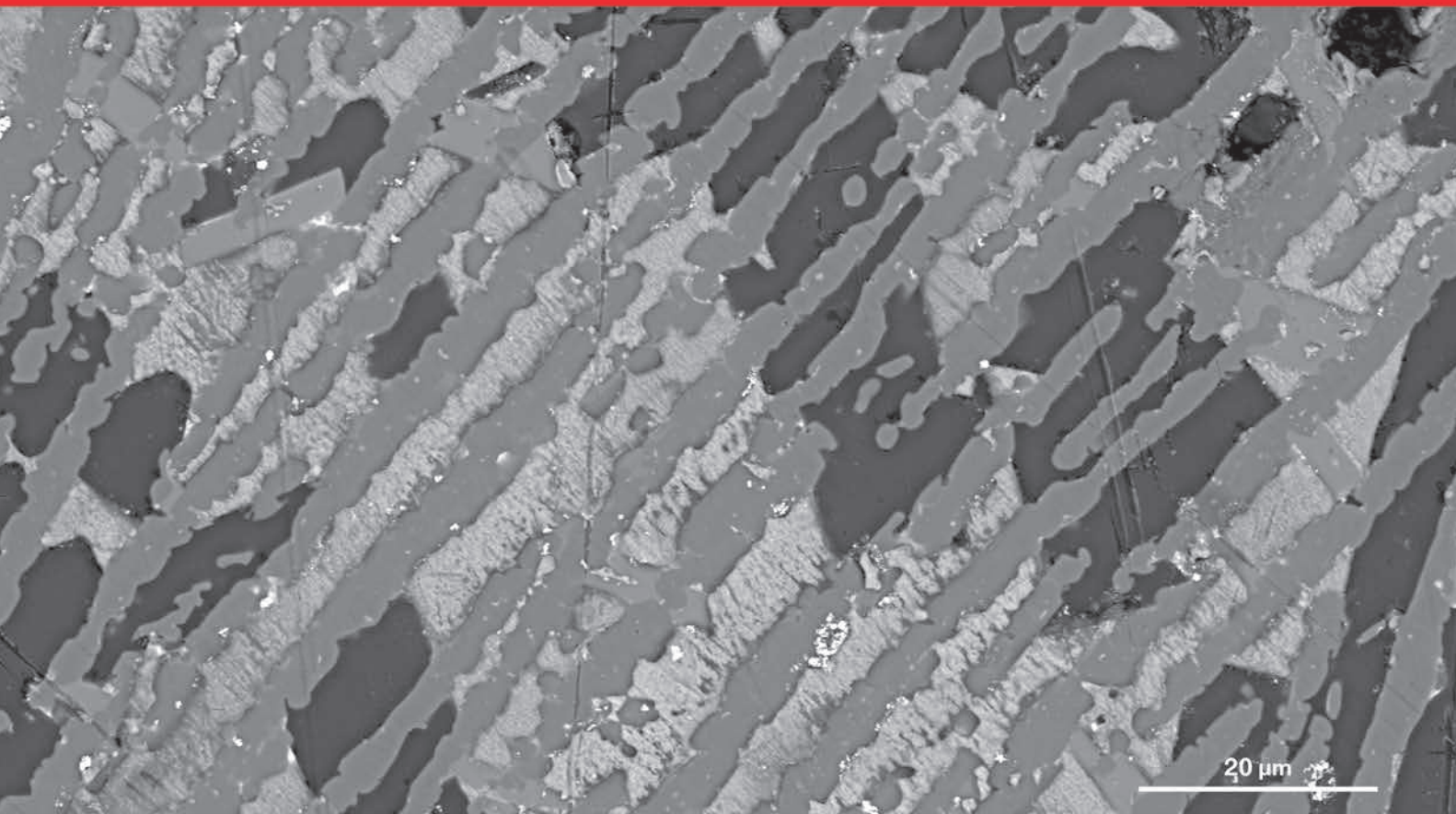


# European Microscopy Society

Yearbook 2018



Defects in glass due to the reduction of silica glass into silicon and the relative oxidation of metals (Fe, Cu and others) in their corresponding oxides. Sample courtesy of Stazione Sperimentale del Vetro, Murano – Venezia.

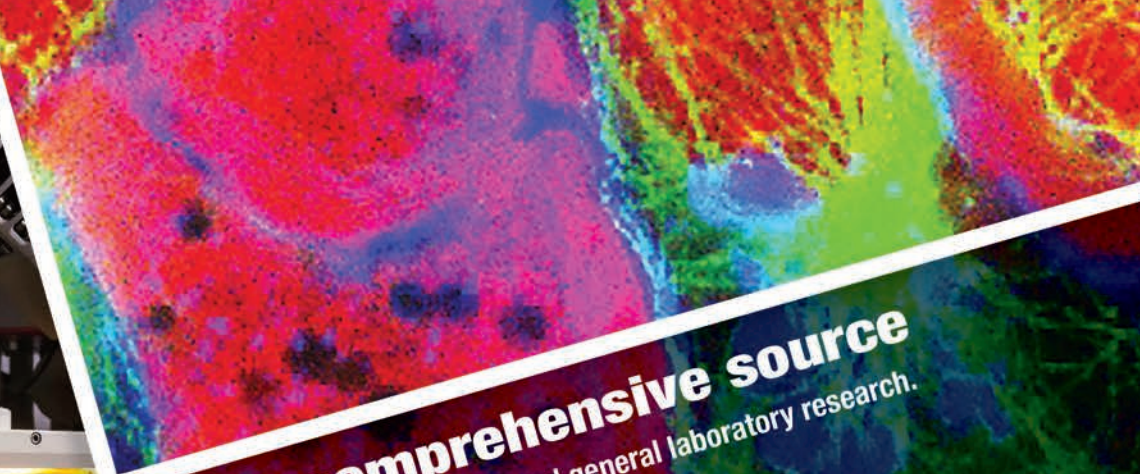
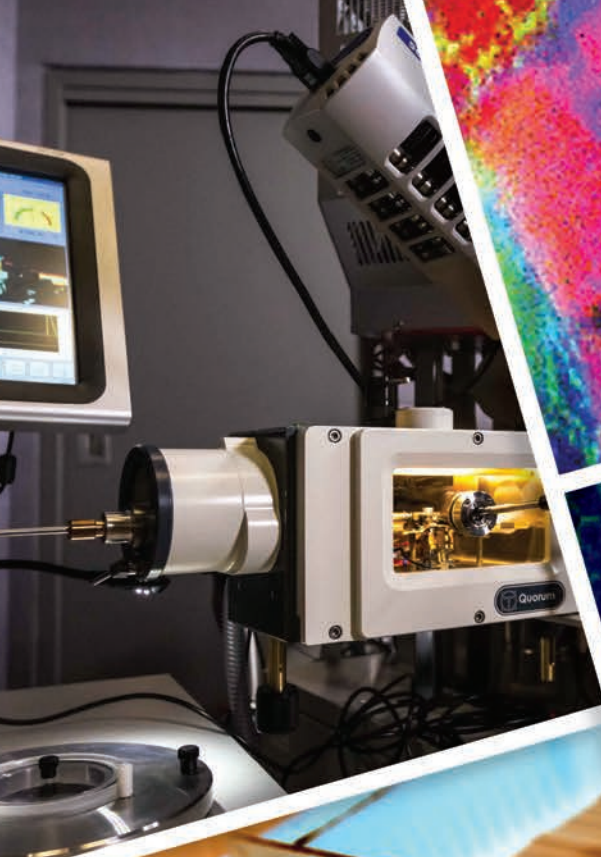
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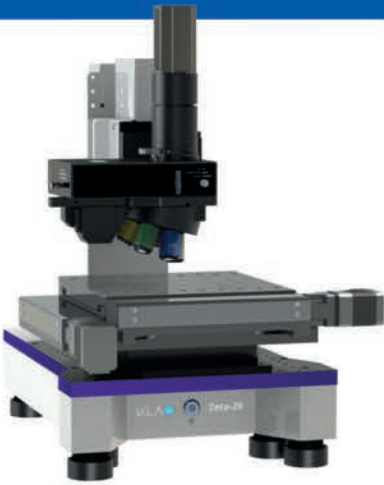
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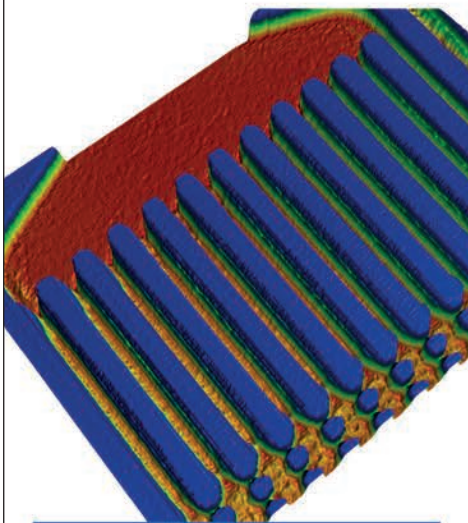
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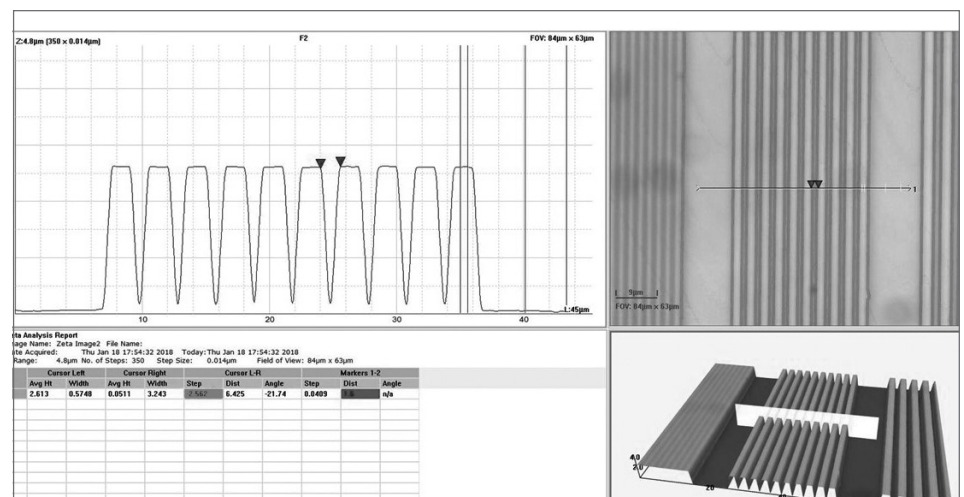
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# European Microscopy Society

Cobalt\_450\_align: Composite colour image of complicated micromagnetic structures in a 30 nm Cobalt film, annealed at 450°C. Different colours indicate different directions of magnetic induction in the specimen. Images taken with DPC (differential phase contrast) technique in STEM mode. Image edge approx. 15 µm. Electron Microscopy Laboratory, Physics Faculty, University of Regensburg.

Specimen and images: Thomas Beer, MSc.

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# PREFACE

Dear EMS members,

The European Microscopy Society (EMS) was formally created in 1998 at the International Congress on Electron Microscopy in Cancun. This year, it celebrates its twentieth birthday, with the European Microscopy Societies well represented. We can therefore declare that the initiative that transformed the old Committee of European Societies of Electron Microscopy (CESEM) into the EMS has been a real success.

2018 has been a fantastic year marked by major events.

First, the International Microscopy Conference was held in Sydney, Australia in September. At this meeting, C. Colliex and A. Howie were respectively awarded the "Vernon E. Cosslett Medal" and the "John Cowley Medal", by the IFSM to honor their outstanding contributions into the field of microscopy and related techniques.

We are looking forward to the next EMC in 2020 in Copenhagen, Denmark.

Secondly, in 2018, we had an outstanding level of EMS sponsored events whose reports are available in this yearbook.

Many other events, as inaugurations of new machines, prizes, meetings or reports of young researchers are also covered in this issue, proving again the vitality of our society and the activeness of its members. Some of these include: Dr Andrew Chick was awarded the trail crisp award by the Linnean Society of London for his work in entomological micro-technique. New state-of-the-art microscopes, and Nature Research award won by (a member of) the Microscopy Hungarian Society.

Reports on new machines and structures are included in this yearbook. The inauguration of a new microscope: The Hitachi HF-3300 ETEM in Lund, Sweden; and TEMPOS, a unique platform for electron microscopy in Orsay, France.

ELECMI, the Spanish Infrastructure for Electron Microscopy of Materials, a Unique Scientific and Technical Infrastructure (ICTS) within the current Map of National Facilities in Spain.

The 80th anniversary of the construction of the TEM was celebrated at the Electron Microscopy Symposium, Uppsala University, Sweden.

Reports on other microscopic related events are included in the yearbook, such as the Electron Microscopy Course in Holland; the 3rd Sino-German Symposium on Advanced Electron Microscopy of Interface Structures and Properties of Materials, in Beijing, China; the International Workshop on Advanced and In-situ Microscopies of Functional Nanomaterials and Devices (IAMNano 2018) in Hamburg, Germany. The Japanese Society for Electron Microscopy Research in Dermatology (SSSR) and the Society for Cutaneous Ultrastructure Research (SCUR – The Skin Imaging Society) held their 7th joint meeting in Asahikawa, Japan.

A report on the ESTEEM3 – European Network for Electron Microscopy project is included.

The RMS also announces its activities.

Finally, the memberships that the EMS owes its existence through local societies and individual members. The many companies that advertise in our pages are also warmly thanked for their support and I hope that they will be joined by many more firms once the Europe-wide distribution of the Yearbook to more than 6500 Microscopists is appreciated.

This 2018 EMS yearbook is printed and distributed by ERI company, free of charge for the Society. Thanks to the firms who advertise in our pages to support it.

Thanks also to all colleagues who have contributed to and for proof reading of this Yearbook.

**Virginie Serin,**  
EMS Secretary

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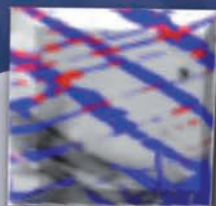
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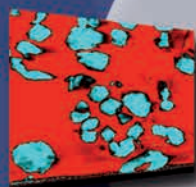


# Precession Diffraction Solutions

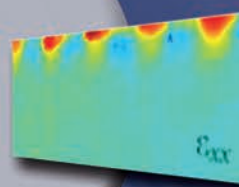
Orientation Imaging



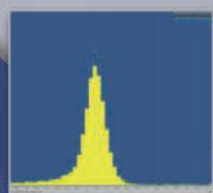
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topspin



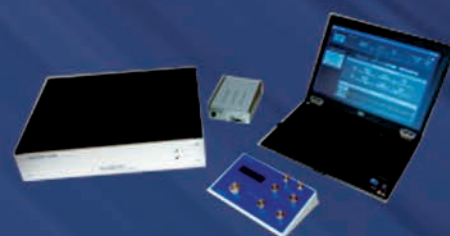
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# LETTER FROM THE PRESIDENT

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## Dear members of the European Society for Microscopy (EMS),

When you hold this EMS Yearbook 2018 in your hands, it manifests several facts to you. To begin with, it tells you that – after now 20 years of existence – the EMS is not only "still alive", but in contrary vividly active, as you can tell from the large number of contributions in this Yearbook. Even better, the Yearbook contains more contributions from our members rather than from the EMS board! This makes clear, EMS is an active society, where our members happily contribute to the society's life. In case you have not noticed until now, let me again point to the fact that – besides on our EMS website – our society is also present on Facebook (<https://www.facebook.com/eurmicsoc/>) and Twitter (<https://twitter.com/eurmicsoc>), waiting for your input, too!

But let me get back to the Yearbook. It gives you a compendium of microscopy related events throughout the year 2018, with a special focus on Europe. This overview is rather uniquely given by our publications, and even though there is still one year to pass until you receive the next Yearbook, keep it in mind and do not hesitate to share your "microscopy moments" with the EMS community.

In this current issue, you will find reports on ICM19 (Sydney, Australia) from participants, who were able to attend the conference also because they received generous support from the EMS. Even though the cost to attend IMC19 was relatively high due to the long distance, 23 members could finally be supported. As you may have heard of by now, for the next IMC, Busan (South Korea) was elected, and we will make sure by then that again numerous young scientists will be able to attend. The presentation of Busan was given by some very enthusiastic members of the organizing committee, and we are already today looking forward to another unforgettable event on microscopy.

Also in Sydney, we had the election of the new IFSM board, with Professor Kazuo Furuya now being Past-President and Professor Angus I. Kirkland the current President. As for EMS we are proud to have our Secretary, Professor Virginie Serin elected in the Executive Board, which grants us easy access to current processes there. For more information on IFSM and your representatives, please refer to IFSM's homepage: <http://www.ifsm.info/index.html>.

From IFSM's General Assembly we learned that IFSM is now also a full union member of the International Council for Science, and as such has suggested to establish the "International Year of Microscopy", probably in time for the 100th anniversary of the invention of the electron microscope. Exciting events lie ahead of us!

Moving one time step back to the more imminent future, I would like to remind you that in 2019, the EMS will hold its General Assembly during the EMS extension, the 14th Multinational Congress on Microscopy (September 15-20, 2019 in Belgrade, Serbia). And finally, preparations for the EMC2020 in Copenhagen (also not too far ahead from now) gain more and more momentum, led by Professor Klaus Qvortrup, the Chairperson of the Executive Board. Already, a list of highly prominent plenary speakers has been established and as I am writing these lines, preparations are ongoing to set up a top-notch scientific program, to attract as many delegates as possible – and I have no doubt that this will be successful. Keep an eye on the website (<https://www.emc2020.eu/>) and be prepared for another great conference from the EMS for YOU! ■

**Josef Zweck,**  
EMS President



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**IMC19 MEETING  
SEPTEMBER 2018  
SYDNEY**

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# IMC19 MEETING, SEPTEMBER 2018, SYDNEY



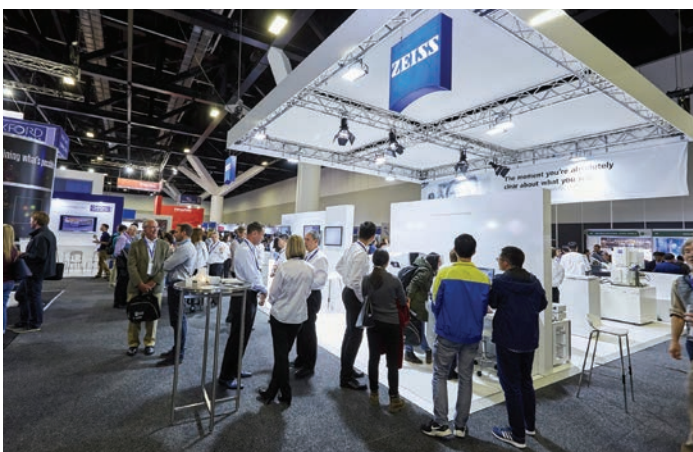
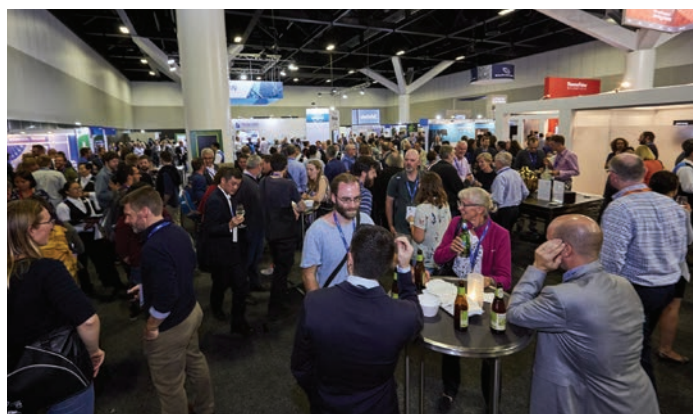
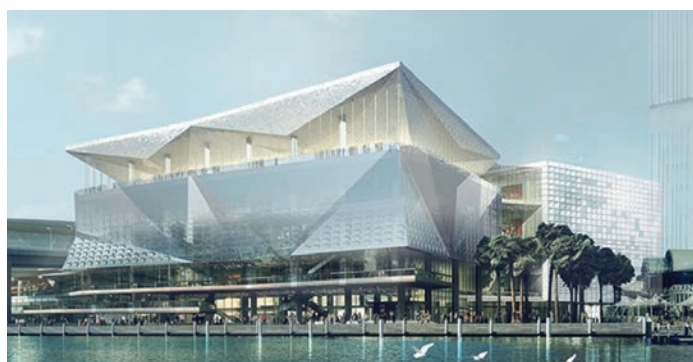
## REFLECTIONS FROM THE CONFERENCE CHAIRS

**THE AUSTRALIAN MICROSCOPY COMMUNITY welcomed the world to Sydney for the 19<sup>th</sup> International Microscopy Congress (IMC19) in September.**

Over 2,100 delegates attended the meeting from 48 countries. Of these, around 600 were from Australia and over 1,500 from overseas, with large contingents from Japan, Korea and Europe. The meeting attracted over 2,000 presentations including ~150 invited talks and ~450 oral presentations. Outstanding plenary lectures by Nobel Laureate Dan Shechtman and Jennifer Dionne, Zhiwen Shan and Misty Jenkins were just some of the meeting's highlights. For the conference's closing session on the Friday, Nobel Laureate Joachim Frank reflected quite brilliantly on his award as part of the IFSM symposium.

In this meeting we introduced, with some trepidation, digital posters (almost 800 presented in different forms), where attendees could view presentations electronically on any screen, as well as share, download and 'like' posters of interest. Presentations in this form proved to be highly popular and will undoubtedly play a key role in microscopy meetings in the future. The trade exhibition was sold out, with 70 companies represented. With morning and afternoon tea and lunches served in the exhibition hall, as well as this acting as the venue for mini-oral presentations, the trade show was a constant hive of activity.... helped not insignificantly by the excellent standard of food and barista quality coffee! ■

Paul Munroe and Simon Ringer





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EMC2020  
SEPTEMBER 2020  
COPENHAGEN

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# EMC 2020 REPORT, AUGUST 23-28, 2020; COPENHAGEN, DENMARK



**emc2020, the forthcoming European Microscopy Congress, is hosted by Scandem – The Nordic Microscopy Society – and will take place at The Bella Center, Copenhagen (Denmark) on August 23-28, 2020. Preparations are well underway both scientifically and locally.**

The emc2020 symposia committees have defined the main themes of the conference and look forward to welcoming all the invited plenary speakers:

- *Phase Sensitive Methods with Photons and Electrons* with plenary speaker: **Professor John Rodenburg** (University of Sheffield, UK)
- *Imaging Quantum Phenomena* with **plenary speaker: Professor Roland Wiesendanger** (University of Hamburg, Germany)
- *Live & Fast Super-resolution - Frontiers in imaging of ultrafast processes* with **plenary speaker: Professor Claus Ropers** (Universität Göttingen, Germany)
- *Artificial Intelligence in big data analysis, and computational microscopy* with **plenary speaker: Professor Moritz Helmstaedter** (Max Planck Institute for Brain Research, Frankfurt, Germany)
- *Cutting edge advanced sample preparation* with **plenary speaker: Professor Carolyn Larabell** (University of California, San Francisco, USA)
- *The lab in the microscope - In situ, in vivo, in operando, and multimodal Microscopy* **plenary speaker: Doctor Frances Ross** (IBM, USA)

By July 2019 an outline of the scientific program and scope of sessions will be available online, where abstract submission opens in August 2019. For the first time, the conference has also invited the submission of ideas and suggestions for symposium topics within the agreed themes.

The emc exhibitions typically attract well over 100 exhibitors, ranging from small start-up companies to

the industry giants. This makes it a great place to compare the latest products from different suppliers with many product demonstrations available and teams on hand to offer advice for any challenges you may be experiencing in the lab and answer any questions you may have.

Set to be the largest of its kind on the continent, the emc2020 exhibition will also offer a number of free commercial training workshops throughout the hall. Focusing on the latest equipment and software, these will be presented by industry experts offering troubleshooting tips and handy tricks that you can take back to the workplace.

The exhibition at emc2020 – encompassing an area of 2208 m<sup>2</sup> – will be the central hub for the whole event, including the plenary lecture theatre, six lecture theatres, digital posters, workshops and catering. It will provide a great opportunity for networking for both delegates and exhibitors.

Exhibition space went on sale to ECMA members from 25 February 2019 and to non-ECMA members from 13 March 2019.

Please visit [www.emc2020.eu](http://www.emc2020.eu) for more information and updates.

emc2020 is organized by the Royal Microscopical Society (RMS) under the auspices of the European Society for Microscopy (EMS) and International Federation of Societies for Microscopy (IFSM). On behalf of all of these societies and the Organizing Committee, I look forward to welcoming you to Copenhagen for what promises to be a really great event. ■

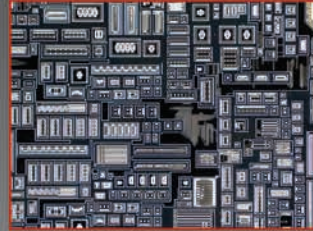
**Klaus Qvortrup, EMC2020 chair**



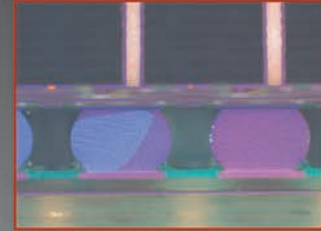
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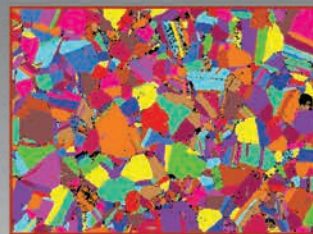
Common applications include parallel circuit delayering, cross-sectioning, substrate thinning, serial/3-D preparation, wedge polishing and more.



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Cross-Sectioning



EBSD Preparation

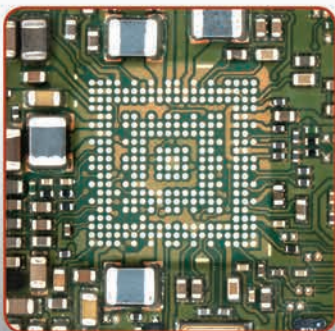


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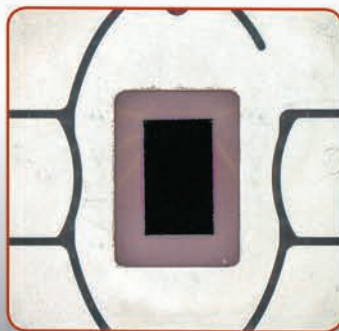
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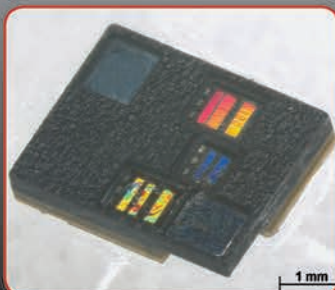
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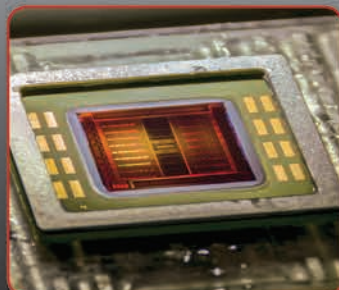
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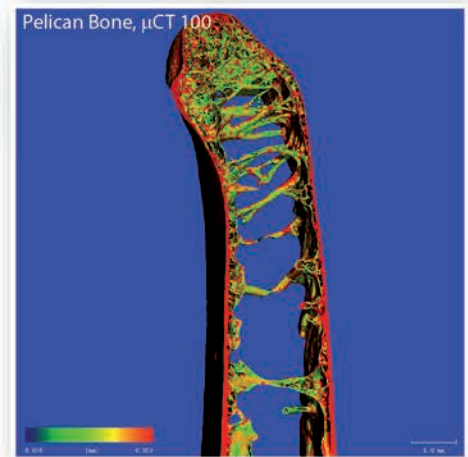
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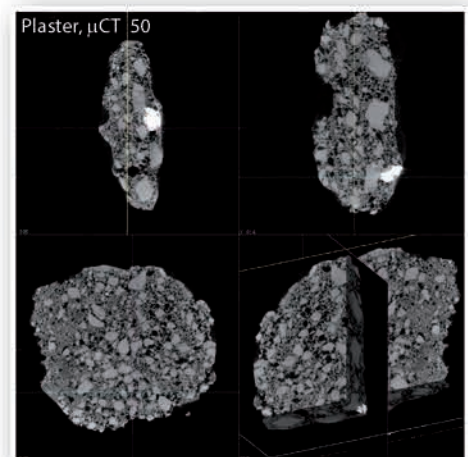
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# REPORTS ON EMS SPONSORED EVENTS

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## EMS SPONSORED EVENTS IN 2018

- **International School of Crystallography  
51<sup>st</sup> Course: Electron Crystallography**  
*June 1-10, 2018; Erice, Italy*
- **Second European FIB Workshop (FIB2018)**  
*June 19-20, 2018; Grenoble, France*
- **International Holography Workshop**  
*June 26-28, 2018; Berlin, Germany*
- **7<sup>th</sup> SuperSTEM biennial Summer School. Advanced Topics  
on Electron Microscopy: Theory meets experiment**  
*June 29-July 4, 2018; Daresbury, United Kingdom*
- **Applications of Electron Microscopy  
to Beam Sensitive Materials (EMAG 2018)**  
*July 04-07, 2018; Coventry, United Kingdom*
- **Electron Microscopy of Nanostructures (ELMINA2018)**  
*August 27-29, 2018; Belgrade, Serbia*
- **CISCHEM 2018 – 4<sup>th</sup> Conference on In Situ  
and Correlative Electron Microscopy**  
*October 10-12, 2018; Saarbrücken, Germany*
- **Advanced Microscopy Techniques For Plant-Microbe  
Interaction Analysis. Training Course and Workshop**  
*November 26-30, 2018; Uft, Tulln An Der Donau, Austria*

# INTERNATIONAL SCHOOL OF CRYSTALLOGRAPHY

## 51<sup>ST</sup> COURSE: ELECTRON CRYSTALLOGRAPHY

### JUNE 1-10, 2018; ERICE, ITALY

The course participants included 55 Ph.D. students and young postdocs, and 19 lecturers and workshop leaders. The course provided lectures on the basics of electron crystallography as well as insight into the most recent developments in this field, stretching from electron diffraction to imaging for crystallographic purposes, on a wide range of materials, from proteins to inorganic materials. This was done by organizing (on average) lectures in the morning and hands-on workshops in the afternoons. Each workshop was given twice, such that, as many participants worked on their own laptops, everyone was able to attend each workshop topic.

The first day was devoted to the basics of diffraction and crystallography, to make sure all necessary background knowledge for the more advanced lectures was front-and-centre in the participants' minds. Thereafter, the successful and upcoming techniques of quantitative electron diffraction analysis for structure determination and refinement were discussed, from sample preparation and data acquisition up to the final refinement procedures. Most lectures were coupled with effective hands-on sessions. In the second half of the course, attention was also given to imaging and spectroscopic techniques as specifically used for crystallographic purposes.

The participants themselves were encouraged to show their recent work during the poster sessions. There were two poster sessions in the evenings, exhibiting half of the posters in each session, with a chance to preview the poster during lunchtime.

Many discussions were held at the poster during both the "official" poster sessions and the preview sessions. The three best posters were selected by a small committee and the authors of those posters were presented with a certificate at the end of the course. Networking was supported by several organized social events.

Further opportunities for the Ph.D. students to learn general skills were provided by asking student volunteers to function as chairpersons for the sessions and encouraging them to prepare questions and open remarks for the round-table discussion on the Future of Electron Crystallography (held as last event of the course).

In this round table session on the future, several directions were put forward as necessary for future advancement, such as further the need for decreasing beam damage, and related to this, further progress in detectors, sample preparation methods and automation to make the techniques available for a wider user audience.

**Prizes and Award:** Several prizes were awarded during the closing ceremony on the last day of the course, for the best posters and the Lodovico Prize, named after Lodovico Riva di Sanseverino who created the International School of Crystallography. The third place for the best poster was awarded to Stefan Noisternig, PhD student at the Faculty of Physics, University of Vienna (Austria), the second place to Paul Benjamin Klar, Ph.D. student at the Department of Condensed Matter Physics, University of the Basque Country (Spain), and the first prize was awarded to Olga Chovnik, Ph.D. student at the Department of Organic Chemistry, Weizmann Institute of Science (Israel).

The Lodovico prize for the most active student inside and outside the lecture hall was awarded to Eu Pin Tien, Ph.D. student at the School of Materials, University of Manchester (UK).

At the end of the Course, participants were asked to complete a survey to evaluate the course and comment on the quality of the program. Their responses indicated that a similar meeting should be held at least within four years and that the course had achieved most of its objectives (score 92/100). ■





# SECOND EUROPEAN FIB WORKSHOP (FIB2018) JUNE 19-20, 2018; GRENOBLE, FRANCE

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The second workshop of the European FIB network (EU-F-N) has been held in Grenoble (France) on June 19-20, 2018, at the Minatec Campus, organized by CEA Leti. One hundred and thirty attendees have been hosted in this completely free workshop, open to industrials, academics, students and equipment suppliers. At a particular focus this year was the organization of

4 tutorials given by worldwide experts on ion optics (Ray Hill, Zeiss USA), FIB patterning strategies (Ken Lagarec, FIBICS Canada), Cryogenics operations (Stephen Gerstl, ETH Zurich), ion implantation simulation (Jin Huang, DCN Dresden).

Next workshop will be in Dresden the 12-14<sup>th</sup> June 2019. ■

# INTERNATIONAL HOLOGRAPHY WORKSHOP

## JUNE 26-28, 2018; BERLIN, GERMANY

**The international holography workshop took place on June 26-28, 2018 with the focus on *The phase of the electron wave*.**

With this three-day workshop, we continued the loose series of European and international holography workshops and revived the spirit of the workshops at Dresden's *Meixmühle*. The idea behind this German tradition is to offer opportunities to participants, and especially young scientists, and in particular, much space for extensive scientific discussions and for the creation of own contacts in a relaxed atmosphere.

This year, the workshop took place directly at Lake Zeuthen in the "Seehotel Zeuthen" (Berlin-Zeuthen, Germany). Here 76 participants from all over Europe, Asia and North America met for a lively exchange of experiences.

More than 50 contributions on the topics of strain, in situ biasing, electrostatic potentials and magnetic fields, phase plates and vortex beams, holography setups as well as holography at low and high acceleration voltages set up the basis for discussions. In addition to the presentation of current, partly unpublished results, the focus was on open discussion of theoretical basics, experimental difficulties, and the resulting questions. Important experiences which cannot be found in any publication elsewhere were exchanged and ideas were developed to advance joint projects.

The holography workshop took place within the framework of the DFG-funded Berlin Network for Electron Microscopy (BerlinEM Network, [www.berlinem.org](http://www.berlinem.org)), in

which holographic methods serve as a crystallization point for new collaborations between electron microscopy groups and non-university research institutions in and around Berlin, Germany. Jointly organized workshops and conferences, like the MC2019 ([www.microscopy-conference.de](http://www.microscopy-conference.de)) and the Autumn School on Advanced Methods ([www.berlinem.org](http://www.berlinem.org)), are cornerstones of the BerlinEM Network.

Thanks to our sponsors (EMS, DGE, DFG, JEOL GmbH, Thermo Fisher Scientific, Hitachi, LOT Quantum Design and Protochips) we were able to offer an extensive and interesting program in a relaxed atmosphere. The exchange of experiences stimulated by the lectures and discussions often lasted into the late evening hours. On the second evening, the BBQ evening took place on the hotel's own beach. The pleasant informal atmosphere on this warm summer night will remain in our memories for a long time.

The great resonance to this workshop showed us not only how up-to-date this topic is, but also how great the necessity for open discussions was and still is. Therefore, we hope that the tradition of the holography workshop will be continued.

We would like to thank all participants and sponsors for a successful holography workshop. We would also like to thank the European Microscopy Society for covering the travel expenses for Prof. Hannes Lichte and Dr. Kurt Scheerschmidt.■

**By Michael Lehmann und Ines Häusler**  
Technische Universität Berlin, Germany



# 7<sup>TH</sup> SUPERSTEM BIENNIAL SUMMER SCHOOL. ADVANCED TOPICS ON ELECTRON MICROSCOPY: THEORY MEETS EXPERIMENT

## JUNE 29-JULY 4, 2018; DARESBURY, UNITED KINGDOM

The 2018 SuperSTEM Summer School was held on June 29-July 4, 2018 on the Sci-Tech Daresbury Campus, in North-West England, where the SuperSTEM Laboratory is located. This year's event was co-organised with the Scientific Computing Department of the Science & Technology Facilities Council (<https://www.scd.stfc.ac.uk>) and CCP9, the Collaborative Computational Project for the Study of the Electronic Structure of Condensed Matter (<https://www.ccp9.ac.uk/>).

Building on the established series of schools and workshops held at SuperSTEM every two years, this year's school acknowledged the increasing need for theoretical methodologies to rationalise and simulate experimental findings.

In addition to topics in experimental aberration-corrected scanning transmission electron microscopy (STEM), including advanced instrumentation, principles of aberration correction and diagnosis, imaging theory and simulation, energy dispersive X-ray electron (EDX) energy loss spectroscopies (EELS, including in the optical and vibrational regimes), this year's school delved for the first time into more advanced computational topics. Half of the school program was dedicated to electronic structure theory and calculations as well as to methodologies for the simulation of EELS and other spectroscopy data. The school was therefore intended



*Summer School Group photograph taken just outside the lecture room, by the historic Bridgewater Canal, which runs alongside Daresbury Laboratory*

for advanced Ph.D. students, post-doctoral researchers as well as academics with an existing background in electron microscopy and an interest in advanced spectroscopy.

Lectures by world-leading experts were complemented by extensive practical sessions over the six days of a densely packed scientific programme. A particular emphasis in organizing the practical sessions was the requirement for every participant to be given real hands-on experience on the electron microscopes housed at the Laboratory. This imposed a limit on the number of attendees that could be accommodated although we were delighted to welcome a very international contingent of 28 applicants from as many as 14 countries.

The participants had the opportunity to operate all three of the dedicated STEM instruments of the SuperSTEM facility (an aberration-corrected VG HB501, a Nion UltraSTEM100 and a monochromated Nion UltraSTEM100MC-Hermes), and learn from the facility's expert staff scientists the practical aspects of aberration correction, STEM imaging and atomically resolved spectroscopy. Perhaps the most exciting practical for the participants was operating the state-of-the-art monochromated Nion UltraSTEM100MC-Hermes, where participants were able to perform phonon EELS spectroscopy in an electron microscope.



*Prof. Peter Schattschneider delivering his lecture on the principles of electron energy loss spectroscopy*

# 7<sup>TH</sup> SUPERSTEM BIENNIAL SUMMER SCHOOL. ADVANCED TOPICS ON ELECTRON MICROSCOPY: THEORY MEETS EXPERIMENT JUNE 29-JULY 4, 2018; DARESURY, UNITED KINGDOM



*Hands-on practical session at the Daresbury Hitachi demo-centre*

In addition to the Laboratory's instruments, further practical sessions were held at the neighboring Daresbury Hitachi High Technologies demonstration centre, where participants had the opportunity to perform STEM imaging and quantitative X-ray Spectroscopy in a Scanning Electron Microscope (Hitachi SU8020 SEM/STEM instrument). Computer practical sessions included the latest processing and interpretation software, while one and a half days of the theoretical part of the school were dedicated to hands-on band structure and spectral calculations.

Thanks to the particularly pleasant weather the beautiful Cheshire countryside enjoyed this summer, all attendees were able to take part in a number of social events throughout the weekend, including a BBQ by the scenic Bridgewater canal.

Attendees were also given the opportunity to present a poster about their own research, in order to further stimulate discussions and interaction. A prize for the best poster was awarded at the end of the school banquet by SuperSTEM's Dr. Demie Kepaptsoglou to Mr. Eoghan O'Connell, from the University of Limerick in Ireland, after consultation with a panel of the school's instructors.



*Mr. Eoghan O'Connell receiving his best poster award*

From all accounts, the school was a resounding success. "I gained valuable knowledge and insight from the instructors and was very happy to be able to ask questions and gain hands-on experience with the microscopes. I look forward to transferring this knowledge into my own research", said one of the participants, echoing all the other comments and feedback received.

The Summer School organizers would like to acknowledge support from the Engineering and Physical Sciences Research Council (EPSRC) for their continued support of the SuperSTEM facility, as well as their support to the Laboratory's events through CCP9.

The Summer School was made possible thanks to generous support from the European Microscopy Society, the Royal Microscopical Society, Nion Co., Hitachi High Technologies, Bruker GmbH and the Science and Technology Facilities Council (STFC). ■

**By Demie Kepaptsoglou, SuperSTEM Staff Scientist, on behalf of the school organisers, Prof. Quentin Ramasse, Dr. Dorothea Mücke Herzberg (SuperSTEM), Drs. Jerome Jackson, Martin Lueders and Leon Petit (SCD-STFC).**



# APPLICATIONS OF ELECTRON MICROSCOPY TO BEAM SENSITIVE MATERIALS (EMAG 2018)

## JULY 4-7, 2018; COVENTRY, UNITED KINGDOM



EMAG 2018 was held at the University of Warwick, on the 4-6 July 2018. The conference focused on “Applications of Electron Microscopy to Beam Sensitive Materials”. The 120+ delegate and 20+ exhibitors attended sessions on Low Voltage Microscopy, Low Dimensional Materials, In-situ Electron Microscopy, Technique developments and Electron Microscopy Applications.

Several distinguished plenary (Prof. Nigel Browning, Prof. Ray Egerton and Prof. Kazuo Suenaga) and invited speakers (Prof. Elena Besley, Dr. Stuart Boden, Dr. Lewys Jones and Dr. Joe Patterson) presented the state-of-the-art in their field, alongside contributed oral presentations as well as poster sessions. There was also a table-top trade exhibition, involving some of the largest manufacturers of electron microscopes and other scientific instruments.

An important aspect of EMAG conference is to encourage student contributions. Thus, prizes were awarded to the best student contributions. For EMAG 2018 Daniel Kelly (University of Manchester) and Kecheng Cao (Ulm University) won the best and runner-up oral presentations.

There were also two poster prizes, best and runner-up, awarded to Alex Sheader (University of Oxford) and Haytham Hussein (University of Warwick) respectively. For more information about the research of these young electron microscopists see the Research Highlights. ■



EMAG 2018 winners with local committee organizer (left to right): Ana Sanchez, Daniel Kelly, Alex Sheader, Haytham Hussein, Kecheng Cao and Richard Beanland



By Prof. Ana M Sanchez, University of Warwick

# ELECTRON MICROSCOPY OF NANOSTRUCTURES (ELMINA2018) AUGUST 27-29, 2018; BELGRADE, SERBIA



**ELMINA2018 was organized by: Serbian Academy of Sciences and Arts (SASA), Faculty of Technology and Metallurgy (FTM), and University of Belgrade, Serbia and held at the Rectorate of the University of Belgrade on August 27-29, 2018.**

The conference was opened by Prof. Dr. Vladimir Bumbaširević, SASA member and rector of the University of Belgrade; Prof. Dr. Tibor Sabo, assistant of the Minister of Education, Science and Technological Development of the Republic of Serbia; Prof. Dr. Robert Sinclair, ELMINA2018 international advisory board chair; Prof. Dr. Velimir Radmilović, SASA member and ELMINA2018 chair. The number of participants was 137, out of which 92 were presenting authors. In order to make the ELMINA2018 conference accessible to as many young researchers as possible, the organizers waived the conference fee for all participants. The program consisted of 8 plenary and 2 poster sessions. Twenty-five plenary talks were given by some of the most renowned world experts in the field of theory and application of electron microscopy in characterization of nanostructures, including:

Gianluigi Botton (Canada), Fu-Rong Chen (Taiwan), Miran Čeh (Slovenia), Peter Denes (USA) Rafal Dunin-Borkowski (Germany), Rolf Erni (Switzerland), Paulo Ferreira (Portugal & USA), Hamish Fraser (USA), Ferdinand Hofer (Austria), Wolfgang Jäger (Germany), Wayne D. Kaplan (Israel), Hannes Lichte (Germany), Laurence Marks (USA), Joachim Mayer

(Germany), Zoran Mišković (Canada), Jan Neethling (South Africa), Stephen Pennycook (Singapore), Jürgen Pitzko (Germany), Tamara Radetić (Serbia), Robert Sinclair (USA), Erdmann Spiecker (Germany), Kazu Suenaga (Japan), Maria Varela del Arco (Spain), Johan Verbeeck (Belgium).

Additionally, 68 posters were presented. It is noteworthy that most posters were presented by master and PhD students as well as young researchers.

Based on the quality of plenary talks and poster presentations as well as the fact that the conference was attended by a large number of young researchers (more than 100), most of whom were from Serbia, it was concluded that the ELMINA2018 conference was very successful. It was also concluded that, due to huge interest from young researchers as well as plenary speaker suggestions, ELMINA should grow into a biannual event in Belgrade, Serbia, with the next ELMINA2020 which will be held in September 7-11, 2020.

We would like to take this opportunity to thank first and foremost ThermoFisher Scientific as well as NanoMegs, JEOL/Scan, Ministry of Education, Science and Technological Development of the Republic of Serbia, European Microscopy Society and the Federation of European Materials Societies, without whom this conference would not have been possible. ■

**ELMINA Conference Manager Vuk Radmilović**  
(website: <http://elmina.tmf.bg.ac.rs/>)



# CISCHEM 2018 - 4<sup>TH</sup> CONFERENCE ON IN SITU AND CORRELATIVE ELECTRON MICROSCOPY OCTOBER 10-12, 2018; SAARBRÜCKEN, GERMANY

The Conference on “In Situ and Correlative Electron Microscopy (CISCHEM)” organized by the INM - Leibniz Institute for New Materials, took place for the fourth time in Saarbrücken (Germany) on October 10-12, 2018.

How can methods to study protein function in cells be improved? How to image soft materials in liquid by electron microscopy? What are the possibilities to analyze in processes of, for example, catalytic nanoparticles? Scientists from around the world took the opportunity to discuss the future direction of *in situ* electron microscopy from different perspectives. CISCHEM is about understanding a particular process under native and realistic conditions. In so-called *in situ* methods, measurements are carried out in a gaseous environment, at high temperatures or in a liquid. The common goal of biologists, materials scientists, chemists and physicists is to further improve *in situ* electron microscopy, for example, by the combination of electron microscopy with fluorescence microscopy or by incorporating advanced data acquisition and processing algorithms.

The highlight of the conference was the keynote lecture by Prof. Robert Sinclair on *High Resolution in situ and Transmission Environmental Electron Microscopy of Material Reactions*. The topics of the other lectures and posters included soft materials and biological samples, nanocatalysts, *in situ* spectroscopy, innovations in *in situ* microscopy and data processing, high-speed or high-temperature *in situ* electron microscopy, and dynamic processes of nanomaterials.

The abstracts are published as online volume of the journal *Microscopy and Microanalysis*.

Keynote lecture: Prof. Robert Sinclair, Stanford University, CA, USA

## Invited speakers:

- Prof. Nigel Browning, University of Liverpool, UK
- Dr. Lucy Collinson, The Francis Crick Institute, UK
- Dr.-Ing. Tim Dahmen, German Research Center for Artificial Intelligence, Saarbrücken, Germany
- Dr. Indra Navina Dahmke, INM – Leibniz Institute for New Materials, Germany
- Dr. Radostin Danev, University of Tokyo, Japan
- Dr. Arnaud Demortière, CNRS / Université de Picardie Jules Verne, France
- Dr. Stig Helveg, Haldor Topsøe, Lyngby, Denmark
- Prof. R. J. Dwayne Miller, Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany
- Ass. Prof. Jaysen Nelayah, CNRS / Diderot University, Paris, France
- Ass. Prof. Joe Patterson, University of California, Irvine, CA, USA
- Prof. Erdmann Spiecker, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
- Dr. Kinga A. Unocic, Oak Ridge National Laboratory, Oak Ridge, TN, USA
- Ass. Prof. Taylor Woehl, University of Maryland, USA

## Scientific organization:

Prof. Niels de Jonge, INM – Leibniz Institute for New Materials, Saarbrücken, Germany

Prof. Kristian Molhave, Denmark Technical University, Lyngby, Denmark

Dr. Damien Alloyeau, Université Diderot – Paris 7, France

Website: [www.ciscem2018.de](http://www.ciscem2018.de) ■



# ADVANCED MICROSCOPY TECHNIQUES FOR PLANT-MICROBE INTERACTION ANALYSIS. TRAINING COURSE AND WORKSHOP NOVEMBER 26-30, 2018; UFT, TULLN AN DER DONAU, AUSTRIA

Last year's AIT Microscopy Workshop 2018 attracted 20 young scientists from all over the world, meaning the course was fully booked. Doctoral students, postdocs and academics from universities and industry from Austria, Belgium, Canada, Germany, Italy, Spain, Portugal, Poland, Sweden, Hungary, UK and the Czech Republic, attended an intensive one-week training course in Austria.

In addition to practical exercises in small groups and lectures, we were able to expand the program this year with attractive guest lectures. Prof. Hanns-Heinz Kassemeyer from the University of Freiburg, Germany, presented his Cryo SEM results in the lecture *The Plant Surface as a Preformed Barrier and Contact Zone in the Host-Pathogen Interaction*. Prof. Miroslav Ovecka from the Palacký University in Olomouc, Czech Republic, provided fantastic insights into the world of plant developmental biology using Light Sheet Microscopy. Prof. Levi Gheber (Ben-Gurion University of the Negev, Israel) gave a presentation on the physics of Atomic Force Microscopy and a course in practical image analysis.

The demonstration of a tabletop electron microscope from Hitachi with energy dispersive X-ray spectroscopy for the chemical elemental analysis of the samples by Videko was a special highlight. Joint discussions in poster sessions and an evening at the *Christkindlmarkt* (Christmas market) followed by dinner completed the demanding program of the week.

Lectures and guest lectures were opened to a wider audience, the lecture program was sent to colleges of the University of Natural Resources and Applied Life



Sciences, Vienna, Austria, to give their students the opportunity to participate.

Videko's device display was also expanded for interested institutes and companies on the campus. Thus, the event also serves to connect scientists from AIT, the University, and the companies at our campus.

## Website:

During an intensive preparation phase for the workshop, we also established a website that should not only promote the event but also simplify the registration process. At [www.plant-microbe-microscopy.com](http://www.plant-microbe-microscopy.com) we can now present and promote our expertise and ongoing research in the field of plant-microbe interaction. The website is linked to EMS and Sfam websites and to university and industry partners.

## AIT Project Team:

Dr. Ursula Sauer, Dr. Stéphane Compant, Dr. Birgit Mitter, Dr. Markus Gorfer, Mag. Milica Pastar ■





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# REPORTS ON SPECIAL EVENTS

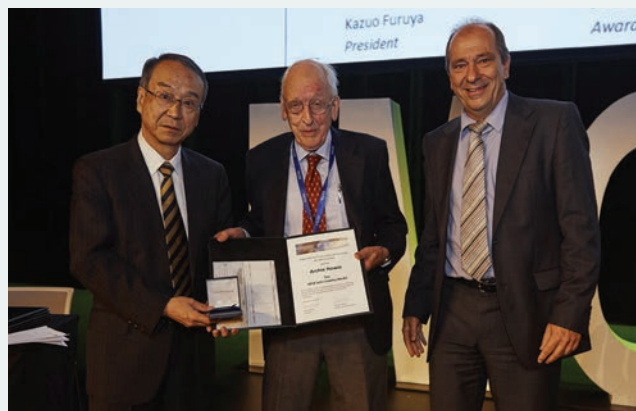
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## C. COLLIEX AND A. HOWIE AWARDED AT IMC19 IN SYDNEY

The European Microscopy Society was extremely delighted by the announcement of these very high level distinctions in the domain of microscopy attributed to two of its outstanding and esteemed European Microscopists: Christian Colliex and Archibald Howie. The European Microscopy Society warmly congratulates here the new awardees.

In the following, our valued colleague, Joachim Mayer, Award Committee Chair, gives a short summary of the IFSM Awards at IMC 19, Sydney. C. Colliex and A. Howie very kindly accepted to contribute to this yearbook by a unique contribution: "Platform reunion for a diffractionist and a spectroscopist at IMC 19 in Sydney".



Christian Colliex ( left picture) and Archibald Howie ( right picture) were respectively awarded the "Vernon E. Cosslett Medal" and the "John Cowley Medal", by the IFSM to honor their outstanding contributions into the field of microscopy and related techniques. The medals were awarded by the IFSM President, Kazuo Furuya, and the Awards Committee Chair, Joachim Mayer at the conference IMC19 in Sydney in September 2018.

### IFSM AWARDS AT IMC 19, SYDNEY

By Joachim Mayer<sup>1</sup>, Chairman of the IFSM Awards Committee

The IFSM awarded the first John Cowley Medal at the International Microscopy Congress in 2006. The award consisted of an oral presentation during the Presidential Symposium of the International Microscopy Congress and a medal in recognition of John Cowley's work.

In 2012, the IFSM Executive Committee decided that three new awards would be created, which complement the John Cowley Medal and provide wider coverage of the different fields of microscopy. Henceforth, the four awardees received the award at the International Microscopy Congress following their selection, for the first time at IMC18 at Prague in the framework of the IFSM Symposium on the last day of the IMC. Last year, the awards were presented to the award winners at the IFSM Symposium of the IMC at Sydney and was certainly a highlight of the Congress.

The awards honor outstanding contributions of individual scientists and their achievements in the field of microscopy and related techniques. They are devoted to the

following four areas upon which the award definition is based:

#### 1-Diffraction Physics and Microscopy

The John Cowley Medal is awarded in recognition of life-time achievement to an international leader in the fields of diffraction physics or microscopy.

#### 2-New Developments in Optics and Instrumentation

The Vernon Cosslett Medal honors new developments in optics and instrumentation in all fields of microscopy including hardware, methods and evaluation routines.

#### 3-Applications in Physical Sciences

The Hatsujiro Hashimoto Medal is devoted to applications in physical sciences which includes all classes of conventional and composite materials, new effects in solid state physics, meta- and nanomaterials and their properties.

#### 4-Applications in Life Sciences

The Eduard Kellenberger Medal is devoted to applications in life sciences and includes all relevant areas in biology, medicine and related fields.

<sup>1</sup> Ernst Ruska-Centre for Microscopy and Spectroscopy with Electronics Materials Science and Technology (ER-C-2), Wilhelm-Johnen-Straße, 52425 Jülich, Germany



For IMC19, the call for nominations was sent out to the national and regional societies in summer of 2017 and an open call was also put on the IFSM website. Nominations could be submitted by all national and regional societies and by individuals with expertise in the field. In total, 15 nominations were received and all nominees certainly were eminent scientists who made major contributions to the field.

Upon closure of the call, the IFSM Executive Committee reviewed the nominations and selected a short list of candidates who were considered as second round candidates. The IFSM Executive Committee then asked independent experts to provide an appraisal for the selected candidates.

The final votes on the award winners were then held by the IFSM Executive Committee via electronic means. In December 2017, the award winners were informed about their selection and were invited to the Award Ceremony, which took place at the IFSM Symposium of IMC19 at Sydney, consisting of a series of memorable talks given by the winners of the IFSM Medals:

#### **John Cowley Medal (Diffraction Physics and Microscopy)**

- Archie Howie

#### **Vernon Cosslett Medal (New Developments in Optics and Instrumentation)**

- Christian Colliex
- Les J. Allen

#### **Hatsujiro Hashimoto Medal (Applications in Physical Sciences)**

- Frances Ross
- Yuichi Ikuhara

#### **Eduard Kellenberger Medal (Life Sciences) the three Nobel Prize winners:**

- Joachim Frank
- Richard Henderson
- Jacques Dubochet

The awardees received the prize in the form of a medal, an award certificate, and an honorarium, which were handed over by the President of IFSM, Prof. Kazuo Furuya. Each awardee was honored by a short laudatio and then presented his/her talk as part of the IFSM Symposium of the IMC congress. The IFSM Symposium was certainly a highlight of the Congress, very well attended and also benefitted of the special atmosphere of the large auditorium of the novel Congress Centre at Sydney. The awardees presented a very dense overview of the state-of-the-art in their fields, which

certainly covered all major aspects of microscopy, and also included many personal reminiscences highlighting major historical and recent developments. And it was not only the attractive coverage of modern science and the history of its development, but also the insight into the dedication and/ or the serendipity, which is needed to produce scientific breakthroughs, which was a highlight not only for the young researchers in the auditorium.

The next series of awards will be presented at IMC20 at Busan, Korea in 2022. We are convinced that there will again be an IFSM Symposium with outstanding awardees and highlights in all fields of microscopy.

## **PLATFORM REUNION FOR A DIFFRACTIONIST AND A SPECTROSCOPIST AT IMC 19 IN SYDNEY**

*By Archie Howie<sup>2</sup> and Christian Colliex<sup>3</sup>*

During the 19<sup>th</sup> International Microscopy Congress (IMC19) held in the Sydney International Convention Centre from 9<sup>th</sup> to 14<sup>th</sup> of September, the final session was devoted to the IFSM (International Federation of Microscopy Societies) symposium during which the IFSM 2018 awards were presented. The John Cowley medal for achievements in diffraction physics and microscopy was attributed to one of us, Archie Howie. A Vernon Cosslett medal for new developments in optics and instrumentation, was bestowed on the other one, Christian Colliex. Our duty, as awardees, was then to deliver special plenary lectures. Their respective talks were entitled “Songlines of a diffractionist” (Howie) and “From Cambridge to Sydney, forty years of energy loss in Orsay” (Colliex). The complete abstracts of these contributions are accessible on the website of the conference [1, 2]. These texts describe through personal eyes, moments of our careers and selected fields of interest and research.

Rather than summarizing them in this short contribution for the European Microscopy Society 2018 yearbook, we have preferred in the following lines to pick up some stories around a common object of interest which has contributed to create a solid line of exchange between our teams at Cambridge and Orsay. In his abstract, at some point, Archie writes: “For Mick Brown and me, Albert Crewe’s STEM seemed an attractive instrument for our

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## C. COLLIEX AND A. HOWIE AWARDED AT IMC19 IN SYDNEY

microstructural physics research group". For the plasmon mapping and coherence studies that had earlier interested both Cambridge and Orsay teams, it clearly offered a more flexible platform than the Mollenstedt analyzer favored by Cambridge or the Castaing-Henry system developed in Orsay. Compared with TEM many other imaging signals including secondary electrons, X-rays, cathodoluminescence (CDL) would also be available.

After a few years devoted to the recording, analysis and use of core-loss EELS signals with a conventional TEM microscope equipped with a Castaing-Henry energy filter, Christian had come to the same conclusion: the STEM approach was the perfect instrument to collect most information resulting from an inelastic collision between the incident electron and the thin foil target. This is how the spectroscopist has joined the diffractionist in the same search for an instrument dedicated to fundamental studies of the structural and electronic properties of solid material to the ultimate spatial resolution and in particular to the single atom.

In November 1974, the Cavendish group had acquired the second HB5 STEM instrument manufactured by the Vacuum Generators Company in the UK, and initiated some projects on its application to crystalline materials. Knowing the existence of this exceptional environment, Christian applied with the support of Archie, for a special grant just created by the French government, a "de Gaulle fellowship", to encourage visits and stays of French researchers at Churchill College. This is how he could stay for a few months during summer 1976 in Archie's research group to learn a lot, under the guidance of Alan Craven, about the running and potentialities of this new STEM instrument. Two papers [3, 4] resulted from this exciting period and he came back to France with the clear idea: "I want a VG STEM". And, of course, it took a few years before the so much desired machine could be installed in Orsay during the year 1980.

Christian's visit was extremely well timed and coincided with the conclusion of the HB5 installation period where a number of problems had been identified and mostly corrected. Most rapid success was obtained with nm scale microdiffraction including its application to short range order investigations [5]. Initial imaging results from the angular detector were disappointing because it did not operate at high enough angles to remove the coherent Bragg scattering. The CDL detector developed by Steve Pennycook was the first and best implementation of the extra image signals that we had hoped for [6] and also provided the high angle scattering signal required for Z-contrast imaging [7]. The steps towards improved instrumentation and understanding of HAADF imaging are



*Figure 1: Archie Howie and Christian Colliex in front of the Cavendish early VG microscope which, after having been used by Ondrej Krivanek and Niklas Dellby in the nineties, is now exhibited in a pedagogical open cut version (2009)*

outlined in [1]. More relevant here are the improvements that were needed for the HB5 spectrometer [8] laying the foundation for much later work including the first aloof beam spectrum obtained by Laurie Marks [9]. As noted in [1], this opened two decades of activity on valence loss spectroscopy with theoretical assistance from Rufus Ritchie and Pedro Echenique's team in San Sebastian.

Meanwhile in Orsay, a couple of years were first devoted to master the newly installed VG HB501 STEM microscope, in order to optimize the acquisition of images in all accessible modes (Claudie Mory's Ph. D. dissertation). Then, the microscope was rapidly adapted to record high resolution EELS spectra (typically 0.5 nm in space and 0.5 eV in energy) over wide area ranges on defects, interfaces, nanoobjects, thanks to the fruitful contributions of Marcel Tencé, Ondrej Krivanek and Christian Jeanguillaume. With this machine, as soon as in 1985, we went into a long period of experimental and theoretical research on the use of valence energy-loss spectroscopy to further characterize the electronic properties of nanospheres, nanotubes and interfaces which had, at this time, already been explored in other places such as Cornell University and the Cavendish at Cambridge. The great advantage of the STEM instrument was its ability in positioning the trajectory of the incoming electron beam with a great accuracy with respect to the object under investigation. Following initial studies on surface plasmons in individual nanospheres (Ga, Si), we moved to interfaces and together (AH and CC) we cosigned in 1997 a paper on a detailed study of the interface plasmon mode across a Si/SiO<sub>2</sub> interface and its interpretation involving relativistic effects [10]. A couple of years later, a



Phys. Rev. Letter [11] reporting results of “near-field” EELS spectroscopy across surfaces of a MoS<sub>2</sub> platelet cosigned by Colliex together with Israeli colleagues, raised severe comments from Howie, then at the Universidad del Pais Vasco, demonstrating the previous knowledge of these phenomena which had been accumulated in “aloof beam energy loss spectroscopy” !!

As illustrated in Figure 1 of his abstract contribution to IMC 19, Archie mentions “valence EELS” as a periodically revisited topic. For Christian also, it has been fully demonstrated with the new objects to be investigated, in particular the whole family of simple and mixed nanotubes, with the arrival into this research domain of a new generation of bright young researchers as Odile Stéphan and Mathieu Kociak in Orsay. The role of colleagues bridging our research topics has also been important over this period, either by moving from one team to another such as Michael Walls before finding a stable position at LPS Orsay, or by contributing with both of us through theoretical works, as Javier Garcia de Abajo. In most recent years, the superb development of these techniques, valence EELS (III and IV for Archie) combined with photonics tools, such as optical spectroscopy and time correlated measurements, has opened very rich domains of investigations which are nowadays explored all over the world. As claimed by Garcia de Abajo [12], when “photons and electrons team up”, there is for sure a rich field of experimental and theoretical science to be explored. And both of us are fully convinced of it!!

Transferring to STEM was a mind stretching experience for a diffractionist as is conveyed by the phrase “Expunging diffraction contrast” in a valuable survey provided by Mick Brown [13]. Many people, most notably Dennis McMullen, contributed to the on-going instrumental development which enabled the HB5 to serve so usefully for about 25 years. It was finally used by Ondrej Krivanek and Niklas Dellby as the prototype instrument for aberration correction in STEM [14]. On its side, the machine delivered in Orsay in 1980 is still in every-day operation mostly reserved to cathodoluminescence spectroscopy and liquid N<sub>2</sub> operation as described in the recent review by Kociak and Zagonel [15].

Illustrating our common interest and great memories of the rich discoveries realized with the VG STEM family of instruments since the mid-seventies, we had the great pleasure of admiring a few years ago the microscope in operation in Cambridge in 1976, nowadays object of an exhibition of scientific instruments at the Cavendish laboratory (see Figure 1).

We warmly thank the IFSM board for their award. ■



Figure 2: Two men on a punt: Archie Howie and Christian Colliex in Cambridge (1976), where the story of this scientific and human complicity began....

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# THE TRAIL-CRISP AWARD, MAY 24, 2018; LONDON, UNITED KINGDOM

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**On May 24, 2018, Dr. Andrew Chick has received the trail crisp award by the Linnean Society of London.**

Established in 1966, an amalgamation of the trail award and the crisp award. The award is presented by the society in recognition of an outstanding contribution to biological microscopy.

Andy was awarded this honor in recognition of his work in entomological microtechnique and his ongoing dedication to the research of safe and accessible mounting media. ■



# GOOD NEWS FROM HUNGARY!

## **New state-of-the-art microscopes, and Nature Research award won by (a member of) the microscopy Hungarian society**

2018 was an exceptionally lucky year for Hungarian microscopists working on both life and material sciences.

Hungary's first spherical aberration corrected TEM/STEM electron microscope, a THEMIS 200 was installed at the Energy Research Center of the Hungarian Academy of Sciences /ERC HAS/. The project was submitted by Dr. Béla Pécz, deputy director general of the ERC HAS.

"A new generation of electron microscope for the open Laboratory of the Hungarian Material Sciences" has been achieved with the support of both the European Union and the Government of Hungary through European Structural Funds.

The THEMIS 200 was purchased with an image corrector and four built-in EDS detectors. The instrument provides TEM resolution below 1 Angström both at 200 and at 80 kV and opens new possibilities in Hungary in basic and applied research of semiconducting materials, ceramics, metals, 2D layers and nanostructures.

The inauguration ceremony was held on June 11, 2018. The importance of the instrument for the Hungarian material sciences research community was also denoted by the fact that both László Lovász, president of the Hungarian Academy of Sciences and József Pálinkás, president of the National Office for Development and Research and Innovation were present at the event.

The second outstanding event happened on October 2, 2018 at the University of Pannonia, a medium-sized university in Hungary with a strong research performance in chemistry, engineering, nanotechnology, material, earth, and environmental sciences.



*József Pálinkás, László Lovász and Béla Pécz at Themis200*



*The new Nanolab building in Veszprém, housing the Talos F200X TEM.*

The research infrastructure was significantly enriched by the establishment of a brand new electron microscopy center, the "Nanolab", supported by the European Union and the Government of Hungary through European Structural Funds under the project number GINOP-2.3.3-15-2016-00009.

The inauguration ceremony included guest lectures given by prominent experts in the field, such as Rafal Dunin-Borkowski (Jülich Research Centre), Peter Buseck (Arizona State University), Béla Pécz (Institute for Technical Physics and Materials Science, Budapest), Aleksander Recnik (Jozef Stefan Institute, Ljubljana) and Péter Németh (Institute for Natural Sciences, Budapest).

The "Nanolab" includes a Talos F200X G2 instrument, a versatile microscope that can be operated in both TEM and STEM modes. It is equipped with a field-emission gun and a Super-X EDS system with four detectors. TEM, HAADF, and EDS tomography are also available. Stable, noise-free conditions for the Talos are ensured by the custom-designed building, the "Nanolab", resulting in resolutions typically exceeding specifications (1.3 Å STEM resolution and 0.7 Å TEM information limit are regularly achieved).

The Apreo LoVac scanning electron microscope is equipped with a field-emission gun, plus EDS and EBSD systems. Both electron microscopes delivered through a European public procurement procedure by Auro-Science Ltd., the Hungarian representative of Thermo Fisher/ FEI.

Since this is the only state-of-the-art electron microscopy facility in the western part of Hungary, it welcomes users from other universities, research institutes and industry as well.

The last event in this row was the inauguration of a new N-STORM system at the Nikon Center of Excellence Institute of Experimental Medicine HAS /IEM HAS on November 30, 2018.

# GOOD NEWS FROM HUNGARY!



A bunch of electron microscopists who, at some point in their careers, have been affiliated with Peter Buseck's group at Arizona State University. From right to left: Rafal Dunin-Borkowski (Jülich), Péter Németh (Budapest), Mihály Pósfai (Veszprém), Peter Buseck (Tempe, AZ), Michael Czank (Kiel), István Dódony (Budapest)



Lisa Napolione (Senior Vice President, Global R&D, The Estée Lauder Companies), Hódosy Lucia (Association of Hungarian Women in Science), Mariette Di Christina editor-in-chief (Director of Editorial & Publishing for Nature Research Magazines, Senior Vice President, Scientific American), Dr Balázs Katalin, Dr Nadine Pernodet (Vice President, Skin Biology & Bio Actives, Estée Lauder Laboratory & Estée Lauder Companies, Innovation & Strategy)



Tamás F. Freund, (Director of IEM HAS, Takaharu Sasaoka (President of Nikon Instruments Europe, B.V) and László Barna (Head of the Nikon Center at IEM HAS)

IEM HAS is the country's only institute dedicated to neuroscience. The average number of its researchers is about 150 including PhD students.

Auroscience Ltd, the Hungarian supplier mentioned before, has been IEM HAS partner since 2010, when they installed three Nikon instruments and established a core facility similar to other Nikon Imaging Centers in the States and Europe (Harvard, Heidelberg, Paris, UCSF). Very soon, the IEM HAS facility has become essential for researchers at the institute. To date, almost every IEM research team uses the Center. In addition, the list of flagship scientific publications is impressive. In the last four years (2015-2018), 3 Nature Neuroscience

and 3 Nature Communications, 1 Nature Protocols, 1 Neuron, 1 Plos Biology and 1 Acta Neuropathological papers were published.

The results were achieved using A1/C2 confocal microscopes for anatomical, 3 patch-clamp setups (confocal, SD and MP) for physiological experiments and 2 N-STORM super-resolution microscopes for molecular experiments. This success is in part due to the applied collaborative attitude, where the equipment is obtained by major financial support from independent group leaders, consortium grants and the help of the industry such as Nikon.

Finally, we would like to acknowledge Dr Katalin Balázs, head of Thin Film Physics Department, Institute of Technical Physics & Material Sciences, ERC HAS, for her hard and successful work dedicated not only to microscopists but also to the entire scientific community. She is one of the ten female scientists who ten years ago founded the Association of Hungarian Women in Science (NATE) to inspire women to develop their careers in science, technology, engineering and maths (STEM). The society won the Nature Research's Inaugural Innovating Science Award, one of the two global prizes launched in partnership with The Estée Lauder Companies. Dr Balázs received the prize at the award ceremony held in London on October 30, 2018. ■





# INAUGURATION OF THE HITACHI HF-3300 ETEM

## APRIL 12, 2018; LUND, SWEDEN

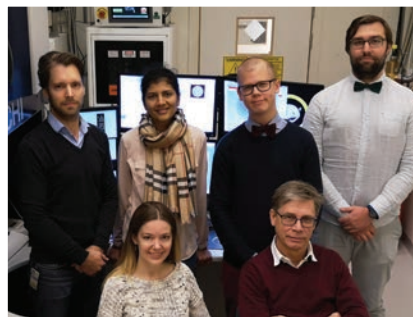
**The inauguration of a Hitachi HF3300 Environmental TEM took place on April 12, 2018 at Lund University, Sweden. The main goal of the instrument is atomic resolution imaging of semiconductor nanowires during their growth.**

Lund University has been at the forefront of nanowire growth for many years, and it has a long history of electron microscopy at its national Center for High Resolution Electron Microscopy (nCHREM, website at [www.kilu.lu.se/nchrem](http://www.kilu.lu.se/nchrem)). Up to now, a nanowire has been grown in one apparatus and then transferred to the microscope. This “ex situ” microscopy has played a vital role in the characterisation of the growth process. But the procedure is inefficient, and key events during the growth can only be guessed at. Placing a miniaturised version of the growth chamber inside the microscope itself had been thought about for a long time. Solutions to the technical demands of such an instrument started to be realised: the development of lens correction enabling larger pole piece gaps, fast cameras and specialised specimen holders with MEMS chips. A timely and generous donation from Sweden’s Knut and Alice Wallenberg Foundation allowed Lund finally to acquire such an instrument.

Delivery of the 300kV TEM-STEM was in late 2015 and there followed the custom installation of the gas handling system, overseen by Joacim Gustafsson of Spectral Solutions. This system combines with a specialist holder to form a miniature MOCVD: Metal-Organics such as trimethylgallium and gases such as arsine ( $\text{AsH}_3$ ) transport the elements to the site where Chemical Vapour Deposition of, in this case, GaAs can proceed. A total of 3 group III and 3 group V elements are available in order to form a range of III-V semiconductors. Other experiments e.g. redox reactions and catalysis studies are planned and so oxygen, hydrogen and nitrogen gases are also incorporated.

The microscope is adapted for *in situ* work with enhanced pumping, residual gas analysers and a large polepiece gap. The specimen holder is of the open type. For  $\text{N}_2$ , up to 4Pa of pressure may be admitted into the specimen area. Adding an optional lid with an aperture for the electron beam allows the pressure at the sample to be raised to 400Pa for  $\text{N}_2$  gas. The MEMS chip can maintain temperatures at the sample of 700C. High resolution studies are made possible through the combination of a cold FEG source and the B-COR image corrector from CEOS to give sub 1Å resolution. Elemental analysis is performed using EDX, which can be done simultaneously with imaging during gas exposure at elevated temperatures. A key additional feature is a detector for secondary electron imaging which helps image the 3D shape of nanowires.

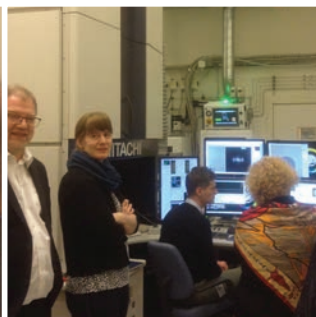
The inauguration event was marked by a one-day symposium hosted by Professors Reine Wallenberg and Kimberly Dick Thelander. Invited speakers included Dr Frances Ross of MIT, formerly at IBM, Yorktown Heights, who described the evolution of environmental TEM for semiconductor growth. Ian Cotton, President of Hitachi High-Tech Canada outlined the wide range of *in situ* studies now possible from SEM through to STEM. Short talks from directors of HREM laboratories across Sweden showed the range of specialised instrumentation now available, constituting in effect a distributed infrastructure for Sweden. Further presentations were made by Elisabetta Fiordaliso from DTU, Copenhagen on nanoparticle catalysis, Jordi Arbiol from ICN2, Barcelona on free standing nanostructures and Federico Panciera, C2N CNRS, Paris, on silicon liquid surface ordering. Before adjourning for dinner, participants were treated to a site visit including a live demonstration by Daniel Jacobsson of a nanowire growing in the microscope. ■



The ETEM Team at the microscope: front row from left - Kimberly Dick Thelander, Reine Wallenberg, back row – Daniel Jacobsson, Carina Maliakkal, Axel Persson, Marcus Tornberg



(from left) Lisa Lautrup, Eva Olsson, Daniel Jacobsson, Kimberly Dick Thelander, Frances Ross, Federico Panciera, Ian Cotton, at the ETEM microscope. A growing nanowire can be seen on one of the monitors



(from left) Joacim Gustafsson, Lisa Lautrup, Martin Ek Rosén, Eva Olsson

# ELECMI: THE NEW SPANISH INFRASTRUCTURE FOR ELECTRON MICROSCOPY OF MATERIALS



The Spanish Strategy of Science, Technology and Innovation is the instrument that establishes the general objectives to fostering and developing RTDI activities in Spain during 2013-2020, in alignment with the ones highlighted by the European Union under Horizon 2020. In this framework, a map of Unique Scientific and Technical Infrastructure (ICTS) was defined.

**ELECMI** (<http://elecmi.es/en/>) is the Spanish Infrastructure for Electron Microscopy of Materials, an Unique Scientific and Technical Infrastructure (ICTS) within the current Map of National Facilities in Spain. The term ICTS refers to facilities, resources or services for the development of top-quality cutting-edge research.

They are unique or exceptional in their fields; with a high cost of investment, maintenance and operation, and are of a strategic importance that justifies their availability to all actors in the field of R&D&I. ICTS share three fundamental characteristics; they are infrastructures with public ownership, unique and open to competitive access. They are essential as well in communication, exchange, and preservation of knowledge, the transfer of technology and promotion of innovation.

In November 2018, the Executive Committee of the Council of Scientific, Technological and Innovation Policy (CPCTI), approved and published the new ICTS Map composed of 29 ICTS with a total of 62 infrastructures, organized in eight scientific fields<sup>1</sup>. In this recent update, ELECMI, that was composed of two facilities, the CNME<sup>2</sup> (National Center for Electron Microscopy)

from University Complutense of Madrid and the LMA<sup>3</sup> (Laboratory for Advanced Microscopies) from University of Zaragoza, has integrated two new nodes: the Division of Electron Microscopy<sup>4</sup> of the University of Cadiz (DME-UCA) and the Unit of Transmission Electron Microscopy Applied to Materials<sup>5</sup> from the University of Barcelona (UMEAP-UB). Additionally, LMA and DME-UCA are members of the ESTEEM3 European project.

ELECMI has a wide range of top level equipment and know-how in Electron and Local Probe Microscopy dedicated to the observation, analysis and characterization of materials at atomic and molecular scale, constituting a large infrastructure to provide service to researchers, universities, research centers and industry, with the ability to address the most relevant challenges in the field of new materials. ■

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<sup>1</sup> <http://www.ciencia.gob.es/portal/site/MICINN/menuitem.eed4570ef37d2c-8fbaa777b9026041a0/?vgnextoid=928d5ef3677c4610VgnVCM1000001d04140aRCRD>  
<sup>2</sup> [www.cnme.es/](http://www.cnme.es/)

<sup>3</sup> <http://lma.unizar.es/es/>

<sup>4</sup> <https://vrinvestigacion.uca.es/scientific-infrastructure/central-research-service-for-science-and-technology/division-de-microscopia-electronica/?lang=en>

<sup>5</sup> <http://www.ccit.ub.edu/EN/home.html>

<sup>6</sup> <http://sccyt.uca.es>



# NEW MICROSCOPY PLATFORM IN PARIS-SACLAY, FRANCE

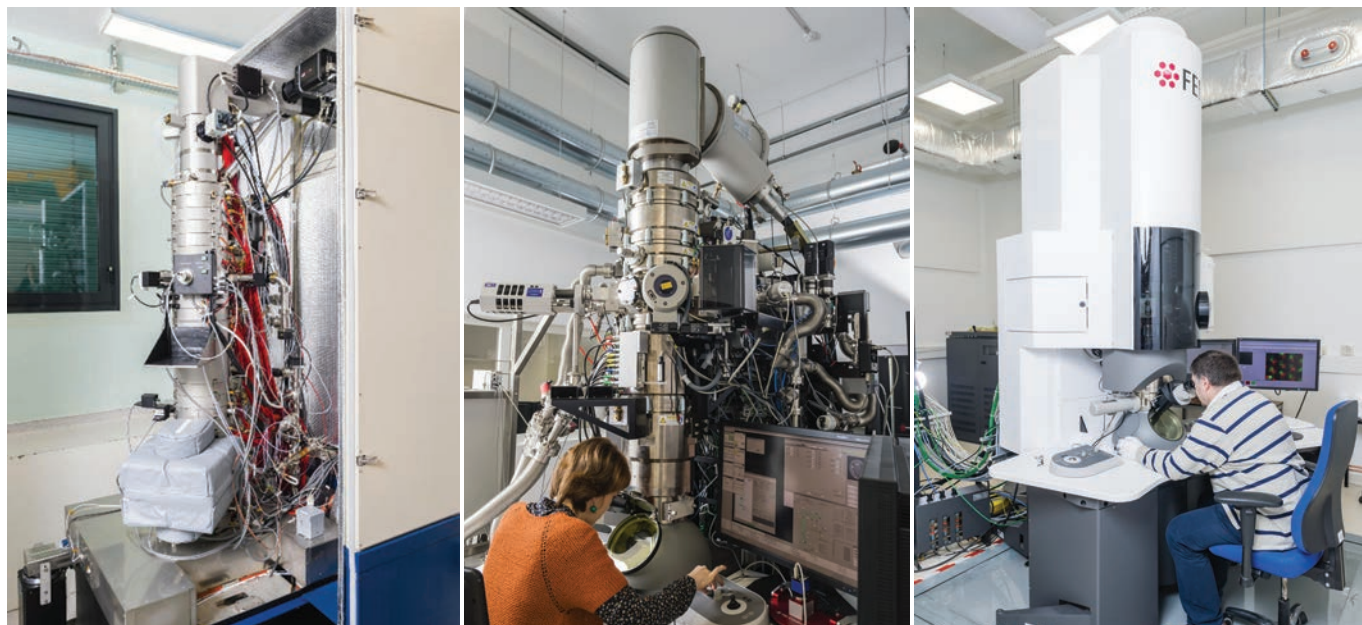
**TEMPOS, a unique platform for electron microscopy accessible to all researchers in the Paris-Saclay consortium was inaugurated on, December 18, 2018, in Orsay, France. Financed in the framework of the French Equipex call, this project is supported by Paris-Sud University, the CNRS, the École Polytechnique and the CEA. Saint-Gobain and Thales are also involved through their research and development departments.**

The objective of the TEMPOS platform is to push the limits in exploring the properties of nanomaterials, from the study of their growth mechanisms to the study at the most local scales of their physical properties. With this aim, two instruments will explore the growth and the physics of nano-objects, Chromatem and Nanomax, and will be complemented by Nanotem, a state-of-the-art electron microscopy access facility. Unique in their field, Chromatem and Nanomax allow the simultaneous combination of experimental techniques that usually require separate equipment: photon and electron spectrometry for Chromatem, synthesis and observation of nano-objects for Nanomax.

The Chromatem microscope, a modified monochromated NION HERMES instrument uniquely combines the world's most energy-resolved electron spectroscopy with photon-electron measurements and a low-temperature environment. This association specifically opens two new observation possibilities:

First, the electron/photon combination makes it possible to study the optical phenomena of nano-objects with the spatial resolution of an electron microscope, nearly a thousand times better than that of conventional optical microscopy. The spectroscopies (EELS and cathodoluminescence) implemented by Chromatem allow us to explore with high energy spatial resolution nanometer-scale absorption and scattering events hybrid electron/photon excitations such as plasmons or excitons. In addition, Chromatem will stand on the shoulders of the measurements made with synchrotron radiation on electronic phase transition phenomena, by adding to the spectral resolution the spatial one, with the added benefit of very low temperature conditions. This instrument will be particularly useful for determining whether those phenomena involving electrons happen with or without atomic phase transitions. Through collaborations with experts in their fields (sample production, physical characterization or theory) Chromatem provides a fresh look at many cutting-edge issues: the status of metal-insulator transitions in electronically correlated systems, strong photomagnetic mechanisms in molecular magnets, optoelectronic properties of semiconductor nanostructures, quantum nanotechnologies, optics and interface physics in oxide and ferroelectric devices.

Nanomax, a modified Thermo-Fisher Titan ETEM, is an image aberration-corrected electron microscope, whose main objective is to observe and characterize,



*The three Transmission Electron Microscopes involved in TEMPOS. From left to right: Chromatem, Nanomax and Nanotem. ©CNRS Photothèque*

# NEW MICROSCOPY PLATFORM IN PARIS-SACLAY, FRANCE

*in situ*, the growth of nano-objects such as semiconductor nanowires or carbon nanotubes. The unique attribute of Nanomax is its ability to combine two processes that are difficult to reconcile: supplying matter to the nano-object to make it grow while maintaining the high vacuum level of an electron microscope. The recent observation in real time by this instrument of the growth of a crystalline nanowire revealed clearly the step-by-step formation, of each atomic plane in the wire. Such results demonstrate the unique potential of Nanomax and the highly versatile configuration of its material sources. Within the microscope column, the material is supplied in the form of atom jets, molecules (molecular beam epitaxy - MBE), gases or gaseous radicals (chemical vapor deposition - CVD). This configuration makes it possible to synthesize various nanostructures with excellent control of the kinetics of their crystal growth.

This instrument opens the way to the detailed understanding of the growth mechanisms involved for various objects, the control of their morphology and their interfaces, their crystalline structure and their chemical composition and, ultimately, the control of their electronic and optical properties. Nanomax will thus provide crucial information for the wider goal of producing sophisticated, highly technological applications...

Nanotem is a versatile facility with wide-ranging utility for the entire community of the Paris-Saclay site in



Visit of one of the infrastructure command rooms with TEMPOS leader O. Stéphan. © M. Lecompt/ Université Paris Sud

France. It is composed of two state-of-the-art instruments enabling electron microscopy observations for the study of academic and industrial problems in the fields of nanosciences and materials science.

The inauguration was the occasion to bring together specialists in spectro-microscopies and *in situ* techniques, who presented cutting-edge results, including Ondrej Krivanek (Progress in Ultrahigh Energy Resolution EELS), Quentin Ramasse (Balancing Spatial, Energy and Momentum Resolutions in STEM-EELS), Stefan Kujawa (Atomic Scale *In situ* Electron Microscopy), Frances Ross (Environmental TEM: A Window into the Nanoworld), Pierre Muller (Dynamics of Self-propelled Structures on Solid Surfaces Studied by Low Energy Electron Microscopy), Lena Kourkoutis (New Frontiers in Cryo-electron Microscopy: From Probing Low Temperature Electronic Phases to Processes at Liquid/Solid Interfaces), Martien Den Hertog (Transmission Electron Microscopy Combined with *In situ* Biasing of Semiconducting NWs for the Study of Dopants, Surface Charges and Metal Contacts), Jean-Pascal Rueff (Advanced Spectroscopic Techniques for Complex Materials). ■



Two of the speakers (F. Ross, left, and Q. Ramasse, right). © J. D. Blazit

# 80 YEARS ELECTRON MICROSCOPY SYMPOSIUM, UPPSALA UNIVERSITY, SWEDEN

**Feynman, by announcing in his famous speech some of the basic directions of nanotechnology, speculated to have one-day electron microscopes with 0.1 Å resolution, which, at that time in the 1950s, had been far from reality.**

He most likely followed in his thoughts the extremely fast evolution of microscopy resolution that had been decreased, from the light microscopes in the 1920s to the electron microscopes in the 1950s, by 2-3 orders of magnitude. It needed though another half century to decrease resolution by another 1-2 orders of magnitude. Though the evolution of microscope resolution might appear to have slowed down in the after the invention of the electron microscope, the last decades were paved with new techniques and findings opening our eyes more at every single step where resolution had been increased.

When Manne Siegbahn and his team at Uppsala University had been constructing, in 1938 and after contact with the Berlin team of Ernst Ruska, the first electron microscope in the north of Europe, a possible use and methods of electron microscopy was still hidden in the mist of times.

Yet, as in other places of early constructions of electron microscopes, biological and medical scientists were among the early adopters of this technique leading to one of the first documented results of electron microscopic investigation carried out on the Siegbahn TEM (Sjöstrand, *Nature*, 1943).

To honor the 80<sup>th</sup> Anniversary of the construction of this TEM, 70 scientists met at the Ångström Laboratory in Uppsala on 27<sup>th</sup> November 2018. After an introduction by Prof. H. Engqvist (Uppsala University), Prof. K. Edström (Uppsala University), Prof. G. Svensson (Stockholm University), Prof. R. Wallenberg (Lund Technical University) and Prof. K. Leifer (Uppsala University) highlighted the impact that TEM had made on the scientific evolution of science throughout Sweden as well as they showed the latest results from their state-of-the-art TEMs. Prof. S. Hogmark (Uppsala University) illustrated the historical evolution of electron microscopy at Uppsala University.

The scientific presentations started with a talk by Assoc. Prof. J. Weissenrieder (Karolinska Tekniska Högskolan, KTH), who presented recent efforts in time resolved TEM. In the Nordic countries, materials science based metal and coating industry discovered

the importance of electron microscopy for their development very early and are nowadays equipped with some of the most advanced TEMs, whose applications were shown by Dr. E. Coronel (Sandvik).

Recently, Sweden invested in several state-of-the-art life science TEMs, where Prof. L. Sandblad (Umeå University) showed several exciting application examples. Prof. E. Olsson (Chalmers) showed, how novel TEMs can be used to understand light and soft materials.

In the last presentation of the symposium, David Smith (Arizona State University) elucidated not only historical aspects of electron microscopy resolution, but showed recent developments in improving the resolution in electron microscopes as well as he highlighted where the travel in microscopic analysis could go in the next years. ■

*Klaus Leifer, Uppsala, December 14, 2018*



*Jonas Weissenrieder during his presentation on time resolved TEM*

# 3<sup>RD</sup> SINO-GERMAN SYMPOSIUM ON ADVANCED ELECTRON MICROSCOPY OF INTERFACE STRUCTURES AND PROPERTIES OF MATERIALS, SEPTEMBER 24-27, 2018; BEIJING, CHINA

**The 3<sup>rd</sup> Sino-German Symposium on Advanced Electron Microscopy and Spectroscopy of Interface Structures and Properties of Materials was held in Tsinghua University, Beijing, China.**

This 4-day symposium was organised by Prof. Rafal Dunin-Borkowski from the Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons in Forschungszentrum Jülich, Prof. Wolfgang Jäger from the Christian-Albrechts-Universität zu Kiel, Prof. Hengqiang Ye from The Institute of Metal Research, Chinese Academy of Sciences, and Prof. Jing Zhu, Prof. Rong Yu and Associate Prof. Xiaoyan Zhong from The School of Materials Science and Engineering in Tsinghua University.

A festive welcome banquet and an impressive concert performance by the China National Traditional Orchestra at the National Center for Performing Arts preceded the scientific symposium, which featured colloquia honouring Prof. Jing Zhu on the occasion of her 56-year academic career in electron microscopy. Prof. Jing Zhu was congratulated for her impressive achievements in the field of electron microscopy and wishes were conveyed to her for further successes, health and joy in the years to come.



The event attracted more than 140 participants from more than 30 universities and research institutes, including more than 90 students and young scholars.

During 12 scientific sessions, which comprised more than 45 presentations given by invited speakers from China, Germany, Japan, The Netherlands, Singapore, Hong Kong, Sweden, the United Kingdom and the United States, the participants discussed current developments and challenges in instrumental developments and recent results on the characterization of interfaces and properties of materials using advanced and *in situ* electron microscopy and spectroscopy.

The techniques that were discussed included aberration-corrected electron microscopy, *in situ* and environmental characterisation, investigations of the dynamics of interfaces in materials, time-resolved characterisation, phase imaging methods, the use of structured electron beams, exit wavefunction reconstruction, phonon spectroscopy, correlative methods and electron holography for quantitative charge density and electric field measurements, with a focus on interfaces and material properties and processing methods for the development of materials and devices.

A wide spectrum of novel methodological and materials research topics was covered, including (1) novel instrumental and corrector developments and novel imaging and spectroscopic characterization methods in aberration-corrected ultra-high resolution and scanning transmission electron microscopy (TEM); (2) novel developments in low-dose electron holography, electron wavefront engineering, multidimensional characterization and time-resolved TEM; (3) model-based reconstruction of charge density and electric field using quantitative methods based on off-axis holography; (4) quantitative measurements of electric and magnetic fields using differential phase contrast methods and off-axis electron holography; (5) advances in simulation and reconstruction methods for quantitative high-resolution and scanning TEM; (6) advances in electron spectroscopy and spectrum imaging for probing electronic and valence structure, plasmonic and phononic properties, and magnetic circular dichroism of nanomaterials, surfaces and interfaces; (7) measurements of magnetism at atomic resolution and of the magnetic properties of surfaces and interfaces, nanoscopic materials and devices; (8) *in situ* and environmental transmission electron microscopy, involving nm-scale investigations of





reactions and processes at different temperatures in gases and liquids, and the development of novel methods and instrumentation for the *in situ* manipulation and measurement of nanomaterials; (9) novel developments for understanding structure, charge transfer and dynamics at interfaces in oxides and ferroics on the atomistic level; (10) applications of electron microscopy and spectroscopy to advanced materials research on interfaces and defects in structural and functional materials, including layered chalcogenides, soft materials, materials for applications in bioscience, materials for energy and resource efficiency, storage, semiconductors and semiconductor heterostructures, solar materials, battery materials, catalytic materials, nanostructured functional materials, photoelectric devices, metals and compounds.

The symposium covered insights into current and future research related to interface structures and properties of materials for energy technology, nanotechnology, nanoelectronics, information technology, transport, product development, and the environment.

The developments in instrumentation that were applied to the characterisation and understanding of interfaces, novel materials and devices and their properties documented the impressive progress that has been made possible by aberration-corrected electron microscopy.

It was also shown that correlative approaches involving the application of different characterisation techniques to the same material and the use of *in situ* and environmental transmission electron microscopy can provide an improved understanding of the fundamental properties of interface structures, material properties and mechanisms and reactions in materials and on their surfaces on the atomic and molecular scale.

This well attended and scientifically outstanding symposium reflected current interest in research on interfaces in materials and their properties. Furthermore, it provided valuable opportunities to establish collaborations through academic student exchange and scholarship programmes, collaborative projects, international workshops and teaching, which will accelerate research collaborations between Germany and China in the fields of electron microscopy and materials science. It also provided a forum for discussions between sponsoring companies and conference participants. The next workshop in this series is planned to be held in 2019.

The organisers are grateful for generous financial support from the National Science Foundation of China, Tsinghua University, Forschungszentrum Jülich, Kiel University, Thermo Fisher Scientific, Zeiss, JEOL, Hitachi High Technologies, CEOS, DENSSolutions, Nanomegus, Gatan, and KYC. ■

# ELECTRON MICROSCOPY COURSE, NOVEMBER 12-16, 2018; AMSTERDAM AND WAGENINGEN, NETHERLANDS

## The basics: From Amsterdam to Wageningen

Electron Microscopy (EM) has rapidly developed as a powerful research tool for high-resolution imaging. New, more powerful electron microscopes and the possibility to work at very low temperatures (cryo-EM), have made it possible to achieve atomic resolutions. In addition, combined light and EM (CLEM; correlative microscopy) now allows precise detection of fluorescently labelled molecules in high resolution images of cells and tissues.

As many researchers want to exploit these novel possibilities, EM facilities are besieged with training individual users. Therefore, the EM Centrum Amsterdam (EMCA location Amsterdam UMC) together with the Wageningen EM Centre of the Wageningen University (WUR) decided to give a basic course EM; from A to W.

During this course, the participants have been introduced to the novel developments in EM. They learned to use both transmission (TEM) as well as scanning electron microscopes (SEM) with different detectors.

Also they have performed classical techniques for specimen preparation, like resin embedding of cells and tissues and negative staining of small structures

like virus particles, as well as cryo-techniques for both TEM and SEM. The course included cryo-sectioning and tips and tricks to perform CLEM.

## Aim and scope

After this course, the participants have insight into the possibilities of electron microscopy as a research tool and are able to decide whether you should use SEM, TEM or CLEM for their analysis. Participants should be able to operate an EM at basic level, make images and perform basic techniques for sample preparation.

## Format and program

4-day practical training at WUR and AMC locations and a final day with presentations of participants and guest lectures on advanced microscopy and concluding reception at AMC.

## Course organizers

Jan van Lent (WUR), Marcel Giesbers (WUR), Henk van Veen (AMC) and Nicole van der Wel (AMC). For more information, please contact: [n.n.vanderwel@amc.nl](mailto:n.n.vanderwel@amc.nl) and [marcel.giesbers@wur.nl](mailto:marcel.giesbers@wur.nl) ■





# IAMNANO 2018 HAMBURG - INTERNATIONAL WORKSHOP ON ADVANCED AND IN-SITU MICROSCOPIES OF FUNCTIONAL NANOMATERIALS AND DEVICES, OCTOBER 14-17, 2018; HAMBURG, GERMANY

**BEEEM** BETRIEBSEINHEIT ELEKTRONENMIKROSKOPIE The International Workshop on Advanced and In-situ Microscopies of Functional Nanomaterials and Devices was held in October 14 – 17, 2018, at the Hotel Empire Riverside in Hamburg, Germany.

The workshop was organized commonly by the Helmholtz-Zentrum Geesthacht - Centre for Materials and Coastal Research, by the Helmut Schmidt University (University of the Federal Armed Forces Hamburg), by the Hamburg University of Technology TUHH, and by the Centre for Advanced Materials Hamburg, in collaboration with an international advisory board. It was supported by the Deutsche Forschungsgemeinschaft DFG.

The workshop provided a forum for researchers interested in applying advanced imaging and spectroscopy methods of electron microscopy, including aberration-corrected, *in situ*, environmental and low-voltage electron microscopy, to topical issues in materials science and engineering, in nanoscience, in soft matter research, in interface and surface science, and in biomaterials research.

As these methods are of fundamental importance in virtually all technological fields, the program covered a wide field of topics of the development of new materials, such as environment and energy materials, engineering, electronics, optics, magnetics, nanosystems, soft matter, and bioscience. Novel methodological developments were discussed as well as topical areas of research on thin films, bulk materials, surfaces, materials at the nanoscale and at the interface between the physical



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and life sciences, for understanding structure-property relationships of materials, as well as for metrology. This workshop was the sixth of its kind, with about 100 participants from Europe, from the Americas (Canada, US), from Asia (Singapore, Japan), and from South Africa who presented their research in more than 50 oral and in 18 poster contributions.

The oral sessions of the Invited Speakers were complemented by research highlights presented during a special Session of Young Professionals that directly followed the Opening Session, and by a poster session. The broad spectrum of topical areas presented at this workshop is reflected by the contributions that are published in the program and in the abstract booklet of the IAMNano 2018 Hamburg symposium (for details see [www.iamnano2018.com](http://www.iamnano2018.com)).

All participants, including the many junior scientists, were enthusiastic about the scientific program and explicitly gave their positive feedback on the excellent choice of topical subject areas, on the outstanding quality of the presentations as well as on the smooth and pleasant overall organization that allowed for initiating contacts and discussions between newcomers and science leaders in a broad range of research fields. ■

Heike Gabrisch, Thomas Klassen, Florian Pyczak, Martin Ritter



Participants of the IAMNano2018 in Hamburg

# JOINT SSSR/SCUR MEETING, OCTOBER 2018; ASAHIKAWA, JAPAN



**In the beginning of October, the Japanese Society for Electron Microscopy Research in Dermatology (SSSR) and the Society for Cutaneous Ultrastructure Research (SCUR – The Skin Imaging Society) held their 7<sup>th</sup> joint meeting in Asahikawa, Japan.**

A long tradition connects both societies founded in 1974 and 1970: from morphologically based diagnostics by ultrastructural electron microscopy via molecular pathology examination through to clinical dermoscopy, scientists and clinicians actively engaged in the field of skin research annually meet to share their expertise and recent findings, all five years within the scope of a joint meeting. One of the main initiators of the foundation of both societies, Professor Robin AJ Eady, Emeritus Professor of dermatopathology at London King's College, died in 2017. His primary research focused on epidermolysis bullosa, authoring more than 240 relevant papers mainly on this topic. One of his disciples, Professor Akemi Ishida-Yamamoto, president of the SSSR and

local organizer of the conference, gave an agitating tribute lecture on electron microscopic legacy in dermatology. A further disciple, Professor John A McGrath, gave a profound talk on inherited skin diseases; he became an honorary member of the SCUR.

Numerous further contributions, inter alia from Professor Elena Donetti, Professor Akira Ishiko (secretary generals of the SCUR and the SSSR), Doctor Volker Huck (president of the SCUR), Professor Hiroshi Shimizu, Professor Francesca Prignano, Professor Akiharu Kubo and further veteran and young investigators in the field of skin research completed the three-day joint meeting in an inspiring atmosphere of scientific and cooperation-inducing discussions.

After this fruitful conference, the committees are looking forward to the 46<sup>th</sup> annual meeting in 2019 of the SSSR in Osaka, Japan, and of the SCUR in the framework of the World Congress of Dermatology in Milan, Italy. ■

# ESTEEM3 – EUROPEAN NETWORK FOR ELECTRON MICROSCOPY



ESTEEM3 – Enabling Science and Technology through European Electron Microscopy – is an H2020 Integrating Activity project for electron microscopy, which

aims at **providing access to the leading European state-of-the-art electron microscopy research infrastructures**, facilitating and extending transnational access services of the most powerful atomic scale characterization techniques in advanced electron microscopy research to a wide range of academic and industrial research communities for the analysis and engineering of **novel materials in physical, chemical and biological sciences**.

The ESTEEM3 objective is to deliver more access to more users coming from a wider range of disciplines. Transnational Access (TA) to ESTEEM3 centres is obtained through a **transparent, simple peer review process** based on merit and scientific priorities. Optimum service to users is supported by Networking Activities (NA) and Joint Research Activities (JRA), which address key issues such as specimen preparation, data interpretation, treatment and automation through theory and simulation, and standardization of protocols and methodologies.

Innovative activities dedicated to the dissemination of expertise, education and training in cutting-edge quantitative transmission electron microscopy (TEM) techniques, such as **schools, advanced workshops and webinars**, are offered to the European electron microscopy users from academia, research institutes and industry.

Directed research programs involving the academic and industrial partners of the consortium focus on the further **methodology development in imaging and diffraction, spectroscopy, in-situ techniques and metrology, and on advancing applied research of materials related to ICT, energy, health, and transport** for the benefit of European scientists and industry. Moreover, the definition of strategic roadmaps and open access data policies aims to ensure the long-term sustainability of the consortium. In all, ESTEEM3 establishes a strategic leadership in electron microscopy to guide future developments and promote electron microscopy to the widest research community at large.

In 2012, the ESTEEM2 project (2012 – 2016) started within the 7<sup>th</sup> Framework Program of the European Commission and was supported as the follow-up to the previous ESTEEM Integrated Infrastructure Initiative (2006 – 2011) within the 6<sup>th</sup> Framework Program of the European Commission. These two successive ESTEEM and



ESTEEM2 integrating initiatives in advanced electron microscopy for physical sciences brought together, in a sustainable network, the leading European Laboratories equipped with the most advanced TEM installations offering the best expertise in all different TEM fields.

This advanced consortium is now established as ESTEEM3, the primary European portal for industrial and academic scientists who need access to latest generation TEM instrumentation and methodology. This is offered along with the cutting-edge TEM expertise for solving complex materials problems in various fields of science such as physics, materials science, engineering, chemistry or even life sciences and earth sciences. ESTEEM3 includes five high-end SMEs that can directly transform academic innovation into products or services.

The project coordinator of the Horizon H2020-INFRAIA-2018-2020 project ESTEEM3 and the intermediary between the consortium and the European Commission is Prof. Dr. Peter A. van Aken, head of the Stuttgart Center for Electron Microscopy (StEM) at the Max Planck Institute for Solid State Research in Stuttgart, Germany, Professor at the Department of Materials and Geosciences of the Technische Universität Darmstadt, Germany, and Honorary Professor at the Nelson Mandela University, Port Elizabeth, South Africa.



For further information,  
please contact the coordinator,  
Prof. Dr. Peter A. van Aken,  
[p.vanaken@fkf.mpg.de](mailto:p.vanaken@fkf.mpg.de)



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# OUTSTANDING PAPER AWARDS FOR 2017

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# 2017 OUTSTANDING PAPER AWARDS

The EMS Outstanding Paper Awards for 2017 were chosen from a strong field of entries and were awarded by Professor Peter Nellist (the Chair of the Jury) in Sydney, Australia, at IMC19. The winners received a glass plaque plus a prize of €1000.

The following papers received the 2017 EMS Outstanding Paper Awards (OPAs) in the respective categories:

## 2017 OPAs Winners

### 1. Instrumentation and Technique Development

“Hydrogen positions in single nanocrystals revealed by electron diffraction”. Palatinus, P. Brázda, P. Boullay, O. Perez, M. Klementová, S. Petit, V. Eigner, M. Zaarour, S. Mintova. *Science* 355 (2017) 166-169. DOI: 10.1126/science.aak9652.

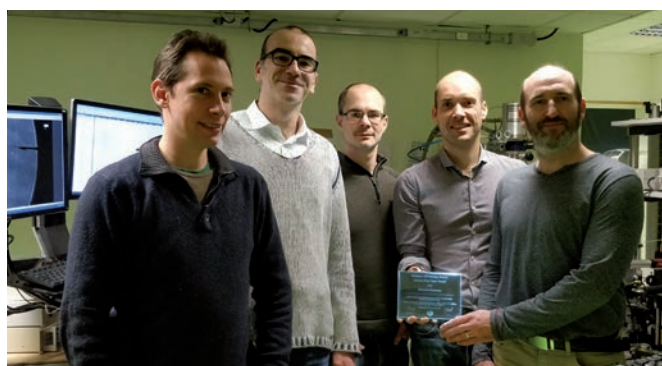


Mariana Klementova, Lukas Palatinus and Petr Brazda

The jury commented, “This development might have a great impact for the pharmaceutical industry to better design drugs to fit the reactive site of proteins involved in diseases, such as Huntington’s disease, Alzheimer, etc”.

### 2. Materials Sciences

“Carrier Localization in GaN/AlN Quantum Dots As Revealed by Three-Dimensional Multimicroscopy”. Lorenzo Mancini, Florian Moyon, David Hernandez-Maldonado, Ivan Blum, Jonathan Houard, Williams Lefebvre, François Vurpillot, Aparna Das, Eva Monroy,



Jonathan Houard, Lorenzo Rigutti, Ivan Blum, Williams Lefebvre, Francois Vurpillot

and Lorenzo Rigutti. *Nano Letters* 17 (2017) 4261-4269. DOI: 10.1021/acs.nanolett.7b01189.

The jury commented, “The correlative ET, APT and PL study of individual quantum dots is most striking work, in particular because the microscopic data from ET and APT are combined and used as input for calculations which are then compared with the optical data”.

### 3. Life Sciences

“Influenza virus genome reaches the plasma membrane via a modified endoplasmic reticulum and Rab11-dependent vesicles”. Isabel Fernández de Castro Martin, Guillaume Fournier, Martin Sachse, Javier Pizarro-Cerda, Cristina Risco & Nadia Naffakh. *Nature Communications* 8 (2017) 1396. DOI: 10.1038/s41467-017-01557-6.

The jury commented, “These are nice result and an interesting technique which has used (i) flat embedding for sectioning complete cells in a precise orientation (as opposed to random orientation sectioning in cell pellets), and (ii) the optimization of labeling methods to localize cell and virus factors, including the use of METTEM.”



Isabel Fernandez De Castro Martin

EMS extends its warmest congratulations to all winners.

## 2017-2019 OPA Jury Members

(judging on papers in 2016 - 2017 - 2018)

- **Erdmann Spieker**  
(Institute for Micro- and Nanostructure Research, Erlangen, Germany)
- **Francesco Priolo**  
(Università di Catania, Catane, Italy)
- **Paul Midgley**  
(University of Cambridge, Cambridge, UK)
- **Bruno M. Humbel**  
(University of Lausanne, Lausanne, Switzerland)
- **Catherine Venien-Bryan**  
(Université Paris 6, Paris, France)
- **Jose-Maria Carazo**  
(Universidad Autonoma, Madrid, Spain)

Chair: Peter Nellist (University of Oxford, Oxford, United Kingdom)



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# EMS SCHOLARSHIPS 2018

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## 19<sup>th</sup> International Microscopy Congress (IMC19), September 9-14, 2018, Sydney, Australia

Name	Society	Lab & Country
<b>Knaislová</b> Anna	CSMS	University of Chemistry and Technology Prague, Department of Metals and Corrosion Engineering, Prague, Czech Republic
<b>Lak</b> Behnam	SCANDEM	University of Helsinki, Department of Anatomy, Faculty of Medicine, Helsinki, Finland
<b>Alfredo</b> Campos	Sfμ	Université de Paris Sud, Nanophysics, Paris, France
<b>Pfeiffer</b> Stephan	ASEM	USTEM, Vienna, Austria
<b>Villinger</b> Clarissa	DGE	Ulm University, Ulm, Germany
<b>Hieke</b> Stefan	DGE	Max-Planck-Institut für Eisenforschung GmbH, Düsseldorf, Germany
<b>Schloz</b> Marcel	DGE	Humboldt Universität zu Berlin, Berlin, Germany
<b>Weßels</b> Teresa	DGE	RWTH Aachen University, Jülich, Germany
<b>Gomez Bolivar</b> Jaime	SCANDEM	University of Granada, Granada, Spain
<b>Martin Malpartida</b> Gemma	SME	Universitat of Barcelona, Department of Electronics and Biomedical Engineering, Barcelona, Spain
<b>Cookman</b> Jennifer	MSI	University college Dublin, Department of Physics and Bernal Institute, Limerick, Ireland
<b>Shedder</b> Alexandra	RMS	University of Oxford, Oxford, UK
<b>Wang</b> Yi-Chi	RMS	The University of Manchester, Department of Materials, Manchester, UK
<b>Webster</b> Robert	RMS	University of Glasgow, Glasgow, UK
<b>Hawes</b> Jonathan	SSOM	Paul Scherrer Institut, Nuclear Fuels Group, Villigen, Switzerland
<b>Persson</b> Ingemar	SCANDEM	Lindköping University, Department of Physics, Chemistry and Biology (IFM), Lindköping, Sweden
<b>Bergh</b> Tina	SCANDEM	NTNU, Physics, Trondheim, Norway
<b>Leijten</b> Zino	EMS	Eindhoven University of Technology, Eindhoven, Netherlands
<b>Campanini</b> Marco	SSOM	University of Parma, Electron Microscopy Center, Parma, Italy
<b>Krisper</b> Robert	ASEM	Graz University, Graz, Austria
<b>Petrinec</b> Daniela	CMS	University of Zagreb, Department of Biology, Zagreb, Croatia
<b>Orekhov</b> Andrey	BSM	University of Antwerp, Antwerp, Belgium
<b>Levin</b> Barnaby	RMS	Arizona state University, Engineering, Tempe, USA





## Anna Knaislová (Czech Republic)



The conference started in the evening of September 9, 2018 by a Welcome Reception. There were exhibitions from companies involved in the microscopy industry who presented their products and services. There were also stalls

with candidates for the next IMC20 in 2022. I had the chance to speak with the representatives of present companies about the news in the microscopy science and industry. I had also the time to speak with other participants of the conference about their own research. On Monday September 10, 2018, the oral and poster presentations have started. After the Opening Ceremony, the first plenary presentation of Prof. Shechtman (awarded the 2011 Nobel Prize in Chemistry for the discovery of quasicrystals) had a great success. Through the week of the conference, I have heard many presentations concerning metals and microscopy, for example, presentations about metals for aerospace industry, titanium and magnesium alloys, oxidation of metals, various techniques of microscopy, various using of detectors in SEM, 3D print, etc. Throughout the week, I have talked with other scientists not only personally but also through the official mobile application (IMC19). It was also great to meet some scientists with research similar to mine and to talk about our research and the possibilities for further cooperation.

I had a mini oral presentation with a digital poster at this conference, where I presented our teamwork about the substitution of critical raw materials. The title was “Microstructure of TiAl<sub>10</sub>Si<sub>20</sub> intermetallic alloy prepared by Spark Plasma Sintering”. Ti-Al-Si alloys are a prospective material for high-temperature applications. Due to their low density, good mechanical properties and corrosion and oxidation resistance, these intermetallic alloys are considered for the aerospace and automobile industry applications. In my research studies, the TiAl<sub>10</sub>Si<sub>20</sub> alloy was prepared by different techniques of powder metallurgy and their microstructure after reactive sintering. Reactive sintering in a combination of Spark Plasma Sintering, and mechanical alloying followed by Spark Plasma Sintering was described.

I received many advices for my future research, hence I will continue with the preparation of the Ti-Al-Si alloys and try further microscopy techniques to understand the connection between their structure and mechanical properties.

I would like to thank the European Microscopy Society (EMS) for the scholarship and the French Society for Microscopy (Sfμ) for their support.

## Behnam Lak (Finland)



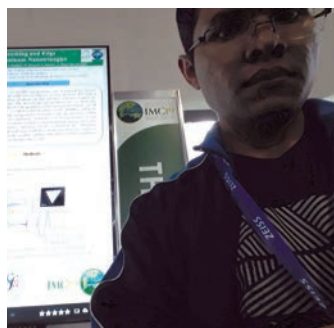
The 19th International Microscopy Congress (IMC19) was held in Sydney in September 2018. As PhD student in cell and molecular biology, the meeting gave an excellent insight into various microscopy techniques for my research.

Thanks to the meeting; I was able to get the knowledge on possible solutions for some of my research challenges and questions such as using correlative light and electron microscopy to track down a special cellular organelle. Furthermore, the new signs of progress in EM and especially in Cryo-EM seemingly provided me with new approaches to my future career as a cell biologist.

Thanks to the grant from the **European Microscopy Society (EMS)** and the **French Society for Microscopy (Sfμ)**, I was able to present my latest results in the form of poster presentation. The poster session was a success, I had the opportunity to discuss several aspects of my research with other young and enthusiastic scientists. More precisely, some of the techniques used in my research such as immuno EM were revised during the poster session.

Collectively, I believe the congress offered a good platform to network with other scientists and spot future opportunities and the growing interests among the scientists.

## Alfredo Campos Otero (France)



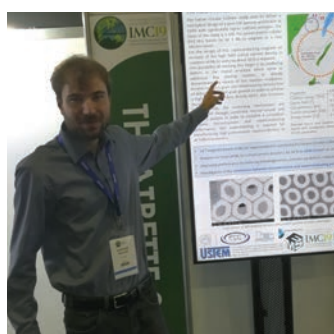
First of all, I would like to thank the **European Microscopy Society (EMS)** and the **French Society for Microscopy (Sfμ)** for supporting my participation to IMC19. I am very glad for this opportunity.

During IMC19, I was enriched with different experiences including fruitful discussions with researchers, Ph.D. students and post-docs in my field (nanooptics with fast electrons). The discussions have been of huge advance for my thesis work. The opportunity to see original and current works helped me to increase my knowledge and to discover new tendencies on my research field. In addition, I had the opportunity to see presentations with information about post-doc positions which I am currently considering for my future career.

My contribution to IMC19 was at the section of digital posters. I have presented 2 digital posters of 30 minutes each. I have included EMS and SFμ logos in all pages of the posters and in the acknowledge part I dedicated some words to EMS and SFμ for supporting my participation to the IMC19 congress.

Thanks again to EMS and SFμ for your kind support.

## Stephan Pfeiffer (Austria)



Attending IMC19 was a very interesting and educational experience for me. Sharing my work and exchanging my knowledge with over 2100 other attendees was very helpful in further expanding my horizon and getting updated

on the most recent achievements in various research areas. I was given the opportunity to present my research results on the microstructure and magnetic properties of Nb<sub>3</sub>Sn superconductors for the Future Circular Collider project at CERN. The ultimate goal of improving the performance of the superconductor to the required value can only be achieved by understanding the microstructural processes. Talking to other people

involved in similar research topics helped me deepen my understanding in these areas, which will be of great help during my remaining time as PhD candidate as well as in the future. Meeting new people and further increasing the social networks is an important part of every conference; I have learned a lot by listening to presentations of other researchers, not only in my field but also in others like life sciences. On top of all that, Sydney is a beautiful city that was well worth of visiting.

In summary, it was a very successful journey and I want to thank the **European Microscopy Society (EMS)** for their generous scholarship as well as the **French Society for Microscopy (Sfμ)** for its kind contribution that made this great experience possible.

## Clarissa Read (Germany)



I want to thank the **European Microscopy Society (EMS)** and the **French Society for Microscopy (Sfμ)** for their travel support to the IMC19 in Sydney.

At IMC19, I have presented my newest data by oral presentation

in the session of “host-microbe interaction”. My talk included data of herpesvirus infected fibroblasts acquired by the three different 3D EM methods: serial sectioning TEM, FIB-SEM tomography and STEM tomography. We use these techniques to better understand the mechanisms of formation of infections virus particles within the host cell.

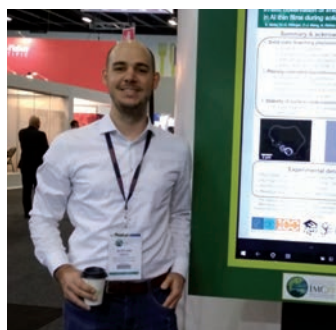
During the conference, I could attend several high-quality presentations held not only by experienced and already established scientists in the field but also by excellent Ph.D. students and young scientists. It was also interesting to learn how Australia promotes the collaboration of the well-equipped microscopy facilities spread all over the country and with users from different institutions in order to use resources wisely. There was also plenty of time between sessions to openly discuss tricky methodological problems and to get in touch with colleagues from all over the world. It was great that the organizers kept the daily schedule open like this. The only drawback of the organization of this great congress, however, was the inconvenience caused by lack of a conclusive digital abstract book in which the



abstracts are sorted by session/day of presentation. This would have facilitated the planning of sessions to attend.

My personal highlight was to be part of the reception onboard the historical sailing ship James Craig to celebrate the careers of the well-known pioneers of biological electron microscopy Heinz Schwarz, Bruno Humbel and Kent McDonald. Thanks to all three of you for being such helpful and encouraging colleagues and for always being eager to share your knowledge!

## Stefan Hieke (Germany)



Sydney, Australia.

It was a successful, well organized conference filled with outstanding contributions in an impressive location of the International Convention Centre in Sydney. Cutting edge research and methodological developments were presented. In addition, I want to mention the amazing improvement, capabilities and potential of *in situ* techniques applied in scanning and transmission electron microscopy.

I had the chance to discuss research with scientists from all over the world on the field of microscopy. I had the pleasure to present and discuss my research about “*In situ* observation of irregular void growth in Al thin films during solid state dewetting”, which connects different *ex situ* as well as *in situ* microscopy techniques. The study was possibly thanks to a collaboration with Marc Willinger established at the previous European Microscopy Congress (EMC16) in Lyon, France. The digital poster presentation is a promising approach to present dynamical results and I got feedback as well as new ideas for my future work.

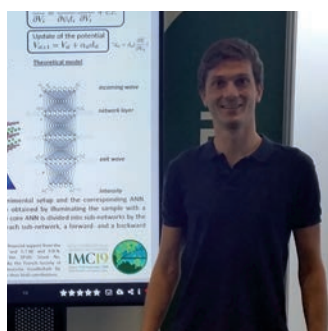
The International Federation of Societies for Microscopy (IFSM) selected me for the IFSM Young Scientists Assembly. I was honored to get the great opportunity to discuss with leading experts, nobel laureates and early stage researchers in this pre-conference event. It was an

inspiring experience and great chance to expand the scientific network.

The conference offered many chances to establish and strengthen contacts, to meet microscopists from different fields and countries, and to get new insights in the field of microscopy.

Overall, I want to thank the supporting Microscopy Societies and the organizers for the great conference and experience and I want to encourage each researcher to join the next microscopy conferences and to be part of the direct scientific exchange. It is simply great!

## Marcel Schloz (Germany)



I would like to thank the **European Microscopy Society (EMS)** and the **French Society of Microscopy (Sfμ)** for supporting my participation at the International Microscopy Congress 19 (IMC19) in Sydney.

This event gave me the opportunity not only to learn about new methods and trends in my research field, but also to get to know researchers from all around the world. The discussions I had with some of the experts and other young scientists were truly enlightening and gave me new ideas for further research. My contribution to the congress has been in the form of a digital poster showing my latest results of applying the method of compressed sensing to reconstructions in ptychography.

Ptychography is a very interesting technique with increasing popularity due to its ability to achieve super-resolution while offering a fast reconstruction as a result of ever-improving computing power. The talk given by Prof. David Muller on his impressive results using this technique was therefore one of my personal highlights.

Besides that, Sydney was a great location and prior to the congress I took the chance to discover some of the city’s most beautiful places, such as the opera house, the harbour bridge and the nearby blue mountains. The congress itself was excellently organized and together with the social events it has been an unforgettable experience for me.

## Teresa Weßels (Germany)



First of all, I would like to thank the **European Microscopy Society (EMS)** and especially the **French Society of Microscopy (Sfμ)** for supporting my participation at IMC19 in Sydney, Australia. IMC19 was the first big

international conference I have attended so far. Moreover, it was the first time that I have ever travelled outside of Europe. Therefore, I was greatly impressed by the conference and the journey, and all the experiences made it a truly unforgettable time for me.

Over 2000 researchers attended the congress resulting in a huge variety of covered topics from light microscopy, life science and physical science to recent developments in instrumentation and techniques. Due to my own focus of research, the sessions on “*In-situ*, environmental and time-resolved microscopy”, “Instrumentation”, “Phase-related techniques” and “Magnetic, ferroelectric and multiferroic materials” were of particular interest. One drawback of the large number of interesting talks was that some of the them overlapped. Therefore, it was not possible for me to listen to all the talks I would have liked to listen to.

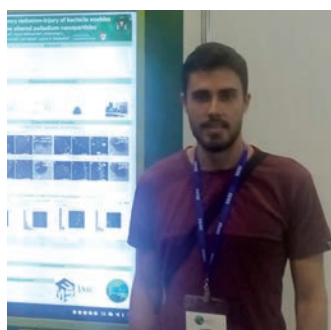
During the congress, I had the opportunity to present a hardcopy poster as well as a digital poster and a mini oral presentation. For the hardcopy poster, I had a number of valuable discussion with people visiting my poster. The disadvantage of the hardcopy poster compared to the digital poster was that I had to bring it from Europe to Sydney by plane. In contrast, I could upload the digital poster before the conference and did not have to carry it around with me. In addition, one could use animations and videos to visualise the content. However, fewer discussions raised from my mini oral presentation in contrast to the conventional hardcopy poster.

The convention centre in Sydney as well as the city itself were ideal for the IMC19. Throughout the congress, beverages and drinks were offered in the exhibition hall, making easier to gather together and to discuss with others. Conversations could be prolonged during dinner in one of the various restaurants in Sydney. In addition to the restaurants, also the Opera House is worth to visit in the dark, maybe even more than during daytime. The end of the congress was the celebration

of the 25<sup>th</sup> anniversary of the Australian Microscopy and Microanalysis Society (AMMS). One of the highlights of this celebrations was a cake in form of a TEM.

As a summary, the conference trip was extremely useful for me as I was able to a lot learn about the latest progress in the field. Furthermore, it gave me the opportunity to meet many scientists working on various topics related to microscopy in a very pleasant atmosphere.

## Jaime Gomez Bolivar (Spain)



First of all, I would like to thank the **European Microscopy Society (EMS)** for the generous Scholarship and the the **French Society of Microscopy (Sfμ)**, which allowed me to attend to the 19<sup>th</sup> International Microscopy Conference

(IMC19) held in Sydney (Australia) in 2018. I participated in the conference by presenting a digital poster entitled “Characterization of palladium nanoparticles produced by microwave-injured bacteria”, where I included part of the results from my PhD thesis conducted in between the University of Granada with Professor Mohamed Merroun and the University of Birmingham with Professor Lynne Macaskie.

IMC19 allowed me to widen my knowledge about microscopy and related topics. The friendly and relaxing atmosphere also allowed me to interact and learn from the rest of IMC19 participants. During my poster presentation, I have received many constructive comments of which my PhD thesis will benefit from. Due to the diverse topics presented in the plenary talks, I could expand my knowledge further from my current research topic what would be very useful for a future postdoc and my future career as a young scientist.

From my personal point of view as a microbiologist working on bio-nanotechnology, the most interesting part was learning from experts in nanoparticles using microscopy as a tool for its characterization. They gave me valuable advices about how to use the different techniques for nanoparticles characterization.

Not the least important, I would like to highlight the organization of ICM19 which was at the highest level, the staff of the conference and the delicious international food improving the relaxing environment of the meeting.



## Gemma Martin (Spain)



I would like to thank the **European Microscopy Society (EMS)** and the **French Society of Microscopy (Sfμ)** for the scholarship they granted me to attend the 19<sup>th</sup> International Microscopy Congress (IMC19) held in Sydney.

Attending to this conference has provided me the opportunity to share my research by the digital poster entitled “**Assessment of the anisotropic electrical conductivity of GaInP CuPt<sub>B</sub> type ordering by in-situ TEM**” and live a great experience taking part of an international congress.

During the conference, I had the chance to attend a variety of innovative and interesting lectures, especially in the *in-situ* and operando TEM field. I have also the opportunity to meet researchers in my field with whom to collaborate in the future, and also try new microscopes and see the advances in the industry, thanks to the congress exhibition.

## Yi-Chi Wang (United Kingdom)



From September 9-14, 19<sup>th</sup> International Microscopy Congress (IMC19) was held in the beautiful harbour side of Sydney. IMC19 is the biggest microscopy conference organised by International Federation of Societies for

Microscopy (ISFM). This year, the theme of the congress was “Microscopy: Bridging the Sciences”. More than 2000 scientists have attended the conference, along with their ground-breaking research presentations and state-of-the-art instruments demonstrated by industrial partners.

There were four plenary sessions presented in four days. The Nobel laureate Dan Shechtman presented his findings on quasi-crystal, entitled “The discovery of quasi-periodic materials – The role of TEM”. Prof. Jennifer Dionne from Stanford University presented the latest results using environmental TEM and combination

of TEM with optical microscopy. Her talk was entitled: “The light years: Combined optical and environmental electron microscopy to visualize photonic processes with atomic-scale resolution”. Third plenary talk, delivered by Prof Zhiwei Shan from Xi’an Jiaotong University, China, demonstrated a series of fascinating investigations focused on the mechanical properties of metals at micro-nano scale using *in situ* mechanical TEM and environmental TEM. The presentation was entitled: “Mechanical testing laboratory inside TEM”. The final plenary talk was given by Dr Misty Jenkins from Walter Eliza Hall Institute for Medical Research. Her fascinating talk entitled: “Understanding Serial Killers: Investigating the function of Cytotoxic T lymphocytes using microscopy” showed beautiful videos using electron microscopy and live cell microscopy and highlighted the pivotal role of microscopy in the recent findings on cellular immunology and cancer immunotherapy.

During the week of microscopy talks, the conference venue was flooded by interesting discussions and breakthrough knowledge. My personal talk, “High-throughput chemical imaging and quantification of nanoparticles in 2D and 3D”, was also well received. I was subjected to many interesting questions and discussions which I believe will definitely strengthen my research project.

I would like to conclude by thanking the **European Microscopy Society (EMS)** scholarship and the **French Society of Microscopy (Sfμ)** for its kind contribution to EMS scholarship which allow me to attend this congress.

## Robert Webster (United Kingdom)



I would like to take this opportunity to express my gratitude to the **European Microscopy Society (EMS)** for their support, which has allowed me to travel to the International Microscopy Congress (IMC19) in Sydney,

Australia in September 2018 – my first international conference.

At this conference, I was able to present my results in two talks entitled ‘Spontaneous nanostructuring of TiNiSn half-Heusler films for thermoelectric applications: a refined STEM-EELS study’ and ‘High-temperature thermal evolution of nanostructured thermoelectrics observed by *in-situ* electron microscopy’. These talks covered my

work on phase segregation nanostructures in thermoelectric materials using high-resolution quantitative EELS methods, which enables us to track absolute quantities of elements during thermal annealing inside the electron microscope. Attending IMC19 also allowed me to explore fields in electron microscopy beyond my own research as well as to attend to many talks and posters which lead to interesting discussions and connections which will be useful for my future career.

One big and popular topics at the conference were developments in 4d-STEM, with talks about electron counting detectors like the MediPix and developments in processing these large datasets absolutely packed full. The possibilities in this area seem particularly exciting, with recent developments in, for instance, ptychography and differential phase contrast imaging. This is definitely an area of development to keep an eye on.

As part of the conference, I was also accepted to attend the IFSM Young Scientists Assembly, which provided a fantastic opportunity to meet others at a similar stage in their career, as well as some of the big names in electron microscopy! I particularly enjoyed conversations with Archie Howie, who also has his roots in Fife in Scotland, and Les Allen, who continues to share wonderful ideas and ambitions for analytical electron microscopy. We also had the opportunity to learn about and discuss IFSM's plans for an International Year of Microscopy, which will nominally occur in 2031, commemorating the centenary of the electron microscope. There are certainly great prospects ahead for the microscopy community!

All my best to everyone who was at IMC19 and many thanks to EMS for their contribution to making this trip possible.

### Jonathan Hawes (Switzerland)



thank the **European Microscopy Society (EMS)** for their generous scholarship, which facilitated this travel.

The 19<sup>th</sup> International Microscopy Conference (IMC19) took place in Sydney, Australia, on September 9-14, 2018. As my first international conference, I would like to start by saying I fully enjoyed the experience. Secondly, I would like to

A huge variety of information was available, and while it sometimes made it difficult to select exactly what to go and listen to or see, there was always interesting and relevant information to be heard. Each category stream consisted of approximately 11 talks, which occupied the majority of the middle of the day allowing people to choose which talks to attend so that one moment one could find themselves in the life sciences stream and the next anything else such as metals and alloys. Throughout the day, opportunity was also given to explore stands from industry partners and network with others in academia or industry in the enormous main hall.

A new addition to this conference was the use of digital posters, these posters (of which I also contributed) consisted of few slides and were displayed at stations around the big hall. For those interested, these were also downloadable from the conference application. In practice, the way of viewing may have to be altered since the large space between stations made it difficult to interact with multiple poster presenters compared to the usual format, but the idea and the ability to show graphical content and videos certainly seemed good and I hope to see more of this type of presentations in the future.

To summarise, the whole event was well organised and ran smoothly, it covered everything that could be expected from a microscopy conference and was a memorable experience.

### Ingemar Persson (Sweden)



Many thanks to the **European Microscopy Society (EMS)** for giving me the opportunity to attend and present my work at IMC19 in the very beautiful setting of Darling Harbour in Sydney, and the **French Society of Microscopy**

(Sfμ) for their generous donation. I was very pleased to give a talk on “*In situ* surface termination modification of 2D Ti<sub>3</sub>C<sub>2</sub> MXene in an environmental TEM” in the presence of leading contributors in the field and forming new interesting collaboration connections. Another highlight was Professor Dan Shechtman's very inspirational and captivating lecture on his discovery of quasi-periodic materials and the long struggles with critics that followed. It was in addition a great privilege to have too many interesting presentations to attend that

the schedule allowed, split over the 12 different sessions. Last but not least, to me IMC19 meant the perfect opportunity for connecting and reconnecting with colleagues from all over the world learning about life and work situations in different places and forming new ideas for research.

Coming to IMC19 was of great importance to my continued work in the field of electron microscopy and experiencing Sydney and Australia is something I will never forget.

## Tina Bergh (Norway)



“Everything happens by chance, yet you are here”. Nobel laureate Dan Shechtman shared these wise words during the IFSM Young Scientists Assembly, which I was fortunate to attend prior to IMC19. This assembly was an informal event

excellent for meeting other young researchers together with prominent researchers that shared their experiences and valuable career advices. For example, Nobel laureate Joachim Frank told us that you might have to challenge and do the opposite of your mentor to excel in the field. The most important thing when working in a rapidly evolving field is to ask the most relevant questions, according to Dr Gaia Pigino, Prof. Angus Kirkland and Dr Amy Gandy discussed the importance of learning from constructive critique of your work, and for preparing for career crossroads early on. Dan Shechtman told us that he has always loved working hands-on in the lab, and it all started with a magnifying glass when he was 7. It was amazing to listen to him talk about his fascination with microscopy from an early age one day, and then to listen to his plenary talk the next day.

Dan Shechtman held the first plenary talk during IMC19 in Sydney. He let us see pages of his actual logbook from 1982, where he had written three question marks; “(10 fold???)”. This was when he saw a diffraction pattern with a 10-fold symmetry for the first time, which could indicate either twins or an icosahedral 5-fold symmetry characteristic of quasi-crystals, as was the case. Shechtman talked about the “years of rejection” that followed his discovery of quasi-crystals, where well-known giants in the field, like Nobel laureate Linus Pauling, criticised his analysis. It was incredible to experience his exceptional attitude towards the sceptic.

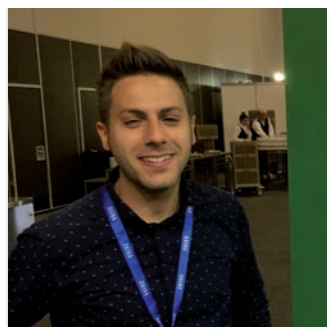
“I am my own worst critic,” he explained, and therefore he had tested himself from the start and eliminated all doubt. “So, I know I was right from day one.”

The conference proceeded with interesting talks in several parallel sessions. The most rewarding for my research was the diffraction session, where I got new input on phase identification. Further, the conference had many inspiring talks on e.g. computational methods to get more out of the microscopy data, and on 4D STEM for a vast range of applications, from magnetic domain mapping and strain mapping to quantification of the crystallinity of disordered materials. I am curious about the emerging 4D STEM technique, especially since there are many similarities to scanning precession electron diffraction (SPED) that we work on in the Trondheim TEM group.

I presented a digital poster focused on using spectroscopy together with scanning precession electron diffraction (SPED) to determine the crystal structures and compositions of different intermetallic phases occurring at the interfaces between aluminium and steel in various aluminium-steel joints. I discussed my work with others working on different diffraction techniques, and I am hoping for future collaborations.

During IMC, I met people from around the world, and meeting people, sharing ideas and getting inspired is my main motivation for attending conferences. The travel almost to the other side of the globe was definitely worth it, and I would like to thank EMS for providing me with a scholarship to support my attendance at IMC. I would like to end with Jennifer Dionne’s encouraging words; “reach high, be inclusive, and the future is better than you think”.

## Marco Campanini (Italy)



I would like to thank the European Microscopy Society (EMS) and the French Society of Microscopy (Sfμ) for supporting me with the EMS scholarship grant to attend the 19<sup>th</sup> International Microscopy Conference (IMC2019)

in Sydney.

During the Conference I had the opportunity to present my recent scientific work on the investigation of ferroelectric materials by atomically-resolved

differential-phase contrast scanning transmission electron microscopy (DPC-STEM), with a digital poster presentation entitled “Direct Imaging of Polarization Gradients by Atomic Resolution Differential-Phase Contrast STEM”.

This experience was very helpful to discuss about my ideas and my research activity with other scientist working on similar topics and to get a wider perspective about actual trends and future developments in the field I am working.

The overall conference program was rich and exciting, with stimulating plenary lectures, many interesting talks and an amazing exhibition area and workshops program.

I am very grateful to EMS and Sfμ for making possible for me to participate to such a unique event!

### Robert Krisper (Austria)



Receiving the **European Microscopy Society (EMS)** scholarship allowed me to attend the International Microscopy Congress (IMC19), held in Sydney in September 2018. Correspondingly, I want to thank the **French**

**Society of Microscopy (Sfμ)** for their generous donations to the European Microscopy Society. A total number of 24 scholarships were granted for this meeting.

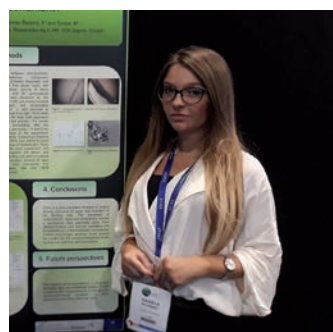
During the congress and the IFSM Young Scientist’s assembly, I was able to establish contacts with numerous young researchers, as well as with many distinguished scientists. Gaining a deeper insight into not only their work but also to their academic careers can be very inspirational and is certainly one of the cornerstones in networking at such events. With twelve concurrent sessions, IMC19 offered a rich program across numerous fields in microscopy, from core topics concerning instrumentation, across physical and life sciences to frontier issues, as how to present the contents of your work to a non-academic audience in a convenient fashion. Truly inspiring plenary talks complemented a well-rounded program.

In my oral presentation “*In situ* TEM: The Performance of EDXS at Elevated Sample Temperatures”, which was part of the instrumentation program stream on the second congress day, I could already refer to presentations

given by colleagues during the first day and I hopefully was able to contribute a bit to their advances. As for myself, I also gathered a more thorough understanding of some advanced techniques, their possible range of applications, and challenges that we all are thrilled to take on.

Ultimately, I want to highlight the importance of broadening one’s horizon during an early researcher’s life. To me, it seems vital that our (microscopy) societies embrace travels to such distant places with impressive nature, culture and history. I sincerely hope for many young scientists to receive support in their efforts to attend IMC20 in Busan, South Korea.

### Daniela Petrinec (Croatia)



The 19<sup>th</sup> International Microscopic Congress held in Sydney (9-14 September 2018) was an outstanding opportunity not only to get acquainted with the latest achievements and discoveries of microscopy, but to meet with

the best scientists and lecturers from all around the world. I was honored to listen to their lectures.

As one of the youngest members of the Croatian Microscopy Society (CMS), it was an extraordinary honor for me to participate with my own hardcopy poster presentation under the title: **Visualization of hunting nets formed by algae: a perfect hunting mechanism?**

Participating to this congress has brought me many new acquaintances and has opened up new perspectives I will happily apply in my future work. I would also like to congratulate the organizers for making this experience extremely interesting and memorable. Sydney was a wonderful location to hold this prestigious event.

In the end, I would very much like to thank the **European Microscopy Society (EMS)** and the **French Society for Microscopy (Sfμ)** for the trust and for granting me with the scholarship, which enabled my participation to this prestigious congress.

I would also thank the Croatian Microscopy Society and all colleagues who made this lifetime experience possible and unforgettable.





## Andrey Orekhov (Belgium)



First of all, I would like to thank the **European Microscopy Society (EMS)** for the scholarship and the **French Society for Microscopy (Sfμ)** for their support, which allowed me to participate at the International Microscopy

Congress (IMC19), held on September 9-14, 2018, in Sydney, Australia.

At congress, I had the chance to give a talk entitled “Advanced electron microscopy techniques in structure characterization of mercury dichloride one-dimensional encapsulated crystals” in the section PS-2.3: Carbon-based materials and 2D structures. It was a great opportunity to share results of our work with other experts in this field and to have fruitful discussions with them.

Plenary lectures, oral and poster presentations allowed me to improve my knowledge, especially on the applications of novel microscopy techniques for the beam sensitive and carbon-based materials.

I was especially inspired by the plenary lecture entitled “The Discovery of Quasi-Periodic Materials – The Role of TEM”, given by Nobel laureate Prof. Dan Shechtman from the Israel Institute of Technology. I am convinced that his history of the path to the Nobel Prize and World Recognition should motivate all young scientists to be as precise as possible in their research and never give up.

Alongside with the scientific talks and posters, I found the developments and presentations in the lunchtime lectures of different exhibitors interesting and useful for my future experiments. In particular, I had the chance to have an extended training on software of the NanoMEGAS company that we are using for crystals orientation, texture and/or strain analysis of 2D and bulk crystals. This knowledge will give me the possibility to improve the data processing procedure.

Finally, I would like to use this opportunity to congratulate the organizers of the IMC19 for the great work and excellent organization at a wonderful location in the city of Sydney. It was a unique chance to visit the motherland of kangaroos.

## Barnaby Levin (USA)



I would like to sincerely thank the **European Microscopy Society (EMS)** and the **Société Française des Microscopies (SFμ)** for their generous support, which allowed me and other early-career scientists to attend the 19<sup>th</sup>

International Microscopy Congress (IMC19) in Sydney.

At the conference, I gave two mini-oral presentations describing the results of my research projects on perovskite oxides for solid oxide fuel cells, and on developing an open-cell *in situ* liquid system to study photo-corrosion in an ETEM. I also gave a talk on vibrational EELS on behalf of a student in my research group who was unable to attend the meeting.

Attending IMC19 gave me a unique opportunity to meet and engage with members of the microscopy community from across Europe and the wider world. It was exciting to be able to attend excellent talks on a wide range of topics at the frontiers of electron microscopy research, including ultrafast electron tomography, high energy resolution monochromated EELS, and the different uses of 4D-STEM detectors. I look forward to continuing to engage with the European Microscopy community in the future, and I hope to be able to attend future meetings such as EMC 2020 in Copenhagen.



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FINANCIAL REPORT OF EMS BUDGET

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EUROPEAN MICROSCOPIES SOCIETIES

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EUROPEAN CORPORATE  
MEMBER ASSEMBLY

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EMS CALENDAR 2019

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APPLICATION  
FOR MEMBERSHIP

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EUROPEAN CORPORATE  
MICROSCOPY ASSEMBLY (ECMA)

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LIST OF BOOKS

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# FINANCIAL REPORT OF EMS BUDGET

## Financial report of EMS budget

To be presented at the EMS Board Meeting, Madrid, 04-04-2019. Budget 2018 final, budget 2019 running, budget 2020 outlook

### Budget 2018, final

#### Incomings

The majority of incomings came from contributions of the national societies and the ECMA members with further incomings from individual members, interest rates and from job postings for non-EMS members. Furthermore, in summary, an amount of **€ 52 143.35** was accrued.

#### Expenses

EMS issued 23 scholarships (á € 900) to young scientists for their attendance at IMC19 in Sydney and EMS sponsored 9 supported meetings; in total € 27 450. Two board meetings, one embedded in the IMC19 and one extra meeting in March in Copenhagen, professional secretarial support and three Outstanding Paper Awards added up to € 36 531. Together with further costs (banking, web hosting, flyers etc.) EMS had total expenses of **€ 65 257.70**. Thus, the balance for 2018 ended with a minus of **€ 13 114.35**. At the end of the year, EMS had **€ 70 231.60** at the savings deposit. As of December 31<sup>st</sup>, 2018, EMS had total assets of **€ 117 725.41**.

### Budget 2019, running

#### Incomings

The major revenues will again be accrued by the annual contributions of EMS members of the national societies and of ECMA members. Invoices to national societies, ECMA members and individual members will be sent out in March latest. Further incomings will be taken by interest rates and, possibly, by job postings for non-EMS members.

Together, incomings can be expected to amount to **€ 50 000**.

#### Expenses

There will be one EMS extension meeting (MCM14 in Belgrade) and EMS will support 8 sponsored meetings this year (together € 7 500). EMS will issue 25 scholarships, á € 300, as travel support for attendance of relevant meetings (MCM etc.). Further expenses will include the Outstanding Paper Awards (€ 3 000), two board meetings (one extra meeting in Madrid in April and one embedded in the MCM), professional secretarial support and bank costs. Expenses are estimated to amount to **€ 50 000.00**. It is thus calculated with a balanced budget at the end of the year 2019.

### Budget 2020, proposal

#### Incomings

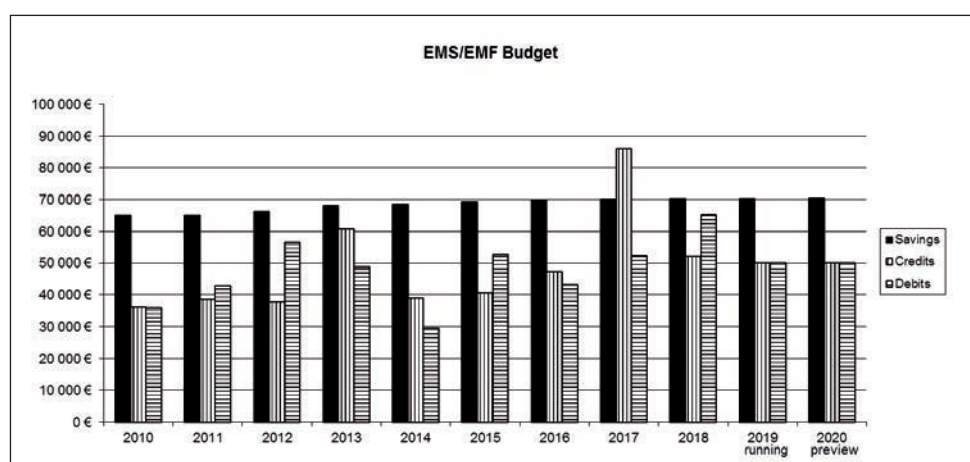
Major incomings will be accrued by the annual fees of EMS members of the national societies and of ECMA members. Together with interest rates of the savings account and advertising for non-EMS members, we can expect incomings of **€ 50 000**.

#### Expenses

There will be no extension meeting due to EMC2010 in Copenhagen. EMS can support 8 sponsored meetings (in total € 6 000) and can issue 32 scholarships as travel support to attend EMC (€ 9 600). Further expenses will include the Outstanding Paper Awards, costs for professional secretary, two board meetings (one extra, one included in EMC) and bank costs, amounting to a total of estimated **€ 50 000**.

It is thus calculated with a balanced budget at the end of the year 2020.

Christian Schöfer, Treasurer EMS/EMF  
Vienna, 1<sup>st</sup> January 2019



# EUROPEAN MICROSCOPIES SOCIETIES

<b>Number of EMS Members by Societies (2018)</b>			
<b>National and regional societies</b>			Number of members
Armenian Electron Microscopy Society	(AEMS)	Armenia	<b>8</b>
Austrian Society for Electron Microscopy	(ASEM)	Austria	<b>185</b>
Belgian Society for Microscopy	(BSM)	Belgium	<b>318</b>
Croatian Microscopy Society	(CMS)	Croatia	<b>112</b>
Czechoslovak Microscopy Society	(CSMS)	Czech Republic	<b>221</b>
Dutch Society for Microscopy	(NVvM)	Netherlands	<b>258</b>
Electron Microscopy and Analysis Group (Institute of Physics)	(EMAG)	United Kingdom	<b>314</b>
French Microscopy Society	(SFμ)	France	<b>502</b>
German Society for Electron Microscopy	(DGE)	Germany	<b>427</b>
Hellenic Microscopy Society	(HMS)	Greece	<b>60</b>
Hungarian Society for Microscopy	(HSM)	Hungary	<b>109</b>
Israel Society for Microscopy	(ISM)	Israel	<b>270</b>
Italian Society of Microscopical Sciences	(SISM)	Italy	<b>356</b>
Microscopical Society of Ireland	(MSI)	Ireland	<b>101</b>
Nordic Microscopy Society	(SCANDEM)	Scandinavia	<b>281</b>
Polish Society for Microscopy	(PTMi)	Poland	<b>149</b>
Portuguese Society for Microscopy	(SPMicros)	Portugal	<b>50</b>
Romanian Electron Microscopy Society	(REMS)	Romania	<b>78</b>
Royal Microscopical Society	(RMS)	United Kingdom	<b>1534</b>
Serbian Society for Microscopy	(SSM)	Serbia	<b>92</b>
Slovene Society for Microscopy	(SDM)	Slovenia	<b>107</b>
Spanish Society for Microscopy	(SME)	Spain	<b>296</b>
Swiss Society for Optics and Microscopy	(SSOM)	Switzerland	<b>293</b>
Turkish Society for Electron Microscopy	(TEMED)	Turkey	<b>92</b>
Corporate members EMS (43 companies)	(ECMA)		<b>45</b>
Individual members	IND		<b>31</b>

# MICROSCOPY AT THE FRONTIERS OF SCIENCE (MFS2019). JOINT MEETING OF THE SPANISH AND PORTUGUESE SOCIETIES OF MICROSCOPY SEPTEMBER 11-13, 2019; GRANADA, SPAIN

The Spanish and the Portuguese Societies of Microscopy will join again in order to celebrate a new edition of the Microscopy at the Frontiers of Science (MFS2019) series. The event will take place in Granada, Spain, September 11-13, 2019.

The Scientific Committee of the Congress has defined an appealing scientific program, full of opportunities for scientists and professionals of Microscopy from both the Life and Material Sciences. Granada is the capital city of the province located in the Andalusian region. The excellent location of the town, close to both Sierra Nevada mountains and the



Mediterranean Sea, together with its vast heritage (including the Alhambra Moorish citadel and Nasrid works of art), and its high scientific tradition (Granada is the location of numerous research institutes, technological infrastructures, and the headquarter of the prestigious University of Granada) makes the city a charming choice.

The venue of the event will be the “Parque de las Ciencias”, an interactive museum devoted to science outreach activities, with superb facilities. ■

More information and registration:  
<https://www.mfs2019.com>



# TURKISH SOCIETY FOR ELECTRON MICROSCOPY

In 2018, monthly scientific meetings (with international participations) of the Turkish Society for Electron Microscopy have been regularly organized in 8 different microscopy centers of Turkey. During 2018-2019, Turkish Society contributes to the organization of 6 scheduled scientific events in different microscopy centers ([www.temd.org/etkinlikler/12/bilimsel-etkinlik-programi](http://www.temd.org/etkinlikler/12/bilimsel-etkinlik-programi))

Turkish Society for Electron Microscopy has also sponsored to the organization of a workshop entitled as '**Cryo applications in biological sciences**' (coorganized by LEICA and Acibadem Univ. School of Medicine, Dept. of Histology and Embryology) in Istanbul on March 8-9, 2018.

In April 13, 2018, a full day symposium '**Clinical approaches in Stem Cells**' - sponsored by Turkish Society- has been held in Izmir Ekonomi Univ. School of Medicine, Dept. of Histology and Embryology, Izmir, Turkey.



*Symposium: Biomaterials–November, 15, 2018, Istanbul, Turkey*

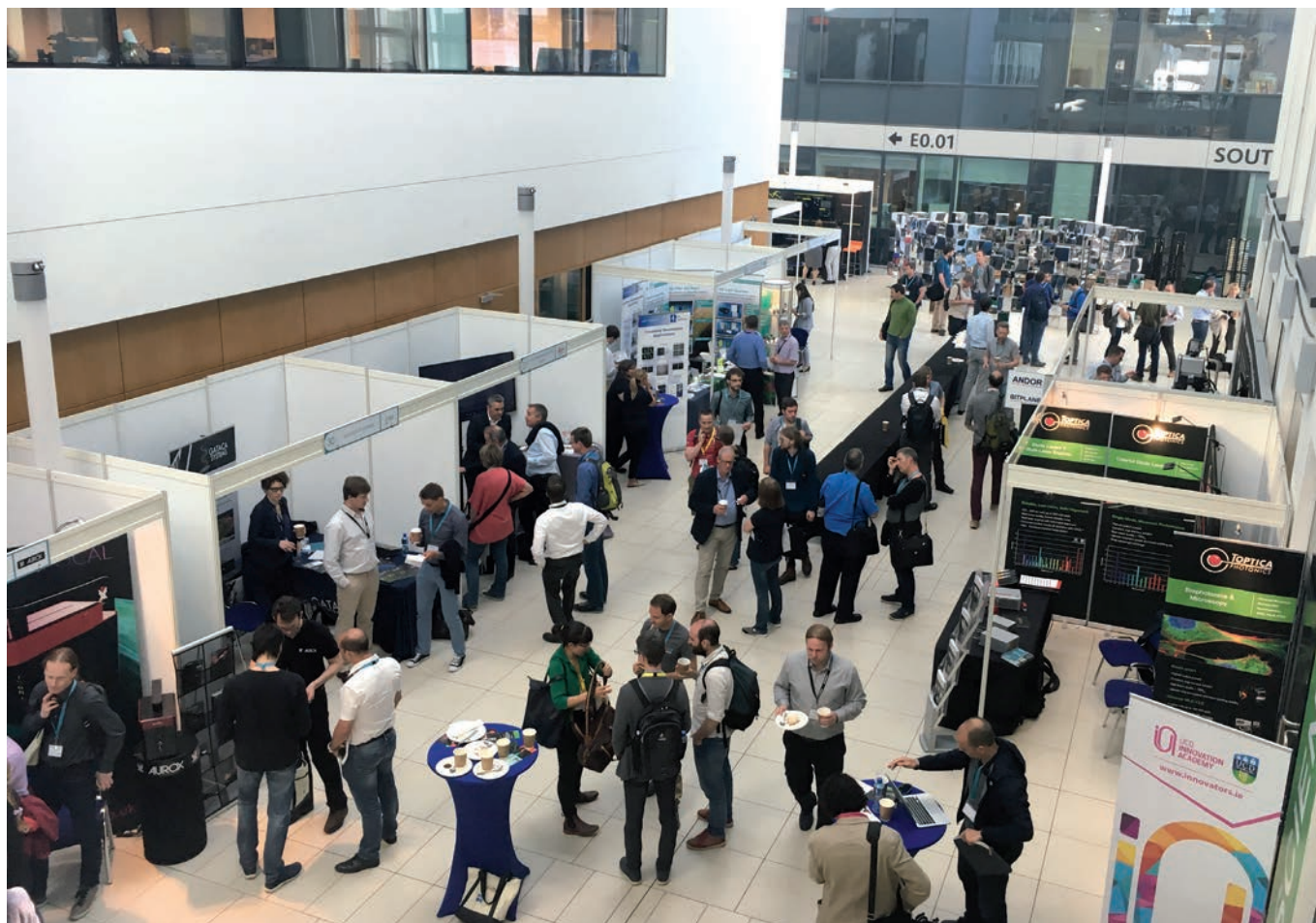
The preparations for next '24<sup>th</sup> National Congress of Electron Microscopy-EMK 2019 (with international participation)' which will be organized in April 24-26, 2019, by Trakya Univ. School of Medicine, Dept. of Histology and Embryology, Edirne, Turkey, are going on.

Turkish Society for Electron Microscopy is one of the 'Organizer Societies' of '14<sup>th</sup> Multinational Congress on Microscopy-MCM 2019' which will be held in 15-19 September, 2019 in Belgrade, Serbia ([w.sdm.edu.rs/mcm2019](http://w.sdm.edu.rs/mcm2019)). ■



*'Symposium: Clinical approaches in Stem Cells' –April 13, 2018, Izmir Turkey*

# RMS ACTIVITIES - REPORT FOR EMS



## **Exciting outreach activities, a thriving events program and the appointment of two Honorary Fellows were just some of the highlights for the RMS this year.**

Our truly international Society has seen a very busy 2018, with over 1430 members now registered from across the globe, including more than 210 students.

This year's array of activities included 22 events either organised or supported by the Society, attracting a total of 1500 delegates. These ranged from conferences and exhibitions through to the courses, workshops and networking events essential to the RMS's strategy for helping the development of those seeking careers in microscopy. Our busy schedule included Courses for Light, Electron, and Confocal Microscopy, as well as Super-Resolution and Flow Cytometry.

Other stand-out meetings and workshops included the LM Facility Managers, EM-UK, Flow Cytometry Facility Managers, EBSD, ToScA UK, *flowcytometryUK*, SPM and Frontiers in Biolmaging. We were also the PCO for ELMI which took place in Dublin in June. This was a very popular and successful event and attracted 503 delegates and exhibitors.

As part of the Society's growing outreach offer, The Microscope Activity Kits (MAK) for schools have continued to increase their reach, with at least 86000 children gaining access to kits in 2018 - around 20000 more than last year.

The scheme continues to boost interest in science among students and teachers, helping teachers develop engaging activities linking science to other parts of the curriculum in imaginative ways.

Among the highly successful public outreach events supported by the RMS was April's Big Bang @ Weston Science and Engineering Festival at Weston-Super-Mare. More than 2500 people attended over two days, including at least 1,600 children. The RMS was among more than 40 exhibitors, and our school binocular microscopes were a big hit with children, teachers and parents.

Having taken great strides in expanding our Facilities Database in 2017, the resource, run in collaboration with Bio Imaging UK, has become the 'go-to' list to access imaging and cytometry facilities both in the UK and worldwide. It also now includes flow cytometry for the first time.





We were especially pleased to award two new Honorary Fellowships this year, to Dame Professor Pratibha Gai and Dr Joachim Frank.

Currently Professor of Electron Microscopy at the University of York, Professor Gai is widely known for co-inventing the atomic resolution environmental transmission electron microscope (ETEM) and later the atomic resolution in-situ aberration corrected ESEM.

Dr Frank was awarded the Nobel Prize in Chemistry in 2017 for his contribution to solving structures by cryoEM and single particle image processing, and for his particular contribution of image processing to this technique.

In June, we were delighted to welcome Professor Pete Nellist as the new General Editor of the Journal of Microscopy. Pete takes over from Professor Tony Wilson, who has been at the helm since 2000. We will also be seeing some changes in our scientific editors and editorial board in the coming months as a number of members step down and are replaced. We extend our thanks to Tony and all those who have contributed to the Journal. Meanwhile the Society's quarterly magazine Infocus underwent a redesign early in 2018 and celebrated its 50<sup>th</sup> issue in the summer.

2019 is already shaping up to be a busy year. We start off with the Facility Manager Meetings in January, our regular courses, and in March, the RMS will host the second Tomography for Scientific Advancement (ToScA) North America Symposium at the University of Florida – following the great success of the inaugural event in 2017.

Meanwhile the excitement continues to build as the RMS's flagship event, mmc2019, approaches. The event takes place on July 1-4, 2019 in Manchester, and we are preparing for what we expect to be one of the biggest and best ever instalments of this fantastic Congress. We look forward to welcoming all our delegates, manufacturers and suppliers in July.

We are also proudly looking ahead to our role as Professional Congress Organiser for the forthcoming European Microscopy Congress (EMC) in August 2020. We will be working closely alongside the European Microscopy Society (EMS) and the Nordik Microscopy Society SCANDEM as preparations gather pace in the coming months. The website for this fantastic event is live



at [www.emc2020.eu](http://www.emc2020.eu), where you can register your interest as either an attendee or an exhibitor.

We look forward to serving the microscopy community again throughout 2019 and to meeting many of you at events throughout the year. ■

# EUROPEAN CORPORATE MEMBER ASSEMBLY (ECMA)

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## Corporate Members 2018

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- ISS Group Services Ltd
- JSC Nanopromimport
- Klocke Nanotechnik
- LAB PROTECT – Electron Microscope Protection
- MICROS Austria Produktions- und Handelsges.m.b.H
- Micro to Nano
- Nanolive SA
- NenoVision
- Protochips
- Safematic GmbH
- Science Services GmbH
- SmarAct GmbH
- Systron EMV GmbH
- Thermo Fisher Scientific



# EMS CALENDAR 2019

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## **EMBO Practical Course: Advanced Methods of Electron Microscopy in Cell Biology.**

10 to 20 June 2019  
České Budějovice – Czech Republic

## **EMAT Workshop on Transmission Electron Microscopy**

11 to 21 June 2019  
Antwerp – Belgium

## **4<sup>th</sup> International Workshop on TEM Spectroscopy in Material Science**

17 to 19 June 2019  
Uppsala University – Sweden

## **Microscience Microscopy Congress 2019 (MMC2019)**

01 to 04 July 2019  
Manchester Central – United Kingdom

## **EMBL Course: Super Resolution Microscopy**

08 to 13 July 2019  
Heidelberg – Germany

## **Edinburgh Super-Resolution Imaging Consortium (ESRIC) Summer School**

15 to 20 July 2019  
Edinburgh – United Kingdom

## **Microscopy Conference MC2019**

01 to 05 September 2019  
Berlin – Germany

## **EUROMAT 2019**

01 to 05 September 2019  
Stockholm – Sweden

## **Microscopy at the Frontiers of Science (MFS2019)**

11 to 13 September 2019  
Granada – Spain

## **14<sup>th</sup> Multinational Congress on Microscopy (MCM2019)**

15 to 20 September 2019  
Belgrade – Serbia

## **Third International Workshop on Electron Beam Spectroscopy for Nanophotonics (EBSN-2019)**

16 to 18 September 2019  
Orsay – France

## **Interdisciplinary Symposium on 3D Microscopy**

01 to 04 October 2019  
Engelberg – Switzerland

## **EMBO|EMBL Symposium: Seeing is Believing - Imaging the Molecular Processes of Life**

09 to 12 October 2019  
EMBL Heidelberg – Germany

## **EMBL Course: Volume Electron Microscopy by Automated Serial SEM**

20 to 25 October 2019  
Heidelberg – Germany



# APPLICATION FOR MEMBERSHIP

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## EUROPEAN MICROSCOPY SOCIETY (EMS)

### Individual Member Subscription form

Individual membership of the European Microscopy Society is open to all microscopists for €25 per year. Note that the membership fee is €7 for members of European National Microscopy Societies. Please complete and return the following form\* to:

Virginie Serin, Secretary EMS, CEMES - CNRS  
Centre d'Élaboration de Matériaux et d'Etudes Structurales (UPR 8011)  
29, rue Jeanne Marvig, BP 94347, 31055 Toulouse Cedex 4, France  
email: [sec@eurmicsoc.org](mailto:sec@eurmicsoc.org) , Fax: +33 (0)5 62 25 79 99

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I will transfer 25 € in favour of account: 4443344 (ING/Postbank) of EMS, St.Radboud, PO Box 9101, NL-6500 HB Nijmegen, The Netherlands. Swift code: INGBNL2A, IBAN: NL46INGB0004443344.

Please mail or fax a copy of your bank transfer statement to:

Prof. C. Schöfer, EMS Treasurer, Medical University of Vienna, Austria,  
Tel: (+43)14 0160 37713 Fax: (+43)14 0160 937799,  
email: [christian.schoefer@meduniwien.ac.at](mailto:christian.schoefer@meduniwien.ac.at)

Date / Signature: \_\_\_\_\_

\* please print for clarity



## EUROPEAN CORPORATE MICROSCOPY ASSEMBLY (ECMA)

### Subscription form

To subscribe to the ECMA, please complete this form\* and mail or fax to:

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Please mail or fax a copy of your bank transfer statement to  
[christian.schoefer@meduniwien.ac.at](mailto:christian.schoefer@meduniwien.ac.at) , EMS Treasurer, Prof. C. Schöfer, Medical  
University of Vienna, +43 14 0160 937799

Date / Signature: \_\_\_\_\_

\* please print for clarity



# LIST OF BOOKS (P. HAWKES)

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Some recent and not-so-recent books and proceedings

## Conference Proceedings

- **Proceedings of the 16<sup>th</sup> European Microscopy Congress**, Lyon, 28 August – 2 September. Wiley-VCH Weinheim, 2017, 4 volumes. ISBN: 978-3-527-34298-3
- **Proceedings 11<sup>th</sup> Asia–Pacific Microscopy Conference**, Phuket, 23–27 May 2016. Journal of the Electron Microscopy Society of Thailand 29 (2016) (ISSN: 0857-5285) and Siriraj Medical Journal 68 (2016) Supplement 1. ISSN: 0125-152X
- **MC-2017**, Lausanne, 21–25 August 2017. epub. uni-regensburg.de/36143
- **Proceedings 13<sup>th</sup> Multinational Conference on Microscopy**, Rovinj, 24–29 September 2017. Selected papers published in *Resolution and Discovery* (2017). ISSN: 2498-8707
- **Proceedings of the 73<sup>rd</sup> Annual Meeting of the Japanese Society of Microscopy**, Kenbikyo 52 (2017), Supplement 1. ISSN: 1349-0958
- **Microscopy Society of Southern Africa Proceedings Vol. 46** (2016), Port Elizabeth, 5–8 December 2016). ISSN: 0250-0418. ISBN: 978-0-620-73767-8
- **Proceedings of Microscopy & Microanalysis 2017**, *Microsc. Microanal.* 23 (2017), Supplement 1. ISSN: 1431-9276
- **Proceedings EMAG 2017**, Manchester 3–6 July 2017. *J. Phys. Conf. Ser.* vol. 902 (2017), open access
- F. Mika (Ed.), **Recent Trends in Charged Particle Optics and Surface Physics Instrumentation**, Proceedings of the 15th Seminar, 2016. ISI-CAS, Brno 2016. ISBN: 978-80-87441-17-6
- J. Thieme and D.P. Siddons (Eds), **Proceedings, 23rd International Congress on X-ray Optics and Microanalysis (ICXOM-23)**, 14–18 September 2015, Brookhaven National Laboratory. AIP Conf. Proc. 1764 (2016). ISBN: 978-0-7354-1422-8.

## Electron microscopy

- T. Allen, **Microscopy, a Very Short Introduction**. Oxford University Press, Oxford, 2015. ISBN: 978-0-19-871276-3
- C.B. Carter and D.B. Williams (Eds), **Transmission Electron Microscopy, Diffraction, Imaging, and Spectrometry**, Springer, Switzerland 2016. ISBN: 978-3-319-26649-7. This is a Companion to “Williams & Carter”
- G. Dehm, J.M. Howe and J. Zweck (Eds), **In-situ Electron Microscopy**. Wiley—VCH, Weinheim, 2012. ISBN: 978-3-527-31973-2.
- R.F. Egerton, **Physical Principles of Electron Microscopy, an Introduction to TEM, SEM, and AEM** (2nd edn). Springer, Switzerland, 2016. ISBN: 987-3-319-39876-1.
- T.R. Groves, **Charged Particle Optics Theory**, CRC Press, Boca Raton 2015. ISBN: 978-1-4822-2994-3
- P.W. Hawkes and E. Kasper, **Principles of Electron Optics**, vols 1 & 2 (2nd edition), Academic Press/Elsevier, Kidlington 2018. ISBN: 978-0-08102256-6 and 978-0-12813369-9
- F.M. Ross (Ed.), **Liquid Cell Electron Microscopy**. Cambridge University Press, Cambridge 2017. ISBN: 978-1-107-11657-3.
- N. Tanaka, **Electron Nano-imaging, Basics of Imaging and Diffraction for TEM and STEM**. Springer, Japan 2017. ISBN: 978-4-431-56500-0
- P.R. Thornton, **Scanning Electron Microscopy**. Springer, reprint of 1968 edition. ISBN: 978-1-5041-2455-3
- J.M. Zuo and J.C.H. Spence, **Advanced Transmission Electron Microscopy. Imaging and Diffraction in Nanoscience**, Springer, New York 2017. ISBN: 978-1-4939-6605-9

# LIST OF BOOKS (P. HAWKES)

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## Related titles

- N. Brodusch, H. Demers and R. Gauvin, **Field Emission Scanning Electron Microscopy. New Perspectives for Materials Characterization.** Springer, 2018. ISBN: 978-981-10-4432-8
- Z. Cui, **Nanofabrication. Principles, Capabilities and Limits.** Springer Switzerland 2017. ISBN: 978-3-319-39359-9
- A. Evtukh, H. Hartnagel, O. Yilmazoglu, H. Mimura, and D Pavlidis, **Vacuum Nanoelectronic Devices. Novel Electron Sources and Applications.** Wiley, Chichester 2015. ISBN: 978-1-119-03795-8
- J. Goldstein, D. Newbury, J. Michael, N.W.M. Ritchie, J.H. Scott and D.C. Joy, **Scanning Electron Microscopy and X-ray Microanalysis.** Springer, 2018. ISBN: 978-1-4939-6674-5
- G. Hlawacek and A. Götzhäuser (Eds), **Helium Ion Microscopy.** Springer, Switzerland 2016. ISBN: 978-3-319-41988-6; ISSN: 1434-4904
- P. Hommelhoff and M.F. Kling, **Attosecond Nanophysics, from Basic Science to Applications.** Wiley–VCH, Weinheim, 2015. ISBN: 978-3-527-41171-9
- E.J. Jaeschke, S. Khan, J.R. Schneider and J.B. Hastings (Eds). **Synchrotron Light Sources and Free-electron Lasers. Accelerator Physics, Instrumentation and Science Applications.** Springer, Switzerland, 2016. ISBN: 978-3-319-14393-4 (2-volume set)
- M.K. Miller and R.G. Forbes, **Atom-probe Tomography: the Local Electrode Atom Probe.** Springer, New York & Heidelberg, 2014. ISBN: 978-1-4899-7429-7
- Y. Saito (Ed.), **Carbon Nanotube and Related Field Emitters.** Wiley–VCH, Weinheim 2010. ISBN: 978-3-527-32734-8

## General interest

- S.F. Johnston, **Holograms, a Cultural History.** Oxford University Press, Oxford, 2016. ISBN: 978-0-19-870126-2
- S. Paetrow and W. Wimmer, **Carl Zeiss, a Biography 1816–1888.** Published for the Zeiss Archives by Böhlau Verlag, Köln. ISBN: 978-3-412-50423-6
- D. van Delft and T. van Helvoort, **Beelden zonder Weerga. De Elektronenmicroscop van Ernst Ruska tot Ben Feringa.** Prometheus, Amsterdam. ISBN: 978-90-446-3359-7





# NOTES

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