Time</td>
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<td>Chair(s)</td>
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| 1400 - 1430 | Invited: Nanooptics in the Electron Microscope  
Mathieu Kociak CNRS, France  
Invited: Translating Insights from Liquid Phase Electron Microscopy into Theory and Design  
Joe Patterson University of California, Irvine, USA  
Invited: Exploring Cell Biology on a Molecular Level: Live-cell and Quantitative Localisation Microscopy  
Ulrike Endesfelder MPI Marburg, Germany | Cornelia Rodenburg University of Sheffield, UK  
Chris Parmenter University of Nottingham, UK  
Dylan Owen King’s College London, UK | Charter 1  
Charter 3  
Charter 2 |
Ashish Suri University of York, UK  
A New Class of Molecular Probes for In Situ Cellular Imaging  
Cesare De Pace University College London, UK  
Single-molecule Millisecond Super-resolution Light Microscopy to Ptooing, Count and Track: Revealing the Secrets of How Barriers to DNA Replication are Resolved in Living Cells, one Molecule at a Time  
Mark Leake University of York, UK | Cornelia Rodenburg University of Sheffield, UK  
Chris Parmenter University of Nottingham, UK  
Dylan Owen King’s College London, UK | Charter 1  
Charter 3  
Charter 2 |
| 1445 - 1500 | Transmission Imaging of Thin Samples with a Dedicated Multi-Beam SEM  
Wilco Zuidema Delft University of Technology, Netherlands  
A Mechanistic Insight into Bone: Micro-to Nano-scale Characterisation  
Nouf Aldegaither Imperial College London, UK  
Imaging Dynamic Processes beyond the Diffraction Limit: a Centriole Test Case  
Alan Wainman University of Oxford, UK | Cornelia Rodenburg University of Sheffield, UK  
Chris Parmenter University of Nottingham, UK  
Dylan Owen King’s College London, UK | Charter 1  
Charter 3  
Charter 2 |
| 1500 - 1515 | Electron Tomography in the SEM via Scanning-transmission Imaging and Conical Tilting  
Matteo Ferroni University of Brescia-DII & CNR-IMM, Italy  
The Environmental Liquid Cell Technique for Imaging Biological Structures  
Sana Azim Max Planck Institute for the Structure and Dynamics of Matter, Germany  
Applying Expansion Microscopy (ExM) to Visualize Spatial Organisation of Repair Proteins and Chromatin During Repair of Double Strand Breaks (DSBs)  
Emma Faulkner University of Birmingham, UK | Cornelia Rodenburg University of Sheffield, UK  
Chris Parmenter University of Nottingham, UK  
Dylan Owen King’s College London, UK | Charter 1  
Charter 3  
Charter 2 |
Carole Trager-Cowan University of Strathclyde, UK  
Brownian Tomography in Liquid of Soft Polymer Assemblies and Biological Materials  
Lorena Ruiz-Perez University College London, UK  
Improving DNA-PAINT for the Visualisation of Nuclear Structures  
Hylkje Geertsema FU Berlin, Germany | Cornelia Rodenburg University of Sheffield, UK  
Chris Parmenter University of Nottingham, UK  
Dylan Owen King’s College London, UK | Charter 1  
Charter 3  
Charter 2 |
| 1530 - 1545 | Flashes: Automated Three Dimensional Broad Ion Beam Milling Acquisition and Analysis  
Ali Gholinia The University of Manchester, UK  
Flashes: Revolution of EBSD Pattern Detection  
Rene de Kloe EDAX, Netherlands  
Flashes: Recent Developments in the Analysis of Microstructures by JD-EBSD  
Peter Konijnberg Max-Planck-Institute for Iron Research / Bruker Nano GmbH, Germany  
Invited: Revealing Molecular Adversaries of Human Health using In Situ Imaging Technology  
Deb Kelly Pennsylvania State University, USA  
Invited: Using Super-resolution Microscopy to Watch Immune Cells Kill  
Daniel Davis The University of Manchester, UK | Cornelia Rodenburg University of Sheffield, UK  
Chris Parmenter University of Nottingham, UK  
Dylan Owen King’s College London, UK | Charter 1  
Charter 3  
Charter 2 |
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<tr>
<th>Correlative Microscopy</th>
<th>SMG &amp; MSI: Trials and Tribulations of Electron and Light Beam Induced Radiation Effects</th>
<th>SPM of Soft and Biological Matter</th>
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<td><strong>Leandro Lemgruber</strong> University of Glasgow, UK</td>
<td><strong>Ursel Bangert</strong> University of Limerick, Ireland</td>
<td><strong>Jamie Hobbs</strong> University of Sheffield, UK</td>
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<td><strong>Charter 4</strong></td>
<td><strong>Central 5, 6, 7</strong></td>
<td><strong>Central 3, 4</strong></td>
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<tr>
<td><strong>Invited:</strong> A Correlative Microscopy Toolbox to Study Native Membrane Architectures</td>
<td><strong>Invited:</strong> Imaging and Spectroscopy of Radiation-induced Physical and Chemical Processes in the Electron Microscope: from the Study of Molecular Excited States to the In Situ Degradation/growth of Nanostructures</td>
<td><strong>Invited:</strong> Molecular To Cellular Mechanics Using High-speed Atomic Force Microscopy</td>
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<tr>
<td>Wanda Kukulski MRC Laboratory of Molecular Biology, UK</td>
<td>Patricia Abellan SuperSTEM, UK</td>
<td>Felix Rico Aix-Marseille University, France</td>
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<td><strong>Correlating the Overlays: Overlaying LM and EM Data for 3D-CLEM</strong></td>
<td><strong>Controlling Dose/Rate using Compressive Sensing Methods in Scanning Transmission Electron Microscopy</strong></td>
<td><strong>Direct Observations of the Transpeptidation Activity of Sortase in a DNA Nanostructure</strong></td>
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<td>Anna Kremer VIB, Belgium</td>
<td>Daniel Nicholls University of Liverpool, UK</td>
<td>Andrew Lee University of Leeds, UK</td>
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<td><strong>Putting Molecules in Context with Correlated Fluorescence and Soft X-ray Tomography</strong></td>
<td><strong>Exploiting Electron-beam Induced Damage to obtain Fluorescence Super-resolution</strong></td>
<td><strong>Understanding the Sequence of Events Leading to MAC Induced Killing of Gram-negative Bacteria</strong></td>
</tr>
<tr>
<td>Carolyn Larabell University of California, San Francisco, USA</td>
<td>Aditi Srinivasa Raja Delft University of Technology, Netherlands</td>
<td>Georgina Benn University College London, UK</td>
</tr>
<tr>
<td><strong>Correlative AFM and STORM/PALM: Imaging the Structure and Mechanics of Cell Adhesions</strong></td>
<td><strong>Exploiting the Electron Beam Effects: a Study of Radiation and Electric Field Applications</strong></td>
<td><strong>Molecular Resolution Effect of Antibiotics on Gram Positive Bacteria Cell Wall using AFM</strong></td>
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<tr>
<td>Liisa Hirvonen King’s College London, UK</td>
<td>Michele Conroy University of Limerick, Ireland</td>
<td>Laia Pasquina Lemonche University of Sheffield, UK</td>
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<tr>
<td><strong>Correlative Microscopy - The New System RISE Combined with EDXSS Applied on Complex Materials</strong></td>
<td><strong>Visualizing Electron-molecule Interactions using In Situ Fluorescence in Few-eV SEM</strong></td>
<td><strong>Studying Phase Separation in Lipid Bilayers Mixture and Detection of Femtomolar Graphene Solution in Bilayers using Tip Enhanced Raman Spectroscopy TERS</strong></td>
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<tr>
<td>Ruth Schmidt Technical University Graz, Austria</td>
<td>Yoram Vos Delft University of Technology, Netherlands</td>
<td>Pierre Burgos Horiba UK</td>
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<tr>
<td><strong>Invited:</strong> Towards a Mechanistic Understanding of cellular Processes by Cryo-EM</td>
<td><strong>Invited:</strong> Mitigating Electron Dose for 3D and In Situ Imaging</td>
<td><strong>Invited:</strong> Untangling DNA, one Molecule at a Time</td>
</tr>
<tr>
<td>Gaia Pigino Max Planck Institute CBG, Germany</td>
<td>Ilke Arslan Argonne National Laboratory, USA</td>
<td>Alice L B Pyne University College London, UK</td>
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**Tuesday 2 July, Afternoon**
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<tbody>
<tr>
<td>Session Chair(s)</td>
<td>Jun Yuan University of York, UK</td>
<td>Ana Sanchez University of Warwick, UK</td>
<td>Seamus Holden Newcastle University, UK</td>
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<tr>
<td>Room</td>
<td>Charter 1</td>
<td>Charter 3</td>
<td>Charter 2</td>
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<tr>
<td>1000 - 1030</td>
<td>Invited: Challenges and Opportunities in Corrosion Research: In Situ Analytical TEM of Metals M. Grace Burke The University of Manchester, UK</td>
<td>Invited: Local Structure and Disorder in Relaxor Ferroelectrics Elizabeth Dickey North Carolina State University, USA</td>
<td>Invited: Structure and Dynamics, Crossing Scales with Super-resolution Microscopy Sulliana Manley Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland</td>
</tr>
<tr>
<td>1030 - 1045</td>
<td>Focused Electron-beam Induced Deposition, In Situ TEM and Off-axis Electron Holography Investigation of Biomagnetic Core-shell Nanostructures Trevor Almeida University of Glasgow, UK</td>
<td>The use of Scanning Precession Electron Diffraction for Characterisation of Bismuth Ferrite-Barium Titanate Ceramics Shane McCartan University of Glasgow, UK</td>
<td>Artefact free High Density Localisation Microscopy Analysis Richard Marsh King’s College London, UK</td>
</tr>
<tr>
<td>1045 - 1100</td>
<td>Investigating Ferroelectric Charged Domain Wall Dynamics of Cu$_3$B$<em>7$O$</em>{13}$Cl at the Atomic Scale Michele Conroy University of Limerick, Ireland</td>
<td>Analytical Electron Microscopy Characterisation of a Temperature-Stable Relaxor Ferroelectric Ceramic Teresa Roncal-Herrero University of Leeds, UK</td>
<td>Pushing the Boundaries of 3D-Structured Illumination Microscopy (3D-SIM) Ian Dobbie University of Oxford, UK</td>
</tr>
<tr>
<td>1100 - 1115</td>
<td>In Situ SEM Observation of Abnormal Grain Growth in the Austenitic Region of Carbon Steel Rhiannon Heard University of Oxford, UK</td>
<td>Fourier Masked Imaging to Reveal Charged Domain Wall Junctions in Lead Titanate Kalani Moore University of Limerick, Ireland</td>
<td>NanoSIM: High-performance Open-source Super-resolution Microscopy Analysis in Imagej Romain Laine MRC Laboratory for Molecular Cell Biology, University College London, UK</td>
</tr>
<tr>
<td>1130 - 1145</td>
<td>Liquid Cell Electron Microscopy (LCEM) of Organic Crystal Nucleation, Growth and Dynamics Jennifer Cookman University of Limerick, Ireland</td>
<td>Visualising the Lithiation Mechanisms of LiCoPO$_4$ Laura Wheatcroft University of Sheffield, UK</td>
<td>Invited: Three-Dimensional Super-resolution Imaging of Membrane Receptors Sebastian van de Linde University of Strathclyde, UK</td>
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<tr>
<td>1145 - 1200</td>
<td>Flash: Quantitative STEM-EDS for Liquid-phase Transmission Electron Microscopy Daniel Kelly The University of Manchester, UK</td>
<td>Flash: Switching Mechanism in HED3-based Oxide Resistant Memories using HAADF and EELS-STEM Sylvie Schamm-Chardon CEMES-CNRS, France</td>
<td>Flash: Irradiation Effects on the Oxidation First Stages of a 316L Austenitic Stainless Steel in Simulated Primary Environment Lydia Laffont CIRIMAT/ENSIACET, France</td>
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<tr>
<td>Imaging in the Big Data era: Large Data Sets Rich in Information</td>
<td>FIB Microscopy and Sample Preparation</td>
<td>SPM: A tool for Pharmaceutical and Applied Biological/Biomedical Research</td>
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<td>Tobias Starborg The University of Manchester, UK &amp; Martin Jones The Francis Crick Institute, UK</td>
<td>Xiang Li Zhong The University of Manchester, UK</td>
<td>Stephanie Allen University of Nottingham, UK</td>
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**Chart 4**

Invited: Large Volume Serial Sectioning: Adding Multiple Layers of Analytical Information in 3D
Tim Burnett The University of Manchester, UK

**Central 5, 6, 7**

Invited: Odd Artefacts Induced by Ga and Xe Ion Exposures
Joseph Michael Sandia National Laboratories, USA

Invited: Nanomechanical and Surface Properties of Cells Post Exposure to Wear Particles
Polina Prokopovich Cardiff University, UK

**Central 3, 4**

Avoiding Amorphisation Related Shape Changes of Nano-structures During Medium Fluence Ion Beam Irradiation of Semiconductor Materials
Gregor Hlawacek Helmholtz Zentrum Dresden Rossendorf, Germany

The Interfacial Interactions Between Faceted Crystals: an Invisibility and Atomic Force Microscopy Study
Alexandru Moldovan University of Leeds, UK

Optimised Protocol for the Three-dimensional Visualisation and Reconstruction of Intercellular Junctions in Cardiac Muscle using SBF-SEM and FIB-SEM
Bieke Vanslembrouck University Ghent, Belgium

Targeting Twist: Single Molecule Insights into Supercoiled DNA-Polymerase I and Top DNA using Atomic Force Microscopy
Vinny Verma University of Sheffield, UK

Invited: Leveraging Machine Learning to do More with Less
Minh Doan Broad Institute of MIT and Harvard, USA

Multimodal 3D Imaging of Butterfly Defects in Bearing Steels
Matthew Curd The University of Manchester, UK

Single Molecular Imaging of DNA-Protein Interactions Between Flap Endonuclease Domain of DNA Polymerase I and Flap DNA using Atomic Force Microscopy
Vinny Verma University of Sheffield, UK

Flash: Sample Preparation, Transfer and Coregistration: From Micro CT to TEM Bartłomiej Winiarski Thermo Scientific / The University of Manchester, Czech Republic / UK

Flash: The Development of GyrFIB Lift-out for Soft Matter and Biological Imaging - Making the Practically Impossible 'Less Difficult'
Chris Parmenter University of Nottingham, UK

Low Damage Ultrathin Lamella Preparation of Metals and Nanostructured Materials with a Novel GMax+Ar+TripleBeamTM Technique Michael Dixon Hitachi High-Technologies Europe, UK

A Broad Frequency Chirp-based Nondamaging Technique for Viscoelastic Measurements in Tissue Engineering
Alba Piacenti University of Oxford, UK

Invited: Large-scale Image Segmentation with Machine Learning
Anna Kreshuk EMBL, Germany

Invited: Sample Preparation, Ion-Sample Interactions and Image Processing Considerations in Plasma Focused Ion Beam - Scanning Electron Microscopy Workflows
Nabil Bassim McMaster University, Canada

Invited: Metrology in Pharmaceutical Formulation and Manufacturing
Dimotris Lamprou Queen’s University Belfast, UK
<table>
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<tr>
<th>Session Title</th>
<th>EMAG: Structural Materials and Metallurgy</th>
<th>EMAG: Electron Crystallography and Diffraction</th>
<th>Frontiers in BioImaging: Light Sheet Microscopy: Imaging Complex Biological Samples in Time and Space</th>
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<tbody>
<tr>
<td>Session Chair(s)</td>
<td>Larry Stoter</td>
<td>Andy Brown University of Leeds, UK</td>
<td>Steve Thomas University of Birmingham, UK</td>
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<td>Room</td>
<td>Charter 1</td>
<td>Charter 3</td>
<td>Charter 2</td>
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| 1400 - 1430 | Invited: Precipitates in Aluminium Alloys - Studied by Advanced (S)TEM Techniques  
Randi Holmestad Norwegian University of Science and Technology, Norway | Invited: Measuring Crystals with Digital Electron Diffraction  
Richard Beanland University of Warwick, UK | Invited: Lessons from the Glassy Bone: Spatial Regulation of Thrombopoiesis in the Bone Marrow  
Katrin Heinze RudolfVirchow Center, Germany |
| 1430 - 1445 | Scanning Electron Diffraction as a Versatile Tool for Studying the Microstructure of Al Alloys  
Jonas Sunde Norwegian University of Science and Technology, Norway | Mapping Deformation in Nanoindented C-BN with Scanning Precession Electron Diffraction  
Phillip Crout University of Cambridge, UK | Single- and Multi-photon Shaped Illumination for Light-sheet Fluorescence Microscopy  
Jonathan Nylik University of St Andrews, UK |
| 1445 - 1500 | Multi-lengthscale Analysis of T宁Sr Hafl-Heuer Thermoelectrics: Assessing Structure, Function and Chemistry using Electron Microscopies and Spectroscopies and Atom Probe Tomography  
Donald MacLaren University of Glasgow, UK | Mechanical Driven Grain Boundary Formation in Bent Penta-twinned Ag NWs and their Structure Analyse  
Hu Zhao The University of Manchester, UK | Lorenzian Light Sheets: Longer, Thinner, more Efficient Illumination Profiles for Macroscopic Samples  
James Manton MRC Laboratory of Molecular Biology, UK |
| 1500 - 1515 | TEM Image Simulations of Overlapping Phases - a Case Study of Sheared β” Precipitates in AlMgSi Alloys  
Emil Christiansen Norwegian University of Science and Technology, Norway | Electron Ptychography using Fast Binary 4D STEM Data  
Aleks Ponjavic University of Cambridge, UK |
| 1515 - 1530 | Flash: Identification of Internal Oxidation in a 20% Cold-worked 316SS at 340ºC Through Advanced Characterisation  
Zhao Shen University of Oxford, UK  
Flash: Examination of Damage Mechanisms of Alloys Hardmetals by EBSD and ECD  
Mark Gee National Physical Laboratory, UK  
Flash: High Resolution Imaging of Neutron Radiation Induced Nano Features in Zr-Nb Alloys  
Mark S’ari University of Leeds, UK | A Curvature-enhanced Random Walker Segmentation Method for Detailed Capture of 3D Cell Surface Membrane Features  
Josiah Lutton University of Warwick, UK |
| 1530 - 1600 | Invited: Non-equilibrium Solute Capture in Oxidation and Corrosion  
Laurence Markis Northwestern University, USA | Utilising High Spatial Resolution in TEM to Determine the Structure of Bismuth Manganite  
Ercin Duran The University of Manchester, UK | Invited: Advanced Multiphoton Microscopy and Image Analysis to Investigate Fast Biological Processes in Living Embryos  
Willy Supatto Ecole polytechnique - CNRS - INSERM, France |
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<thead>
<tr>
<th>Believing is More than Seeing: Learning and Models in Quantitative Imaging</th>
<th>Multimode Ion Beam Microscopy: Hybrid-techniques and Spectroscopy</th>
<th>SPM: Nanomechanics for Biology and Biomedicine</th>
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<tbody>
<tr>
<td>Jason Swedlow University of Dundee, UK</td>
<td>Trevor Almeida University of Glasgow, UK</td>
<td>Nuria Gavara Queen Mary University of London, UK</td>
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Charter 4  
Central 5, 6, 7  
Central 3, 4

Invited: Content-Aware Image Restoration for Light and Electron Microscopy Facilitates Quantitative Data Analysis  
Florian Jug Centre for Systems Biology Dresden, Germany

Invited: 3D Printing at the Nanoscale in an Electron Microscope  
Amalio Fernandez-Pacheco University of Glasgow, UK

Invited: Atomic Force Microscopy for Measuring the Local Mechanical Properties of Complex and Soft Tissue  
Jamie Hobbs University of Sheffield, UK

Invited: Charaterisation of Neuutrophils using Optical Diffraction Tomography and Machine Learning  
Young Seo Kim Advanced Institute of Science and Technology (KAIST), Korea, Republic of

Rapid Fabrication of Sub-1nm Nanopores in MoS2 Membrane over a Large Area using a Helium Ion Microscope  
Yunsheng Deng Southern University of Science and Technology, China, Peoples Republic

AM-FM AFM Nanomechanical Mapping of the Effects of Ion Concentration, Growth Factors and Collagen V Knockdown on the Extracellular Matrix Secreted by Fibroblasts In Vivo  
Casey Adam University of Oxford, UK

Label-free Characterisation of Neutrophils using Optical Diffraction Tomography and Machine Learning  
Young Seo Kim Advanced Institute of Science and Technology (KAIST), Korea, Republic of

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AM-FM AFM Nanomechanical Mapping of the Effects of Ion Concentration, Growth Factors and Collagen V Knockdown on the Extracellular Matrix Secreted by Fibroblasts In Vivo  
Casey Adam University of Oxford, UK
<table>
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<tr>
<th>Time</th>
<th>Invited Session</th>
<th>Chair(s)</th>
<th>Room</th>
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<tbody>
<tr>
<td>0930</td>
<td><strong>Invited:</strong> Functionalising Low-dimensional Materials by Low-Voltage High-Resolution Transmission Electron Microscopy&lt;br&gt;Ute Kaiser Ulm University, Germany</td>
<td><strong>Invited:</strong> Model-based Characterisation of Magnetic Moments and Charge Densities in the Transmission Electron Microscope&lt;br&gt;Rafal Dunin-Borkowski Forschungszentrum Juelich GmbH, Germany</td>
<td>Charter 1</td>
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<td>1000</td>
<td><strong>Invited:</strong> Investigating Tumor Cell Dissemination and Metastasis with Single Cell Resolution Intravital Imaging&lt;br&gt;David Entenberg Einstein College of Medicine, USA</td>
<td>Claire Wells King’s College London, UK</td>
<td>Charter 3</td>
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<tr>
<td>1015</td>
<td>Different Folding Structures from Graphene to Graphite&lt;br&gt;Aidan Rooney Université Grenoble Alpes, France</td>
<td><strong>Electron Ptychography with an Ultrafast Detector&lt;br&gt;Peng Wang Nanjing University, China, Peoples Republic</strong></td>
<td>Charter 2</td>
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<tr>
<td>1030</td>
<td>Atomic Ordering in Two-dimensional Transition Metal Dichalcogenide Alloys&lt;br&gt;Xue Xia University of Warwick, UK</td>
<td>Phase Reconstruction of Structured Electron Beams by Ptychograph&lt;br&gt;Zhiyuan Ding Nanjing University, China, Peoples Republic</td>
<td>Charter 1</td>
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<tr>
<td>1045</td>
<td>Modelling the Lattice of Ion-Implanted Impurities in Two-dimensional Materials via Atomic Resolution Electron Microscopy&lt;br&gt;Eoghan O’Connell University of Limerick, Ireland</td>
<td><strong>The OpenFlexure Microscope: a Motorised, Automated 3D Printed Microscope for Research and Healthcare Laboratories&lt;br&gt;Richard Bowman University of Bath, UK</strong></td>
<td>Charter 3</td>
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<td>1100</td>
<td>AR-TEM and STEM Studies of Encapsulated PCMs in Narrow to Medium Diameter SWCNTs&lt;br&gt;Charlotte Slade University of Warwick, UK</td>
<td>A Lorentz TEM Study of Hybrid Domain Walls in Skyrmionic Materials&lt;br&gt;Stephen McVitie University of Glasgow, UK</td>
<td>Charter 2</td>
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<tr>
<td>1115</td>
<td>Characterisation of Plasmons in 2D TMDCs: Moving Towards Custom Plasmon Tailoring&lt;br&gt;Eoin Moynihan University of Limerick, Ireland</td>
<td>Three-dimensional Electron Ptychography of Catalyst Nanoparticles using Combined HAADF STEM and Atom Counting&lt;br&gt;Emanuela Libertii University of Oxford, UK</td>
<td>Charter 1</td>
</tr>
<tr>
<td>1130</td>
<td><strong>Flash:</strong> Confocal Raman Microscope integrated in SEM for Correlative Microscopy of 2D Materials&lt;br&gt;Fang Zhou Carl Zeiss Microscopy GmbH, Germany&lt;br&gt;<strong>Flash:</strong> Optoelectronic Tailoring of 2D Materials by Ultra Low Energy Ion Implantation&lt;br&gt;Michael Hennessy University of Limerick, Ireland</td>
<td><strong>Flash:</strong> Exploring the Performance of Hybrid Pixel Detectors for Electron Microscopy with Alternative Sensor Materials&lt;br&gt;Kirsty Paton University of Glasgow, UK&lt;br&gt;<strong>Flash:</strong> Integrated Differential Phase Contrast (IDPC) STEM for Low Z Detection and for High Contrast Low Dose Imaging Applications&lt;br&gt;Anil Yalcin Thermo Fisher Scientific, Netherlands&lt;br&gt;<strong>Flash:</strong> Visualisation and Quantification of Sub-A Image Contrast Shifts to Reveal Character and Constellations of Individual Atoms&lt;br&gt;Ursel Bangert University of Limerick, Ireland</td>
<td>Charter 3</td>
</tr>
</tbody>
</table>
UK Applied Image Analysis (NEUBIAS UK and IAFIG-RMS) | Quantitative Microscopy in Earth, Planetary and Archaeological Sciences | Microscopy of Materials for Healthcare

Dominic Waithe University of Oxford, UK | Duncan Muir Cardiff University, UK | Roland Kröger University of York, UK

Thursday 4 July, Morning

Charter 4 | Central 5, 6, 7 | Central 3, 4

Shoaib Sufi Software Sustainability Institute, UK

Invited: What Quantitative Petrography Revealed about Ancient Roman Builders in Ostia
Jennifer Murgatroyd RSK Environment Ltd, UK

Invited: Bone Hierarchical Structure and Mechanics Through 3D X-ray Imaging Techniques
Henrik Birkedal Aarhus University, Denmark

Analysis of Relative Positions in 3D PALM and DSTORM Provides High-resolution Information on Organised Biological Complexes
Alistair Curd University of Leeds, UK

The use of High Speed, High Resolution EBSD and EDS to Understand Fayalite Formation in the Allende Meteorite
Pat Trimby Oxford Instruments Nanoanalysis, UK

3D Characterisation of Inhaled Powder Blends using X-ray Computed Tomography
Parmesh Gajjar The University of Manchester, UK

Shoaib Sufi Software Sustainability Institute, UK

Invited: What Quantitative Petrography Revealed about Ancient Roman Builders in Ostia
Jennifer Murgatroyd RSK Environment Ltd, UK

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Henrik Birkedal Aarhus University, Denmark

Automated Segmentation And Quantification Of Isolated Mitochondria In Electron Microscopy Images Using Ilastik
Marie-Charlotte Domart Francis Crick Institute, UK

Invited: What Quantitative Petrography Revealed about Ancient Roman Builders in Ostia
Jennifer Murgatroyd RSK Environment Ltd, UK

Invited: Bone Hierarchical Structure and Mechanics Through 3D X-ray Imaging Techniques
Henrik Birkedal Aarhus University, Denmark

Harnessing the Power of the Crowd for Bioimage Analysis
Martin Jones Francis Crick Institute, UK

Flash Ancient Egyptian Gold Jewellery: Technologies and Corrosion Study
Lore Troalen National Museums Scotland, UK

Flash: Through Time and Space using X-ray Computed Tomography
Alice Macente University of Glasgow, UK

Flash: Characterisation of Hydrothermally Altered Inclusions in the Mineral Caldasite by SEM and TEM Analysis
Michael Lee Nelson Mandela University, South Africa

Reference Standards for High Resolution Microscopy and Differential Diagnostics
Ibolya Kepiro National Physical Laboratory, UK

Discussion: IAFIG-RMS and Neubias Community update

Understanding Biologically-induced Soil Weathering: Applying a Novel Multi-modal and Multi-scale Method via Correlative Imaging
Ria Mitchell Swansea University, UK

The Widow’s Kiss: the Effects of Venom of the Noble False Widow Spider Steatoda Nobilis on Keratinocytes in Culture
John Dunbar NUI Galway, Ireland

Invited: Building Bioinformatics Training Capacity across Europe
Gabriella Rustici University of Cambridge, UK

Invited: Application of Secondary Ion Mass Spectrometry (SIMS) to the Study of Earth and Planetary Processes
Cees-Jan De Hoog University of Edinburgh, UK

Invited: Not-too-stiff and Not-too-compliant, just Right: how the Goldilocks Principle Applies to Bone Tissue Engineering
Natalie Reznikov Object Research Systems Inc. Canada
<table>
<thead>
<tr>
<th>Session Title</th>
<th>EMAG: Electron Microscopy of Nanomaterials</th>
<th>EMAG: Spectroscopy</th>
<th>Imaging the Immune System</th>
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<td>Andy Brown University of Leeds, UK</td>
<td>Charter 1</td>
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<td><strong>Chair(s)</strong></td>
<td>Thomas Slater Diamond Light Source Ltd, UK</td>
<td>Charter 3</td>
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<tr>
<td><strong>Chair(s)</strong></td>
<td>Theresa Ward London School of Hygiene &amp; Tropical Medicine, UK</td>
<td>Charter 2</td>
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<td><strong>Room</strong></td>
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<tr>
<td>1330 - 1400</td>
<td>Invited: Transmission Electron Microscopy Studies of Photoactive Hybrid Perovskite-based Nanomaterials - Caterina Ducati University of Cambridge, UK</td>
<td>Invited: Analytical STEM at 30 KeV - Raynald Gauvin McGill University, Canada</td>
<td>Invited: Healthy and Malignant Haematopoiesis in the Bone Marrow: Dynamic Cells in an Evolving Environment - Cristina Lo Celso Imperial College London, UK</td>
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<tr>
<td>1400 - 1415</td>
<td>The Impact of Corrosion and Chemical Modification of Silver Nanoparticle-Assemblies on their Plasmonic Functionality Studied by Electron Energy Loss Spectroscopy - Jack Brennan University of Glasgow, UK</td>
<td>Defining the Tumor Microenvironment Niche in the 4T1 Tumor Model: Treatment Resistance, Metastasis, and Immunosuppression - David Scheiblin Frederick National Laboratory for Cancer Research / Leidos Biomedical Research Inc / National Institute of Health / National Cancer Institute, USA</td>
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<tr>
<td>1415 - 1430</td>
<td>In Situ Observation of ( \Sigma_3 ) ((112)) Twin Boundary Motion at Atomic Resolution in III-V Nanowires - James Gott University of Warwick, UK</td>
<td>Intracellular Elemental Mapping of Na, K and Ca using EELS and EDX: a Combined Approach for Quantification - Alexandra Sheader University of Oxford, UK</td>
<td>Elucidating the Pathway of Staphylococcus Aureus Internalisation by Primary Macrophages - Ilias Kounatidis Diamond Light Source, UK</td>
</tr>
<tr>
<td>1430 - 1500</td>
<td>Progress on Cryogenic Analytical STEM of Nanomaterials - Nicole Hondow University of Leeds, UK</td>
<td>Three-Dimensional Imaging of Nanoparticle Chemistry using Spectroscopic Single Particle Reconstruction Yi-Chi Wang The University of Manchester, UK</td>
<td>Characterising Interactions of Food-grade Titanium Dioxide Particles with Intestinal Immune Cells In Vivo - John Wills University of Cambridge, UK</td>
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<tr>
<td>1500 - 1515</td>
<td>Preparative and Analytical Challenges in Electron Microscopic Investigation of Nanostructured CuInS(_2) Thin Films for Energy Applications - Anna Frank Max Planck Institut for Iron Research, Germany</td>
<td>Extending the Energy Loss Range for EELS: Praticabilities and Applications - Ian MacLaren University of Glasgow, UK</td>
<td>Invited: Mechanics in Leukocyte Recruitment - Olivier Thedoly Laboratoire Adhesion et Inflammation, France</td>
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<tr>
<td><strong>Flash</strong>: Self-assembled Quantum Wires and Dots in GaO(_x)P: GaO(_x)P Core-shell Nanowires</td>
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<td>Tissue Cytometry</td>
<td>X-ray Microscopy: Beyond Attenuation Contrast Tomography</td>
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<tr>
<td>Derek Davies The Francis Crick Institute, UK</td>
<td>Michael Doube City University of Hong Kong’s College of Veterinary Medicine and Life Science</td>
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<td>Charter 4</td>
<td>Central 5, 6, 7</td>
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| Invited: Imaging Mass Cytometry of Kras Mutated Lung Cancers to Study Effects of Drug Treatments on the Tumour Microenvironment  
Febe van Maldegem Francis Crick Institute, UK | Invited: Bragg Ptychography on X-ray 3D Crystalline Microscopy to Shed New Light on Biomineral Structure and Biomineralisation Mechanisms  
Virginie Chamard Institut Fresnel, France |
| From ’Pretty’ Pictures to Dots on Plots!  
Karen Hogg University of York, UK | X-ray Grating Talbot Interferometer for Fast Imaging and Tomography Applications at I13-2 Diamond Manchester Beamline  
Shashi Marathe Diamond Light Source Ltd, UK |
| Imaging Mass Cytometry: Adoption of New Technologies  
Philip Hobson Francis Crick Institute, UK | Time-lapse 3D Imaging during the Compression of Freeze Cast Aerogel by Phase Contrast Synchrotron X-ray Micro-CT  
Shelley Rawson The University of Manchester, UK |
| Dynamic Analysis of NF-Kappa-B P105 Processing using Photo-switchable FRET and Live Cell Imaging  
David Spiller The University of Manchester, UK | Non-destructive Mapping of Crystallographic Microstructure Evolution in 3D by Laboratory X-ray Diffraction Contrast Tomography  
Samuel McDonald The University of Manchester, UK |
| Using FRAP as Technique to Quantitate Local Reactive Oxygen Species (ROS) Production  
Josh Hughes LightOx Ltd, UK | Flash: Synchrotron Microtomography of Native Intervertebral Disc for Structural Characterisation and Stain Analysis  
Catherine Disney The University of Manchester, UK  
Flash: Time-lapse Synchrotron X-ray Computed Tomography Imaging Of Damage Evolution In Composite Tubes  
Yuan Chai The University of Manchester, UK  
Flash: 3D Magnetic Reconstruction of Non-trivial Spin Textures from Simulated Dichroic Soft X-ray Transmission Tomography  
Aurelio Hierro-Rodriguez University of Glasgow, UK |
| Invited: Building and Exploring Molecularly Annotated 3D-tissue Atlases to Understand Tumour Heterogeneity and Micro-environment  
Dario Bressan CRUK, Cambridge Institute, UK | Invited: Multi-modal and Multi-length Scale Correlative Imaging of Hierarchical Biological Materials  
Richard Johnston Swansea University, UK |
**Poster List**

Posters with 1000 and 2000 numbers relate to mmc2019 sessions. Posters with 3000, 4000 and 5000 numbers relate to EMAG sessions.

**Poster Session 1, Tuesday 2 July, 1600 - 1800.** Posters with 1000 and 3000 numbers.

**Poster Session 2, Wednesday 3 July, 1600 - 1800.** Posters with 2000 and 4000 numbers.

**Poster Session 3, Thursday 4 July, 1200 - 1315.** Posters with 5000 numbers.

### Poster Session 1

#### PHYSICAL SCIENCES

**1000 In Situ Transmission Electron Microscopy Double-Tilt Sample Heating Platform**

Daan Hein Alsem, Hummingbird Scientific, USA

**1001 Real-Time Observation of Dynamics of Nanoscale Pattern Collapse**

Tanmay Ghosh, National University of Singapore

**1002 Cryogenic and Static Liquid Cell Approaches to Enable Native State Electron Microscopy of Nanoparticle Dispersions**

Elliott Hawkins-Farrow, University of Leeds, UK

**1003 In Situ Observation of Crystallised Grain Boundaries in Environmental Scanning Electron Microscope after Different Freezing Conditions**

Kamila Imrichova, Institute of Scientific Instruments of the CAS, Czech Republic

**1004 Multi-Modal Electroanalytical Liquid Microscopy for Energy Applications**

Khim Karki, Hummingbird Scientific, USA

**1005 In Situ α-Iron Cuboidal Nanoparticles Formation and Interaction with O2 Gas in an Open Cell Environmental TEM**

Leonardo Lari, University of York, UK

**1006 Studying Cobalt-based Catalysts Promoted with Manganese using In Situ Gas Cell Scanning Transmission Electron Microscopy**

Matt Lindley, The University of Manchester, UK

**1007 Chemical Reactions and Growth of New Phases in The Ceria-water System by Liquid-cell TEM**

Guenter Moebus, Humboldt University, Germany

**1008 Feasibility Test of In Situ Gas Injection Observation in 300 KV Corrected TEM**

Takao Sasaki, JEOL, Japan

**1009 Transmission Electron Microscopy Study of TiO2 Thin Films for Solar Cell Applications**

Zhengyuan Shan, University of York, UK

**1010 Observing Phase Transformations of the Phase Change Material Sb2Te3 in Carbon Nanotube Bundles: Electron Diffraction, Imaging and Theory**

Jeremy Sloan, University of Warwick, UK

**1011 Complex Study of Thermally Induced Microstructure Evolution in Cu-Au Thin Films**

Alia Sologubenko, ScopeM ETH Zürich, Switzerland

### LIFE SCIENCES

**1012 Getting Trained as well as Training others in a Shared Imaging Facility**

Jennifer Adcott, University of Liverpool, UK

**1013 In-resin Fluorescence Preservation and Imaging Conditions for High-resolution Imaging with Integrated Light and Electron Microscope**

Pieter Baatsen, vIB@kuleuven, Belgium

**1014 Tracking Wireworm Burrowing Behaviour in Soil over time using 3D X-ray CT**

Samuel Booth, University of Nottingham, UK

**1015 Use of Focal Charge Compensation to Avoid Charging Artefacts during Serial Block-face Scanning Electron Microscopy**

Peter Borghgraef, VIB Bioimaging, Ghent, Belgium

**1016 New Approach to Increase Information Content in Polarisated Light Microscopy of Skeletal and Dental Tissues**

Alan Boyde, Queen Mary University of London, UK

**1017 A New Class of Molecular Probes for Biological Imaging**

Cesare De Pace, Imperial College London, UK

**1018 Progress in the Development of a Laboratory-scale Soft X-ray Microscope for Whole Cell Imaging**

Kenneth Fahy, SiriusXT, Ireland

**1019 Single Particle Analysis Workflow Productivity Enhancements**

Fanis Grollios, Thermo Fisher Scientific, Netherlands

**1020 Streamlining Microscope Quality Control using Open Source Resources**

Nadia Halidi, University of Oxford, UK

**1021 Correlative Imaging for the Life Sciences at Diamond Light Source**

Bea Beasley, Diamond Light Source Ltd, UK

**1022 Heterodyne Dual-polarisation Epi-detected CARS Microscopy for Chemically Specific and Topographic Imaging of Interfaces**

Dafydd Harlow, Cardiff University, UK

**1023 Investigating Dynamic Biological Processes with High-speed, High-resolution Correlative AFM-light Microscopy**

Heiko Haschke, JPK BioAFM, Germany

**1024 Combining Optical Tweezers with IRM, TIRF, Widefield and STED: a Platform for Dynamic Single Molecule Analysis**

Maurice Hendriks, Lumicks, Netherlands

**1025 Enhanced Raman-Based Cancer Diagnosis using Hyperspectral Tissue Pre-Characterisation and Optimised Segmentation Techniques**

Anneliese Jarman, King’s College London, UK

**1026 Quantitative Three-dimensional Analysis of Wound Healing Model using Optical Diffraction Tomography**

Ariel Lee, KAIST, Republic of Korea

**1027 What Lies Beneath: 3D Vs 2D Correlative Imaging Challenges and how to Overcome them**

Ria Mitchell, Swansea University, UK

**1028 3D Structure And Functionality Of Coccotil Platelets Revealed by Cryo-Electron Tomography And Super-Resolution Microscopy**

Fabio Nudefman, University of Edinburgh, UK

**1029 Correlative Cryo-light and EM: Context and Application**

Chris Parmenter, University of Nottingham, UK

**1030 Measuring Spatio-temporal Electrical Activity in Neural Networks using Widefield Diamond Based Quantum Magnetometry: Towards next Generation Nanoscale Electrophysiology**

Joshua Price, University of Nottingham, UK

**1031 Measuring Sub-nanometre Thickness Changes in Supported Lipid Bilayers with Quantitative Differential Interference Microscopy**

David Regan, Cardiff University, UK

**1032 Polarised Light Microscopy Method (PLM) and Correlative Imaging for Mapping Crystal Orientation in Titanium Alloys**

Hamed Safaie, Swansea University, UK

**1033 Stokes Polarimetric Microscopy and Label-free Quantitative Imaging**

Tiehan Shen, University of Salford, UK

**1034 The Electron Bio-Imaging Centre (eBIC) at Diamond Light Source**

Alistair Siebert, eBIC at Diamond Light Source, UK

**1035 Developments towards Laboratory-Scale Correlative Cryo-Light 3D Soft X-Ray Tomography**

Dunja Skoko, SiriusXT, Ireland

**1036 Scanning Electron Microscopy of Subgingival Biofilm and its Endotoxin Activity in Patients with Chronic Periodontitis**

Alex Strachan, Plymouth Electron Microscopy Centre, UK

**1037 The Effect of Environmentally Sensitive Dyes on Lipid Bilayers**

Adam Suhaj, King’s College London, UK
1038 Development of a Quantitative Model for the Ordered Process of Chromatin Rearrangements at DNA Double-strand Breaks
Pritishkumar Tidke National University of Ireland Galway, Ireland

1039 Energy Transfer in Artificial Light-harvesting Assemblies Studied by Fluorescence Life-time Imaging
Cvetelin Vasilev University of Sheffield, UK

SPM
1040 High Resolution Imaging and Nanomechanical Properties of the Gram-Positive Bacterial Cell Wall using Atomic Force Microscopy
Anaam Alomari University of Sheffield, UK
1041 Investigating Potato Plant Cell Mechanics using Atomic Force Microscopy Zeinab Al-Rekabi National Physical Laboratory, UK
1042 High Electrical Conductivity of Metal-organic Chains at the Single-molecule Level Pablo Ares The University of Manchester, UK
1043 Lubricated Friction at Surface Nano-defects Clodomiro Cafolla Durham University, UK
1044 Characterisation of Metallic Coated Atomic Force Microscope Probes for Conductive AFM and Scanning Kelvin Probe Microscopy Applications Charles Clifford National Physical Laboratory, UK
1045 Probing the Dielectric Constant of Two-dimensionally Confined Water using Scanning Dielectric Microscopy James Dougherty The University of Manchester, UK
1046 NanoMechanics with Atomic Force Microscopy: Overview from Force Spectroscopy to NanoDNA Capabilities Michael Febvre Bruker, France
1047 Tracking the Molecular Organisation of Water and Alcohol Mixtures at Hydrophobic Solid Interfaces William Foster Durham University, UK
1048 Probing Dielectric Constant on the Nanoscale using Scanning Dielectric Microscopy: from Thin Films to Two-dimensionally Confined Water Laura Fumagalli The University of Manchester, UK
1049 Strain-induced Stiffening and Charging of Collagen Fibris on the Nanoscale Emilie Gachon King’s College London, UK
1050 Recognising Multiple Scanning Probe Tip States in Real Time with Convolutional Neural Network Ensembles Oliver Gordon University of Nottingham, UK
1051 Nanoscale Visible-IR Optical Properties of 2D Materials via AFM Optical Microscope Ian Holton Acutance Scientific Ltd, UK
1052 Cross-sectional Nanoscale Resolution Mapping of Potential and Current Distribution in 3D Structure of Vertical Cavity Surface Emitting Laser II-Vi Nanostructures Oleg Kosolov Lancaster University, UK
1053 Thermo-mechanical Behaviour of Atomic Force Microscopy Cantilevers in Thermal Drift Utilising Scanning Thermal Microscopy Probes Christopher Mordue University of Glasgow, UK
1054 Visualisation of Subsurface Defects in Van der Waals Heterostructures via 3D SPM Mapping Marta Muñientes Lancaster University, UK
1055 Multiphysics 3D Study of Compound Semiconductor Nano-structures via Scanning Probes Marta Muñientes Lancaster University, UK
1056 Molecular Resolution Effect of Antibiotics on Gram Positive Bacteria Cell Wall using AFM Laia Pasquina Lemonche University of Sheffield, UK
1057 Bilayer Lithography in Atomic Force Microscope Yu Shu University of Oxford, UK
1058 Reconfigured Filamentary High Resolution Electrical Probes Eugene Soh University of Oxford, UK
1059 Latest Advances in Nanoscale IR Spectroscopy and Imaging Miriam Unger Bruker Nano Surfaces, Germany
1060 Mapping Nanoscale Flow Charts at Solid-liquid Interfaces Kislon Voitochovsky Durham University, UK
1061 Revealing the Complexity of Stacking Order in Graphite Films Yaping Yang The University of Manchester, UK

EMAG
3000 In Situ Electrochemical Study of Solid-State Energy Storage Materials using a Probe-Based Transmission Electron Microscope Sample Holder Daan Hein Alsem Hummingbird Scientific, USA
3001 (R)evolution of EBSD Pattern Detection Rene de Kloe EDAX, Netherlands
3002 The Reliability of Silicon Drift Detectors (SDD) for Quantitative Chemical Analysis in Analytical Electron Microscopy Rik Drummond-Brydson University of Leeds, UK
3003 Secondary Electron Hyper Spectral Surface Imaging for Beam Sensitive Biomaterial Characterisation Nicholas Farr University of Sheffield, UK
3004 Automated Three Dimensional Broad Ion Beam Milling Acquisition and Analysis Ali Gholinia The University of Manchester, UK
3005 Advanced Material Characterisation: Scanning Atomic Force and Electron Microscopy Colin Grant Hitachi High-Technologies Corporation, UK
3006 Fabrication of Sub-micron Apertures by Plasma Focused Ion Beam Milling for Atomic-optical Microscopy John Halpin University of Glasgow, UK
3007 Simulation of Electron Trajectories in Scanning Electron Microscope Specimen Chamber Yuka Ito Osaka Institute of Technology, Japan
3008 Smart Approach to Combining Compositional and Topographical Information into a Single Image Jakub Kolář TESCAN Brno s.r.o. Czech Republic
3009 Recent Developments in the Analysis of Microstructures by 3D-EBSD Peter Konijnenberg Max-Planck-Institute for Iron Research / Bruker Nano GmbH, Germany
3010 Visualisation and Elemental Analysis of Perovskite Damage in Laser Scribing of Perovskite Solar Modules Felix Kosasih University of Cambridge, UK
3011 Calibration of Secondary Electron Energy Filters with in-column Detectors in Latest Generation FESEM's James McGladdery Loughborough University, UK
3012 Detection and Quantification of Secondary Phases in 12%Cr Steels using in-column Secondary Electron Detectors James McGladdery Loughborough University, UK
3013 Application of Cryo-FIB-SEM to Volume Analysis of Liquid Dispersed Nanoparticle based Samples Stuart Micklethwait University of Leeds, UK
3014 Measurement of Scattered Electron Current Distribution in Scanning Electron Microscope Kentaro Morimoto Osaka Institute of Technology, Japan
3015 Understanding Li-ion Battery Cathode Degradation using Analytical Electron Microscopy Jedrzej Morzy University of Cambridge, UK
3016 Growth and Structural Analysis of NiO Thin Films for Solar Cells Applications Sam Orchard University of York, UK
**Poster Session 2**

**Physical Sciences**

2000 A Study of Chirality and Optical Response of 2D Chiral Metamaterials with Stokes Polarimetric Light Microscope Huda Alzahrani University of Salford, UK

2001 Quantitative and Qualitative Analysis of Hydrocarbon Contamination and Removal in FIB/SEMs Barbara Armbuster XEI Scientific, USA

2002 Focused Ion Beam In Situ Lamella Fabrication Technique For In Situ TEM Megan Canavan Trinity College Dublin, Ireland

2003 Time-lapse Synchrotron X-ray Computed Tomography Imaging Of Damage Evolution In Composite Tubes Yuan Chai The University of Manchester, UK

2004 Synchrotron Micromotography of Native Intervertebral Disc for Structural Characterisation and Strain Analysis Catherine Disney The University of Manchester; UK

2005 Low Damage Ultra-thin Lamella Preparation of Metals and Nanostructured Materials with a Novel Ga+Ar+/e-TripleBeamTM Technique Michael Dixon Hitachi High-Technologies Europe, UK

2006 Creating Context for Geochemical Analysis: Microanalytical Studies of Lewison Zircons using the Xe-FIB - SEM Microscope Joshua Einsle Imperial College London, UK

2007 Evaluation of Abraded WC/Co Surfaces by FIB Tomography Mark Gee National Physical Laboratory, UK

2008 3D Magnetic Reconstruction of Non-trivial Spin Textures from Simulated Dichroic Soft X-ray Transmission Tomography Aurelio Hierro-Rodriguez University of Glasgow, UK

2009 Quantitative Analysis of Dislocations in Bulk Earth Materials using Bend Contour Contrast Shirin Kaboli Hydro-Québec's Center of Excellence in Transportation Electrification and Energy Storage, Canada

2010 Quantitative Characterisation of the Nanostructure of Bone using Electron Tomography Roland Krüger University of York, UK

2011 Characterisation of Hydrothermally Altered Inclusions in the Mineral Caldasite by SEM and TEM Analysis Michael Lee Nelson Mandela University, South Africa

2012 Through Time and Space using X-ray Computed Tomography Alice Macente University of Glasgow, UK

2013 Improved FIB Preparation of Samples for MEMS-based In Situ Simultaneous Heating and Biasing in the TEM/STEM Tom Macgregor University of Glasgow, UK

2014 The Development of Cryo-FIB Lift-out for Soft Matter and Biological Imaging - Making the Practically Impossible 'Less Difficult' Chris Parminter University of Nottingham, UK

2015 AutoTEM 5 - Fully Automated TEM Sample Preparation for Everyone Anna Prokhodtseva Thermo Fisher Scientific, Netherlands

2016 Focused Ion Beam Preparation of Microbeams for In Situ Mechanical Analysis of Electroplated Nanowhiskers with Probe Type Indenters Stuart Robertson Loughborough University, UK

2017 A Tool for Generating Smooth Cross Sections with Focussed Ion Beams: A Highly-precise Eucentric Tilting Substage Andrew Smith Kleindiek Nanotechnik, Germany

2019 Sculpting at the Nanoscale: a Route to Electron Transparency Evan Tillotson The University of Manchester, UK

2020 Observing Biomimetic Bone Formation: Studying Colagen Mineralisation via Precursor Phases In Situ and Ex Situ using Raman Spectroscopy and Electron Microscopy Emma Tong University of York, UK

2021 Ancient Egyptian Gold Jewellery: Technologies and Corrosion Study Lore Troalen National Museums Scotland, UK

2022 Focused Ion Beam Fabrication of Thin Samples for Cryo-electron Tomography Rostislav Vana TESCAN-Orsay Holding, Czech Republic

2023 Microstructural Defects in Antimony Selenide Solar Cells Rhys Williams University of York, UK

2024 Sample Preparation, Transfer and Coregistration: From Micro CT to TEM Bartlomiej Winiarski Thermo Fisher Scientific / The University of Manchester, Czech Republic / UK

2025 Magnesium Alloy TEM Sample Preparation using Ultramicrotome Xiangli Zhong The University of Manchester, UK

**Life Sciences**

2026 Pilocarpine Rat Model of Epilepsy Elicits Upregulation of Hippocampal Synaptophysin and GFAP Oluwole Alese University of KwaZulu-Natal, South Africa
2027 Multiphoton Excitation of Biological Samples with 10 Femtosecond Laser Pulses Kurt Anderson Francis Crick Institute, UK

2028 Deep Learning Enables 3D Reconstructions from 2D Projections in Localisation Microscopy Benjamin Blundell King’s College London, UK

2029 Haar Wavelet Kernel Analysis of Three-dimensional Localisation Microscopy Data Ishan Costello King’s College London, UK

2030 3D Visualisation of Bone Quality in Osteoporosis Alexander Cresswell-Boyes Queen Mary University of London, UK

2031 Tracking the Fate of Individual Disseminated Tumor Cells in Target Organs to Determine the Role of Premetastatic Conditioning David Entenberg Einstein College of Medicine, USA

2032 DeepSIM: Adaptive Optics Enhancing Deep Super-resolution Imaging in Difficult Samples Nicholas Hall Micron Advanced Bioimaging, UK

2033 Selective Single Cell Isolation of Adherent Cells using a Novel Shake Method Bob Hartley Molecular Machines & Industries AG, Switzerland

2034 The Role of the Electron Microscope in the Study of the Immune Escape Mechanism of Malignant Cells Amira Helmy Theodor Bilharz Research Institute, Egypt

2035 Gene Circuits and Multi-dimensional Optical Microscopy: Characterisation of Cellular Stress Sarah Lecinski University of York, UK

2036 A Flexible, Adaptable Design for Sub-cellular Light Sheet Microscopy James Manton MRC Laboratory of Molecular Biology, UK

2037 SandSTORM Enables Accelerated and Unlimited Super-resolution Imaging in Quasi-physiological Buffers Kaarjel Narayanasamy University of Leeds, UK

2038 Wide-field Paramagnetic Spatial Mapping using Nitrogen Vacancies Valentin Radu University of Nottingham, UK

2039 Axial Localisation of Single Particles using Machine Learning Craig Russell National Physical Laboratory, UK

2040 High-Stability Design for Super-Resolution, Life-cell Imaging and Single Molecule Experiments at Reduced Cost Michael Schwertner Linkam Scientific Instruments Ltd. UK

2041 Microscopy on Drugs: Characterisation and Quantification of Pb-based Pharmaceuticals using the STEM Alexandra Sheader University of Oxford, UK

2042 Sub-15 Nm 3D Fluorescence Nanoscopy Based on Single Molecule Localisation and Photometry Sabrina Simoncelli King’s College London, UK

2043 Imaging Mitochondrial Viscosity using Fluorescent Molecular Motors and Fluorescence Lifetime Imaging Microscopy Ida Emilie Steinmark King’s College London, UK

2044 Developing Microscope Software with Python David Miguel Susano Pinto University of Oxford, UK

2045 A Custom MSPIM for Long Time Course Imaging of Live Samples Ben Sutcliffe MRC Laboratory of Molecular Biology, UK

2046 Re-engineered Enzymes as Tools in DSTM Microscopy - The New Field of Enzymostaining? Beatriz Yale Heriot-Watt University, UK

2047 Microsphere Super-resolution Imaging of Bio-samples Sébastien Vilain LIG Nanowise, Switzerland

2048 Morphological and Histological Features of the Greenland Shark Coronary Circulation Sana Yaar The University of Manchester, UK

2049 Nineteenth Century Sharks: 3D Segments of the Organelles from the Greenland Shark (Somnus Microcephalus) Cardiac Myocytes Provide Insights on Extreme Longevity Pierre Delaroche The University of Manchester, UK

2050 Multiscale Correlative Characterisation of Environmentally Induced Crack Initiation, Propagation and Failure in a High Strength Aluminium Alloy Vishveswara Gudia The University of Manchester, UK

2051 Chromosomal Studies on the Egyptian Fresh Water Snail Biomphalaria Alexandrina by using Transmission and Scanning Electron Microscope Amira Helmy Theodor Bilharz Research Institute, Egypt

2052 4D Image Analysis Technique in Liquid TEM for Soft Matter Systems Gabriele Marchello University College London, UK

2053 Set-theoretical Foundation of Imaging in Microscopy Volodymyr Nechyporuk-Zloy The University of Oxford, UK

2054 Unambiguous Characterisation of Nanosized Particles in 14%Cr Oxide Dispersion Strengthened (ODS) Steel using Classical and Frontier Microscopy Methods Yael Templeman Ben Gurion University of the Negev, Israel

2055 Serial Block Face Scanning Electron Microscopy - Big Data Results for Life Sciences and Materials Science. An Issue for Measurement and Analysis Armin Zankel Technical University Graz, Austria

EMAG

4000 In Situ 4D Characterisation of Indentation Damage in Mineralised Biological Materials Rachel Board Swansea University, UK

4001 Microstructure Studies on Combination of Work Hardening and Precipitation Strengthening in 2024 Aluminium Alloy by a Complex Thermomechanical Treatment Witold Chrominski Warsaw University of Technology, Poland

4002 In Situ Gas and Heating TEM/STEM Study at Atmospheric Pressure of Multi-shaped Pd and NiPd Nano-particles Michele Conroy University of Limerick, Ireland

4003 Applications of CMOS-based Imaging Sensors for High-Speed EBSD Mapping Rene de Kloe EDAX, Netherlands

4004 Examination of Damage Mechanisms of Wc/co Hardmetals by EBSD and ECCI Mark Gee National Physical Laboratory, UK

4005 Femtosecond Laser-Enabled TriBeam for In Situ Laser Ablation of Charge Sensitive Materials Remco Geurts ThermoFisher Scientific, Netherlands

4006 Electron Counting Mode with Fibre-optically Coupled Camera System Reza Ghadimi TVIPS GmbH, Germany

4007 Electron Diffraction for the Ab Initio Structure Solution of Microcrystals of a Common Pharmaceutical Grown by Destructive Eutectic Solvents Victoria Hamilton University of Bristol, UK

4008 Using EBSD to Visualise the Grain Structure of Electroplated Tin and its Intermetallic Compounds, Relating to Tin Whisker Growth Dan Haspel University of Plymouth, UK

4009 High Resolution Imaging of Neutron Radiation Induced Nano Features in Zr-Nb Alloys Guanzhe He University of Oxford, UK

4010 A New In Situ Heating Stage for SEM Imaging at Elevated Temperature Rhiannon Heard University of Oxford, UK
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Poster Session 3

EMAG

5000 NTCDI Thin Films and NTCDI/PCTDI Heterostructures on Hexagonal Boron Nitride Manal Alkhamsi University of Nottingham, UK

5001 Differential Phase Contrast Imaging of the Magnetostuctural Transition and Phase Boundary Motion in Uniform and Gradient-doped FeMn-based Thin Films Trevor Almeida University of Glasgow, UK

5002 Applying Scanning Electron Microscopy for the Development of Technology of Microplasma Spraying of Titanium Wire Biocompatible Coatings Darya Alontseva East Kazakhstan State Technical University, Kazakhstan

5003 Determination of Boron Concentration in Silicon by EELS and Multivariate Analysis Kyoichiyo Asayama JEOL Ltd. Japan

5004 Morphology Based Comparison of Photocatalytic Activity of Cazno3, Nano Composite as Solar Photocatalyst Ambreen Ashar University of Agriculture, Faisalabad, Pakistan

5005 Comparative Efficacies of Nano Zinc Oxide and Nano Curcuma Longa against Third Degree Burn Wound Ambreen Ashar University of Agriculture, Faisalabad, Pakistan

5006 Sunlight Mediated Antibacterial Activity of (ZnO-Aloe Vera) Nanomaterials Ambreen Ashar University of Agriculture, Faisalabad, Pakistan

5007 Solar-Photocatalytic Degradation of Humic Substances from Municipal Wastewater an Efficient Fe/Zno/Ceramic Hybrid Ambreen Ashar University of Agriculture, Faisalabad, Pakistan

5008 Visualisation and Quantification of Sub-Å Image Contrast Shifts to Reveal Character and Constellations of Individual Atoms Ursel Bangert University of Limerick, Ireland

5009 Calcite Orientation Tuned in a Marine Shell to Support the Filter-feeding Organ Peter Chung University of Glasgow, UK

5010 Atomic Resolution STEM Imaging and Low Loss EELS Spectroscopy Study of the Growth Plane Effect on Band Gap Changes in GaN Based MQWs in Nanorods Michele Conroy University of Limerick, Ireland

5011 Metal and 2D-material Interaction Investigated via HAADF STEM Eileen Courtney University of Limerick, Ireland

5012 Self-assembled Quantum Wires and Dots in GaAsP-GaAsP Core-shell Nanowires Aruni Fonseka University of Warwick, UK

5013 Using STEM EDX Mapping and Mono-EELS to Understand the Reaction Kinetics of Environmentally Relevant Iron Oxide Minerals for Water Remediation Helen Freeman University of Leeds, UK

5014 Confinement Controlled Calcium Sulfate Polymorphism Revealed by Low Dose Electron Diffraction Johanna Galloway University of Leeds, UK

5015 Shining a Light on Hidden Nanophases: using EELS to Reveal Irradiation-induced Defects in Nuclear Alloys Jack Haley University of Oxford, UK

5016 Optoelectronic Tailoring of 2D Materials by Ultra Low Energy Ion Implantation Michael Hennessy University of Limerick, Ireland

5017 Application of STEM-EELS Provides Mechanistic Understanding of the Complexation of Aqueous Waste Gold Chloride to Pyrolysis Carbon from Biomass Luke Higgins University of Leeds, UK


5019 Microscopy and Microspectroscopy of 2D Material Liquid Crystal Nanocomposites: From Fundamental Properties to Application in Devices Benjamin Hogan University of Exeter, UK

5020 Dose Limited STEM Characterisation of Calcium Carbonate Based Nanomaterials Rob Hooley University of Leeds, UK

5021 Neuromorphic MoS2 Mem transistors Fabricated by Localised Helium Ion Beam Irradiation Jakub Jadwiszczak Trinity College Dublin, Ireland
5022 Double Helices and One-dimensional Chains of Cesium Iodide in Ultra-Narrow Carbon Nanotubes Reza Kashtiban University of Warwick, UK

5023 Climb of the 90° Partial Dislocation in Brown Type Ila Natural Diamond Fraser Laidlaw University of Warwick, UK

5024 Ostwald Ripening Rates and Electron Beam Effect Analysis on Heated Au Nanoparticles by In Situ STEM Leonardo Lari University of York, UK

5025 Imaging Polymer Crystallinity with Transmission Electron Microscopy Hui Luo University of Oxford, UK

5026 Modelling a Capped Carbon Nanotube by Linear-scaling Density-functional Theory Sabrina Masur University of Cambridge, UK

5027 A Reliable Method to Count Number of Layers in Chemically Derived Two Dimensional Materials: Correlation Between Optical Transparency and Atomic Force Microscopy

Mohsen Moazzami Gudarzi The University of Manchester, UK


5029 Contrast Transfer and Noise Minimisation in Electron Ptychography Colum O’Leary University of Oxford, UK

5030 Exploring the Performance of Hybrid Pixel Detectors for Electron Microscopy with Alternative Sensor Materials Kirsty Paton University of Glasgow, UK

5031 Analytical Cryo Electron Microscopy for Characterisation of Pickering Emulsions Teresa Roncal-Herrero University of Leeds, UK

5032 Investigation of Co Oxidation States in PtCo Nanoparticles using STEM-EELS James Sode University of Oxford, UK

5033 High Resolution Electron Energy-Loss Spectroscopy with Low Point Spread Detector Liam Spillane Gatan incorporated, USA

5034 A Study of Tip-induced Moire Deformation of Strained MBE Grown Graphene on HBN James Thomas University of Nottingham, UK

5035 Understanding Catalyst Failure Mechanisms in Plant Operation Ewa Tocha Dow Benelux B.V. Netherlands

5036 Integrated Differential Phase Contrast (IDPC) STEM for Low Z Detection and for High Contrast Low Dose Imaging Applications Anil Yalcin Thermo Fisher Scientific, Netherlands

5037 Direct Synthesis of MoS₂ Or MoO₃ via Single Source Precursor Niting Zeng The University of Manchester, UK

5038 Confocal Raman Microscope integrated in SEM for Correlative Microscopy of 2D Materials Fang Zhou Carl Zeiss Microscopy GmbH, Germany
Award Presentations & Prizes
A number of prestigious awards are being presented at mmc2019, these include:

Honorary Fellowship of the Royal Microscopical Society
Honorary Fellowships are bestowed by the Society for eminence in microscopy or related branches of science or for exceptional service to science.

An Honorary Fellowship is being presented to Professor Dr Wolfgang Baumeister (Max Planck Institute of Biochemistry) during his plenary talk at mmc2019.

More information about the Honorary Fellowships can be found on the RMS website.

The Pearse Prize
The Pearse Prize was established by the RMS Histochemistry and Cytochemistry Section (now Life Sciences) in 1982 to honour the contribution made to histochemistry by Professor AGE Pearse. The prize is awarded to a scientist who has made a significant contribution to histochemistry and life sciences and is still active in their field. It will not be restricted to any particular age group.

It is typically awarded every four or five years (and not more frequently than every two years) and only then when it is felt there is a suitable candidate. It is generally regarded as one of the international honours in histochemistry and the life sciences, with an emphasis on microscopy.

Professor Klaus Hahn (University of North Carolina - Chapel Hill) is the recipient of the 2019 Pearse Prize, this will be presented during his plenary talk at mmc2019.

More information about the Pearse Prize can be found on the RMS website.

RMS Medal Series
An RMS Medal for Life Sciences has been awarded since 2012, and since then additional new scientific section committee medals have also been established, some of which are going to be presented at mmc2019, they are:

Medal for Innovation in Applied Microscopy for Materials Science - Caterina Ducati (University of Cambridge, UK)
The Presentation will take place before Caterina’s invited talk in one of the EMAG sessions.

Medal for Life Sciences - Cristina Lo Celso (Imperial College London, UK)
The Presentation will take place on Thursday 4 July at 1330, ahead of Cristina’s invited talk in the Imaging the Immune System session.

Medal for Light Microscopy - Suliana Manley (EPFL, Switzerland)
The Presentation will take place on Wednesday 3 July at 1000, ahead of Suliana’s invited talk in the Frontiers in BioImaging: Developments in Super-resolution Microscopy session.

Alan Agar Medal for Electron Microscopy - Wanda Kukulski (MRC Laboratory of Molecular Biology, UK)
The presentation will take place on Tuesday 2 July at 1400, ahead of Wanda’s invited talk in the Correlative Microscopy session.

Medal for Scanning Probe Microscopy - Cyrus Hirjibehedin (MIT, Lincoln Laboratory, USA)
The presentation will take place on Tuesday 2 July at 1000, ahead of Cyrus’ invited talk in the SPM: Advancing Materials Science via Scanning Probes session. Scanwel Ltd have provided Cyrus with a travel bursary to assist his attendance at mmc2019.

Poster Prizes
There are a number of poster prizes up for grabs at mmc2019. The prizes will be in the following categories:
- Physical Sciences
- Life Sciences
- SPM
- EMAG

Poster prizes will be awarded on Thursday 4 July from 1630 prior to Professor Klaus Hahn’s plenary talk in Charter 1.

The organisers would like to thank Microscopy & Analysis for their kind sponsorship of the poster prizes.
# Commercial Workshop Timetable

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<td>1130 - 1200</td>
<td>Agar Scientific Ltd Microwave Processing using the BioMove Pro+</td>
<td>Media Cybernetics Simplifying Your Advanced Imaging Solutions Using Image-Pro APPS</td>
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<tr>
<td>1430 - 1500</td>
<td>Ji Intelligent Imaging Innovations Cleared Tissue LightSheet: Presenting a New Microscope for High Speed, High Resolution Imaging of Cleared Tissue and Whole Organ</td>
<td>WITec GmbH RISE Microscopy – Combining the Advantages of 2D Chemical Raman and SEM Imaging</td>
<td>Stream Bio Conjugated Polymer Nanoparticles: Highly Fluorescent Imaging Agents for Fluorescent Microscopy, Flow Cytometry and Multiple other Cellular Applications</td>
<td>Bitplane, an Oxford Instruments Company 3D and 4D Image Visualization and Analysis for Light Sheet Microscopy</td>
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<tr>
<td>1530 - 1600</td>
<td>DENSSolutions Impulse - Next Generation In Situ Software ’Optimizes Your Workflow’</td>
<td>Leica Microsystems</td>
<td></td>
<td>Quorum Studying Nano-Structures by Electron Microscopy - Methods of Coating for Successful Imaging and Elemental Analysis</td>
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<tr>
<td>1600 - 1630</td>
<td>Gatan GIP Continuum: New Capabilities and Their Impact on Your EELS and EFTEM Experiments</td>
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<tr>
<td>1630 - 1700</td>
<td>Quekett Microscopical Club “New Lamps for Old” Updating Old Microscopes for Current Use and Digital Imaging</td>
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### Wednesday 3 July

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<tr>
<td><strong>1100 - 1130</strong></td>
<td>Thermo Fisher Scientific Advances in 3D Image Processing Automation in Aivio Software for Materials Science</td>
<td>Bitplane, an Oxford Instruments Company 3D Image Visualization and Analysis for Light, Electron and Correlative Microscopy</td>
<td>Andor Technology, an Oxford Instruments Company Dragonfly High-Speed Confocal for nm to mm Imaging; Latest Developments in this High-Productivity Multi-Modal Imaging Platform</td>
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<tr>
<td><strong>1200 - 1230</strong></td>
<td>Gatan What’s New in Gatan Microscopy Suite® (GMS)?</td>
<td>Expredo Software Ltd Calpeda Activity Recorders (CAR) for Actual Usage Tracking</td>
<td>EDAX The APEX of EDS and EBSD Data Collection and Analysis</td>
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<tr>
<td><strong>1230 - 1300</strong></td>
<td>Linkam Scientific Instruments Super-Stable Microscope Design for Super-Resolution Light Microscopy on Your Desktop Without an Optical Table</td>
<td>Agar Scientific Ltd DiamondWire Saws for Microscopy Applications</td>
<td>Thermo Fisher Scientific A New Generation Multiple Ion Species Plasma FIB Technology</td>
</tr>
<tr>
<td><strong>1300 - 1330</strong></td>
<td>SVI Huygens New Super-Resolution Advances in HUYGENS Reliable SLM, ZEISS Airyscan, and STED Image Processing</td>
<td>Cairn Research Ltd Tik – A New Angle on Light Sheet Imaging</td>
<td>3i - Intelligent Imaging Innovations Cleared Tissue LightSheet: Presenting a New Microscope for High Speed, High Resolution Imaging of Cleared Tissue and Whole Organs</td>
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<tr>
<td><strong>1330 - 1400</strong></td>
<td>Nanomegas Precision Electron Diffraction Tomography and Amorphous Materials Analysis (e-PDF) in TEM</td>
<td>Oxford Instruments - NanoAnalysis Bringing EDS to Life: Using EDS to Analyze Biological Samples</td>
<td>Quorum Studying Nano-Structures by Electron Microscopy - Methods of Coating for Successful Imaging and Elemental Analysis</td>
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<tr>
<td><strong>1400 - 1430</strong></td>
<td>ZEISS Multimodal Microscopy for Very Large 2D &amp; 3D Imaging</td>
<td>Thermo Fisher Scientific Advances in Image Processing Automation in Thermo Scientific Amira Software for Life Sciences</td>
<td>Nikon UK Ltd High Content Imaging Software: Enhancing Ease and Flexibility of Image Capture</td>
</tr>
<tr>
<td><strong>1500 - 1530</strong></td>
<td>Agar Scientific Ltd The Future of Sample Preparation</td>
<td>Leica Microsystems Inspirational Research with the Leica SP8 Platform</td>
<td>Media Cybernetics Image-Pro Solutions for Analyzing Electron Microscopy Images</td>
</tr>
<tr>
<td><strong>1530 - 1600</strong></td>
<td>Thermo Fisher Scientific UHR-STEM Imaging: How the Latest Developments are Coming Together</td>
<td>TESCAN Multi-Modal 3D Microstructure Analysis Using New Generation Plasma FIB-SEM</td>
<td>NEWTEC Scientific SEM Observation on a Sample Subject to Mechanical and/or Thermal Stress in an Oxidizing Environment or High Vacuum</td>
</tr>
<tr>
<td><strong>1600 - 1630</strong></td>
<td>Gatan Advances in Cathodoluminescence – Optical Characterization Below the Diffraction Limit</td>
<td>Gatan Advanced Imaging for all TEMs and All Applications: New Generation Cameras from Gatan</td>
<td>LUMICKS Step into the Unresolved: Versatile Tools Towards Real-time Single-molecule Biology</td>
</tr>
<tr>
<td><strong>1630 - 1700</strong></td>
<td>Quekett Microscopical Club “New Lamps for Old” Updating Old Microscopes for Current Use and Digital Imaging</td>
<td></td>
<td>JEOI UK Ltd With Great Microscopy Comes Great Spectroscopy – Analytical Solutions from JEOI</td>
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### Poster Session

**Poster 1**

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<tr>
<td><strong>1100 - 1130</strong></td>
<td>Linkam Scientific Instruments Solutions for Sample Characterisation, Make More of Your Microscope</td>
</tr>
<tr>
<td><strong>1130 - 1200</strong></td>
<td>ZEISS Solutions for the Challenges of Advanced FIB-SEM Tomography Including Machine Learning Based Segmentation</td>
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<tr>
<td><strong>1100 - 1130</strong></td>
<td>Thermo Fisher Scientific Advances in 3D Image Processing Automation in Aivio Software for Materials Science</td>
<td>Fluidigm Simultaneously Detect up to 37 Protein Markers in a Single Tissue Scan with the Hyperion™ Imaging System, Powered by CyTOF® Technology</td>
<td>Zaber Technologies Low-cost Automated Fluorescence Microscopy</td>
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arivis AG 720
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