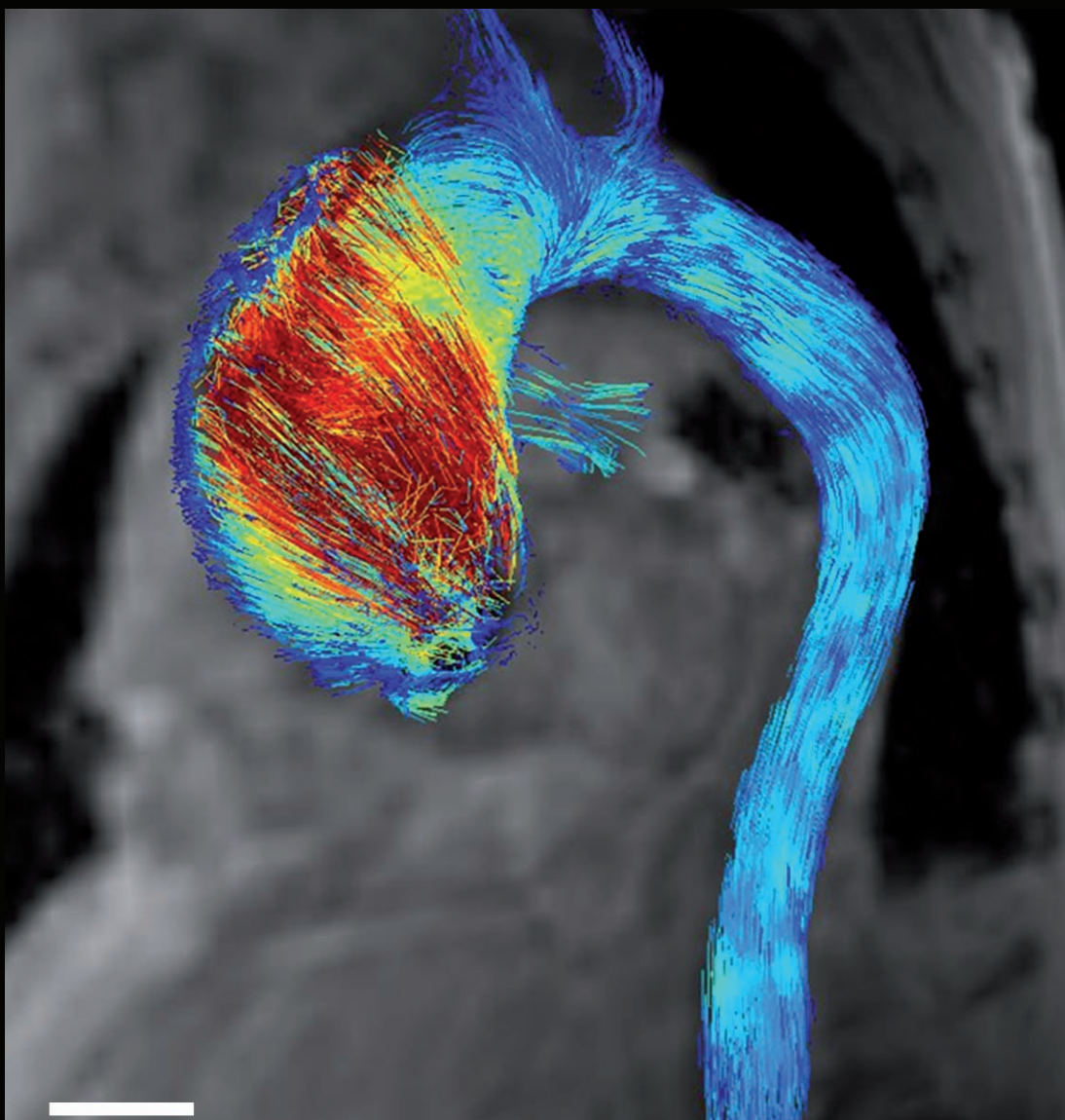
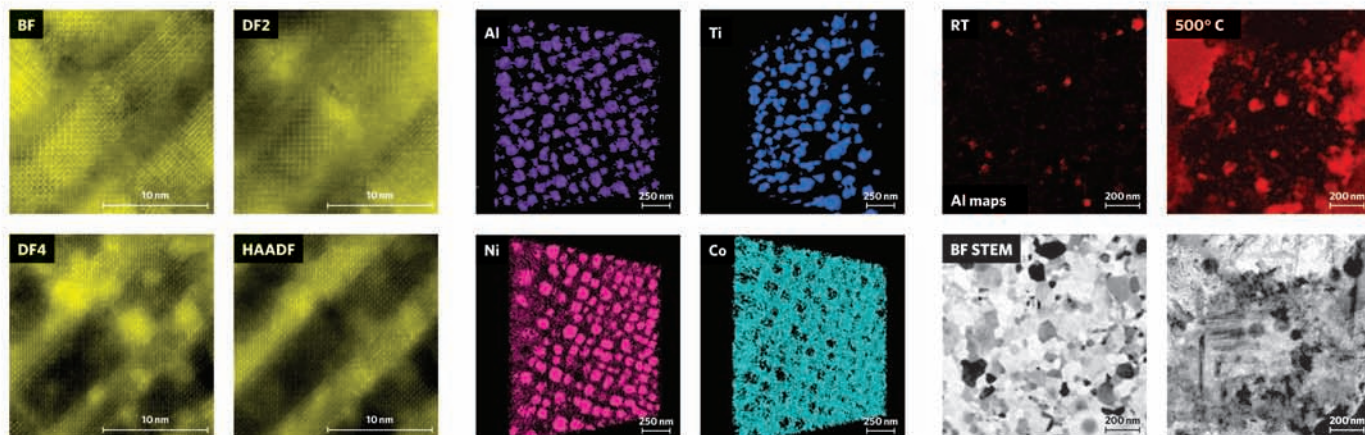


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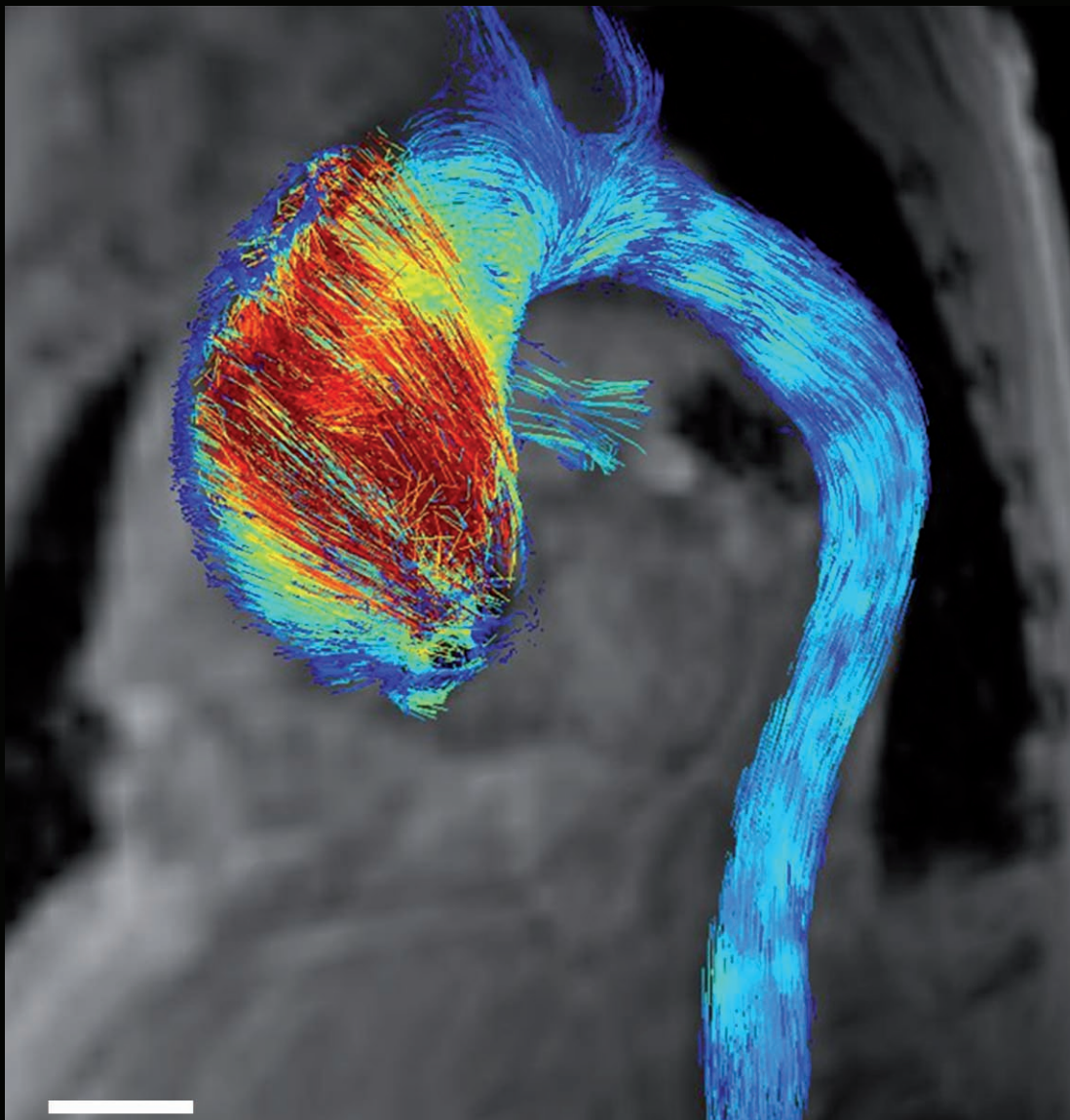
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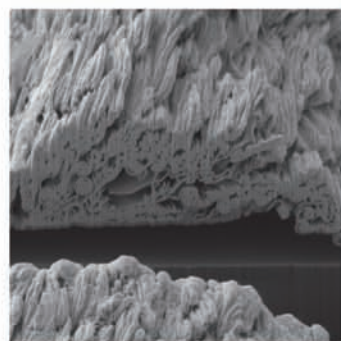
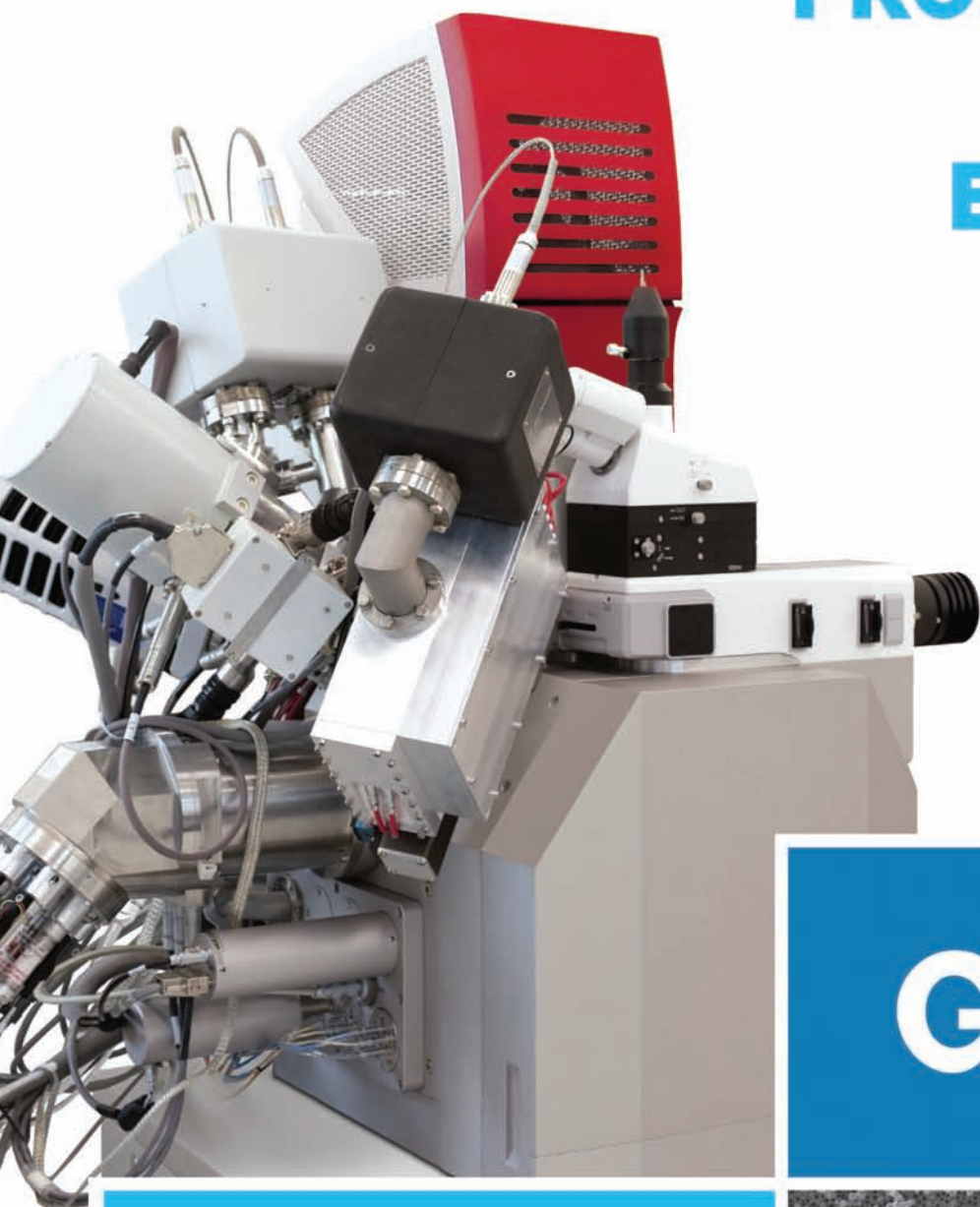


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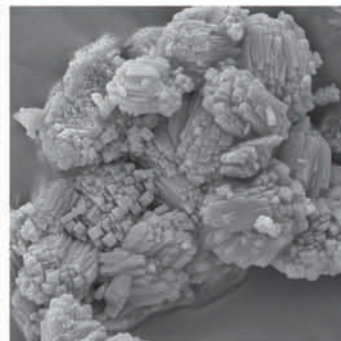
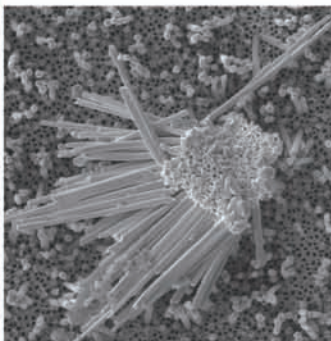
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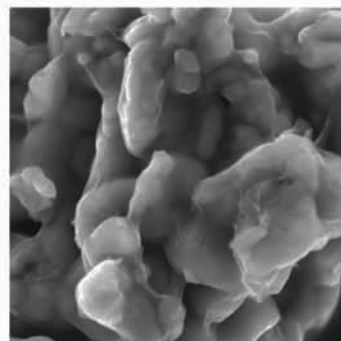


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# Preface

Dear EMS members,

This year we already celebrate the fifth issue of the Yearbook new look. One suggestion from the publisher at the time was to focus more on people. As you will see, even more than before we follow this suggestions, especially with a large number of reports from early stage researchers who were supported by the EMS to attend IMC 2014 in Prague. If you ever plan to organize a large microscopy conference, it's certainly worth a while to read these comments to see what our new generations of researchers appreciate about these events that become larger every time. A few examples showing the impact on the young scientists: *"By following talks on other research topics, I learned new aspects and it allowed me to broaden my perspective in the microscopy world."* and *"The plenary talks were amazing and I enjoyed it every morning."*, or the excitement *"This was something completely new and "exotic" for me and I thought it was truly interesting and in fact, pretty cool!"* (about the session on forensic microscopy), and *"Additionally, I found the lunch workshops and exhibition hall of all the new microscopy equipment to be extremely encouraging."* and of course some go for the extra attractions *"I have to give a special mention to the city of Prague and the beer."* But see for yourself, there's much more.

Another classic item is the report on the winners of the 2013 Outstanding Paper Award receiving their plaques at the special award ceremony at IMC 2014 in Prague, with many thanks to the organizers for providing the time and place. Because of the strong support from EMS for this International event on the European continent, both before and during the conference, no EMS Extension was organized in 2014. Still, several smaller meetings were supported and noteworthy reports of those and other microscopy related events throughout Europe can be found in this issue, as well as the announcements of the two EMS Extensions organized in 2015 to which we kindly invite you to participate. Unfortunately, we also had to add two *in memoriams*.

Many thanks to all colleagues who have contributed to this Yearbook and to Serap Arbak for the proof reading.



**Nick Schryvers**  
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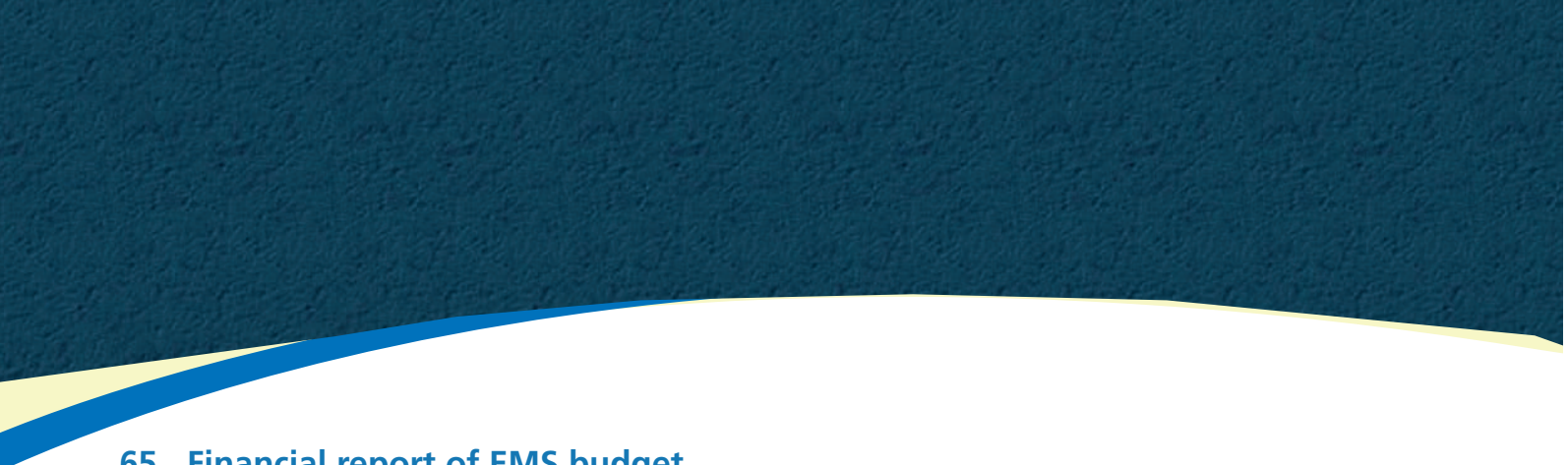


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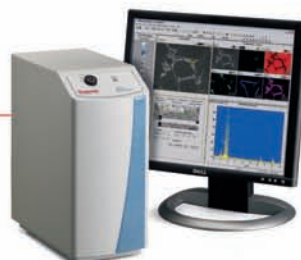
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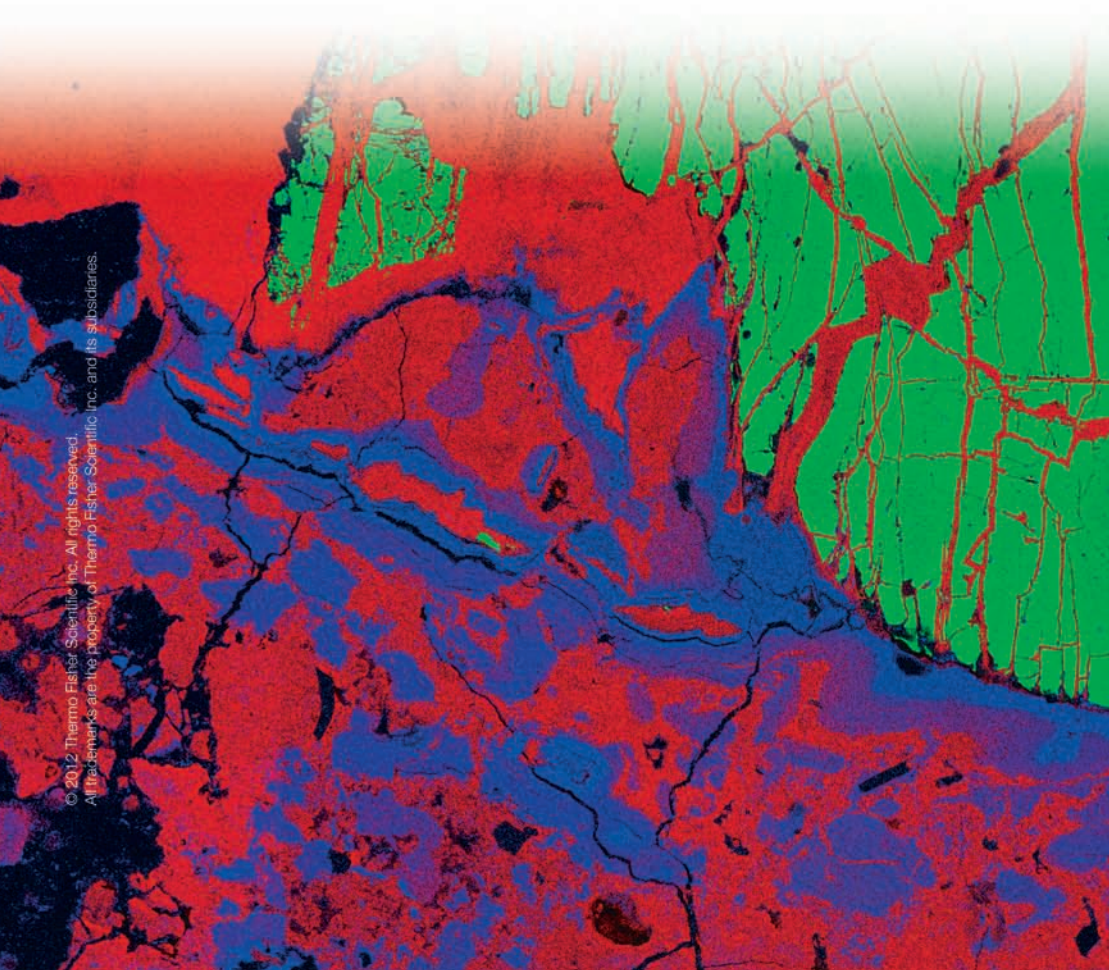
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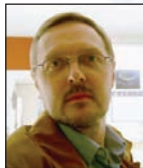


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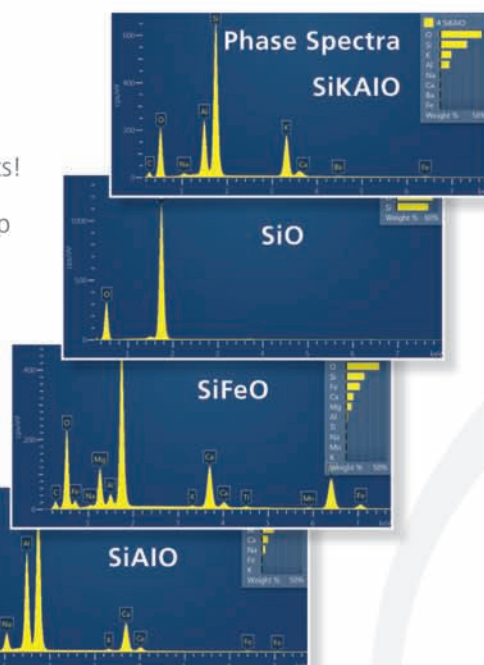
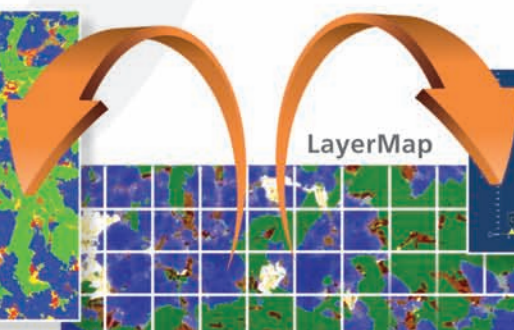
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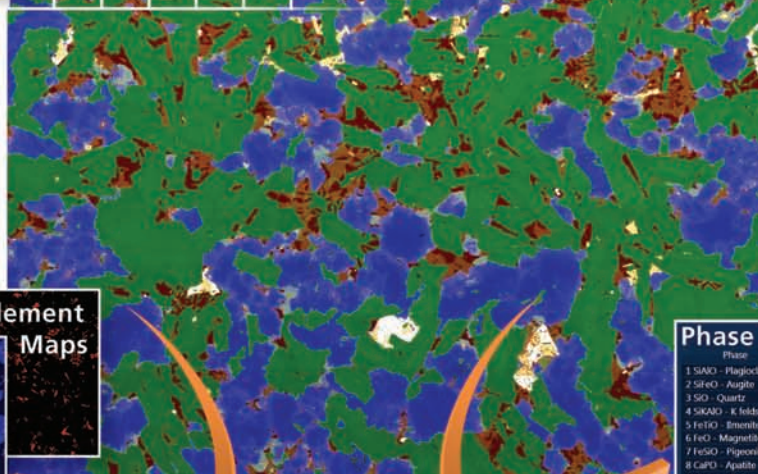
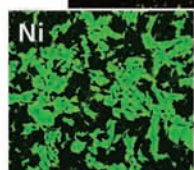
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2 SiFeO - Augite		39.1	26,080,067
3 SiO - Quartz		6.1	4,048,423
4 SiAlO - K-feldspar		4.5	3,007,415
5 FeO - Biotite		2.0	1,330,023
6 FeO - Magnetite		0.9	581,477
7 FeSiO - Pigeonite		1.9	1,262,059
8 CaPO - Apatite		0.5	352,297
9 FeSiO - Biotite		0.5	330,548
10 FeS - Pyrite		0.0	15,804
11 CaSiO - Hornblende		0.2	131,591
12 FeCuS - Chalcopyrite		0.0	14,078
13 CrSiO		0.1	34,756
14 ZrO - Baddeleyite		0.0	2,611



# A NOBLE YEAR FOR MICROSCOPY – FURTHER PUSHING THE BOARDERS

2014 was an exciting year for any microscopist, not only because it was the international year of Crystallography in which novel applications of precession electron crystallography for materials and life-sciences were highlighted but also because of many activities such as the excellently organized international microscopy conference held in Prague (IMC 2014). Some of these activities you will find in this Yearbook and especially the young scientist reports from the IMC are a pleasure to read. The really big highlight in 2014 was of course the award of a Nobel Prize to a scientist in the field of microscopy.

EMS cordially congratulates Eric Betzig, Stefan W. Hell (EMS member) and William E. Moerner for their Nobel Prize in Chemistry awarded for “Super-resolved fluorescence microscopy and single molecular imaging”, today also recognized as the field of nanoscopy in life science.

Just ahead of 2015 - the international year of light – once more imaging techniques pushing the resolution borders in microscopy receive recognition from the Nobel committee for opening a new area in the study of biology and its objects below the wavelength of light. This is possible by using fluorescence emitted light and precession techniques and/or using the time domain to circumvent the diffraction limitation known as the Abbe criteria. A rigid physical resolution criteria for continued coherent imaging not only described by E. Abbe, but with a similar consequence also by Lord Rayleigh (J. W. Strutt) and by G.B. Airy – setting for a long time a mental barrier in the field preventing the search for alternative solutions. The word Super-Resolution was used in 1988 in a publication by C. Sheppard marking a point in time when scientists started to find alternative solutions to be able to see nanostructures in the cellular context and thus breaking this mental barrier.

Looking back in history on the chase to see the atomic and molecular organization of nature you will notice that many openings in the field of microscopy and structure research were accompanied by mishap moments, surprising observations, serendipity and even plain luck paired with the open mind of a genius scientist being open enough and wise to follow such observations even against unfriendly circumstances (some even built their microscopes in their living room at home).

The history of imaging and seeing nature beyond the resolution of the naked eye starts with the invention of the light microscope around the 16<sup>th</sup> century and later with the discovery of X-rays,

electrons and ions. For example: the discovery of crystal symmetry was a mishap by looking at cracked crystalline matter and noticing some symmetry, the discovery of X-rays in the lab of C. Röntgen (1895) was a lucky moment in the dark and finally lead to X-ray crystallography by Max von Laue (1912) and the first proof of periodic arrangements of atoms in crystals. M. Laue asked himself the simple question “What would happen if you assumed very much shorter waves to travel in a crystal?”, The experiment was awarded the Noble Prize in Physics already in 1914 .

Actually the first Nobel Prize in Chemistry dedicated to microscopy (1925) was awarded to R. Zsigmondy for pushing the resolution barrier to see structures below the wavelength of light in the spatial dimension. R. Zsigmondy received the prize for the development of the so-called *Ultramicroscope* in 1903. This was followed by a prize for microscopy in Physics awarded to Frits Zernike in 1953 for the invention of the phase-contrast microscope in 1932 allowing to get enough contrast of weak phase objects not seen by normal absorption contrast.

Interestingly already in 1911 O. Heimstädt built the first successful fluorescence light microscope and visualized e.g. bacteria but stated “If and to what degree fluorescence microscopy will widen the possibilities of microscopic imaging only the future will show”. He was right as the recent Nobel Prize was awarded to different fluorescence based imaging techniques.

Another interesting idea already existed in 1928 from E.H. Syngé, he proposed to scan an aperture much smaller than the wavelength across a surface (near-field optical microscope) and thus overcame the Abbe wavelength limitation. It took more than 50 years for this idea to be realized by D. Pohl and E. Betzig (SNOM or NSOM).

The next successful steps were realized by using even smaller wavelengths. In 1934 V. K. Zworykin built his so-called *Electric Microscope* by using UV light, which he scanned across the sample (one of the first successful scanning LM's concepts) and later the use of electrons based on V. De Broglie (1924 – wave-particle duality) and ideas from D. Gabor (1926 – focussing of electrons) enabled the development of the Electron Microscope.

Even E. Ruska, B. von Borries and G. Knoll after building the first functional transmission electron microscope faced a problem that even an established and well respected physicist in those days mentioned “Electrons will decompose all

samples during observation so there is very little hope for a useful tool". Then it was the interest of the medical scientists who hoped to finally have a microscope, which would allow to visualize viruses and bacteria at a resolution of the wavelength of the electron that triggered further work. Here the detailed knowledge of high energy physics set another barrier in mind but was overcome by the enthusiastic trio in 1933-38, for which E. Ruska received the Nobel Prize in Physics in 1986 jointly with G. Binnig and H. Rohrer, the inventors of the scanning tunneling microscope, which they developed only 5 years earlier.

The Nobel Prize in Chemistry 1982 was awarded to Aaron Klug for his development of crystallographic electron microscopy and his structural elucidation of biologically important nucleic acid-protein complexes.

As a side remark – the first atoms being imaged was not obtained by light or electrons, it was the use of ions in the Field Ion Microscope, which allowed E. Müller and K. Bahadur around 1950 to see individual W-atoms. Later in 1969 A. Crewe used STEM to take pictures of single heavy atoms and finally the development of electron optical correctors by M. Haider, H. Rose, K. Urban and O.L. Krivanek rendered atomic imaging in electron microscopes a routine relatively easy to operate. With the aid of today's computer power first commercial Cs corrected TEM/STEM appeared around 2000.

There would be many more such events or fascinating stories to share but we all - and especially young scientists - should be aware that we need many brains and hands continuously scrutinizing existing barriers, while bringing new ideas to the lab and be open minded when testing these fresh ideas.

Many of us struggle and may only contribute a little to big stories of science but all this is needed to bring our field forward and push borders and frontiers. For this we need scientists with durability, convincibility, and power of endurance even against science fashions and general opinions.

The chase to see atoms continues and seeing atomic or nanostructures resolved in time resolved – e.g. under dynamic changes or reactions – is the next big thing in our field. Next obvious steps are the hunt

for new fluorescence dyes for the novel Super-Resolution applications and, as a recent paper by E. Betzig's team shows to combine natural photon dose exposure with the high speed imaging for larger structures (Science Vol. 346 p 439ff). The work is based on ideas from R.A. Zsigmondy and optimized by E. Stelzer and A. Voie's groups.

Unfortunately the time has changed dramatically – in the past freedom of science and ideas was protected by local patrons/donators, Universities and large company research labs – but today we are more and more regulated towards innovation and return of investment. The gap between discovery and final implementation was often longer than today's funding periods. Even worse in Horizon 2020, there is not one incentive for any scientific instrumentation or methodology development nor any freedom for crazy instrumentation ideas. We urgently need, as a community and society, to take care about the future scientific environment in Europe, which again should also allow methodology developments to help pushing the frontiers of science and discoveries. The Nobel prizes in structure research and microscopy are, among others a proof of the importance of such scientific instrumentation. They hopefully will help bring back the needed awareness on discovery & innovation as a real partnership for science and thus for the society as a whole.

We as a society and microscopy community have to take care for future generations; organize events, workshops and join forces to bring bright people together, get them focused on microscopy and understanding the fundamental basics, with their limitations, but also potentials. Finally the tribute to recognize microscopy as an important field of discovery and research goes to all instrument and methods developers and inventors, who did, are and will try to push the frontiers of our microscopy/spectroscopy field – they need our special attention and Europe's Science support to see what comes next beyond Super-Resolution Fluorescence Microscopy.

We are looking into an exciting international year of the light and beyond with electrons and ions - let's see what comes next - and we wish you all great courage in the exploration of the frontiers in microscopy and beyond.



**Roger Wepf**  
President EMS

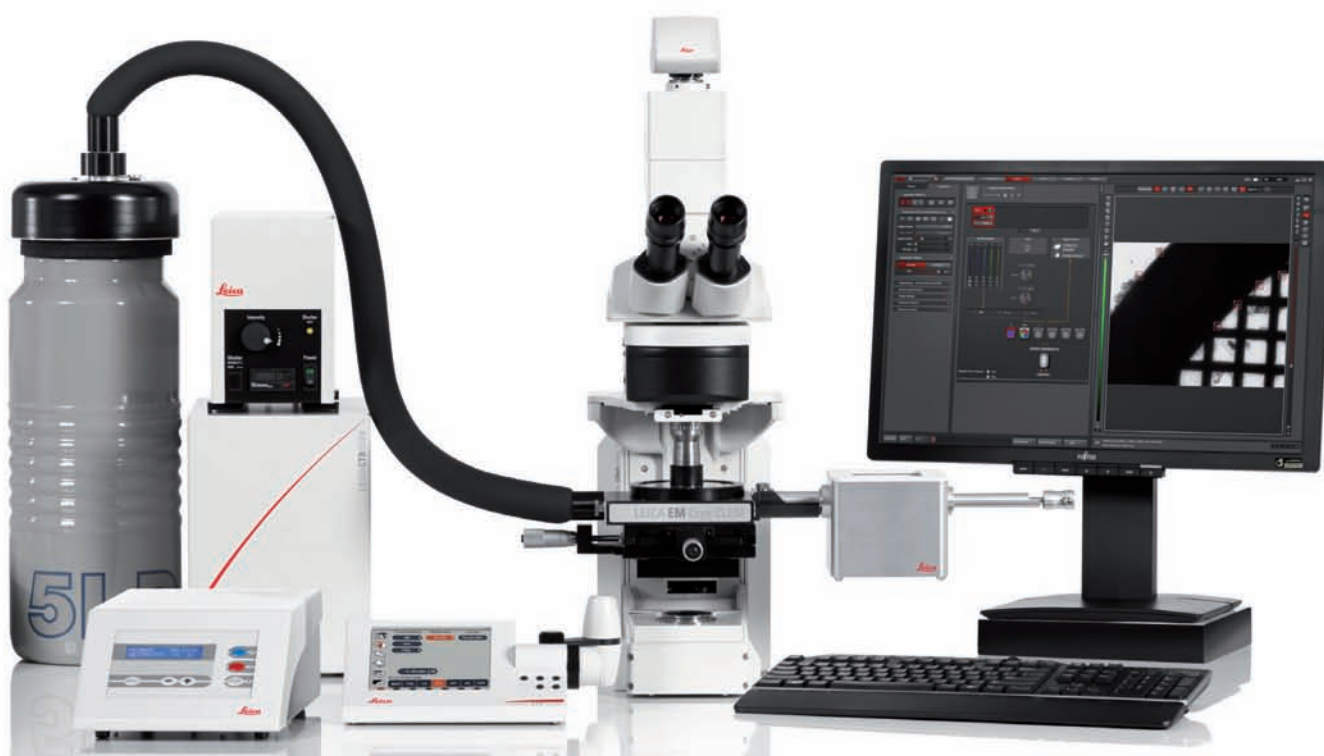


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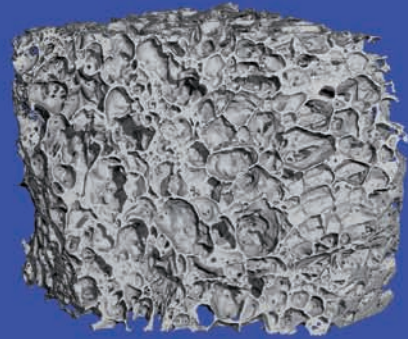
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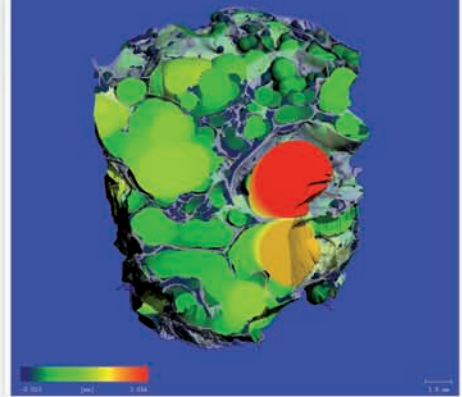
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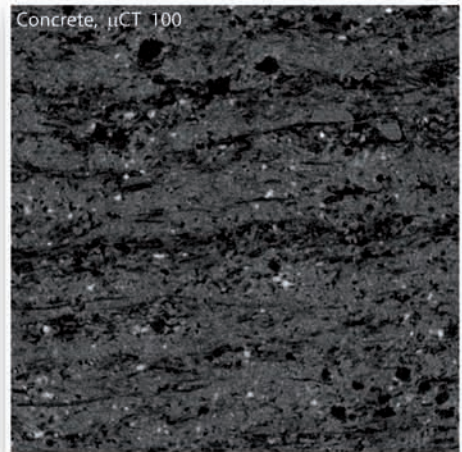
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30-100 kVp, 4-18W, filter changer, automatic sample changer  
FOV  $\mu$ CT 50:  $\varnothing$  4-50 x H 120 mm,  $\mu$ CT 100:  $\varnothing$  10-105 x H 140 mm  
8k x 8k image matrix, reconstruction cluster, 64-bit analysis SW



# **2015 EMS EXTENSION ANNOUNCEMENTS**



# mmc2015, MANCHESTER, UK

The Microscience Microscopy Congress returns to Manchester Central, UK at the end of June, marking both its new slot in the calendar to run biennially in odd years and the first incorporation of the EMAG Conference within the Congress. mmc2015 is proud to be an EMS Extension for 2015 and is pleased to welcome EMS members to the event and offer them a reduced registration rate.

The scientific programme is made up of six parallel sessions each day encompassing both light and electron microscopy in the life and physical sciences. Five top Plenary Speakers complement all elements of the conference Professor Dirk van Dyck, Professor Sir Colin Humphreys CBE, Professor Jackie Hunter, Professor Petra Schwille and Professor Xiaowei Zhuang are all set to speak. Daily Poster Sessions will run each day, demonstrating hundreds of the latest studies in all aspects of microscopy, further enriching the scientific programme.

As well as a diverse and comprehensive conference, mmc2015 also presents the year's largest exhibition dedicated to microscopy and imaging in Europe. Over 100 exhibitors will be showcasing the latest technologies and advancements in the field and industry experts will be on hand to guide and advise



you on any queries you may have. Exhibition entry is FREE and also includes access to company workshops and the Learning Zone, a unique area organised by the Royal Microscopical Society with a daily seminar programme in various microscopy techniques. These provide invaluable free training opportunities to all mmc2015 visitors enabling everyone to return to the workplace with something new at no cost.





To help unwind after a busy day at the conference, delegates are invited to a number of social events running each evening in and around the venue, making the Congress a truly unmissable experience.

**Registration and Further Information can be found at [www.mmc2015.org.uk](http://www.mmc2015.org.uk)**





# Multinational Congress on Microscopy



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EXTENSION 2015

**August 23-28, 2015**  
Eger, Hungary

HOSTED BY THE HUNGARIAN  
SOCIETY FOR MICROSCOPY



## Plenary Speakers



**Péter Somogyi**  
University of Oxford, UK



**Velimir  
R. Radmilović**  
University of Belgrade, Serbia



**Iva Tolić**  
Max Planck Institute of Molecular  
Cell Biology and Genetics, Germany /  
Ruđer Bošković Institute, Croatia



**Jannik C. Meyer**  
University of Vienna,  
Austria



**Bruno Humbel**  
University of Lausanne,  
Switzerland

## EMS Lecturers



**Rafal  
Dunin-Borkowski**  
Institute for Microstructure  
Research, Germany



**Toyoshi  
Fujimoto**  
Nagoya University,  
Japan

## Important dates

Abstract submission deadline: March 31, 2015  
Early-bird registration deadline: March 31, 2015

[www.mcm2015.com](http://www.mcm2015.com)

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# **REPORTS ON EMS SPONSORED EVENTS**



[Sensofar]

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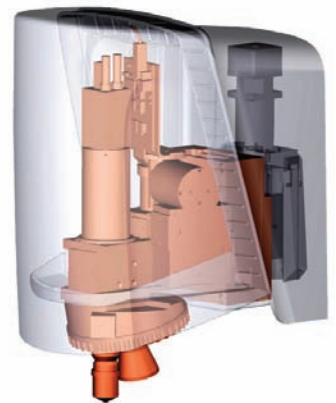
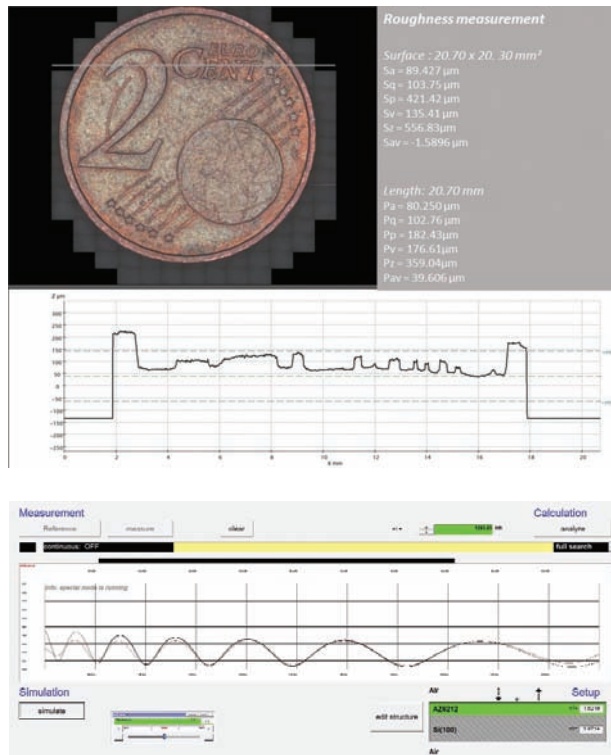
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## New "Sensofar S neox" optical profiler : thin & thick film measurement and Focus Variation technology

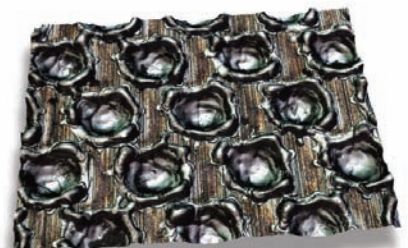


### PUB

The Schaefer-Tec group is presenting the latest instrument for non-contact optical 3D profiling, the Sensofar S neox. It outperforms existing optical profilers achieving vertical and lateral resolutions of 0.01 nm and 0.1 µm, respectively and combines confocal, interferometry (PSI, VSI) and focus variation techniques in the same sensor head.

The system additionally allows thickness measurements of any transparent thin and thick coatings on the surface with a spectroscopic reflectometer coupled through an optical fiber. Films from 10 nm up to 20 µm can be measured in less than one second with a thickness resolution of 0.1 nm. Thus, thin films can be measured with spots as small as 5 µm. The measurement is undertaken with the integrated LED light source, thus providing real-time bright-field images of the sample and simultaneous thin film measurements.

The "Focus Variation" technology has been introduced in the latest version of "S neox". It is an optical technology that has been developed for measuring the shape of large, rough surfaces and is specifically designed to complement confocal measurements at low magnification. Highlights of the technology include high slope surfaces (up to 86°), highest measurement speeds (mm/s) and large vertical range. This combination of measurement capabilities is mainly used for tooling applications.



Texture Surface with Electron Beam



# EMS SPONSORED EVENTS IN 2014

- **EMBO Practical Course in Advanced Optical Microscopy**  
April 2-12, 2014, Plymouth, UK
- **Electron Crystallography School – Introduction to electron diffraction tomography**  
April 7-11, 2014, Darmstadt/Mainz, Germany
- **3D Electron Microscopy: From Molecule to Organism**  
May 22-23, 2014, University Pierre and Marie Curie (UPMC), Paris, France
- **3<sup>rd</sup> Nordic Workshop on Sample Preparation**  
June 9-10, 2014, Linköping, Sweden
- **Holo-Workshop on Electron Wave Imaging**  
June 10-22, 2014, Dresden, Germany
- **6<sup>th</sup> Biennial SuperSTEM Summer School**  
July 4-7, 2014, STFC Daresbury Campus, Daresbury, UK
- **9<sup>th</sup> International Conference on Charged Particle Optics, CPO-9**  
August 31-September 5, 2014, Brno, Czech Republic
- **XV International Conference on Electron Microscopy, EM2014**  
September 15-18, 2014, Kraków, Poland
- **Second Conference on In-Situ and Correlative Electron Microscopy (CISCeM)**  
October 14-15, 2014, Saarbrücken, Germany



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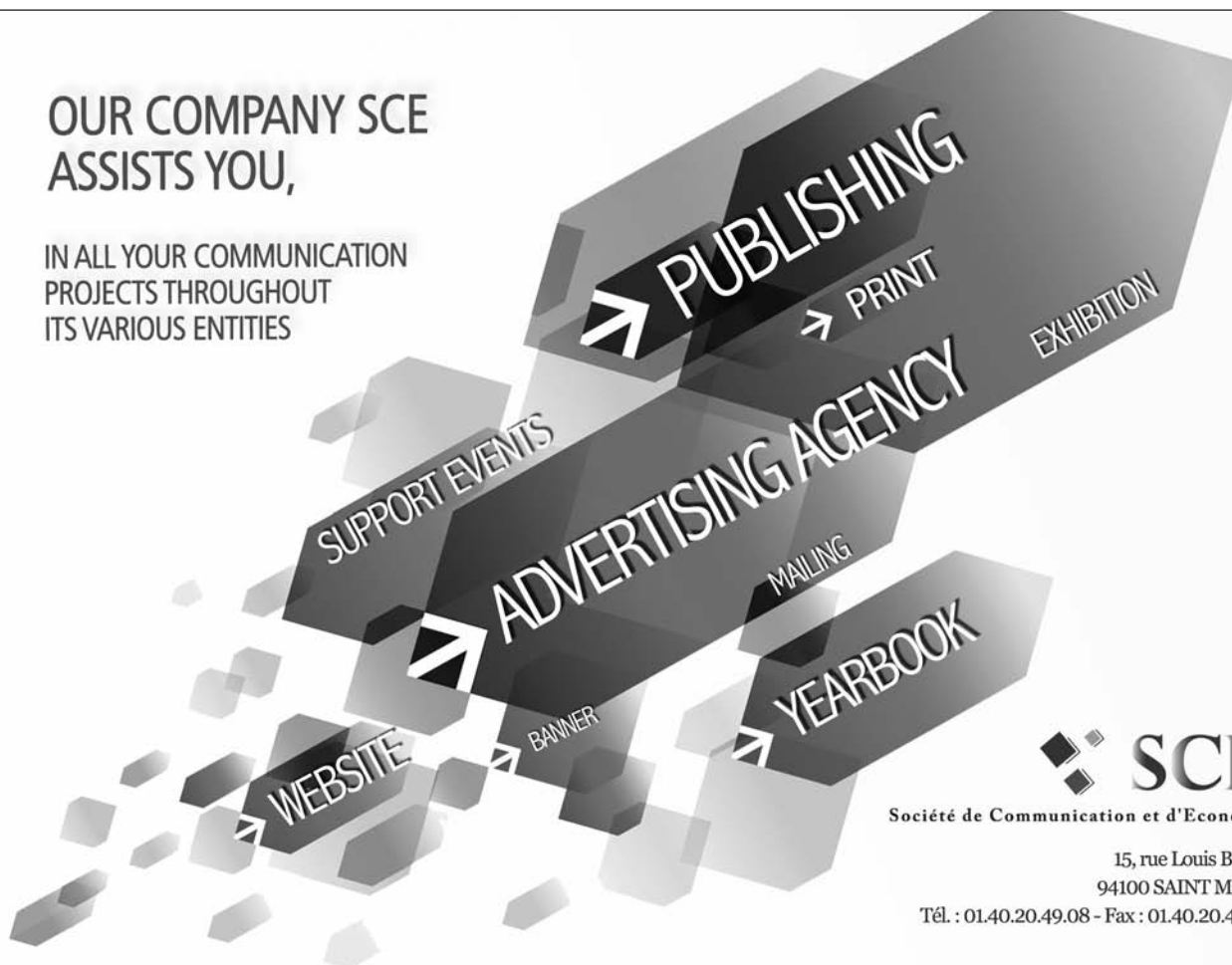
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# EMBO PRACTICAL COURSE IN ADVANCED OPTICAL MICROSCOPY, PLYMOUTH, UK

Thanks to EMS support, Sid Shaw (Indiana University) was able to attend the Practical Course on Advanced Optical Microscopy and deliver the EMS Lecture on Imaging Methods in Plant Development. Dr Shaw enjoyed teaching some of the best students and postdocs in Europe in the field of optical microscopy.

The 2014 Workshop, also supported by EMBO and the Wellcome Foundation, was the 12<sup>th</sup> in a series held at the Marine Biological Association Laboratory in Plymouth, UK. The Workshop is a 10-day intensive course, with a total of 30 lectures alternating with practical work. The course started with basic instruction in the diversity of optical methods, basic ray and wave optics. In the first three days, the students worked in small groups in parallel, learning to set up microscopes and optimize DIC with instructors constantly available. For the rest of the course the students rotated around a range of cutting edge high-cost capital equipment such as multiphoton microscopes from leading manufacturers, including the prototype light-sheet microscope from Zeiss, equipment with a total value of over £2 million, brought in specifically for the course, taking advantage of the ease with which such equipment can be transported at ground level into the large Resource Centre equipped with anti-vibration tables. This year's new lecturers were particularly impressed with two unusual features of the course which

have now been established for several years: the use of optical benches to ensure that even the biologist students gained hands-on experience in optics, field collection of bioluminescent organisms and the use of a seagoing research vessel for subsequent study in the lab.

Most biomedical scientists use optical microscopes but very few have been taught even the basics of their use. The spreading fame of this course this year is no doubt due to the fact that it combines basic instruction with detailed demonstrations and hands-on work which enables more effective choice and use of new types of microscope in the home labs of the students. The later lectures were comprehensive, covering inter alia light sources, the nature and application of nonlinear optics to imaging fluorescence and Forster resonance theory, optical transforms and Fourier theory, novel multiphoton and second harmonic probes, Bayesian statistics in imaging, single molecule imaging, lightsheet and Mesoscopic imaging. The students competed for the 'Glass Jellyfish' award, presented for the best answers to numerical optics questions, and a prize was also given by CoolLEDs for the best student poster.

A similar course is planned for April 2015.





# ELECTRON CRYSTALLOGRAPHY SCHOOL – INTRODUCTION TO ELECTRON DIFFRACTION TOMOGRAPHY, DARMSTADT, GERMANY



42 students (15 women and 27 men) from 16 countries all over the world (Belgium, Denmark, Germany, Greece, Israel, Italy, Mexico, Netherlands, Poland, Russia, Slovakia, Spain, Sweden, Switzerland, Turkey, USA) participated in the school, many of who contributed their own research for discussion in the poster session.



In the tradition of Electron Crystallography Schools, started in Erice (Sicily) in 1990 and held since then in different European countries, a school with a focus on electron diffraction tomography took place in Darmstadt/Mainz (Germany) on 7.4.-11.4.2014. The school organized by the group of Prof. Ute Kolb covered the basic concepts of electron diffraction and imaging, new ways of data acquisition using different upcoming tomography methods in reciprocal space as well as procedures for structure solution. 9 lecturers provided theoretical morning lectures and 5 Lecturers gave practical afternoon courses using different transmission electron microscopes at the Technical University in Darmstadt and the University of Mainz.

The generous sponsoring of small and big companies in the field allowed providing three poster prizes, a general reduction of the registration fee for students and the full organizational support including an excursion and social events.

We are grateful for the lecturers' travel support provided by the European Microscopy Society (EMS) and hope that the achieved mixture of concentrated learning and fun will preserve the high spirit of the school into the scientific live of the students, support them in their work and join them for the future.

**Ute Kolb**





# 3D ELECTRON MICROSCOPY: FROM MOLECULE TO ORGANISM, PARIS, FRANCE

The 1<sup>st</sup> International Meeting of the UPMC Cellular Imaging Network "3D Electron Microscopy: From Molecule to organism" was held on May 22<sup>nd</sup> and 23<sup>rd</sup> 2014 in Paris, France at the University Pierre and Marie Curie (UPMC).

The event was kicked off with a plenary lecture by Prof. Wolfgang Baumeister on "Electron Cryo-microscopy: From Molecules to Cells" where the latest impressive development and future in 2D crystals, single particle and cellular tomography were presented. The closing conference was given by Bruce Trapp "Myelin modulates axonal viability by regulating axonal mitochondrial shape, distribution and interactions with SER" in which detailed presentation of the structure and organization of axonal mitochondria, SER and microtubules associated with myelin and myelin diseases was given.

Ten invited speakers from Europe and the USA, eight selected talks and the posters focused on up-to-date 3D electron microscopy methods and innovative tools to uncover the structure and function of biological systems at all levels of organization: molecules, multimolecular complexes, organelles, cells, tissues, organisms. The success was impressive with scientists discussing new results around a glass of wine.

The meeting was supported by institutions and microscopy societies (UPMC, INSERM, CNRS, EMS, SFμ, FBI (France Biolmaging), ICM) and companies, some of which exposed their latest developments. More than 120 people attended this meeting combining formal presentations, flash presentations, posters and informal discussions.

The scientific committee was composed of Claude-Marie Bachelet, Anne Baron-Van Evercooren, Alain Trembleau, Michael Trichet and Catherine Vénien-Bryan and the members of the UPMC cellular imaging network were part of the organisation committee.

Funding from the EMS was used to provide support for the participation of Prof. Wolfgang Baumeister, Max Plank Institute of Biochemistry, Martinsried, Germany "Electron Cryo-microscopy: From Molecules to Cells" and Dr Angel Merchán-Pérez from Instituto Cajal, Madrid, Spain "New technologies for three-dimensional electron microscopy and image analysis of the brain". Dr Merchán-Pérez presented the latest development in automatic segmentation methods applied on synaptic junctions and mitochondria in image stacks from the cerebral cortex acquired by combined Focused Ion Beam Milling and Scanning Electron Microscopy (FIB/SEM).



# 3<sup>RD</sup> NORDIC WORKSHOP ON SAMPLE PREPARATION, LINKÖPING, SWEDEN



For the third time, the Nordic Workshop on Sample Preparation for electron microscopy applications was organized in Linköping on June 9-10. Held in the city center, the local delights were readily available within walking distance. This time, the workshop preceded the annual meeting of the Nordic Microscopy Society, SCANDEM2014, and therefore attracted a large number of participants. In total, the workshop was attended by 65 participants, excluding the organizers. A majority of the participants were students and early career researchers seeking the opportunity to combine the largest sample preparation workshop and largest electron microscopy conference in the Nordic region.

The workshop included 20 oral contributions from lunch to lunch, where the speakers included academic and commercial representatives in a productive mix. The commercial representatives deserve extensive credit for giving their presentations in an academic spirit. Most of the presentations are available online through the SCANDEM2014 web interface ([www.scandem2014.se](http://www.scandem2014.se)) and will remain so in the

foreseeable future. The presentations on the first day were given in a broad perspective to attract a wide audience and to serve as an eye-opener for new methods outside the normal comfort zone. In contrast, the second day was given to two separate audiences for life science and materials science, respectively.

The Workshop was held with kind sponsorship from the

European Microscopy Society, which enabled the organizers to invite two EMS lecturers. The two stipends, one for life- and one for materials science, were granted to Linda Sandblad from Umeå University (Sweden) and Yaron Kauffmann from Technion, Israel Institute of Technology who both delivered most inspirational presentations on advanced sample preparation methodology.

Upon completion of the lectures, the workshop delegates were invited to the exhibitor's booths for on-site demonstrations and first-hand experience in trying out the latest technology. The workshop ended in the late afternoon with drinks and assorted delicacies from the Linköping region.

On behalf of the organizers  
**Per O.Å. Persson and Magnus Garbrecht**



# HOLO-WORKSHOP ON ELECTRON WAVE IMAGING, DRESDEN, GERMANY

The Holography Workshop on electron wave imaging was held from the 10<sup>th</sup> to the 12<sup>th</sup> of June 2014 in Dresden, Germany. It was organized by the Triebenberg Laboratory and funded by ESTEEM2, DGE, and EMS. Additionally, we thank FEI, Hitachi, JEOL, Gatan, and TVIPS for their kind help. This was the third Holography Workshop in Dresden and this time it took place in the hotel Schloß Eckberg at the shores of the Elbe river overlooking the baroque city center of Dresden.

The workshop was opened by introductory lectures on elastic and inelastic electron scattering given by Helmut Kohl, Harald Rose, Wouter Van den Broek, Ralf Hambach, F. Javier García de Abajo, and Archie Howie. Afterwards, sixty attendees from Europe, Israel, Japan, and the US joined into the vivid discussions after short introductions to recent challenges in the field of electron wave imaging. The topics were methods, reconstruction schemes, and instrumentation for electron holography, as

well as the role of the detectors, and finally the applications of electron wave imaging. The discussions on the different topics were led by shepherds who in the organizer's opinion have the broadest overview on the respective field. A final resume was given jointly by Hannes Lichte, Giulio Pozzi, Harald Rose, and David Smith.

The participants also enjoyed the meals in the exquisite surrounding of Schloß Eckberg and the evenings with the increasing gatherings at the terrace of the Lingner-Schloß with the stunning view over the Elbe valley. After all, most participants expressed their contentment with the workshop's emphasis on the broad discussion of every contribution.

We are pleased to be able to invite Harald Rose for his lecture by the help of the EMS.

**Falk Röder and Felix Börrnert**





# 6<sup>TH</sup> BIENNIAL SUPERSTEM SUMMER SCHOOL, DARESBUURY, UK

The 6<sup>th</sup> biennial SuperSTEM Summer School on Electron Microscopy was held between the 4<sup>th</sup> and 7<sup>th</sup> of July 2014 on the STFC Daresbury Campus, where the SuperSTEM Laboratory is located. This event built on an established series of schools and workshops organised biennially since 2004 by the SuperSTEM Laboratory. It was this year organised as a satellite event to the mmc2014 Conference, held in Manchester and was made possible thanks to financial help from the European Microscopy Society.

The aim of this year's school was to cover more advanced topics in aberration-corrected scanning transmission electron microscopy (STEM), going beyond the typical syllabus of introductory or professional courses, with topics including: principles of aberration correction and diagnosis, recent developments in imaging theory, instrumentation design and advanced optics, quantitative image analysis, spectroscopies, simulation of elastic and inelastic images... The school was therefore intended for Ph.D. students, post-doctoral researchers as well as academics with an existing background in electron microscopy. Lectures by world-leading experts were complemented by extensive practical sessions over

the four days of the school. A particular emphasis in organising the practicals was the requirement for every participant to be given real hands-on experience, both on the electron microscopes housed at the Laboratory (an aberration-corrected VG HB501 and a Nion UltraSTEM100) and on the latest processing and interpretation software (including HyperSpy and HREM Research's Jitterbug). They were therefore organised in small groups of 5-6 people.

This imposed a limit on the number of attendees that could be accommodated: a very international contingent of 31 applicants from an impressive 11 countries was selected to attend, although a much larger number of applications were initially received. Thanks to an organisation on a single site in the middle of the beautiful Cheshire countryside all attendees were able to take part in a number of social events throughout the weekend, including a 'scientific pub quiz' and a school dinner cruise on the nearby river Dee. Attendees were also given the opportunity to present a poster about their own research, in order to further stimulate discussions and interaction. The best poster prize was awarded to Ms. Ekin Simsek, from the Max Planck Institute for Intelligent Systems (Stuttgart, Germany) at the end of the school banquet by Super-STEM's Prof. Rik Brydson, chair of the judging committee.

From the feedback received from the participants, the school was a resounding success: "tired but brimming with new knowledge and information" was a comment often overheard as the participants were preparing to depart. As school co-organiser Dr. Dorothea Mücke-Herzberg concluded: "This is exactly what we were hoping to achieve!"

The 6<sup>th</sup> Biennial SuperSTEM Summer School was organised thanks to generous support from: EPSRC, the Royal Microscopical Society, the



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



ESTEEM2 Network, HREM Research Inc., Nion Co., Bruker Nano GmbH. and in particular the European Microscopy Society.

~~Quentin Ramasse, SuperSTEM Scientific Director, on behalf on the school organisers, Drs. Demie Kepaptsoglou and Dorothea Mücke-Herzberg.~~

More details on this past school, as well as information about upcoming events and workshops organised by the SuperSTEM Laboratory, can be found on the following webpage:

<http://www.superstem.org/events>

Quentin Ramasse, SuperSTEM Scientific Director, on behalf on the school organisers, Drs. Demie Kepaptsoglou and Dorothea Mücke-Herzberg.



School attendee Dr. Jiehua Li engaged in deep discussions about ab initio EELS simulations with lecturer Dr. Rebecca Nicholls during the School Dinner Cruise on the river Dee.

# 9<sup>TH</sup> INTERNATIONAL CONFERENCE ON CHARGED PARTICLE OPTICS, CPO-9, BRNO, CZECH REPUBLIC

The 9<sup>th</sup> International Conference on Charged Particle Optics, CPO-9, took place between August 31<sup>st</sup> and September 5<sup>th</sup> in Brno, Czech Republic, and was organized by the Institute of Scientific Instruments of the ASCR, v.v.i. (ISI). Altogether 112 participants from 18 countries spent one week in the Continental hotel in Brno downtown. The scientific program



Erich Plies, Eric Munro and Harald Rose.

included 59 oral presentations of which 16 talks were invited. In addition, 40 posters were exhibited over the full duration of the event. Proceedings composed of four to six page texts and will be published at the beginning of 2015 as a supplement to the Microscopy and Microanalysis journal. This turn the CPO joined the 14<sup>th</sup> International Seminar on Charged Particle Optics and Surface Physics Instrumentation, which has been biannually organized by ISI at Skalsky dvur in the Bohemian-Moravian highlands. Hence a symposium devoted to Surface Physics Instrumentation was included in the CPO-9 program together with another seven symposia. Symposia were organized in 90 min sessions allocated according to numbers of abstracts submitted; they dealt with Electron Optics (3 sessions), Numerical Methods (3), Ion Optics (2), Accelerator Optics (2), Mass Spectrometers (2), Energy Spectrometers (1) and Aberration Studies (1). The social program culminated in a concert of classical music inside the Catherine Cave in the Moravian Karst.



Participants of CPO-9.



# XV INTERNATIONAL CONFERENCE ON ELECTRON MICROSCOPY, EM2014, KRAKÓW, POLAND

The XV International Conference on Electron Microscopy was held in Kraków from the 15<sup>th</sup> to the 18<sup>th</sup> of September 2014 as an accompanying event of the IMC 2014. This cyclic conference is traditionally held in Poland every three years. The EM2014 was organized jointly by the AGH University of Science and Technology (AGH-UST), particularly the International Centre of Electron Microscopy for Materials Science and the Faculty of Metals Engineering and Industrial Computer Science, in cooperation with the Polish Society for Microscopy and the Committee of Materials Science of the Polish Academy of Sciences. The conference was participated by 251 participants from 20 countries. The opening ceremony took place in the Main Hall of the AGH-UST. The conference was opened by the Vice Rector for Science of the AGH-UST, Prof. Zbigniew Kąkol. The opening remarks were given by the President of IFSM, Prof. C. Barry Carter and the President of PTMi, Prof. Aleksandra Czyrska-Filemonowicz. The plenary lecture "TEM - it's always in situ", given by Prof. C. Barry Carter, gave excellent introduction to problems encountered in modern electron microscopy. The wide range of topical areas was reflected in the conference programme, consisting on invited and keynote lectures, oral presentations and posters. The invited and keynote talks of internationally leading scientists gave highlights on the latest developments in Advances in SEM microscopy (Prof. Ludek Frank, Prof. Michal Želechower), Instrumentation and computing methods in electron microscopy (Prof. Maximilian Haider), HRTEM and electron holography (Prof. Knut Urban, Prof. Hannes Lichte, Prof. Joachim Mayer, Prof. Ulrich Dahmen, Prof. Rafal Dunin-Borkowski, Dr Martin Hýtch), Analytical electron microscopy (Prof. Philippe Buffat, Prof. Ferdinand Hofer, Prof. Eva Olsson, Prof. Cecile Hebert), Electron tomography (Dr Bart Goris, Dr Adam Kruk), Materials Science: applications (Prof. Paul A. Midgley, Prof. Velimir Radmilović, Prof. Guillermo Solorzano, Prof. Robert Sinclair, Prof. Christine Leroux, Dr Ana M. Sanchez, Prof. Wolfgang Jäger, Prof. Piotr Dłużewski, Prof. Boris Straumal) and Life Sciences: applications (Dr Grzegorz Tylko, Prof. Andrzej Marszałek).



The facilities of Galaxy Hotel in Kraków, where the conference was held, allowed the organization of the scientific sessions close to the commercial exhibition, bringing together 13 companies producing electron microscopes, as well as equipment and software related to microscopy. During the conference dinner the awarding of several prizes took place. The PTMi prizes were awarded to three PhD students for their outstanding research presentations. The winners of the competition are: Krishnan Dileep (Jawahar Lal Nehru Center for Advanced Scientific Research, India), Joanna Gryboś (Jagiellonian University, Poland) and Joanna Karbowniczek (AGH-UST, Poland). Three prizes for the best poster contributions, sponsored by COMEF company, were awarded to young scientists. The best images, selected in photo competition, were also awarded.

The EM2014 conference was supported by the Polish Ministry of Science and Higher Education, the Polish Academy of Sciences, the European Microscopy Society as well as the companies FEI and JEOL. Thanks to the very nice atmosphere created by all the participants during the scientific sessions and social events, the conference provided an opportunity to exchange knowledge, establish new friendships and initiate cooperations.

**Beata Dubiel, Tomasz Moskalewicz  
and Grzegorz Michta**

# SECOND CONFERENCE ON IN-SITU AND CORRELATIVE ELECTRON MICROSCOPY (CISCeM), SAARBRÜCKEN, GERMANY



The INM - Leibniz Institute for New Materials, Saarbrücken, Germany, hosted the Second Conference on In-Situ and Correlative Electron Microscopy (CISCeM), 14-15 Oct. 2014. The conference with about 90 participants brought together an interdisciplinary group of scientists from the fields of biology, materials science, chemistry, and physics to discuss future directions of in-situ electron microscopy from different angles. One of the highlights was a presentation of Dr. De Yoreo, who showed atomic-resolution movies of growth processes of minerals. Keynote speaker Prof. Baumeister gave a broad overview about in-situ electron microscopy of proteins and cells embedded in amorphous ice. The topics of the oral and poster presentations involved the nanoscale study of biological samples or nanoparticles in liquid, correlative light- and electron microscopy, catalytic materials in gaseous environments and at elevated temperatures, and several others.

The meeting encouraged inspiration in cross-disciplinary thinking, and provided a comprehensive overview about the latest advances in in-situ electron microscopy. Selected abstracts will be published in the book series *Advances in Imaging and Electron Physics* in 2015.

## *Invited speakers:*

**Dr. Patricia Abellan Baeza**, Pacific Northwest National Laboratory, USA.

**Dr. Damien Alloyeau**, University Paris Diderot, France.

**Dr. James De Yoreo**, Pacific Northwest National Laboratory, USA.

**Dr. Ben Giepmans**, University of Groningen, The Netherlands.

**Prof. Dr. Deborah Kelly**, Virginia Tech Carilion Research Institute, USA.

**Prof. Dr. Eva Olsson**, Chalmers University, Sweden.

**Dr. Renu Sharma**, National Institute of Standards and Technology, USA.

**Prof. Dr. Jacob Wagner**, Denmark Technical University, Denmark.

**Dr. Paul Verkade**, University of Bristol, UK.

## *Scientific organizing committee:*

**Prof. Dr. Niels de Jonge**, INM-Leibniz Institute for New Materials, Saarbrücken, Germany.

**Prof. Dr. Kristian Molhave**, Denmark Technical University, Denmark.

**Christine Hartmann**



# **REPORTS ON SPECIAL EVENTS**



**Notes :**





# CORE FACILITY CELL IMAGING AND ULTRASTRUCTURE RESEARCH, VIENNA, AUSTRIA

## Installation of the laboratories for light and electron microscopy was completed

Microscopy and imaging are indispensable for progress in Life Sciences. Though cells have been known for 350 years, we still continue to detect new features and our understanding of cellular function is far from complete. In order to keep pace with our aim to understand biological structures at all levels of magnitude, advanced techniques of light and electron microscopy are needed. To concentrate both sophisticated microscopes and expertise within the Faculty of Life Sciences, University of Vienna, our Core Facility (CIUS) was founded. With the installation of the new scanning and transmission electron microscopes, the equipment of our Facility is now completed.

In our team, we combine research in plant and animal biology with biochemistry and focus on analyzing structure and function of organisms on all levels of complexity. We support research groups of the faculty, the university and other institutions in their investigations, and we train students in becoming familiar with state-of-the-art microscope techniques. Research conducted by our own group ensures close ties to the scientific community and inspiration for methodological progress.

For **Live Cell Imaging**, we apply ultraviolet brightfield and video-enhanced contrast microscopy to visualize structures in living cells that are at the limit of resolution of conventional light microscopes and so far have only been visible in chemically fixed cells in the electron microscope. For fluorescence observations, we apply wide field and confocal laser scanning microscopy in inverted and upright light microscopes. Equipment for micromanipulation enables the application of mechanical stimuli and the injection of reagents to living cells.

Further analysis of ultrastructure and chemical composition is possible by **Electron Microscopy (EM)**. We apply both scanning EM (SEM) for surface visualization and transmission EM (TEM) for visualizing structures within cells in ultrathin sections. Besides studying fine structures, we apply X-ray microanalysis (EDX) in the SEM and electron energy loss spectroscopy (EELS) in the TEM as element analysis techniques in order to elucidate the chemical composition of the samples. Best possible sample preparation is a prerequisite for any of these applications. Conventional chemical and microwave fixation are followed by ultrathin sectioning in conventional and cryo-ultramicrotomes. Furthermore, ultrafast high pressure freezing or analysis of living cells by atmospheric SEM help to reduce fixation artefacts.



**Correlative Microscopy** of biological structures by both live cell imaging and EM has proven as a source of vital information about cellular dynamics. The latter can be influenced by micromanipulation and microinjection. For relocalization at ultrastructures, vibratome sections from living material get immunolabeled and further processed for EM. Currently, we develop protocols and applications, which aim at time-resolved correlation of light and electron microscopic observations. They comprise the immediate freezing of the living state observed in the light microscope and subsequent steps for cryo-processing of the samples for EM. Specific weight is put on cryo-fixation at ambient and high pressure followed by (accelerated) freeze substitution.

**Static and dynamic imaging** of biological objects at all levels of magnification is a prerequisite for the documentation of experimental setups, for teaching and for dissemination of our scientific results to the general public. We produce educational films about our techniques and research topics, taking advantage of experience and equipment for low magnification microscopy and macrography.

Our **Research** is focused on the organization of biological samples at various levels of complexity comprising tissues, cells, their organelles and their extracellular products. We analyze their dynamic properties, and we study their reactions to various physiological and ecological conditions.

Our **Teaching Activities** include lectures, seminars, internships and excursions related to our research topics and practical training in our techniques; furthermore, we supervise Bachelor, Master and PhD theses. We advise students and guests in hands-on trainings and international training courses in order to enable the best possible application of our techniques for their research.

### ***Instrumentation and Equipment:***

#### Light microscopes:

Olympus, Reichert and Nikon fluorescence wide field microscopes, Leica upright and inverted CLSMs, Video-enhanced contrast (Hamamatsu). Furthermore, we host one of the last functioning UV brightfield microscopes (Zeiss).

#### Electron microscopes:

Transmission electron microscopes: Zeiss 902 (EF)TEM, Zeiss Libra 120 (EF)TEM; scanning electron microscopes: FEI XL30 (ESEM), JEOL IT 300 (SEM) with X-ray microanalysis (EDAX) and cryo-preparation chamber (Gatan).

#### Preparation techniques:

Microtomes and ultramicrotomes (Leica EM UC6, Leica Supercut, Reichert-Jung Ultracut E) and cryo ultramicrotome (Leica, EM UC7 and FC7), vibratome (VT1200S), high pressure freezer (Leica HPM 100), plunge freezer (Leica EM CPC), freeze substitution (Leica AFS 2), freeze dryer/carbon coater (Leica MD 20), critical point dryer (Leica CPD 300), sputter coater (Jeol JFC-2300), microwave fixation Pelco Bio Wave Pro).



# PROF. JORDI ARBIOL RECEIVES THE EU40 MATERIALS PRIZE 2014

The EU40 Materials Prize is awarded by the European Materials Research Society (E-MRS) to recognize outstanding contributions to materials research by a scientist under 40. The award is reserved to researchers showing exceptional promise as leaders in the materials science having performed the research for which this prize is awarded while working in Europe. Prof. Arbiol from the Electron Microscopy Service of the Materials Science Institute of Barcelona presented his Plenary presentation at the E-MRS Spring Meeting in Lille (May 28<sup>th</sup> 2014) reviewing his contributions in the understanding of nanomaterials structures by using advanced electron microscopy techniques. The Plenary talk was entitled: "A close look to the atoms: a journey to the nanoworld through advanced electron microscopy".

New materials for future applications are nowadays being synthesized at nanoscale (ultrathin interfaces, nanoparticles, nanowires and quantum structures, all functionalized for novel applications). As developments in Materials Science are pushing to the size limits of physics and chemistry, there is a critical requirement for identifying and manipulating the atoms at the nanoscale. There is a serious need in advanced nanomaterials to determine their structure, composition and morphology at atomic scale in order to correlate these results with the physical and chemical properties and functionalities they have. In this way, a worldwide increasing interest for advanced electron micro/nanoscopy is emerging. Imagine being able to hold an electron beam over a single atom

for 1 entire second in order to actually directly SEE and acquire information. The advent of aberration-corrected transmission electron microscopy technology is now giving resolutions below 0.05 nanometers enabling single atoms to be directly viewed and nano and quantum structures to be optically and electrically analyzed in-situ. We will be able to see single atoms and fancy nanostructures, and we will explain how simple changes at atomic scale can make a great difference when looking at the material properties from the macroworld (photonics). There is a way to paint the nanoworld with colors, obtaining the intrinsic properties of the atoms themselves, while 3D atomic models obtained from accurate structural analyses will help to understand the growth mechanisms at the nanoscale.



# NEW COMPETENCE CENTRE FOR MULTIMODAL, MULTISCALE BIOMEDICAL IMAGING IN ZURICH

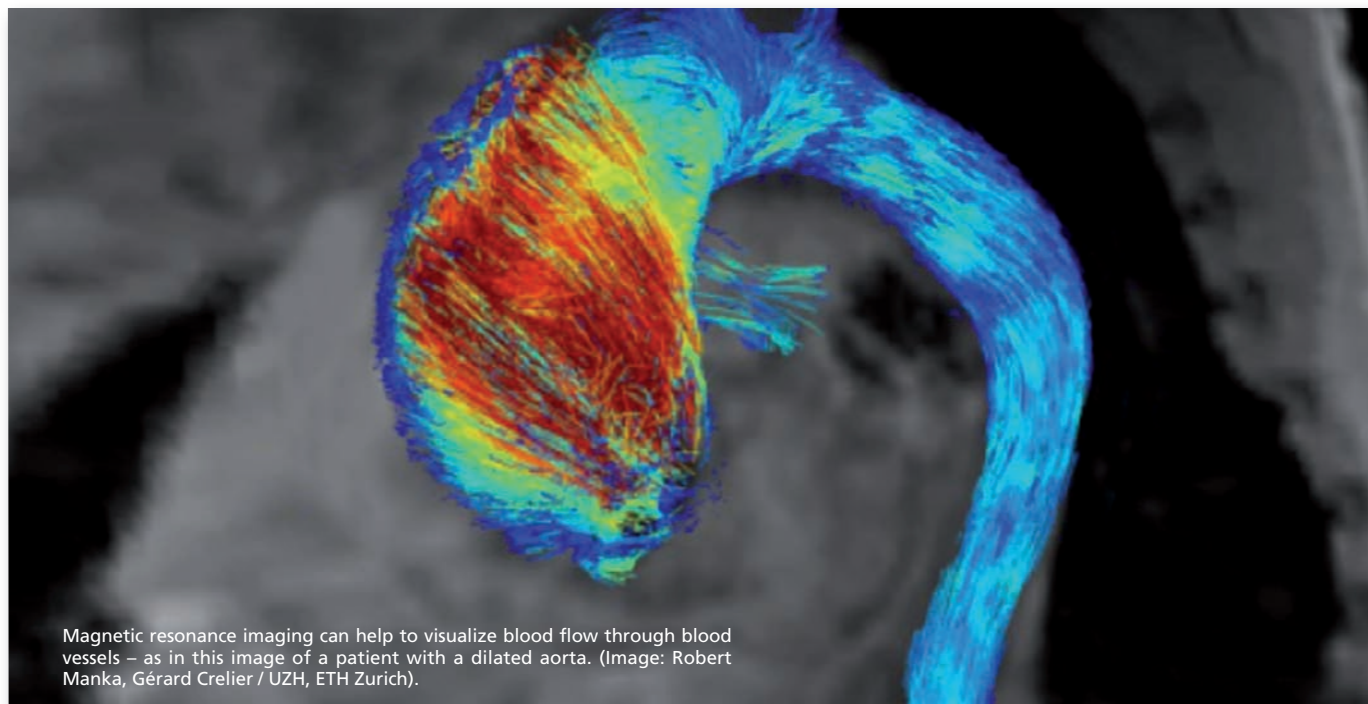
On the 6<sup>th</sup> of September 2014, the Swiss Federal Institute of Technology (ETH) Zurich and the University Zurich (UZH) inaugurated a new competence centre for EXperimental and Clinical Imaging TEchnologies (EXCITE).

EXCITE Zurich ([www.excite.ethz.ch](http://www.excite.ethz.ch)) brings together more than 50 researchers from both universities and clinical experts from the University Hospital of Zurich to jointly and efficiently translate new ideas from basic research into clinical practice. Due to the pre-existing exchange among the members, their long-lasting collaborations and the proximity of the partners of the network, a unique platform was created, connecting specialists from the physical sciences and engineering with medical doctors and researchers in the life sciences. A broad spectrum of cutting-edge imaging technologies is offered by the network including magnetic resonance imaging, positron emission tomography, infrared and optical microscopy, electron microscopy and X-ray microscopy covering the entire spectrum from the molecular to the anatomical level. The exchange of information from bench to bedside and vice versa will foster the translation of new methods from academic laboratories to the clinics as efficiently as possible.

One of the first key areas of EXCITE is arteriosclerosis, which was also chosen as topic for the opening symposium where international leading experts emphasized the importance of imaging technologies

for arteriosclerosis research. High-resolution electron, light and X-ray images are being used to make visible the smallest details of vascular wall changes (plaques) in tissue samples, while magnetic resonance and ultrasound imaging are employed to examine atherosclerotic lesions and blood flow patterns in-vivo. Furthermore, nuclear imaging technologies such as positron emission tomography (PET), which are important in cancer diagnostics today, are increasingly used to develop new molecular readouts. Those indicators are currently tested in animal models to localize molecules using radioactive markers allowing to obtaining hallmarks of stable and vulnerable plaques. These non-invasive imaging approaches are developed to detect the disease before life-threatening conditions such as a heart attack or stroke occur.

Besides its research activity, EXCITE Zurich promotes the education of Master and PhD students through its International Summer School on Biomedical Imaging ([www.excite.ethz.ch/education](http://www.excite.ethz.ch/education)). The school covers the basics and advanced concepts of biological and medical imaging technology. Specialized lectures alongside with theoretical training and practical hands-on sessions are offered to participants from life sciences, physical sciences and engineering. In the future educational activities are expanded to include specialised training programmes including an MD-PhD programme for physicians to gain a scientific doctorate in the field of biomedical imaging.



Magnetic resonance imaging can help to visualize blood flow through blood vessels – as in this image of a patient with a dilated aorta. (Image: Robert Manka, Gérard Crelier / UZH, ETH Zurich).



# STUTTGART CENTER FOR ELECTRON MICROSCOPY (STEM), STUTTGART, GERMANY

## The two new Atomic Resolution Microscopes JEM-ARM200F at the Stuttgart Center For Electron Microscopy (StEM) at the Max Planck Institutes in Stuttgart

StAR-M 2014 – Stuttgart Atomic Resolution Microscopy Symposium was held on the 15<sup>th</sup> and 16<sup>th</sup> of December 2014 at the Max Planck Institute (MPI) for Solid State Research and the MPI for Intelligent Systems in Stuttgart, Germany. The commemorative event was in conjunction with the Inauguration Ceremony celebrating the installation of two new JEOL JEM-ARM 200F TEMs at the Stuttgart Center for Electron Microscopy.

The aim of the symposium was to bring together experts in all the fields of electron microscopy touched by aberration-correction and to encourage them to discuss whatever area of their research was to them most exciting, most recent, or most intriguing. It was hoped that bringing these ideas together, not forgetting the perspectives of the audience, would inspire new directions, new solutions as well as new and interesting research questions for all participants.

The impressive event opened with a champagne reception on Monday morning where the guests and the speakers gathered. The conversation was warm and lively as friends greeted each other and new faces were welcomed. This set the tone for the rest of the two day symposium; the conversations continued, even late into the night on Monday for a few night owls.



Fig. 1: P.A. van Aken opens the Stuttgart Atomic Resolution Microscopy Symposium.



Fig. 2: The symposium was attended by more than 200 participants.

The address of welcome of the Inauguration Ceremony by Prof. Dr. P. A. van Aken was followed by many kind words of congratulation by the Managing Directors of the MPI for Intelligent Systems, Prof. Dr. J. Spatz, and the MPI for Solid State Research, Prof. Dr. B. Keimer, and of Prof. Dr. M. Rühle, Emeritus Scientific Member of the Max Planck Institute for Intelligent Systems, on the installation of the new TEMs. Some of the results that have already been achieved at StEM with the new TEMs were presented and their acquisition and scientific potential was placed in context within the history and development of TEM at MPI-IS. StEM was honoured by the attendance of the Vice President of JEOL Ltd., Dr. M. Iwatsuki. He added his good wishes for the future, and emphasized the many productive collaborations JEOL has with the StEM group and indeed many other EM research groups, which lead to the continuous improvement of their TEM instruments and the research output achievable.

The scientific sessions began with two lectures on instrument development, focusing on recent efforts and results in aberration correction at JEOL and at CEOS. Then dynamic TEM and the remarkable experiments that can be performed in-situ, including live viewing of electro-chemical reactions, were presented. During the lunch break the first tours of the new TEM labs at StEM were held. Many guests took advantage of the opportunity to see the new instruments in action, and StEM researchers were eager to show off their new toys. The scientific sessions on Monday afternoon focused on low-dimensional materials, with four talks, followed by talks on quantitative STEM and multiple-scattering-assisted EM.





Fig. 3: The participants were inspired by excellent invited speakers.

On Monday night the conference dinner was held; it was a gala dinner put on by JEOL to really celebrate the occasion. Excellent food, kind service, and a live band made the evening relaxing and entertaining. Many guests stayed late into the night, to dance in front of the stage surrounded by the music or to talk in the dining room with the tunes providing a quieter background soundtrack.

The scientific sessions continued for a full day on Tuesday. In the morning there were discussions of plasmons and cathodoluminescence. Quantitative atomically resolved EDS was explored, before two talks on electron vortices and magnetic chiral dichroism. After lunch several innovative techniques for producing and exploring fields in the TEM were explained. Leading edge experimental techniques for producing specific fields around a specimen in the TEM and highly developed



Fig. 4: Fascinated guests during a demonstration of the new TEMs.

software analysis routines for visualizing fields, capable of running at the speed of in-situ experiments, were described and their impressive results shown.

In the final session the audience was treated to two talks on the variety and value of the information given by atomically resolved (S)TEM imaging and analysis on specific materials. The necessity of this type of data to the development of functional oxide materials was explained, with additional discussion of ways the data could be further improved by specific instrument developments. And the closing topic was the contribution of new atomically resolved imaging capabilities to the old problem of making stronger, harder steel.



Fig. 5: A group picture of the invited speakers.

The StAR-M 2014 symposium was a great success. An excellent group of invited speakers came together to discuss all the variety of techniques available for examining materials with aberration-corrected (S)TEM. Exciting, recent, and fascinating research questions were indeed discussed. The guests were informed and entertained and went away with new inspiration for getting the best data from their own electron microscopy experiments. StEM was very happy to receive and very appreciative of all the genuinely expressed good wishes for productive and innovative research to be carried out on the two new TEMs.

The procurement of the two new JEOL JEM-ARM 200F transmission electron microscopes was entirely funded through the Max Planck Society.



# 8<sup>TH</sup> MICROSCOPY WINTER SCHOOL 2014 – A PRACTICAL COURSE IN ADVANCED 3D MICROSCOPY, ZURICH, SWITZERLAND



## Organization:

- Roger Wepf, Gabor Csucs  
*Scientific Center for Optical and Electron Microscopy (ScopeM), ETH Zurich*
- Urs Ziegler, Andres Kaech  
*Center for Microscopy & Image Analysis (ZMB), University of Zurich*
- Ohad Medalia  
*Department of Biochemistry, University of Zurich*

The Winter School is aimed at PhD students and post-graduates with prior experience in microscopy keen to improve their knowledge in a specific microscopic technique. The course was held at ScopeM, the Scientific Center for Optical and

Electron Microscopy, ETH Zurich, Höggerberg and the Center for Microscopy & Image Analysis (ZMB), University of Zurich (ZMB). About 80 participants from all over the world attended the Winter School 2014.

The purpose of the Winter School was to provide the participants with the fundamental knowledge in modern microscopic techniques for life science and experimental skills in a specific microscope technique (module). With the aim that participants should be able to apply this technique to their own present and future projects. The focus was on practical work in modules. Prior to the course, each participant selected one specific module, which

lasted throughout the course. These modules allowed exploring a specific microscopic technique in-depth and gave the opportunity to get used to the most state-of-the-art instrumentation and image processing in the field. Through the collaboration between the three microscopy centers – ScopeM (EMEZ and LSMC) and ZMB - the participants got access to a broad variety of instruments, techniques and know-how. Apart from the practical work in modules, theoretical sessions provided valuable background of all the different techniques to all students. The Winter School 2014 was made up of 9 different modules (see list below) and was supported by 23 tutors and instructors from Switzerland, Europe and overseas.

As part of the Winter School, an Industry Day took place on Wednesday, January 22<sup>nd</sup>, 2014 at ETH Zurich. Thirteen representatives from companies and suppliers in the field of light and electron microscopy gave either a talk or a technology exhibition on their newest developments. Some very first announcements by JEOL, Hitachi and RMC made this a special event for all students, tutors and listeners joining this day at the Winterschool. The participants got an overview of the latest developments in instrumentation and techniques currently on the market as well as innovative solutions and ideas to the challenges they encounter today in the field of Microscopy.

**Module 1:** Basic and Applied Light Microscopy.

**Module 2:** Advanced 3D and High Resolution Light Microscopy.

**Module 3:** Life Cell Microscopy.

**Module 4:** Fine structure preparation for Electron Microscopy.

**Module 5:** Immuno Electron Microscopy.

**Module 6:** 3D Correlative Microscopy (CLSM/FIB-SEM).

**Module 7:** Array Tomography - 2D Correlative Microscopy.

**Module 8:** Serial Block-Face Scanning Electron Microscopy (3View).

**Module 9:** Cryo-electron tomography.

We are looking forward to the next Winterschool (Jan 2015) and there are already plans for a Winterschool in 2016 on advanced 3D Light and Electron Microscopy. If you are interested to learn more about it please contact [roger.wepf@scopem.ethz.ch](mailto:roger.wepf@scopem.ethz.ch) or [bianca.maier@scopem.ethz.ch](mailto:bianca.maier@scopem.ethz.ch).

**Bianca Maier and Roger Wepf**



# IN MEMORIAM PROF. FRIEDRICH LENZ (1922-2014)

## Friedrich Lenz (1922 – 2014)\*

For a tool in its eighties it is not surprising that the original pioneers are no longer around, but for the electron microscope now also the second generation of people who have shaped the development, the generation of students of the pioneers, is getting thinly populated: Friedrich Lenz, professor emeritus of Theoretical Electron Physics at the University of Tübingen, the teacher and tutor of several generations of electron opticians, the internationally recognized scientist in the fields of electron optics and theory of electron microscopy, who served his university and the scientific community in many capacities, died on 29 November 2014 in Tübingen.

Born 1922 in Herrsching am Ammersee in southern Bavaria, Friedrich Lenz moved north to study physics, first in Berlin and after the war graduating 1949 in Göttingen with an experimental thesis on the electrical conductivity of lead sulfide layers. But already then he was very keen on theoretical physics and mathematics, which made him join Bodo von Borries – his step-uncle – at the “Rheinisch Westfälische Institut für Übermikroskopie” in Düsseldorf and he received his PhD from the Technical University Aachen in 1953 where the group had moved by then. He also completed his “Habilitation” there in 1957. In these early times of electron microscopy a vast field of open questions and problems awaited an experimentally oriented theorist. Early on electron optics, electron-sample interaction and image formation and transfer in the microscope became his main areas

of interest and it remained this way for his whole career. In 1960 he moved to Tübingen at the invitation of Gottfried Möllenstedt, which started a long lasting friendship and fruitful co-operation at the Institut für Angewandte Physik there.

In those pre-computer days Lenz’s excellent math skills proved very useful for the task of relating electrode or pole-piece configurations with electron optical properties, trying analytical approximations

when possible, but also not shying away from tedious numerical solutions. Numerous publications attest to these efforts. His PhD thesis on small-angle scattering of medium energy electrons enabled a basic understanding electron microscope imaging, eventually leading to a consistent wave-optical theory of image formation in the electron microscope. For the first time the strong contrast variations in electron microscope images upon small focus variations could be understood by means of a defocus dependent transfer function. Transfer functions for amplitude and phase contrast including the influence of aberrations were

developed and a path towards eliminating the effect of aberrations by recording electron holograms was shown. Lenz’s collaboration with the Tübingen experimentalists Karl-Heinz Herrmann, Hannes Lichte and Möllenstedt on “Advancement of Electron Holography” was marked with the 1987 Körber-Preis.

Lenz’s numerous publications excel by conceptual stringency and clear wording – whether in German



or in perfect English, the highest possible precision was sought for the calculations behind them. With the didactically sophisticated and clearly structured classes, the supervision of graduate students and the careful editing of publications from the institute he strove to pass this attitude on to generations of students. Far beyond attaining emeritus status in 1990 he remained a competent advisor.

In spite of many attempts to lure him to other places, including guest professorships in the United States and China Lenz stayed at the University of Tübingen. Besides his academic functions he served there as vice president, head of the physics department, member of the senate and its committees. As a service to the scientific community he was German representative in the Executive Committee of the International Federation of

Societies for Electron Microscopy from 1974 to 1982, member of the board of the German Society for Electron Microscopy from 1980 to 1990, its chairman of the board from 1980 to 1982. In 1991 he was appointed Honorary Fellow by the German Electron Microscopy Society, honoring "the imaginative researcher, physicist and mathematician who made seminal contributions to theoretical electron optics and electron physics" and recognizing "the academic educator who skillfully passed his knowledge on to his students, co-workers and colleagues all over the world". To summarize Friedrich Lenz's work and legacy more aptly is hardly possible.

Dieter Kern

*\* also published in Ultramicroscopy, Elsevier*



# IN MEMORIAM JACQUES CAZAUX (1934-2014)

## Jacques Cazaux (1934 – 2014)

Prague, 30 September 2014, I hurry along in the busy corridors of the Palais des Congrès to hear the invited lecture that my friend Jacques Cazaux is about to deliver on "Influence of the work function changes on the contrast of images in SEM". But at the entrance, a sign says "Cancelled". A surprise, very disquieting!

The sad news of his death reached us a short time ago. He left us "with his boots on" on 4 December 2014 in Reims and he now rests in peace in Marqufave, a few kilometres south of Toulouse, his home country. Origin that was no secret as soon as he spoke, for he never lost the rich, unmistakable, musical accent of the south.

Our community of microscopists and spectroscopists has lost a very colourful personality. Well known to the members of the SF $\mu$  and the groupe GN MEBA of which he was a "historic" member, he has spoken about energy losses, the Auger effect (he was a great admirer of Pierre Auger), scanning electron microscopy and charge effects in insulators at the many congresses, working parties and schools in which he participated – and there are many other subjects that fascinated and even obsessed him until he had mastered all the subtleties and was ready to explain them to us.

His first research topic was in fact electron energy-loss spectroscopy, which he attacked with his colleague

Roger Vilanove on a specially constructed instrument at the Collège de France. His first article, published in 1966 in *Acta Crystallographica*, was entitled "Etude de la variation angulaire des pertes d'énergie caractéristiques d'électrons de 30 kV traversant une feuille mince de béryllium orienté". His thesis, completed in 1970 and representing several years of work in this area, which had led to some ten publications, was entitled "Contribution à l'étude de l'anisotropie des pertes d'énergie caractéristiques et des constantes

optiques entre 3 et 30 eV". At that date, this was very original and it is still relevant to the study of the dispersion curves of plasmon excitations in the two-dimensional material that is attracting so much work, both fundamental and applied, namely, graphene.

During the following forty years, Jacques Cazaux was extremely active: publications, lectures during conferences of the SFME and the SF $\mu$ , thematic days and teaching workshops of the GN MEBA (Groupement National de Microscopie Electronique à Balayage et de Microanalyses) and the EMAS (European Microbeam Analysis Society), which recognised the quality of his research by making him an honorary member.

But Jacques remained very active even after retiring from his professorship at the University of Reims. His

enthusiasm remained intact. He was frequently invited to speak at meetings, but I shall mention only one example, the symposium FSEM-2011 (Frontiers of Scanning Electron Microscopy 2011) organised on the Hiyoshi campus of Keio University in Yokohama. There, where he was the keynote speaker, he



took his listeners "From the physics of secondary electron emission to the contrasts of images in SEM". This was recorded in an article in the *Journal of Electron Microscopy*. And this was by no means his last publication, there are four more of which the last appeared in 2014!

Jacques Cazaux was also a superb teacher, a consistently enthusiastic lecturer at the University of Reims where he taught for almost 40 years. But he widened his audience far beyond the university, as witness the series of textbooks published by Masson: *Initiation à la physique du solide : exercices commentés*. The first edition appeared in 1980 and a third revised edition appeared in 1996.

I count Jacques among my friends for more than 50 years – our beginnings were very close in the vast range of research activities that were open to us in the 1960s and we followed similar paths in extending our fields of knowledge. We both became great enthusiasts of the STEMs constructed by the British company Vacuum Generators, I in the Laboratoire de Physique des Solides, Université Paris Sud, and

he as advisor to the Thomson CSF laboratory which acquired a similar instrument, equipped with a spectrometer and an Auger detector, in the 1980s. It is therefore not surprising that we published a joint article on "Performance of electron spectroscopies from the point of view of EELS and Auger microscopies" in the *Journal of Electron Spectroscopy and Related Phenomena* in 1990. This was the outcome of a conference that took us both to Hawaii. We were lucky enough to participate together in numerous scientific meetings, in France of course but also in many other parts of the world, as this photo taken on a terrace in Louisiana shows.

Jacques, you will not be forgotten.

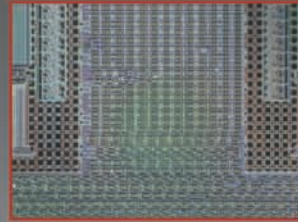
for the SFμ (French Society of Microscopies)  
Christian Colliex  
(President of the SFμ 1990-1991)  
Text revised by Peter Hawkes  
(President of the SFμ 1998-1999)



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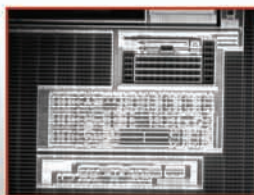
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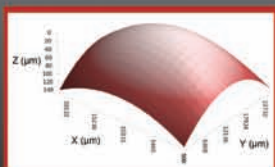


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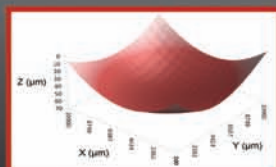


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# **EMS SCHOLARSHIPS**



# SCHOLARSHIP LIST

## Microscopy Conference 2014 (IMC2014), September 7<sup>th</sup>-12<sup>th</sup> , 2014, Prague, Czech Republic

Name	Lab & Country
Acikel Elmas Merve	Marmara University, School of Medicine, Dept. of Histology and Embryology, Istanbul, Turkey
Arredondo Miryam	School of Mathematics and Physics, Queen's University Belfast, UK
Bazioti Calliope	Physics Department, Aristotle University of Thessaloniki, Thessaloniki, Greece
Bijelic Nikola	Department of Histology and Embryology, Faculty of Medicine, Osijek, Croatia
Bladt Eva	EMAT, University of Antwerp, Belgium
Bornhoeft Manuel	Central Facility for Electron Microscopy, RWTH Aachen University, Germany
Caumanns Tobias	Central Facility for Electron Microscopy (GfE), RWTH Aachen, Germany
Clark Laura	EMAT, University of Antwerp, Antwerp, Belgium
Collins Sean	Department of Materials Science and Metallurgy, University of Cambridge, UK
Costanzo Manuela	Dept of Neurological and Movement Sciences, University of Verona, Italy
De Backer Annick	Electron Microscopy for Materials Science (EMAT), University of Antwerp, Belgium
de la Mata Maria	Instituto de Ciencia de Materiales de Barcelona, ICMA-B-CSIC, Bellaterra, Spain
Dohr Judith	Department of Materials, University of Oxford, UK
Fogarassy Zsolt	Hungarian Academy of Sciences, Research Centre for Natural Sciences, Institute for Technical Physics and Materials Science, Hungary
Fukalova Jana	Institute of Molecular Genetics, Dept. of Biology of the Cell Nucleus, Academy of Sciences of the Czech Republic, Prague, Czech Republic
Ganner Thomas	Institute for Electron Microscopy and Nanoanalysis, Graz University of Technology, Graz, Austria
Genç Aziz	Institut de Ciència de Materials de Barcelona, CSIC, Campus de la UAB, Bellaterra, Spain
Grieten Eva	EMAT, Department of Physics, University of Antwerp, Antwerp, Belgium
Guzzinati Giulio	EMAT, University of Antwerp, Antwerp, Belgium
Holsgrove Kristina	Centre for Nanostructured Media, Queen's University, Belfast, U.K
Javon Elsa	EMAT, University of Antwerp, Antwerp, Belgium
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Kalendová Alzbeta	Institute of Molecular Genetics, Department of Biology of the Cell Nucleus, Academy of Sciences of the Czech Republic, Prague, Czech Republic
Kiss Ákos Koppány	Institute for Technical Physics and Materials Science, Research Centre for Natural Sciences of the Hungarian Academy of Sciences (MTA TTK MFA), Budapest, Hungary
Knez Daniel	Institute for Electron Microscopy and Nanoanalysis, Graz University of Technology, Austria
Kocová Lucie	Biology Centre ASCR, v.v.i., Ceske Budejovice, Czech Republic
Kostic Ivana	Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia
Kraxner Johanna	Graz Centre for Electron Microscopy and Institute for Electron Microscopy and Nanoanalysis, Graz, Austria
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Ledig Johannes	Institut für Halbleitertechnik, Technische Universität Braunschweig, Braunschweig, Germany
Lobato Hoyos Ivan Pedro	EMAT University of Antwerp, Department of Physics, Antwerp, Belgium
Lozano Juan G	Department of Materials, University of Oxford, Oxford (UK)
Lucchetti Donatella	General Pathology Institute, Rome, Italy
MacArthur Katherine	Department of Materials Science, University of Oxford, Oxford, UK + Johnson-Matthey Technical Centre, Reading, UK
Melicherová Janka	Department of Botany and Zoology, Brno, Czech Republic
Müller Merlin	Central Facility of Electron Microscopy, RWTH Aachen University, Aachen
Nagy Klára	Research Centre for Natural Sciences, Budapest, Hungary
Oláh Nikolett	Thin Film Physics Department, Institute for Technical Physics and Materials Science, Research Centre for Natural Sciences, Hungarian Academy of Sciences, Budapest, Hungary
Orthacker Angelina	Center for Electron Microscopy, Graz, Austria
Pennycook Timothy	Department of Materials, University of Oxford, UK
Peters Jonathan	University of Warwick, Coventry, UK
Pokle Anuj	School of Physics, Advance Microscopy Lab, Trinity College Dublin, Ireland + School of Chemistry, CRANN, Trinity College Dublin, Ireland
Qi Haoyuan	University of Ulm, Central Facility of Electron Microscopy, Electron Microscopy Group of Materials Science, Ulm, Germany
Rimpelova Silvie	Institute of Chemical Technology in Prague, Prague, Czech Republic
Sanen Kathleen	Biophysics, BIOMED Hasselt University, Hasselt, Belgium
Schmied Roland	Center for Electron Microscopy, Graz, Austria
Schrenková Jana	Institute of Parasitology, Biological Centre of ASCR, v.v.i, Ceske Budejovice, Czech Republic
Slater Thomas	The University of Manchester, Manchester, UK
Svindrych Zdenek	First Faculty of Medicine, Charles University in Prague
Tabasum Ramzan	Université Catholique de Louvain, Belgium
Thersleff Thomas	Department of Engineering Sciences, Uppsala University, Uppsala, Sweden
Ulicná Livia	Institute of Molecular Genetics ASCR v.v.i. Department of Biology of the Cell Nucleus, Prague 4, Czech Republic
Van Boxem Ruben	EMAT, University of Antwerp, Belgium + CMT, University of Antwerp, Belgium
Van den Bos Karel	EMAT, University of Antwerp, Antwerp, Belgium
Xie Ling	Uppsala University, Department of Engineering Sciences, Applied Materials Sciences, Uppsala, Sweden
Yildirim Sukriye	Institute of Molecular Genetics ASCR v.v.i. Department of Biology of the Cell Nucleus, Prague 4, Czech Republic
YIN Jun	IMCN-Institute of Condensed Matter and Nanosciences (BSMA - Bio and Soft Matter Division), Université Catholique de Louvain, Belgium



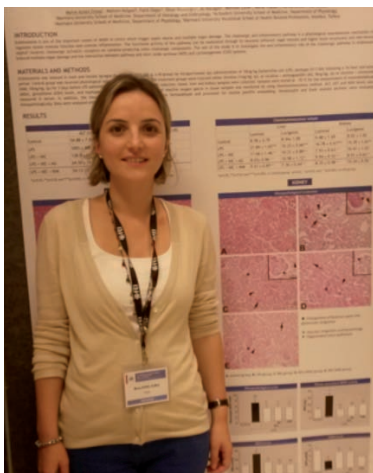
# SHORT REPORTS

## Merve Acikel Elmas (Turkey)

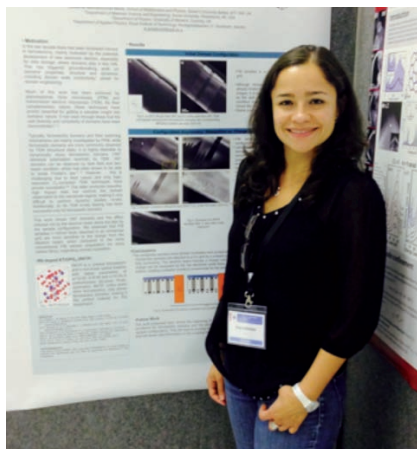
Initially, I would like to thank the European Microscopy Society for their financial support which made it possible for me to participate at the IMC 2014 in Prague, Czech Republic. It was a great experience for me to take part in an international microscopy congress. Lectures during the congress enlightened me about the developments in the field of microscopy. Besides that, I'm very honoured that the EMS has chosen me among the 58 received applicants and awarded me with the scholarship to such a great congress, so did offer me the opportunity to present a poster on "The Role of The Cholinergic Anti-Inflammatory Pathway in Endotoxemia Induced Multiple Organ Damage In Rats: Histological and Biochemical Investigations".

In addition, congress lectures and workshops were fascinating and I got the chance to have a look at the exhibitions of companies even in the breaks. So, the premium products were represented by the manufacturers.

On the other hand, I have met major microscopy experts and I am very happy to have had this opportunity to get detailed information about microscopy.



## Miryam Arredondo (UK)



I attended the conference from Monday 8<sup>th</sup> to Thursday 11<sup>th</sup>. The attendance to the conference had two main objectives, one to present my poster contribution "Observation of pure ferroelectric domains" and two, to meet with different people to establish

collaborations and also meet with companies. Some of the meeting with collaborators included Dr. Q. Ramasse from SuperSTEM, Dr. R. Dunin-borkowski and Dr. M. Duchamp from ER-C, Juelich and collaborators from FEI Eindhoven; as well as providers such as GATAN.

It is my feeling that the poster was well received but more importantly, **the EMS scholarship allowed me to meet in one place with many important collaborators from different countries, which made this conference highly productive.**

## Nikola Bijelić (Croatia)

IMC 2014 in Prague is the largest microscopy event I have ever attended, and I would like to thank EMS for the scholarship which covered the registration fee, and thus greatly supported my participation in this event.

I had the chance to learn about new advances in my fields of interest, have a look at state-of-the-art microscopes and accessories, meet colleagues and discuss other people's research over a glass of great Czech beer during poster sessions. **This congress was a great motivation for me to continue my work and improve working methodology, and also to make new contacts in order to expand collaboration possibilities.**

The event was very well organized and informative. Since the area of my research is histology and embryology, and my PhD work deals mostly with embryology, it was exciting to see a whole section devoted to embryology and developmental biology. Presentations were divided thematically, and because of that, participants were enabled to take some time to enjoy one of world's most attractive cities – the beautiful Prague. Choosing Prague as the host city for this conference was an excellent decision.

I fully support EMS' initiative in providing scholarships for young scientists, especially for those in developing countries, since their participation in scientific events is often heavily influenced by financial factors.

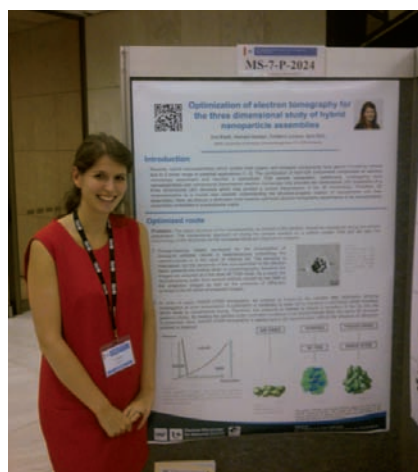




EMS definitely sets a great example by caring for the young members. I hope many more of my young colleagues will have the same benefit I had, and would encourage them to attend events such as IMC 2014, since they are an essential part of our scientific development.

### Eva Bladt (Belgium)

Firstly, I would like to thank the European Microscopy Society (EMS) for the financial support, which allowed me to participate at the International Microscopy Conference 2014 (IMC 2014) in Prague. IMC 2014 was



my first conference as a young researcher, where I presented my work during an oral presentation ("Annular Dark-Field Transmission Electron Microscopy for Low Contrast Materials") and a poster presentation ("Optimization of electron tomography for the

three dimensional study of hybrid nanoparticle assemblies"). Hereby, I had the opportunity to meet interesting people and to discuss the topics which I presented. **By following talks on other research topics, I learned new aspects and it allowed me to broaden my perspective in the microscopy world. The poster presentations were also very interesting and a great opportunity to start a discussion about several topics.** In this way, I could also meet a lot of people that are working on similar topics. These discussions were very helpful and gave me new ideas to look into when arriving back in Antwerp.

Overall, the conference was an excellent meeting and a great motivation to continue my research. Therefore, I would like to thank EMS once more.

### Tobias Caumanns (Germany)

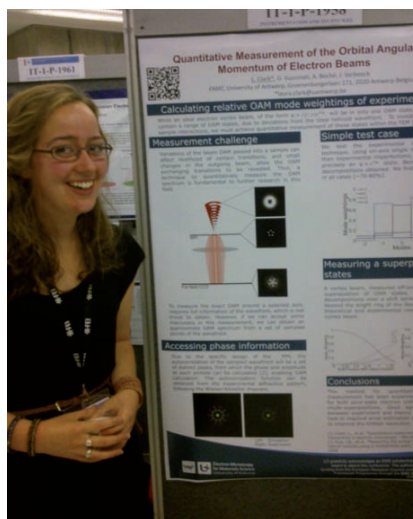
I would like to say thank you to the EMS for the financial support, which made it possible to attend the International Microscopy Conference (IMC) 2014 held in Prague. In addition, I am very happy that the EMS choose me among 58 received applications and awarded me with this scholarship to attend such a great conference and to offer me the opportunity to present my work.

As a new researcher at the GFE in Aachen, **it was my first conference and I have to say: it was a great experience.** The

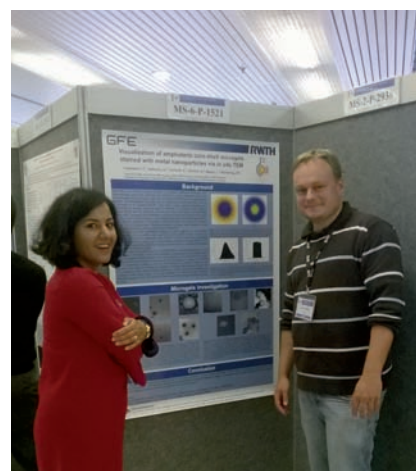
conference was a very exciting meeting. It was full of interesting topics for me as a new Ph.D. student. I am doing my research in in situ liquid cell transmission electron microscopy. There were several interesting talks and poster presentations in the Life Science and the Instrumentation and Techniques symposia. In addition, I found some very interesting talks and posters which increased my general knowledge on different topics of electron microscopy. **The plenary talks were amazing and I enjoyed it every morning.** Apart from listening to the talks, I had the great opportunity to meet interesting people and other researchers to discuss some research topics including showing our poster presentations to each other. During the breaks it was a great pleasure for me to visit the exhibitions of the companies and to take a look at their new equipment.

The complete conference was excellently organized. The attendance to the IMC 2014 in Prague was very valuable for my scientific growth and I am looking forward to the next microscopy conference 2015 in Göttingen.

### Laura Clark (Belgium)



Thanks to the support of the EMS, I was able to attend the 18<sup>th</sup> IMC in Prague. This congress was both very interesting to me, and hugely useful for my PhD research. Attending such a large conference, means that there were both sessions very remote from my own topic, to extend

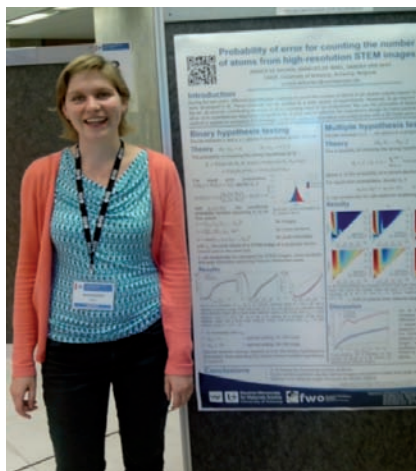




the breadth of my understanding in other areas of microscopy (I found many of the interdisciplinary posters interesting for this), while there were also a number of talks and posters very relevant to my own research, enabling me to listen to other researchers in my field, and discuss with them during the poster sessions and coffee breaks. **From these discussions, I have gained many more ideas for future research directions, all scribbled at speed into my notebook.** Only now there is the post-conference challenge of trying to understand just exactly what idea my cryptic notes are trying to convey ...

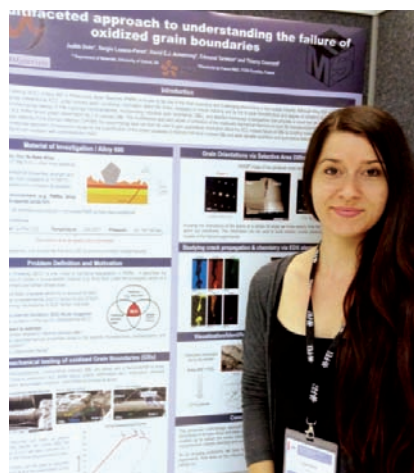
### Annick De Backer (Belgium)

First I would like to thank EMS for supporting me to attend the International Microscopy Congress in Prague, Czech Republic. It was a great experience to take part in the largest international conference on all fields of microscopy. Attending this conference gave me also the opportunity to present my work on nano-particle atom-counting to experts and young researchers with a lecture and poster presentation. During the conference, I followed different lectures in a wide range of microscopy topics. I personally enjoyed the large amount of high quality talks on high resolution TEM and STEM (Instrumentation and Techniques). Between and after the lectures, I was able to talk to other researchers with similar fields of interest and having valuable discussions with them. **In this way, the congress provided me an update of the challenges for my research and motivates me to continue with my current research activities.**



### Judith Dohr (UK)

I would like to start by expressing my deep gratitude to the EMS for the financial support, which allowed me to attend the IMC 2014 in Prague. The really well organized and structured congress was indeed useful, since it gave me the opportunity to not only attend lectures and talks relevant to my own field of research but also to look beyond the borders of my PhD work and to get an insight in the



broad variety of research which microscopy is involved in. I enjoyed the inspiring plenary talks very much and especially profited from the Focused Ion Beam related talks and the ones focused on high resolution TEM characterizations. These talks highlighted

different approaches to prepare and characterize all sorts of materials and gave me new ideas and input relevant to my own experimental work. Nonetheless, one of my personal highlights was the session focusing on the use of microscopy for forensic applications. **This was something completely new and "exotic" for me and I thought it was truly interesting and in fact, pretty cool!**

The poster sessions, in which I had the chance to present my PhD work, which focuses on a multifaceted experimental and computational characterization approach to study the failure of oxidized grain boundaries, gave me a unique chance to discuss my work with cutting-edge researchers and also with young scientists from all around the world. It was very useful to get their input, hear their thoughts and I did enjoy the fruitful discussions very much.

Moreover, **I appreciated the opportunity to visit the different microscopy companies at the exhibition and to attend their lunchtime lectures because it gave me another view on possible career options outside of academia.** The fact that I got invited to the parties organized by FEI & JEOL was also one of my personal highlights and a priceless opportunity to network with the microscopy community.

Overall, I enjoyed my time at the IMC 2014 a lot and profited from my attendance not only from a professional but also from a personal point of view. At this point I want to thank the EMS one more time for making this happen and I'm hoping that I will be able to attend the next IMC 2018 in beautiful Sidney (Australia).

### Zsolt Fogarassy (Hungary)

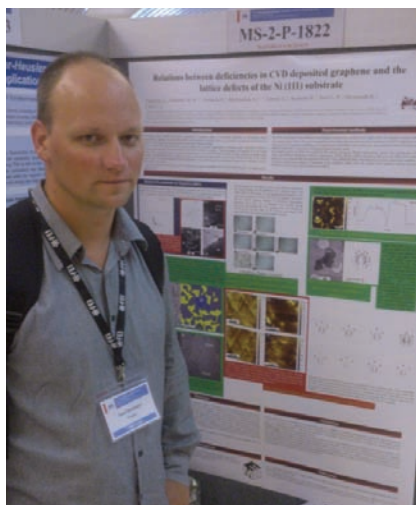
First of all, I would like to thank for the EMS scholarship provided by the European Microscopy Society (EMS) which made it possible that I could attend the IMC 2014 conference, secondly I would like to thank



the conference organizers for the excellent arrangements. I was able to listen to a lot of very good presentations which are near to the area of my PhD studies, and there was a very nice large lecture from the cutting edge of the present microscopy and from possible developments in the future. **During the presentation a lot of new ideas were formed, which I can hopefully utilize in my work. In the poster presentation,** I had the opportunity to talk to people working with similar research topics, in addition to my own work as well as promoting new working relationships with scientist from all over the world.

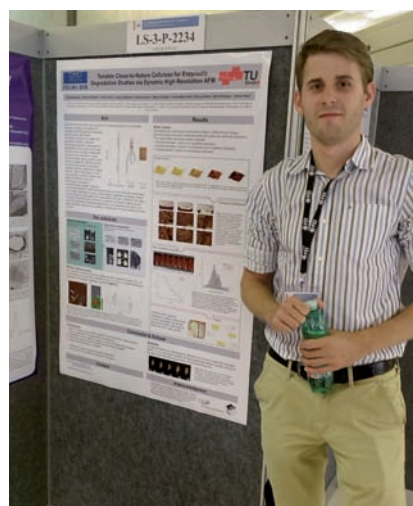
Our poster topic was "Relations between deficiencies in CVD deposited graphene and the lattice defects of the Ni (111) substrate". In that work graphene layers were investigated that were deposited by chemical vapor deposition (CVD) on nickel (111) thin film substrates. The Ni (111) thin substrates themselves were grown previously on bulk sapphire (0001) substrates. The graphene deposited on the Ni (111) was investigated by TEM, Cs-corrected HRTEM, STM, AFM and by SEM / EBSD. Our results show that the first atomic layer grew as a continuous and epitaxial graphene layer on nickel (111). The additional local turbostratic layers and graphite flakes grew above the incoherent twin boundaries high-energy sections or high-energy boundaries in the nickel substrate.

In addition to the participation in the conference it was a great experience to take a look around in Prague, one of the world's most beautiful capitals and test the local food and drinks.



### Thomas Ganner (Austria)

I have to thank the organizers and the conference committee for this well organized international microscopy congress. I also sincerely thank the EMS for providing me with a scholarship for the IMC 2014 in Prague. Thus, I had the chance to talk to many colleagues for a valuable exchange of knowledge. I have to emphasize that especially the discussion with other students in the field of Atomic Force Microscopy helped me a lot as they encounter the same

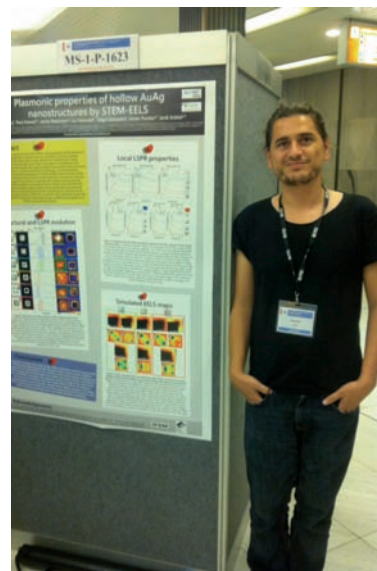


problems. Moreover, the internationality of the conference and the open atmosphere during poster presentations allowed me to find new contacts which I probably will need in the future. However, I have to give a minor remark: I had the feeling, that session, although highly in-

teresting are too focused on electron microscopy. In my view this is a confinement as important questions may be answered with different techniques. **I would appreciate to see more sessions suited for atomic force microscopy or other techniques on the next conference.** Beside the congress, it was my first visit to Prague and I was absolutely amazed by the people, the city with its narrow alleyways and its absolutely amazing food and beer. I really enjoyed my time there and will definitely come back one time, maybe or hopefully for another conference.

### Aziz Genç (Spain)

Firstly, I would like to thank the European Microscopy Society (EMS) for helping me to participate at the 18<sup>th</sup> International Microscopy Congress (IMC 2014) held in Prague, Check Republic through the



EMS Scholarship. I had the chance to present my work entitled "Plasmonic properties of hollow AuAg nanostructures by STEM-EELS" in this exciting event.

Being the biggest microscopy congress, held once in every four years, IMC 2014 has gathered many distinguished researchers working in every aspects of electron microscopy, from whom I learned



a lot during the congress. I had the opportunity to learn what has been done and more importantly what can be done in order to study the optical properties of materials using scanning transmission electron microscopy and related techniques such as electron energy loss spectroscopy.

Apart from the scientific part, the congress was very well organized with many attractive activities. **I have to give a special mention to the city of Prague and the beer.** Once again, I express my gratitude to the EMS for granting me with the scholarship.

### Eva Grieten (Belgium)

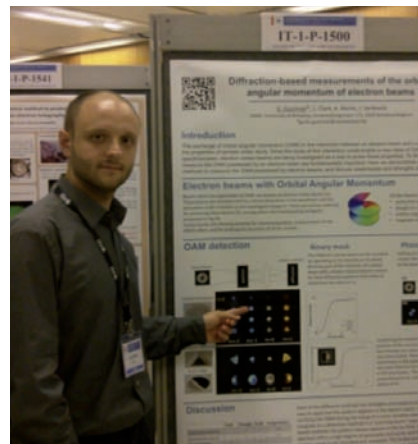
I would like to start by thanking EMS for the financial support making it possible for me to attend this year's international microscopy congress in Prague. This year they introduced the interdisciplinary sessions where I presented an oral presentation "Evaluation of reductive atmospheric plasma afterglow treatment on historical photographs with advanced electron microscopy techniques" in the session of art and archeology and a poster "Comparative study of three sample preparation techniques to prepare a TEM lamella of historical photographs for chemical characterizations" about sample preparation. During the conference I focused on presentations on sample preparation and characterization of composite materials. But the meeting is more than the presentations by itself. **At the exhibition I was able to talk with representatives of several companies about practical issues and had very useful discussion with other researchers.** Overall, I enjoyed the conference and I'm looking forward to implementing all the learned information into my current research.



### Giulio Guzzinati (Belgium)

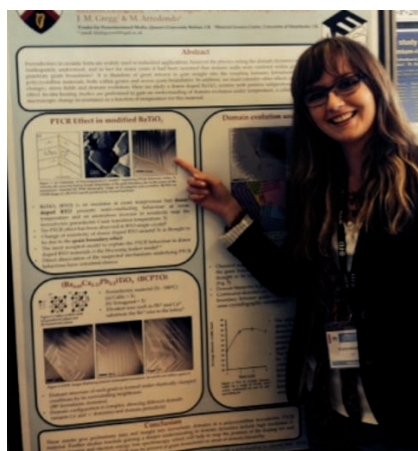
The International Microscopy Conference is the world's largest microscopy conference, organised

every four years. Attending IMC 2014, held in Prague, was an invaluable experience due to the range of topics, industry support and overwhelming participation. It's by far the largest conference that I have taken part in, with an attendance of more than 3000 people from all over the world, and a broad range of topics including also optical microscopy. This has given me the opportunity to gain insight into several topics such as low voltage TEM, super resolution techniques in light microscopy and the new developments in electron holography, EELS and electron tomography by following lectures delivered by some of the most important scientists in the microscopy community. There was also a strong presence of manufacturers of microscopes and related instruments, which allowed me to observe the current trends in the industry towards higher integration between different techniques and further automation of data collection. The poster sessions were very crowded due to the huge size of the event, but allowed me to have interesting discussion with researchers interested in my work and who were presenting interesting work. **The congress centre was just minutes away from beautiful city centre of Prague, which I enjoyed visiting after the long and intense days at the conference.** For all these reasons, I am grateful to the European Microscopy Society for the financial support.



### Kristina Holsgrove (UK)

I would like to thank the European Microscopy Society for awarding me with a scholarship to attend IMC 2014 in Prague. This was the first international conference for me as a researcher in the early stage of my PhD, and it was an overall fantastic experience. I thoroughly enjoyed listening to the talks from researchers based all around the world and I gained much insight into the challenges and anticipation that exist in microscopy. During the week, my main focus was on microscopy in materials science, I presented a poster entitled 'Grain boundary domain dynamics investigated by Transmission Electron Microscopy in modified BaTiO<sub>3</sub> displaying PTCR effect'. I found it very exciting to have fellow researchers

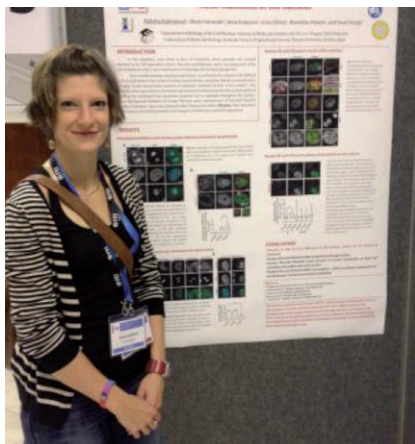


ask me questions and discuss my work with me during the poster sessions. This conference also allowed me to learn about different microscopy techniques, different sample preparation methods and new developments in my area of study.

**Additionally, I found the lunch workshops and exhibition hall of all the new microscopy equipment to be extremely encouraging. I felt that the live demos added a real scientific impact to the week and complimented the scientific programme of the conference very well.** Overall, I think that attending IMC 2014 was a very worthwhile experience and I would like to congratulate the organisers and all involved in making it happen. This conference has been a significant stepping stone in the early stage of my PhD and I look forward to IMC 2018!

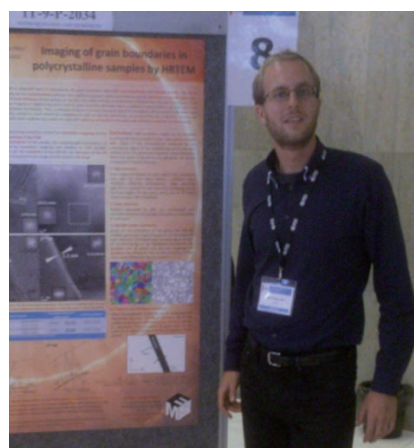
### Alzbeta Kalendova (Czech Republic)

The IMC covered various fields of research where microscopy is used on a daily basis. Being a molecular biologist, I was interested in the life sciences. I especially enjoyed the "Embryology and developmental biology" section, as well as „Structure and function of cells and organelles" and „High-resolution localization of molecular targets and macromolecular complexes". During the poster session, I presented my poster describing generation and behaviour of nuclear actin filaments formed after ectopic expression of actin fused to nuclear localization signal. **The EMS stipend thus gave me the opportunity to meet wonderful experienced scientist from all over the world, to learn new concepts and strategies and receive many useful hints for my research.**



### Ákos Koppány Kiss (Hungary)

I have been enriched by great experience of participating the 18<sup>th</sup> International Microscopy Congress held in Prague. This is why I am very thankful to my professors and to the European Microscopy Society for providing financial support allowing me to take part in the conference. Although there were more than 3000 participants and dozens of exhibitors, numerous sessions ran simultaneously and also thousands of posters were presented, **owning to the excellent location and the professional organization, people could easily orient between the sessions and events of their interest.** I listened to the lectures held mainly in the sessions of Instrumentations and Techniques, so I got informed about the capabilities of the current high-end electron microscopy techniques and also about the latest ideas in data processing. I was really happy that I found a lecture completely fitting to those problems I am dealing with, therefore I could receive really helpful advices. There were also people who were interested in the work presented on my poster, which is on the one hand an inspiring feedback for me, on the other hand I had the opportunity to contact professors and young researchers who have a similar field of interest. I hope I can keep in touch with some of them in the future.



I took the chance to get to know the cultural atmosphere of Prague: I visited the city center and I also visited an opera-performance. Overall I am very glad that I had the opportunity to attend this scientific event. See you next time in Eger!

### Lucie Kocová (Czech Republic)

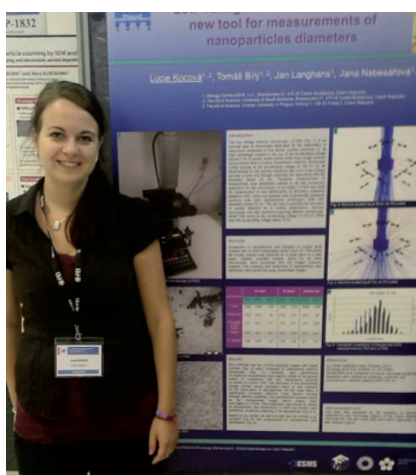
The International Microscopy Congress 2014 was held from 8<sup>th</sup>-12<sup>th</sup> September in the capital city of the Czech Republic - Prague. First I would like to thank the European Microscopy Society (EMS) for the provided scholarship. This international congress was the ideal opportunity for me to present my results. There were many nice posters (more than 1760), which were related to my research and I had an opportunity to discuss my scientific work. The Poster



Session was divided into four specializations – Instrumentation and Techniques, Materials Science, Life Science and Interdisciplinary matters. My poster session was part of the Interdisciplinary session on Monday and Tuesday. My work was focused on “Low voltage electron microscope – new tool for measurements of nanoparticles diameters”. **During the time spent at my poster, I had many interesting dialogs with many scientists which were inspiring for me.**

During the conference I had the chance to attend great exhibition of renowned companies, e.g. FEI, Zeiss, JEOL, TESCAN etc. These companies presented their products and I could have seen everything that I am interested in. Finally, I would like to mention social events which were organized individually by big companies. It was an opportunity for me to make contacts and co-operation and of course these evenings offered great food, drinks and music.

I would like to thank the EMS for sponsoring my trip... Thank you!!



tend the plenary lectures, such as the one held by professor Zhuang from Harvard University (who introduced us to the most recent achievements in super-resolution fluorescence microscopy in life sciences, published in 2013 and 2014 in Cell, Nature etc.), for me as an early stage researcher from low developed scientific community, represented a priceless experience. There were also a lot of other very interesting oral presentations regarding up-to-date knowledge in microscopy instrumentation and techniques applicable in my research area. Aside the scientific program of the highest quality, the IMC 2014 in Prague was held at impressive facilities of Prague Congress Centre, making my expectations of the congress immediately exceeded. **The congress staff was very friendly and helpful.** Truly inspiration for further learning brought to me renowned manufacturers' exhibitions (TESCAN, FEI, JEOL) by their lunch-time talks and demonstrations. They provided me a chance to find out the most recent developments of instruments and software. Very useful information regarding networking with microscopy scientists from different parts of the world were also given to me by exhibition stands of Microscopy Societies from China, Australia, Turkey and United Kingdom. I am really thankful once more with the EMS support for IMC 2014 since it was indeed a very beneficial experience for my professional progress!

## Johanna Kraxner (Austria)

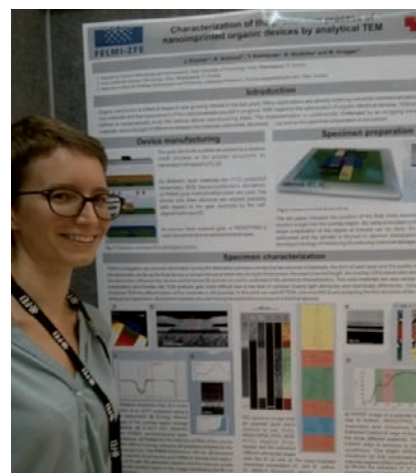
## Ivana Kostic (Serbia)

I am honored to be a recipient of the EMS Scholarship for IMC 2014, held in Prague, Czech Republic, since the IMC 2014 was the biggest congress I've ever attended. Thanks to the EMS scholarship, as a PhD student and early stage researcher I was able to present



two posters related to my PhD work (ID-1-P-1469 and ID-1-P-1470) among the world famous experts in the microscopy of interdisciplinary and life sciences. Unfortunately, the EMS grant this year covered only the registration fee. Nevertheless, having the chance to at-

I would like to thank the EMS for supporting me with a scholarship. The IMC 2014 in Prague was of great interest for me and my research. On the one hand it was very interesting to see the diversity of applications in the field of microscopy. Besides the always very prominent and interesting fields of materials and life sciences, the interdisciplinary fields were also present. Especially research fields like forensic science and microscopy in arts, restoration and archeology were completely new for me. On the other hand, for my own research I was pleased to see that the field of organic electronics is not completely vanished from the



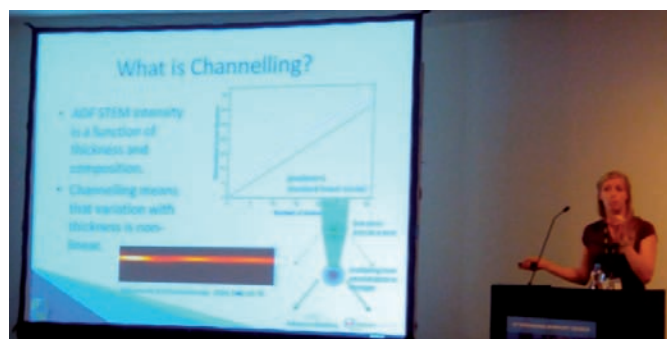
microscopists view. At my last conference, the MC 2013, only very few contributions concerning organic electronics were present. In Prague I had very fruitful discussions at my poster with researchers working in the same field of research.

Currently I also work a lot with EDXS quantification. Therefore it was encouraging to see that many groups try to solve the same problems as we do. The importance of the various parameters to take into account for absolute EDXS quantification is growing. Talks e.g. by Zalužec about the Collection Solid Angle pointed that out.

**I also enjoyed the possibilities to talk to several companies and finally know the person behind the mail address. It is much easier to talk about difficulties or suggest improvements of software face to face. It was also possible to talk to manufacturing companies and to express wishes which would improve their products to our favor.**

Finally I would like to thank the EMS again for giving me the opportunity to attend the IMC 2014.

### Katherine E MacArthur (UK)



The 18<sup>th</sup> International Microscopy Congress held 8<sup>th</sup>-12<sup>th</sup> September in the city of Prague is the largest and most international conference I have had the opportunity to attend. I am very grateful to the EMS for their scholarship to help me attend such a conference in my final year as a PhD student in order to present my work. My talk on "the effect of channelling and tilt on ADF STEM quantification" was well received in a very busy room and I received a lot of helpful feedback that I hope to incorporate into the paper I'm currently writing on the topic.

Before the conference began I was lucky enough to be a member of the IFSM school for early career researchers which included lectures by Barry Carter, David Williams, Joe Michael and Paul Midgley. **This was a fantastic opportunity to meet both with other young researchers and with several members of the IFSM executive committee. It also served as a very**

**helpful gentle introduction to some of the techniques which I was less familiar with before the more in depth talks throughout the conference.**

The remainder of the conference was overwhelming at times with over 3000 delegates in total. However this meant that a wide variety of topics and discussions were available. In fact I often found myself running between different sessions because of the number high end talks which were running in parallel. I attended almost all the sessions on high resolution TEM and STEM as it's particularly applicable to my research. However I also heard many interesting talks in the analytical and in-situ sessions. I tried to attend a selection of the materials specific topics as well, particularly on nanomaterials, as I enjoyed hearing the variety of techniques applied to very similar materials depending on what materials science question they are trying to answer.

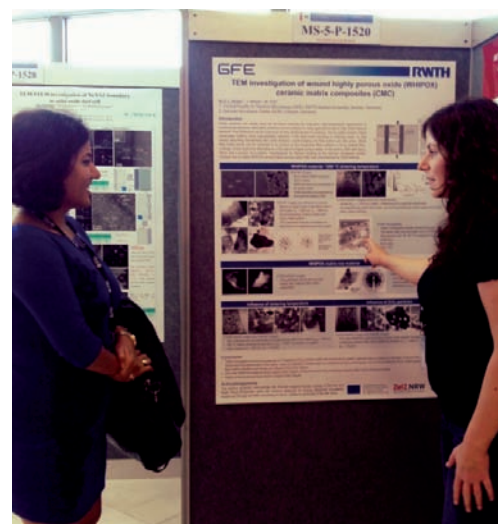
It was a wonderful experience to see all that I've discussed above in the city of Prague, which really is a beautiful city. I was lucky enough to be able to spare an extra day after the conference was over to walk around the old town and the city centre. Some of the buildings were breath taking. Thank you EMS for helping me to attend.

### Merlin Müller (Germany)

First of all, I would like to thank the European Microscopy Society for granting me the scholarship to attend the IMC 2014, which was held in Prague, Czech Republic, from 7<sup>th</sup> to the 12<sup>th</sup> September, 2014.

For me personally, this conference was very successful, because it gave me the opportunity to present my recent research results on my poster entitled "TEM investigation of wound highly porous oxide (WHIPOX) ceramic matrix composites" in the poster session 1 on the 8<sup>th</sup> and 9<sup>th</sup> September.

Furthermore I have met many researchers from all over the world, with whom I could discuss about mine





and their research and related topics at my poster session, at the other poster sessions and at other conference events. In addition, I could listen to many very interesting talks about recent developments in SEM- and TEM-techniques and -investigation methods in a very short time. In particular talks about the TEM preparation- and TEM investigation-methods I am using, such as the Focused Ion Beam (FIB) technique and high resolution TEM (HRTEM) imaging, TEM diffraction analysis, STEM/EDX analysis and TEM/STEM tomography, were very interesting for me and gave me a lot of input for my future work.

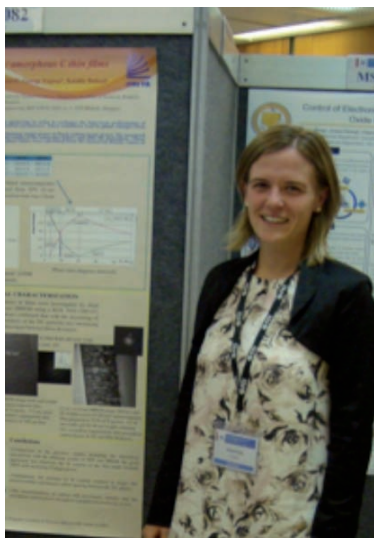
Moreover, I could get in contact with established microscopic companies at their exhibition booths.

**Finally, I would like to thank the EMS again and congratulate the conference organizers for a well-organized conference. I'm already looking forward to the next microscopy conference supported by the EMS.**

### Nikolett Oláh (Hungary)

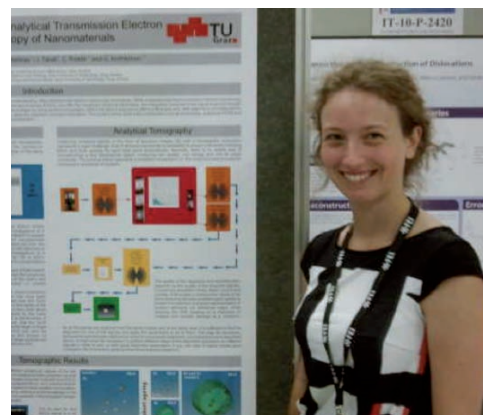
First of all, I would like to thank the EMS for the financial support. The IMC 2014 Prague was my first major conference. As a first year PhD student I could not imagine 3,125 participants and more than 1,500 posters in one place. Many colorful, interesting talks took place in 11 parallel sections. **Thus I really liked that I was able to pre-select lectures by means of the individual program planner.**

The main aim of my research work is the development of C-Ti nanocoatings by magnetron sputtering in order to enhance the long-term performance of surgical implants. We use different investigation techniques such as TEM, XRD, SEM, XPS, EDS, and EELS in order to examine the formed thin films. Furthermore, we are interested in the biological properties of the implants, namely how the implant material behaves in the living organism. **Thus, I could learn something useful from each of the 4 specializations on this conference.** I was especially interested in the microscopy topics, cation exchange reactions, catalytic processes and interactions with cells, tissues and organs. The most impressive presentation was



the "Bioimaging at the nanoscale" presented by Prof. Xiaowei Zhuang from Harvard. I would also like to mention the large number of exhibitors (FEI, JEOL, ZEISS, etc.) and their many demonstrations of new equipment and techniques, which gave me more information about the possibilities of the modern instrumentation. In conclusion, I am glad that I took part in this conference (together with the other programs and parties of FEI and JEM). Thanks to EMS again for granting me a scholarship and to the organizers for their excellent management.

### Angelina Orthacker (Austria)



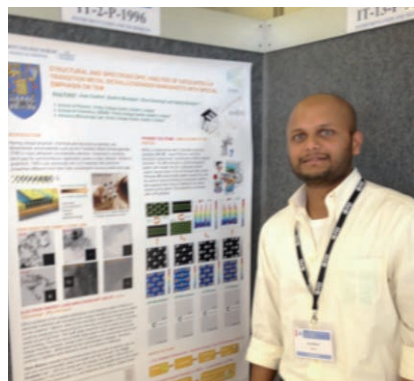
When you think back what you've experienced in the last years, the memories are mostly rather blurred. Just a few exceptional happenings stick out.

They come right to your mind and immediately evoke some emotions. **One such exceptional happening in my life was my participation at the IMC in Prague in September 2014.** I'm filled with happiness and excitement. I did not only experience a beautiful city that hardly sleeps, and the company of nice colleagues and friends. I also got the chance to share my work of the last year with many interested colleagues with whom I also enjoyed very fruitful discussions during the poster session. I also found it extremely interesting and very exciting to learn about new developments from such a great variety of companies present and to directly talk to developers and discuss what's new, and what would be nice to have in the future. And I also got the chance to see very inspiring talks, giving me motivation for my future work in electron microscopy. Therefore I'd like to thank the EMS for financially supporting my visit and by that contributing to the creation of so many inspiring memories I will surely live on for a long time to come.

### Anuj Pokle (Ireland)

I had a great experience at the IMC 2014 conference (Prague) and was glad to be among the 58 who got the EMS scholarship. The conference surely was way

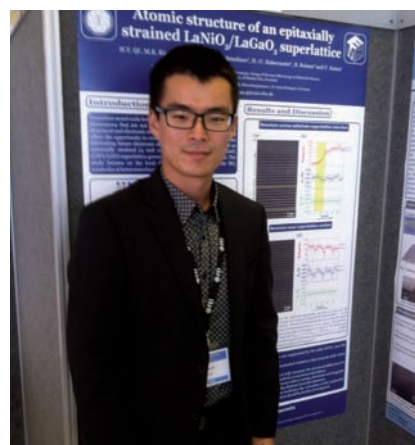
above my expectations. As being a first year PhD student in Trinity College Dublin, it gave me a good exposure to what's going on in the world of microscopy. The level of science presented at the conference was exceptional.



My work comprised of using high end electron microscopy techniques (HRSTEM/EELS) on two dimensional Transition Metal Dichalcogenides (2-D TMD's), studying its structural and edge effects. Some of the workshops and demos organized by HREM, Gatan, Jeol, FEI and Neon were really helpful in knowing the cutting edge technology that we could see in the near future. The most important thing was interaction with some of the eminent researchers of whom I read books and also with other experienced researchers across the world. Prague city was so beautiful that it made me enjoy the conference non-scientifically as well, not to undermine the beer tasting! **I would say IMC is the best platform for early stage researchers to get motivated and move ahead in their field ...**

### Haoyuan Qi (Germany)

The International Microscopy Congress (IMC) in Prague was a great success. Not only because it brought the latest development of electron microscopy and its applications before us. More importantly, it provided a platform for meeting the best scientists and researchers in various related fields. In my opinion, meeting the experts face to face is a valuable experience, especially for early stage researchers.



As a PhD student, I also enjoyed communicating with other young scientists during the congress. Their new ideas and thoughts have never ceased to amaze me. Another highlight of the IMC is interdisciplinarity. You may find a broad

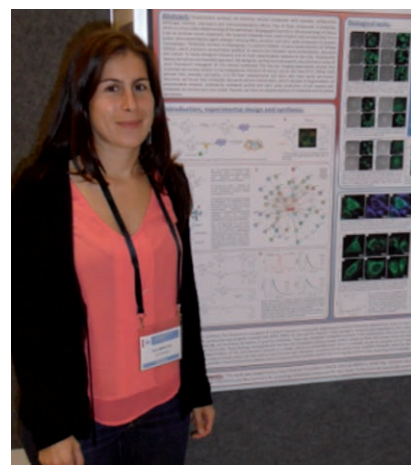
spectrum of topics, including not only microscopy but also materials science and life science. **The conversation between researchers working in different fields is always a source of creativity.**

Attending the IMC has undoubtedly broadened and deepened my understanding of electron microscopy and its related researches. Therefore, I would like to acknowledge the European Microscopy Society (EMS) for the generous offer of the "EMS Scholarship for Students and Early-career Researchers". I sincerely hope that, in the future, more students and young researchers could be given the chance to participate in such high-end conferences.

### Silvie Rimpelová (Czech Republic)

IMC 2014 has completely fulfilled my expectations as an really exciting meeting packed with interesting topics. The congress not only gave me the opportunity to keep informed on the latest progress in microscopy techniques, but **it also motivated me to continue in my research.** Moreover, discussions with the participants brought me

a lot of interesting ideas for new experiments. I strongly believe that IMC 2014 has become a memorable event also for all the other participants. Besides a number of other congress activities, I would like to mention one very important side-event called "Labyrinth of Microscopy"



which was devoted to youth and public. The aim of this outstanding activity was to introduce current microscopy and provide an insight into opportunities that microscopy provides to our life and science. A number of interactive demo stages demonstrating different microscopic techniques used in life sciences, medicine, nanotechnology, and other fields were present on site.

Last but not least, I would like to express my sincerest acknowledgements to EMS for providing the financial support which enabled me to attend the IMC 2014.

### Kathleen Sanen (Belgium)

It is a great pleasure to report on the 18<sup>th</sup> International Microscopy Congress (IMC 2014), for which EMS



granted me a scholarship. From September 7-12, Prague was host city for more than 3000 microscopy experts from 68 countries. The main scientific program comprised four plenary lectures and 58 professional sessions with over 450 oral presentations, one of them by me. As these sessions were organized in parallel, I

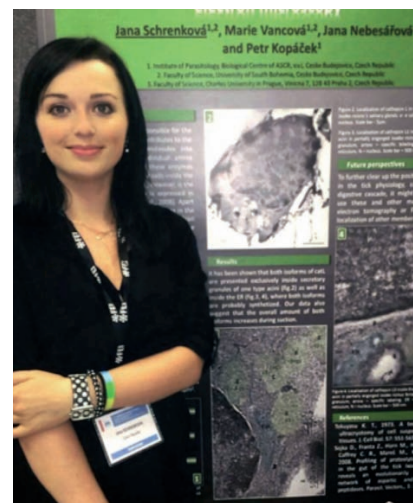


was able to make my own conference "à la carte" by choosing the most relevant presentations according to my research interests. On Wednesday morning, I presented my research "Label free optical imaging of engineered neural tissue formation by second harmonic signals from collagen type I" in the life sciences session "Live imaging of cells, tissues and organs". The multidisciplinary nature of the audience became apparent during the discussion: while some attendees asked for biological (e.g. ultrastructural properties of the collagen type I fibrils in the hydrogel) or microscopic (polarization of the incident light) details, others showed positive interest in the theory we developed to analyze our experimental data and the applicability of this model in other sample types (e.g. multicolor or 3D images).

I was very pleased with the interest shown in my research and received useful feedback and ideas from different people, each from their own expertise, for future experiments and projects. This conference also provided a platform that promoted communication and information exchange between industry and academics. I attended a lunch workshop of Zeiss and visited many of the 76 exhibitors to find out on the most recent developments on instruments, software and microscopy tools. Although four evenings were dedicated to the nearly 2000 poster presentations, it was quite a challenge to find the posters I marked in my abstract book, which was the only small remark I had concerning the organization of IMC 2014. Taken together, this conference offered a highly accessible and accurate source of theoretical, technical and practical knowledge as it brought together professionals of different fields. I am convinced that attending this meeting was a worthwhile investment in my PhD project and will pay off for years to come.

## Jana Schrenková (Czech Republic)

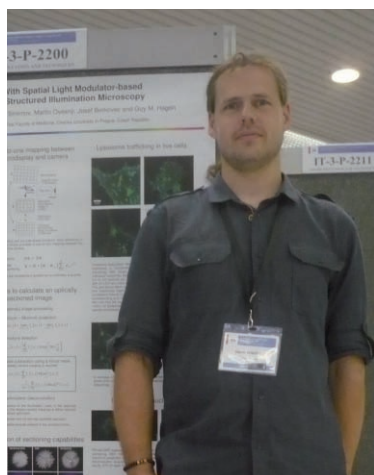
Thank you, EMS! Thank you for your financial support that enabled me to attend the 18<sup>th</sup> International Microscopy Congress in Prague. As a fresh Ph.D. student, I was given a great opportunity to become a part of the biggest event of this year in the world of microscopy. IMC 2014 completely came up to my expectations regarding the content and organization of the whole conference! With more than 400 oral presentations, it was really easy to choose topics that I was interested in and that were suitable for my research. Most of all, I appreciate the latest methods for TEM sample preparation that were presented and that I am going to include into my research. **I also had a great chance to meet the best authorities in the field of electron microscopy who so far I had known just as first authors of my favorite articles.** Moreover, I was surprised by the improvements and developments in other fields of microscopy, most of all in the photon microscopy. The number of exhibitors and their top equipment was also amazing. As far as I am concerned, the poster session was the most beneficial part of the whole congress giving me the chance to present my work and to meet many fellows who are interested in the same scientific issues. Thank you again, next time in Sydney!



## Zdenek Svindrych (Czech Republic)

The 18<sup>th</sup> International Microscopy Congress held in Prague was definitely the biggest scientific meeting I had the chance to attend in 2014. **Although the majority of the talks and posters were focused on electron microscopy, I attended many interesting talks about fluorescence microscopy and superresolution microscopy in particular.** I'm also grateful that I could personally meet top scientists in my field, such as Xiaowei Zhuang and Christoph Cremer. During poster sessions I also enjoyed valuable discussions with numerous researchers interested in structured illumination microscopy, such as Rainer Heintzmann. Also other posters presented the latest developments in

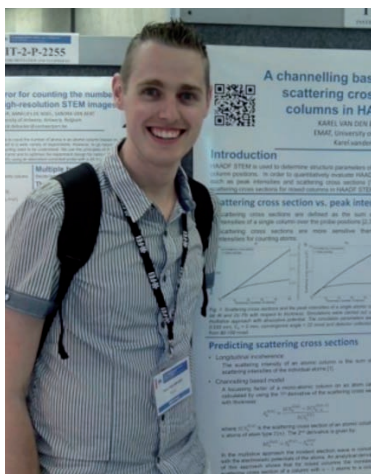




people and make new friends among scientists and to find valuable contacts in industry. I'm very grateful to EMS for providing me with a scholarship so I could take part in this meeting.

## Karel van den Bos (Belgium)

First of all I would like to thank the EMS for awarding me the scholarship to attend the IMC 2014 in Prague. It was the first congress I ever attended and it has been a great experience. There was quite an intensive schedule with lectures in the morning and afternoon and poster sessions in the evening. I was surprised by the amount of lectures given in the different "instrumentation and techniques" sessions, especially the "High-resolution TEM and STEM" session. **I did not know I was working with so many others in the same field of research.** The large amount of interesting lectures taught me a lot about the new developments both in theory and experimental design. The only downside of the busy schedule was that lectures were overlapping and I had to choose. The plenary lectures were a very nice way to get introduced with the different topics of microscopy and gave me the chance to broaden my perspective. In the poster session of Wednesday and Thursday evening I presented our work entitled "A channeling based approach to predict scattering cross sections of mixed columns in HAADF STEM images". For me



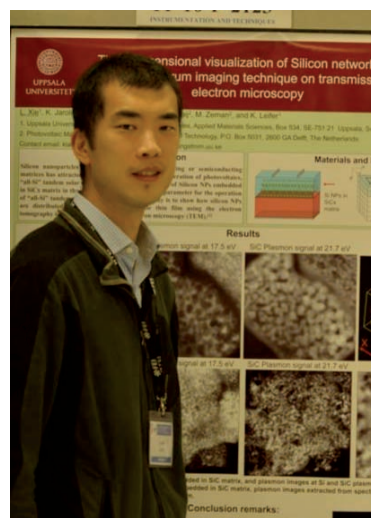
light and electron microscopy and the opportunity to discuss the topics with the authors directly is very valuable.

**I have also spent several lunch breaks among commercial exhibitors, learning about the latest technological development in microscopy instrumentation.** The IMC 2014 was a great opportunity to meet

this was the most interesting part because here I got the chance to meet and discuss with the experts and other young scientists that are working in the same area. The discussions were fruitful and gave me lots of new ideas to work on in the future. Overall, this conference was a great learning opportunity and gave me even more motivation for my further research. I would also like to thank the organizers of the conference for a well-organised and attractive conference. I am already looking forward to the next microscopy conference.

## Ling Xie (Sweden)

First, I would like to thank the European Microscopy Society (EMS) for the scholarship provided and supporting me to attend



the 18<sup>th</sup> International Microscopy Congress held in Prague. The conference provides me with a great opportunity to learn the latest progress in the field of electron tomography applied in materials science. As a Ph.D. student, I was very happy to present two posters entitled "Three dimensional electron tomography characterization of Islet Amyloid Poly-

Peptide aggregates in drosophila melanogaster" and "Three dimensional visualization of Silicon networks by using spectrum imaging technique on transmission electron microscopy". During the poster session, I have had inspiring discussions with scientists on the topics of four dimensional spectra-imaging technique in materials science and the application of electron tomography on biology related materials.

I am also very pleased that I could attend all interesting lectures on electron tomography topics and the lectures help me improve the knowledge on post-processing on tomographic data set. The plenary talk given by Prof. Paul A. Midgley reviewed the development of electron tomography technique and also the application of electron tomography in materials science. **I felt like taking a visiting tour in the 3D nano-world which was very exciting and broadened my knowledge in the field of electron tomography.** Again, I want to express my gratitude to the EMS for the financial support.

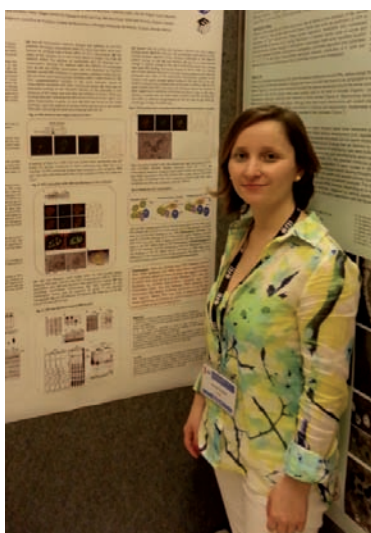


## Sukriye Yildirim (Canada)

This year I had a great chance to attend to 18<sup>th</sup> International Microscopy Congress which was held in Prague. I am really grateful to the European Microscopy Society (EMS) for their financial support which enabled me to travel from Canada to the Czech Republic for this outstanding meeting.

During the conference, we had a chance to learn more about new microscopy techniques that can overcome the resolution limit, namely Structured Illumination Microscopy (SIM), Stimulated Emission Depletion (STED) and Localization Microscopy (PALM, STORM). With these cutting edge techniques scientists are able to look into subcellular structures with a lateral resolution up to 20 nm which is 10 times improved compared to conventional microscopy methods. Another great achievement of the microscopy field is the development of light sheet microscopy in which scientists can visualize the development of the mouse, zebra fish and drosophila embryos without damaging the cells. Moreover, correlation microscopy studies allow us to compare the localization of each protein in light and electron microscopy level. In the meeting we heard about all these new techniques and how they were applied to answer a specific question in cell and developmental biology. Moreover, a talk delivered by Ron Heeren pointed out the new possibilities in personalized medicine using mass spectrometry registered with SIM and immunohistochemical data. We also heard about how new genes are identified in the pathology of breast cancer by using high throughput siRNA approach together with deep imaging in the context of chromosome translocations, a method developed by Tom Misteli and his group. I believe the meeting was very beneficial for all of us, because it covered a wide range of scientific field such as life sciences and materials sciences. **Demonstrations of new microscopes and accessories gave us an idea what to expect in future from the scientific world output and what we need to improve in our own microscopy facilities.**

Last but not least, we got an opportunity to meet colleagues who are experts in their respective fields and



exchange ideas related to our ongoing projects. I would like to thank to EMS once more for their support to promote science.

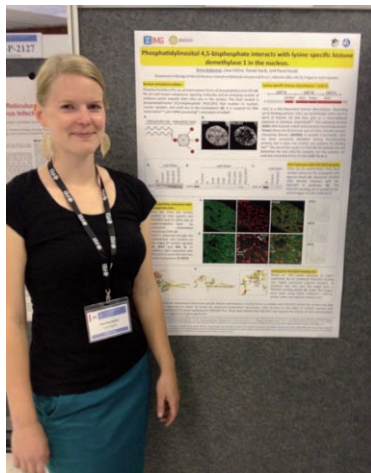
## Jun Yin (Belgium)

First of all, I would like to thank European Microscopy Society (EMS) for supporting me to attend the International Microscopy Congress (IMC 2014). The 18<sup>th</sup> International Microscopy Congress is hosted by the Czechoslovak Microscopy Society, one of the members of European Microscopy Society (EMS). The congress took place at the Prague Congress Centre (PCC) from 7 to 12 September, 2014. In the delightful season of September and the beautiful city of Prague, the congress was finished successfully, leaving me a lot of wonderful memories.

One week's congress was very meaningful. It was a great opportunity for professionals within the academic, research and industrial communities to exchange and share the latest scientific findings and technology developments concerning different techniques in microscopies, such as TEM, SEM, STEM, AFM etc. **The invited lectures by Prof. Christoph Cremer, Prof. Xiaowei Zhuang, Dr. Kazutomo Suenaga and Prof. Paul Midgley were really impressive, standing at a very high level, showed us the basic knowledge, interesting results and progress in their respective fields.** Hundreds and thousands of orals and posters in the sessions of instruments and materials were presented in the congress, they are rich and interesting, gave me a lot of inspirations. As a PhD student in the last year, it was an important chance for me to present my research work as a poster. The topic that I have presented was conduction and dissipation of electrostatic charges: fundamental study by Scanning Probe Microscopy. After having discussed with the other researchers and listened to their comments, I got lots of ideas to enhance my research work. I was so pleased to have this opportunity to expand my horizon, learn a lot of latest scientific findings and technology developments.

## Kalasova Ilona (Czech Republic)

I would like to thank EMS for their scholarship to attend the 18<sup>th</sup> International Microscopy Congress in Prague, Czech Republic. I had a great time during the conference. The congress provided lectures from different scientific fields on cutting-edge microscopy techniques. I found especially interesting the life sciences sessions and interdisciplinary talks. Particularly, I was very fond of Pavel Tomancak's presentation about light sheet microscopy but I attended many other interesting talks. I think that the confe-

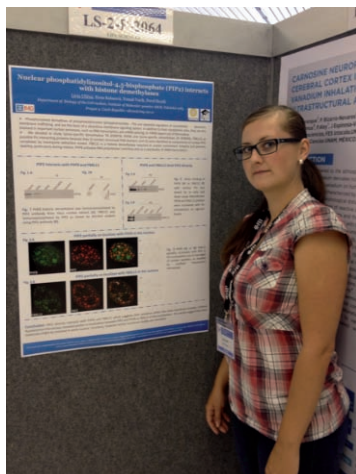


rence was very useful for me as a PhD student. I have learned a lot of new information and broadened my knowledge on different microscopy techniques. Moreover, I presented my poster "Phosphatidylinositol 4,5-bisphosphate interacts with lysine-specific histone demethylase 1 in the nucleus" during the life sciences poster

sessions. I had the opportunity to meet a lot of fascinating people and had many interesting conversations not only about research. Altogether, I believe that the IMC 2014 congress was a great success.

### Livia Ulicná (Czech Republic)

First of all I would like to thanks EMS for funding me to attend IMC 2014 in Prague. As a Ph.D. student doing research in the field of life sciences, I found very interesting talks and poster presentations in the Life sciences symposium and also in the Interdisciplinary symposium. It was a pleasure to have the opportunity to choose



between several lectures from different fields which allowed me to broaden my perspective in the world of microscopy and to learn about new techniques. In our laboratory we are very interested in using Super-resolution fluorescence microscopy so it was a great experience to listen to a talk given by Prof. Xiaowei Zhuang. The IMC 2014 conference was well organized, invited speakers were the best in their field and also the poster session was diverse and interesting. During the whole week we met interesting people – experts in their research field and we had a fruitful discussion not only about our research but also about the very rapid development of microscopy techniques. The conference was very inspirational and valuable therefore I'm looking forward to the next International Microscopy Conference.



**2013 EMS OUTSTANDING PAPER AWARD**

**RECENT AND FORTHCOMING BOOKS**

**FINANCIAL REPORT OF EMS BUDGET**

**EUROPEAN MICROSCOPY SOCIETIES**

**EUROPEAN CORPORATE MEMBER  
ASSEMBLY (ECMA)**

**EMS CALENDAR 2015**

**APPLICATION FORMS  
(MEMBERS - ECMA)**



# 2013 EMS OUTSTANDING PAPER AWARD

For this fourth round of the EMS Outstanding Paper Award, 16 nominations were received well spread over the different categories. The jury\*, chaired by Rik Brydson as non-voting member of the EMS Executive Board, selected a winning paper for each of the three categories of the Award, which was later confirmed by the EMS Executive Board. The following papers received the 2013 EMS Outstanding Paper Award in the respective categories:

1. *Instrumentation and Technique Development*: "A new aberration-corrected, energy-filtered LEEM/PEEM instrument II. Operation and results" by R.M. Tromp, J.B. Hannon, W. Wan, A. Berghaus & O. Schaff, *Ultramicroscopy*, 127 (2013) 25–39. The jury motivates its decision as follows: "Following an earlier paper in 2010 describing the principles and design of the instrument, this work is an excellent description of the final construction, alignment, characterization and operation of a brand new aberration-corrected and energy filtered LEEM/PEEM. Ultimate performance in LEEM is demonstrated to be very close to the theoretical limit."
2. *Materials Sciences*: "Dislocations in bilayer graphene" by Benjamin Butz, Christian Dolle, Florian Niekkel, Konstantin Weber, Daniel Waldmann, Heiko B. Weber, Bernd Meyer & Erdmann Spiecker, *Nature* (online), doi:10.1038/nature12780. The jury motivates its decision as follows: "This paper uses conventional TEM techniques at their optimum in a study of dislocations in the thinnest possible layered material hosting line defects. Measurements are combined with both classical theory and atomistic simulations."
3. *Life Sciences*: "A mammalian KASH domain protein coupling meiotic chromosomes to the cytoskeleton" by Henning F. Horn, Dae In Kim, Graham D. Wright, Esther Sook Miin Wong, Colin L. Stewart, Brian Burke & Kyle J. Roux, *Journal of Cell Biology*, 202: 1023-1039. The jury motivates its decision as follows: "This innovative paper uses a wide variety of different techniques both in vitro and in vivo to study a fundamental event in cell biology. The impact of the results will be over a wide range of cell biology."

Rudolf Tromp, Benjamin Butz and Graham Wright, standing in for Henning Horn, received their metal-on-wood plaque from the EMS President Roger Wepf and jury chair Rik Brydson at a special ceremony at the IMC 2014 in Prague.



The Executive Board extends its warmest congratulations to all winners and we look forward to a new round of excellent papers for the 2014 competition.

## **\*OutPA 2014 – 2016 jury members (judging on papers in 2013 - 2014 - 2015)**

- Prof Alice Warley (King's College, Guy's Hospital London, UK)
- Prof Alberto Diaspro (Optical Nanoscopy, Istituto Italiano di Tecnologia, Genova, Italy)
- Prof Manfred Ruhle (Max Planck Institute für Metallforschung, Stuttgart, Germany)
- Prof Eva Olsen (Department of Applied Physics, Chalmers, Sweden)
- Prof Christian Colliex (Laboratoire de Physique des Solides, Orsay, France)
- Prof Dirk Van Dyck (Electron Microscopy for Materials Science, Antwerp, Belgium)

**Chair:** Rik Brydson (Institute for Materials Research, University of Leeds, UK)



# RECENT AND FORTHCOMING BOOKS

Electron and other forms of microscopy continue to occupy a respectable place in the scientific publishers' catalogues. The following list is biased towards the physical and materials sciences but a few from the life sciences are also present.

There are undoubtedly books on electron microscopy in languages other than English that I am unaware of – members of the EMS are invited to send information about such titles to [hawkes@wanadoo.fr](mailto:hawkes@wanadoo.fr).

*Note: prices should always be checked.*

## *Physical and Materials Sciences*

N. Tanaka, Scanning Transmission Electron Microscopy of Nanomaterials, Imperial College Press, London and World Scientific, Singapore, 2015. ISBN: 978-1-84816-789-6 (Price: £83) (Nice complement to Pennycook and Nellist's collection).

E. Bauer, Surface Microscopy with Low-energy Electrons. Springer, 2014. ISBN: 978-1-4939-0934-6 (Price: €137.14, US\$179, £117) (Authoritative summary of a lifetime in the subject).

J. Thomas & T. Gemming, Analytical Transmission Electron Microscopy. Springer, 2014. ISBN: 978-94-017-8600-3 (Price: €79.11, US\$99, £67) (Beginners' text).

AMTC Letters, International Journal of Advanced Microscopy and Theoretical Calculations. Japan Fine Ceramics Center, Nagoya. ISSN: 1882-9465.

A. Ziegler, H. Graafsma, X.F. Zhang and J.W.M. Frenken (Eds), In-situ Materials Characterization across Spatial and Temporal Scales. Springer, 2014. ISBN: 978-3-642-45151-5 (Price: €137.14, US\$179, £93.50). Springer Series in Materials Science, vol. 193.

C.S.S.R. Kumar (Ed.), Transmission Electron Microscopy Characterization of Nanomaterials. Springer, 2014. ISBN: 978-3-642-38933-7 (Price: €262.69, US\$339, £224.50).

C.S.S.R. Kumar (Ed.), Surface Science Tools for Nanomaterials Characterization, Springer, 2015. ISBN: 978-3-662-44550-1 (Price: to be announced).

M. Sardela (Ed.), Practical Materials Characterization, Springer, 2014. ISBN: 978-1-4614-9280-1 (Price: €105.49, US\$129, £90).

D.-M. Tang, In situ Transmission Electron Microscopy Studies of Carbon Nanotube Nucleation Mechanism and Carbon Nanotube-clamped Metal Atomic Chains, Springer 2013). ISBN: 978-3-642-37258-2, ISSN: 290-5053 (Price: €105.49, US\$129, £72).

L.D. Francis, A. Mayoral and R. Arenal (Eds), Advanced Electron Microscopy, Springer 2015. ISBN: 978-3-319-15176-2 (Price: approx.. €105.49, US\$129, £86.50).

A. Bagmut, Electron microscopy of films deposited by laser evaporation. Monograph / A. Bagmut.- Kharkiv: Publishing NTU "KPI", 2014. - 304 p. (in Russian).

## *Tribute to Akira Tonomura*

K. Fujikawa and Y.A. Ono (Eds), In Memory of Akira Tonomura, Physicist and Electron Microscopist. World Scientific, Singapore 2014. ISBN: 978-981-4472-88-3 (cloth), 978-981-4472-89-0 (paper) (Price: £84) (Splendid tribute to a great holographer).

## *Life Sciences*

J. Kuo (Ed.), Electron Microscopy, Methods and Protocols, 3rd ed. Springer/Humana, 2014. ISBN: 978-1-62703-775-4; ISSN: 1064-3745 (Price: €148, US\$179, £126). Methods in Molecular Biology 1117.

I. Schmidt-Krey and Y. Cheng (Eds), *Electron Crystallography of Soluble and Membrane Proteins, Methods and Protocols*. Springer/Humana, 2013. ISBN: 978-1-62703-175-2; ISSN: 1064-3745 (Price: € 131.82, US\$159, £112). *Methods in Molecular Biology* 955.

F. Hossler *Ultrastructure Atlas of Human Tissue*. Wiley–Blackwell, 2014. ISBN: 978-1-118-28453-7 (£167, €200.40).

### **3-D Reconstruction**

G.T. Herman and J. Frank (Eds), *Computational Methods for Three-Dimensional Microscopy Reconstruction*. Birkhäuser/Springer, 2014. ISBN: 978-1-4614-9520-8, ISSN: 2296-5009 (Price: € 100.21, US\$99, £68).

J. Frank (Ed.), *Found in Translation. Collection of Original Articles on Single-particle reconstruction and the Structural Basis of Protein Synthesis*. World Scientific, Singapore 2014. ISBN: 978-981-4522-80-9 (Price: £98).

### **Other Topics**

K.D. Sattler (Ed.), *Fundamentals of Picoscience*. CRC Press, Boca Raton 2014. ISBN: 978-1-46-650509-4. (Price: US\$ 179.95, £114).

G. Zhang and N. Manjooran, *Nanofabrication and its Application in Renewable Energy*. Royal Society of Chemistry, Cambridge, 2014. ISBN: 978-1-84973-640-4, ISSN: 1757-7136 (Price: £145).

C. Giacovazzo, *Phasing in Crystallography, a Modern Perspective*. Oxford University Press, Oxford, 2014. ISBN: 978-0-19-968699-5 (Price: US\$110).

M. Ladd, *Symmetry of Crystals and Molecules*. Oxford University Press, Oxford 2014. ISBN: 978-0-19-967088-8 (Price: £55) (Student text).

J. Zegenhagen, *The X-ray Standing Wave Technique, Principles and Applications*. World Scientific, Singapore and Imperial College Press, London 2014. ISBN: 978-981-277-900-7 (Price: US\$111, £73.50).

F. Frémont, *Young-type Interferences with Electrons*. Springer, Berlin 2014. ISBN: 978-3-642-38478-3, ISSN: 1615-5653 (Price: €83.29, US\$99, £72) (A most original and thought-provoking book).

P. Lin, *New Computation Methods for Geometrical Optics*. Springer, Singapore, 2014. ISBN: 978-981-4451-78-9 (Price: € 105.49, US\$129, £90) (Introduces homogeneous coordinates into this area).

R. Barabash and G. Ice (Eds), *Strain and Dislocation Gradients from Diffraction*. World Scientific, Singapore, 2014. ISBN: 978-1-908979-62-9 (Price: £79).

J.R. Bowen, L.T. Kuhn, A. Hauch and P.S. Jorgensen, *Electron Microscopy Characterisation of Electrochemical Cells*. Springer Briefs in Applied Science and Technology 2014. ISBN: 978-1-4471-5654-3 (Price: £45, €52.70, US\$ 70).

*4D Visualization of Matter: Recent Collected Works of Ahmed H. Zewail*. World Scientific, Singapore and Imperial College Press, London 2014. ISBN: 978-1-78326-504-6, cloth, 978-1-78326-505-3, paper (Price: £62, cloth, £32 paper).

*Seeing and measuring with electrons, Transmission Electron Microscopy today and tomorrow* C.R. Physique, Volume 15, Issues 2–3, ed. C. Colliex.



# FINANCIAL REPORT OF EMS BUDGET

## Financial report

### Budget 2013 final, budget 2014 running, budget 2015 outlook

#### Budget 2013, final

##### Incomings

The majority of incomings were the contributions from the national societies and the ECMA members. In addition, EMS received the revenues from the EMC2012 in Manchester, which amounted to € 20.471,00. Further incomings came from individual members, interest rates and from job postings. In summary, an amount of € **60.617,32** was accrued.

##### Expenses

In 2013 EMS supported one extension meeting (MC2013 Regensburg) and sponsored eight supported meetings (together € 7.500,00). 20 scholarships granted to young scientists for their attendance at the MC2013 were issued, in total € 5.000,00. Two board meetings were held, one embedded in the MC and one extra meeting in March in Zurich (a total of € 6.768,06). The three Outstanding Paper Awards added up to € 3.000,00. Together with the costs for a half-time secretary and bank costs we had a total of expenses of € **48.828,26**.

In summary, in 2013 we ended with a plus of € **11.789,06**. At the end of the year we had € **68.055,41** at our deposit. As of December 31<sup>st</sup>, 2013 EMS had total assets of € **111.968,65**.

#### Budget 2014, running; (July 28<sup>th</sup>, 2014)

##### 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 ECMA members were sent out by the end of January and the deadline was set for April, 30; reminders were sent to ECMA members not responding (deadline: end of September); to date, contributions of 11 companies are missing. Invoices to national societies were sent out once the updated member lists were available (April) and deadline set to end of May. Reminders were sent to those not responding with deadline set to end of September. Currently, fees of 3 societies are pending. Additionally, invoices for membership fee requests were sent to individual members. Further

incomings will be accrued by interest rates and, so far, by 1 job posting of non-EMS members. Together, incomings can be expected to amount to € **38.200**.

##### Expenses

There will be no EMS extension meeting this year because of the IMC2014. EMS will support 10 sponsored meetings (á € 750, in total € 7.500). EMS will issue 58 scholarships for attendance at IMC in the amount of € 11.426 (early students fee, á € 197). Further expenses will include the Outstanding Paper Awards, costs for one half-time secretary, two board meetings (one at IMC and one earlier this year in Vienna) and bank costs, amounting to a total of estimated € **52.000**. It is thus calculated to end the budget year 2014 with a minus of € **13.800**.

#### Budget 2015, proposal

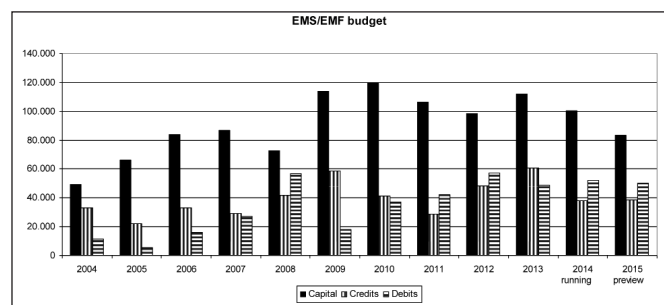
##### Incomings

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 € **38.400**.

##### Expenses

EMS can financially support 2 extension meetings in 2015 with € 1.500 and up to 8 sponsored meetings (á € 750); in total € 7.500). Furthermore, up to 30 scholarships (á € 250) for support of young scientists can be issued, in total € 7.500. Further expenses will include the Outstanding Paper Awards, costs for half-time secretary, two board meetings (one extra, one included in a meeting) and bank costs, amounting to a total of estimated € **53.500**.

It is thus calculated to end the budget year 2015 with a minus of € **15.100**.



Christian Schöfer, m.p.  
Treasurer EMS/EMF

Vienna, 28<sup>th</sup> July 2014

# EUROPEAN MICROSCOPY SOCIETIES

**Number of EMS Members by societies (2014)**

<b>Number of EMS Members by societies (2014)</b>			
<i>Society</i>			<i>Number of Members</i>
Armenian Electron Microscopy Society	AEMS	Armenia	8
Austrian Society for Electron Microscopy	ASEM	Austria	159
Belgian Society for Microscopy	BSM	Belgium	318
Croatian Microscopy Society	CMS	Croatia	74
Czechoslovak Microscopy Society	CSMS	Czech Republic	265
German Society for Electron Microscopy	DGE	Germany	355
Electron Microscopy and Analysis Group	EMAG	UK	313
Hellenic Microscopy Society	HMS	Greece	60
Hungarian Society for Microscopy	HSM	Hungary	111
Israel Society for Microscopy	ISM	Israel	118
Microscopical Society of Ireland	MSI	Ireland	96
Dutch Society for Microscopy	NVvM	The Netherlands	224
Polish Society for Microscopy	PTMi	Poland	96
Royal Microscopical Society	RMS	UK	1190
Nordic Microscopy Society	SCANDEM	Scandinavia	308
Slovene Society for Microscopy	SDM	Slovenia	99
French Microscopy Society	SFμ	France	438
Italian Society of Microscopical Sciences	SISM	Italy	331
Spanish Society for Microscopy	SME	Spain	282
Portuguese Society for Microscopy	SPMicros	Portugal	175
Serbian Society for Electron Microscopy	SSM	Serbia	92
Swiss Society for Optics and Microscopy	SSOM	Switzerland	363
Turkish Society for Electron Microscopy	TEMD	Turkey	44
ECMA	ECMA		40
Individual members	IND		24



# EUROPEAN CORPORATE MEMBER ASSEMBLY (ECMA)

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- Fischione Instruments
- ISS Group Services Ltd
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- JSC Nanopromimport
- Klocke Nanotechnik
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- Phase Focus Limited
- Renishaw plc
- SmarAct GmbH
- Spectral Solutions AB
- Technoorg Linda
- Tietz Video and Image Processing Systems
- Tissue Gnostics
- Wiley-VCH

# EMS CALENDAR 2015

## EMS extensions

- **mmc2015**

June 29 - July 2, 2015  
Manchester Central, Manchester, UK

- **MCM2015**

August 23-28, 2015  
Eger, Hungary  
Organization: ASEM, CMS, CSMS, HSM, SISM, SSM, SDM, TEMD

## EMS sponsored events for 2015

- **Winterschool 2015 - Practical course in advanced 3D microscopy**

January 18-23, 2015  
University of Zurich / ETH Zurich, Switzerland

- **19<sup>th</sup> International Conference on Microscopy of Semiconducting Materials (MSM-XIX)**

March 29 - April 2, 2015  
Murray Edwards College, University of Cambridge, UK

- **2<sup>nd</sup> Workshop on EELS in Materials Science**

May 18-20, 2015  
Uppsala, Sweden

- **Advanced Course on Cryo-Electron Tomography**

June 6-7, 2015: Optional Pre-Course  
June 8-12, 2015: Main Part  
Vienna, Austria

- **Microscopy at the Frontiers of Science 2015 (MFS2015)**

September 9-11, 2015  
Porto University, Portugal



# APPLICATION FOR MEMBERSHIP

## 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 €5 for members of European national microscopy societies. Please return the following form to:*

To subscribe to the EMS, please complete this form\* and mail to:

**Nick Schryvers, Secretary EMS, University of Antwerp, CGB,**

**Groenenborgerlaan 171, B-2020 Belgium**

[nick.schryvers@uantwerpen.be](mailto:nick.schryvers@uantwerpen.be)

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EMS Treasurer, Prof. C. Schöfer, Medical University of Vienna, **+43 14 0160 937799**,  
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Signature:

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## Notes :





# EUROPEAN CORPORATE MICROSCOPY ASSEMBLY (ECMA)

## Subscription form

To subscribe to the ECMA, please complete this form\* and mail:  
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- ☐ Silver ECMA member (250 €)
- ☐ Bronze ECMA member (100 €)

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