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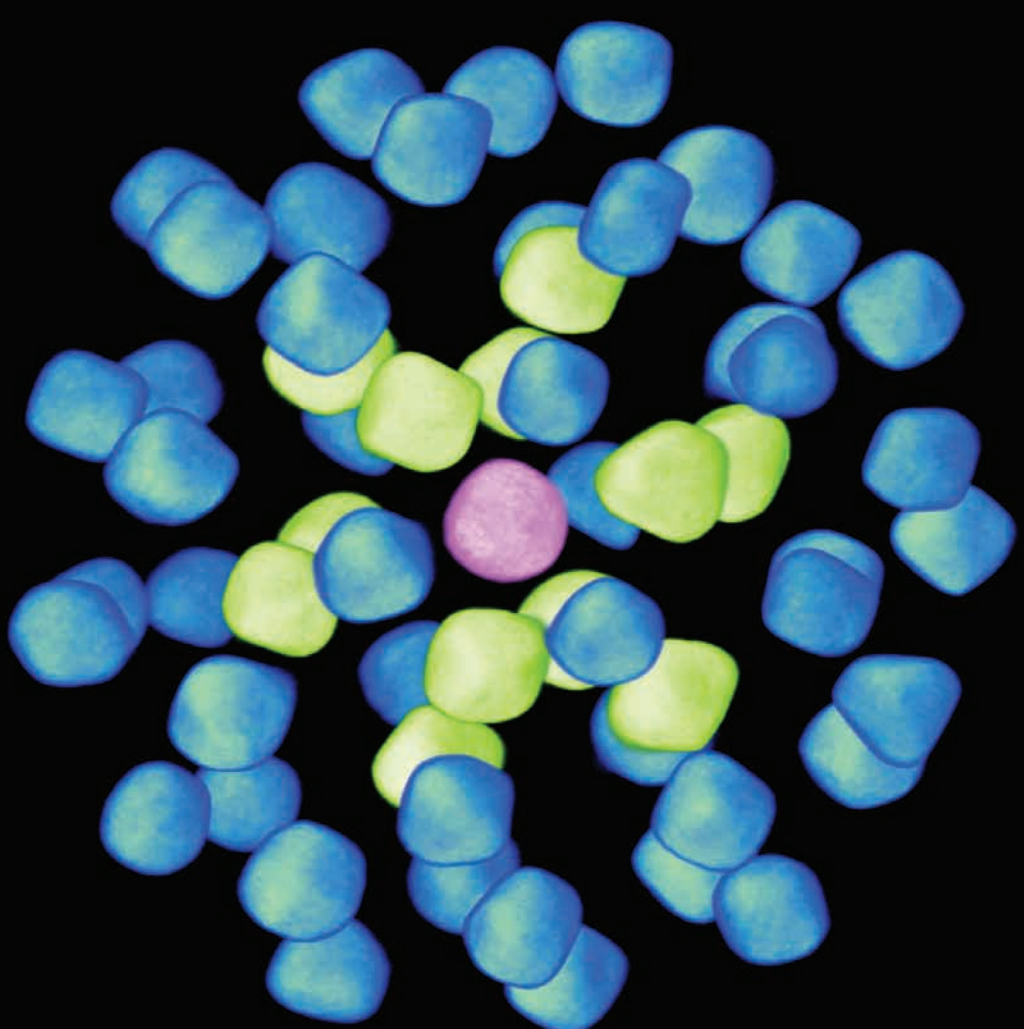

Yearbook 2013

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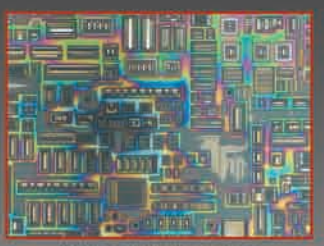
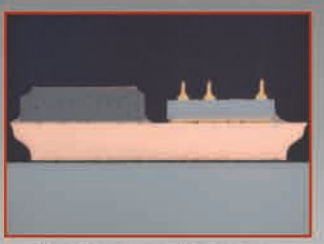


Parallel Delayered Integrated Circuit

Solder Bump



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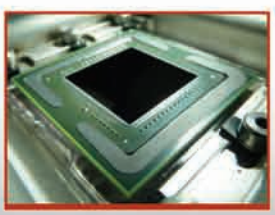

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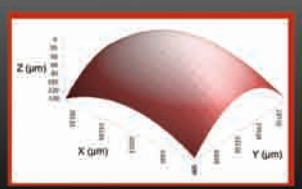
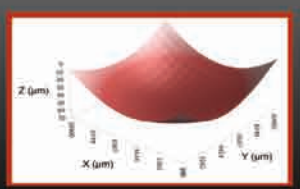


3D profile of a convex device



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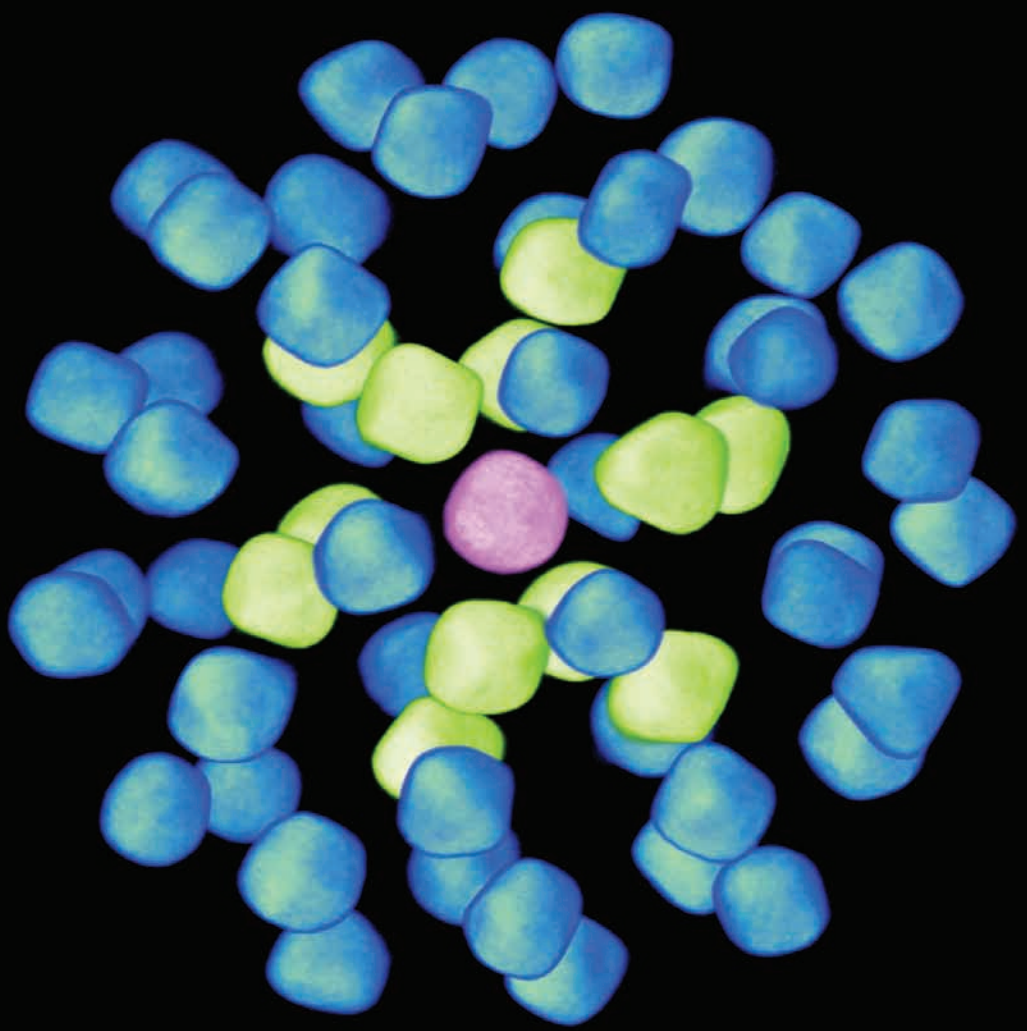

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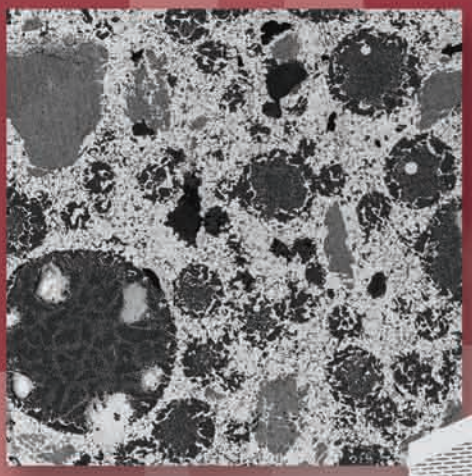

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Preface

Dear EMS members,

This is already the fourth Yearbook since we changed the layout and removed the long list of member addresses. As before, this Yearbook contains reports from the EMS activities of the past year, in which we celebrated the 15th anniversary of our society. The latter is documented in the contribution from the President and Secretary. The reported activities include a very successful EMS Extension in Regensburg showing a promising evolution of such regional meetings. The EMS lecturers at MC2013 have written two very interesting scientific contributions, the early stage researchers who received an EMS scholarship to attend this meeting have provided nice reports of their experiences in Regensburg and a note on the winners of the 2013 Outstanding Paper Award receiving their plaques during the dinner party is also added. Several reports of other EMS sponsored events again show the lively activity in the field of microscopy throughout Europe. From the other submitted reports it is clear that many institutes are increasing their instrumental capacities with novel microscopes of various types so we can expect to see many more interesting new results in future meeting. In 2014, and next to our already traditional activities, EMS focuses on supporting the International Microscopy Congress IMC2014 in Prague, so we look forward to seeing all of you there.

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

Nick Schryvers
Secretary EMS

COVER: 3D visualisation of a self-assembled cluster of polystyrene-stabilized gold nanoparticles, obtained using electron tomography. The size of individual particles is 20 nm. The different colours highlight different concentric shells in which the particles are organized.[1]

(1) Sánchez-Iglesias, A.; Grzelczak, M.; Altantzis, T.; Goris, B.; Perez-Juste, J.; Bals, S.; Van Tendeloo, G.; Donaldson Jr., S. H.; Chmelka, B. F.; Israelachvili, J. N.; Liz-Marzan, L. M. Hydrophobic interactions modulate self-assembly of nanoparticles, ACS Nano, 2012, 6, 11059-11065.

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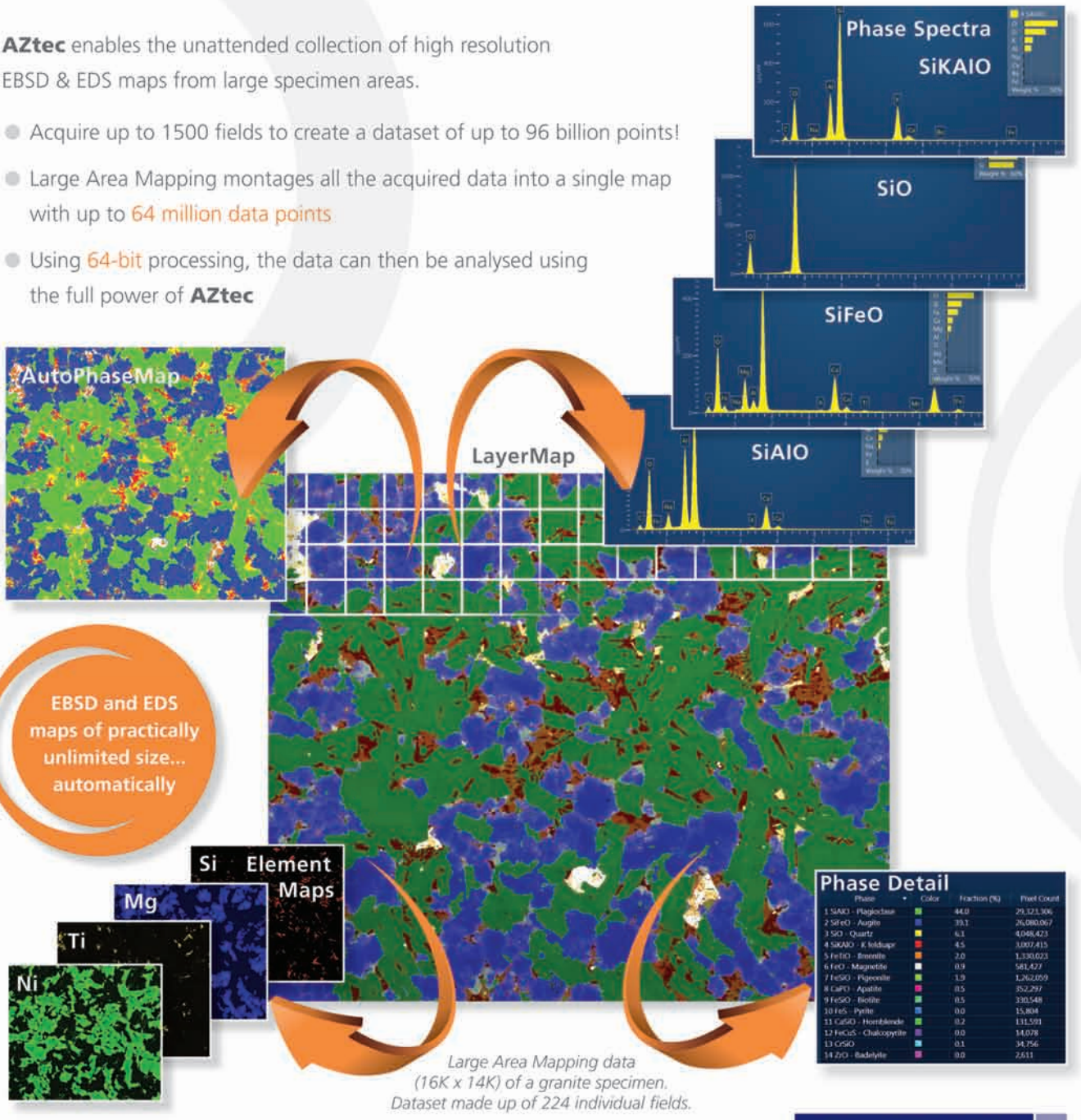

Large Area Mapping data (16K x 14K) of a granite specimen. Dataset made up of 224 individual fields.

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15 YEARS OF EMS

15 Years of European Microscopy Society (EMS)

The creation of the Committee of European Societies of Electron Microscopy (CESEM) dates back to 1975, a year after the International Congress on Electron Microscopy (ICEM) in Canberra and a year before the European Congress on Electron Microscopy (EUREM) in Jerusalem. In May of that year, representatives of the Belgian and Dutch societies arranged a discussion at Schiphol Airport (the airport for Amsterdam), which was attended by microscopists from the Federal Republic of Germany, Scandinavia and the UK as well as Belgium and the Netherlands. A committee consisting of V.E. Cosslett (UK, Chairman), A.B. Maunsbach (Denmark, secretary), K. von Bassewitz (GFR), M. Bouteille (France), L. Simar and E. Wisse (Belgium) was formed with the specific task of drafting a constitution. CESEM was formally created at the Jerusalem EUREM on 19 September 1976, with Ellis Cosslett as its first president and Arvid Maunsbach as secretary and treasurer and his "treasure" was to remain modest. At first, there were ten member societies (Austria, Belgium, the German Federal Republic, Israel, Italy, the Netherlands, SCANDEM, Spain, Switzerland and the United Kingdom). By 1998, the figure had nearly tripled. In 1994, following the important innovations in other forms of microscopy (light, surface, …) and their interactions with the field of electron microscopy, the society dropped the "electron" and became CESM for Committee of European Societies of Microscopy. Many national societies followed the same trend but the majority of members were still mainly involved with various forms of electron microscopy. CES(E)M remained a loosely run club of national or regional European societies, whose main activity was the organization of the EUREM congress every four years, midway between the International Congresses on (Electron) Microscopy.

Wolfgang Baumeister, elected president of CESEM in 1992, launched the idea of disbanding CES(E)M and replacing it with a true European Microscopy Society which should be more active in supporting all forms of microscopy throughout Europe. His suggestion was discussed at the EUREM meeting in Dublin (1996), after which, together with Eddie Wisse (secretary of CESM) and Peter Hawkes (French representative in CESM) a draft constitution was circulated to all European Societies. At the CESM business meeting held during ICEM-14 in Cancún, members were asked to vote on the proposal to disband CESM and create a European Microscopy Society (EMS), governed by the draft constitution that had been circulated. (Some parts of this constitution were incomplete and others rapidly needed amendment but the general spirit has been maintained.) The vote was overwhelmingly in favour of the proposal with the result that a European Microscopy Society was created on Thursday September 3, 1998. The two years between Cancún and the EUREM meeting to be held in Brno (Czech Republic) from 9-14 July, 2000 are being used to iron out problems, decide on the types of membership and establish the society formally. Peter Hawkes (France) was elected president, Jose-Maria Carrascosa (Spain) was elected vice-president (and hence future president), Eddie Wisse (Belgium) was elected secretary and Heinz Gross (Switzerland) remained treasurer.
In the mean time all microscopy societies in Europe have voted to adopt what was originally called an en-bloc membership, whereby paid-up members of the local society are automatically registered as a member of the EMS, and to which the local society pays a membership fee of 5 euros per member per year. In most cases, this automatically holds for every member of the local society, in a few cases a member has to explicitly state his/her interest in adding the EMS membership, usually for free. This approach has ensured a steady increase in membership in the first years, now levelling off at around 5500 members. Around 50 commercial companies are supporting the work of EMS with an explicit membership of the European Corporate Member Assembly (ECMA).

In the past 15 years the EMS, with the support of the local societies, has succeeded in steadily increasing the coherence in the microscopy field within Europe. Counting by the number of scientific and commercial attendants the success of the quadrennial European Microscopy Conferences (EMC) has clearly grown, and the concept of extended regional meetings in the years in between and supported as EMS Extensions has also proven to be a good choice. In fact, the last one in Regensburg in 2013, MC2013 **(see also page 14)**, was co-organized by 10 national societies and attracted as many researchers as the EMC in 2004 in Antwerp, a clear sign of an increased impact of the multinational importance of such meetings.

Using the annual fees of the members and companies, EMS has been able to sponsor, each year, about 8 local microscopy focused meetings, on average one EMS Extensions and 20 to 30 scholarships for early stage career researchers to primarily attend EMC meetings, EMS Extensions or in some cases

dedicated international meetings. In 2010 the Executive Board established an Outstanding Paper Award, which has seen a very severe selection as judged by a jury of 7 independent and highly respected colleagues. By now already 9 (3x3) excellent papers, i.e. their authors, have received this award. Also the Quadrennial EMaward has seen some excellent winners over the past 12 years. The Yearbook has been trimmed down and now presents more personnel reports of meetings, events, scholarships, etc. of the past year. The job-info and calendar pages on the website and related bulk-mailings are highly appreciated by the members.
Along with the technical developments in electron and other microscopy tools over the past decades, often lead by outstanding European scientists, these evolutions clearly reveal that modern, state-of-the-art microscopy has become an indispensable analytical cross-technology tool for today's science and technology.

A Europe-wide microscopy community is therefore important in order to help to educate the next generation of scientists in microscopy, to expose them to opportunities early in their careers by fostering European exchange, but also through cross-linking and networking with and by established researchers in the field. In addition, it is also crucial to give young societies from, e.g., the new Eastern European countries, the opportunity to be involved in European activities and be part of the European research area and policy.
The organisation and support for these successful activities was able thanks to the various initiatives of our individual members, supported by the EMS Executive Board presided by, in chronological order, Peter Hawkes, José Carrascosa, Ueli Aebi, Paul Midgley and at present Roger Wepf, who led a small celebration during the conference dinner at MC2013. Several new initiatives are underway and we are looking forward to more exciting years for European microscopy.

Roger Wepf
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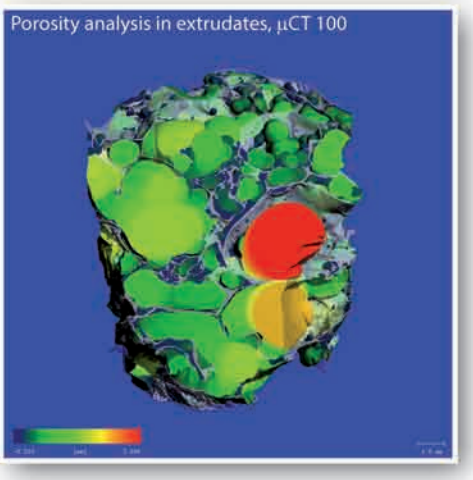

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REPORT ON MC2013 / EMS LECTURES AT MC2013

MC2013 REPORT, REGENSBURG, GERMANY

The Microscopy Conference 2013 – briefly MC2013 – was held in Regensburg from August 25 to 30, 2013, on the Campus of the local University of Regensburg, and was organized by 10 scientific societies from 11 European countries, in alphabetical order: Austria, Croatia, Czech Republic, Germany, Hungary, Italy, Serbia, Slovenia, Slovakia, Switzerland, and Turkey. Initially, it was planned to be another "Dreiländertagung", the Microscopy meetings held every four years since 1985, jointly organized by the microscopy societies in Austria, Germany, and Switzerland. But very early in the preparation phase, the organizers of the Regensburg meeting and all societies involved realized a broad interest in many countries and societies; therefore, they favored to have another, larger microscopy conference like the last one held in Graz, Austria, in 2009, with participation of all member societies of the Multinational Congress on Microscopy (MCM), including for the first time Turkey as an associated member.

The meeting was co-organized by all 10 microscopy societies and the company Conventus as professional congress organizer; it attracted almost 1,200 delegates from 43 countries, from all 5 continents. One novel feature of the conference was that the topics were split into four (and not only three) parallel sessions, with seven symposia each: Materials Science; Life Sciences; Instrumentation and Methods; and Multimodal and Interdisciplinary Microscopies. This concept resulted in a higher diversification of topics and more time for invited and short talks, and more contributions in general. In total, 711 scientific contributions were presented, including Plenary Talks and Price Lectures: the Ernst-Ruska Price, and the Harald-Rose Lecture. The conference included a large industrial exhibition with representatives and specialists from 53 companies showing their latest products, and it was accompanied by an attractive social program to the highlights of the City of Regensburg, its Old Town having the status of a UNESCO World Heritage Site.

Following a relaxed Sunday night welcome reception, the conference was officially opened on Monday morning by the Conference Chair, Reinhard Rachel; the Vice Rector of the local University, Milena Grifoni; the Mayor of the City of Regensburg, Joachim Wolbergs, and notes by the President of the International Federation of the Microscopy Societies (IFSM), Barry Carter, and by the Secretary of the European Microscopy Society (EMS), Nick Schryvers. Afterwards, the President of the German Society for Electron Microscopy (DGE), Josef Zweck, handed over several awards: the Ernst-Ruska Price, to Pete Nellist and

Holger Stark, for their outstanding achievements in Electron Microscopy; the Harald-Rose Lecture to Peter Schattschneider; and the "DGE Technikpreis" to Stefan Diller.

The Plenary Talks comprised (some of) the major trends in the microscopical sciences today: high-resolution imaging and analytics, by Velimir Radmilovic; materials science at the nanoscale, by Erdmann Spieker; 3D-STEM and analytics in Biology, by Richard Leapman; modern trends in light microscopy, by Ernst Stelzer; cryopreparation of biosamples, by Daniel Studer, and X-ray tomography, by Gerd Schneider. Additional highlights of the morning sessions were the Ernst-Ruska Price lectures, presented by Peter Nellist on 3D imaging by confocal STEM, and by Holger Stark on high-resolution 3D imaging of bio-macromolecules. This list already shows some of the trends of the MC2013 conference and of microscopy in general, nowadays: the third dimension, and high-resolution and analytics.

The focus of the scientific sessions in Instrumentation and Methods was into the improvement of technology towards higher precision in analytics and resolution, in all imaging modes (SEM, TEM, STEM, light microscopy), also in three dimensions. For life sciences, there were numerous contributions showing novel results in applications (like in plants and animals, neurobiology, microbes, macromolecules), as well as improvements in ultrastructural or analytical methods, e.g. by cryo-processing/cryo-microscopy / labeling, or by correlative microscopy. The sessions in Materials Science focused on improved methods to in-depth understanding of all kinds of high-tech materials, which always also includes improved highly sophisticated sample preparation techniques. The new session on Multimodal and Interdisciplinary Microscopies included contributions on a variety of

interdisciplinary topics, and on novel 3D techniques, e.g. combining both Light and Electron Microscopy, by correlative microscopy with all its different flavors and applications. Two evening workshops attracted the interest of specialists, with contributions and open discussions in the field of applications using dedicated STEM modes, and in cryo-preparation techniques in biology.

Several societies present on the meeting used the conference for holding the General Assemblies of their members, e.g. the DGE "Mitgliederversammlung", the EMS General Assembly, and the assemblies of the MCM and the Italian Society, SISM.

As on previous meetings, the conference was complimented by the official Conference Dinner, held on Thursday night, with handing over of the Best Poster Awards (one for each session, i.e. 28 awards), and of the Best Image Contest "Art in Science". Several representatives took the opportunity to announce the next microscopy conferences: e.g. the 18th International Microscopy Congress 2014 in Prague (CZ); the meetings in 2015 like the next MCM meeting in Hungary, and the next conference of the DGE in Göttingen; the next European Microscopy Conference in 2016 in Lyon (FR); and finally, in 2017, the next meeting of the "Dreiländertagung" Series in Lausanne (CH). Dinner, music and dance made it possible to enjoy and to talk in a relaxed atmosphere, not only about science. Finally, the Farewell Party on Friday closed this microscopy conference, again in a very relaxed atmosphere.

Reinhard Rachel

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Imaging of Core/shell Nanostructures Embedded in Solid

Velimir Radmilović

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This report illustrates the importance of understanding the fundamental features that underlie the behaviour of nanoscale phases with coherent interfaces embedded in a solid and their role in the evolution of microstructure in materials. The fundamental principles established using model systems are employed in the design and testing of new materials such as Al-based alloys for structural applications. Key requirements for advanced alloys are high strength, light weight, coarsening resistance, corrosion resistance, high temperature stability, etc. Unfortunately, these requirements are very often mutually exclusive in many Al-based alloys. The extraordinary effects of second-phase particles on mechanical properties are well known **[1]**. Two alloy systems, Al-Li and Al-Sc, are of great interest for a variety of structural applications (cryogenic, airspace, etc.), due to their low density and high strength-to-weight ratio. Excellent mechanical properties of Al-Li and Al-Sc alloys are based on a fine dispersion of coherent metastable Al_3Li obtained by congruent ordering followed by spinodal decomposition **[2]**, and Al_3Sc stable precipitates **[3]**, respectively.

The aim of this report is to show the effect of Li addition on core/shell precipitate formation in ternary Al-Li-Sc alloys. A range of advanced microscopy techniques has been used to study the atomic structure of these precipitates. The TEAM 0.5 double-C_S-corrected microscope at the National Center for Electron Microscopy, Berkeley, was employed to reconstruct the projected potential of the Al_3Li ordered phase in the shell and to image Li atom columns directly using exit wave reconstruction **[4]**. This report also demonstrates how aberration corrected electron microscopy can help to overcome a long standing challenge of imaging directly atomic columns of elements below number five in Periodic Table of elements.

Figure 1 shows monodisperse Al_3LiSc core/shell ordered precipitates with a Sc and Li-rich core surrounded by a Li-rich shell, formed by fine adjustment of kinetic and thermodynamic parameters and using two stage heat treatment, after quenching from the solid solution temperature of 620°C **[5]**.

During the first aging stage at 450°C, Li incorporation into the cores leads to a burst of nucleation followed by rapid depletion of Sc solute. In the second stage, at 190°C, $Al_3(LiSc)$ cores become spherical substrates for solid-state epitaxial growth of Al_3Li, which leads to shell formation through a barrier-less process of solid state wetting **[6]**. The thickness of the core and shell are anti-correlated, such that the size distribution of the total core-shell particle is narrower than that of either the core or the shell. Li-rich shell shows almost no compositional differences between adjacent columns. By contrast, the core superlattice columns are highly disordered, which is evidence for random mixing of Li and Sc on these sites. The columns surrounding the superlattice columns are very uniform, showing the amount of solute atoms occupying these sites to be negligible. In fact, no anti phase boundary (APB) defects were observed in any of the investigated $Al_3(LiSc)$ core/shell precipitates. These defects are known to be very energy-costly at room temperature, i.e. 290 mJ/m^2 in Al_3Sc **[7]** and 118 mJ/m^2 in Al_3Li **[8]**.

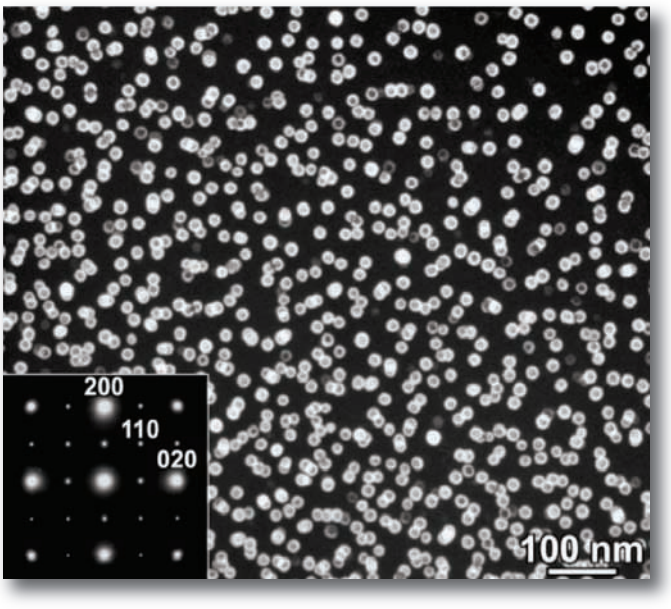

Figure 1. Dark field image of monodisperse Al_3LiSc core/shell ordered precipitates in Al rich matrix, obtained using $L1_2$ 110 superlattice reflection. Inset: Selected area diffraction pattern taken close to 001 zone axis.

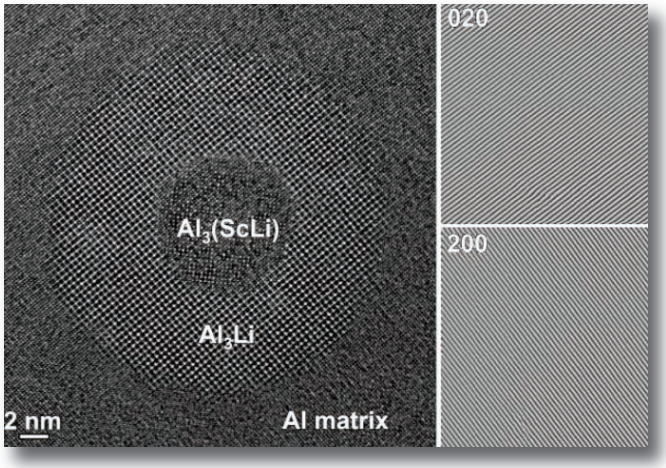

Figure 2. Left: HRTEM micrograph of a single $Al_3(LiSc)$ core-shell precipitate obtained at peak aging, after 4h at 190°C. Right: Moiré images created using 020 and 200 reflections, showing perfect alignment of 200 and 020 planes in the core, shell and surrounding Al matrix.

High-resolution phase contrast imaging and geometric phase analysis shown in **Figure 2** reveal that both, the core and the shell are fully ordered in the $L1_2$ structure and fully coherent with the surrounding fcc matrix.

With prolonged aging time, for more than 1000h at 190°C, these particles exhibit coarsening, and create an interfacial dislocation at the Al_3Li shell/Al matrix interface, in order to accommodate coherent strain increase due to misfit in their lattice parameters, as shown in Moiré images, **Figure 3**.

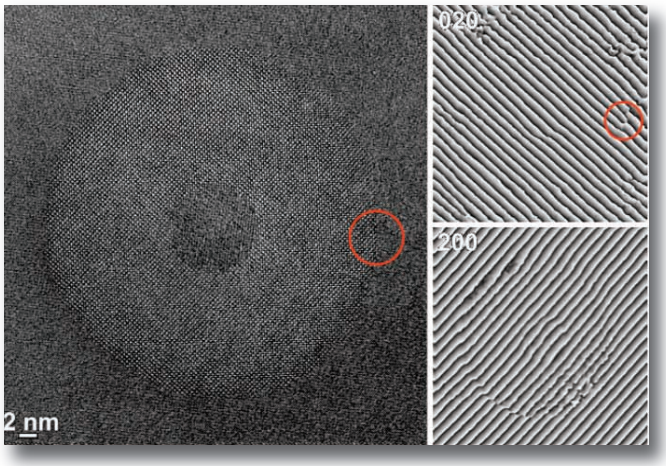

Figure 3. Left: HRTEM micrograph of a single $Al_3(LiSc)$ core-shell precipitate obtained from overaged sample, after 1000h at 190°C. Right: Moiré images created using 020 and 200 reflections in digital diffractogram, respectively, showing significant distortion of {200} planes and the presence of dislocation at the Al_3Li shell/Al matrix interface (red circle).

The phase of the exit wave shown in **Figure 4** distinguished clearly Al columns from Li columns in the Li rich $L1_2$ shell **[10]**. Line profiles across Li column and adjacent Al columns show good agreement between averaged experimental (filled circles) and calculated (solid line) data. The error bars in the line profiles are the standard deviations obtained by comparing the individual peaks with the averaged structure.

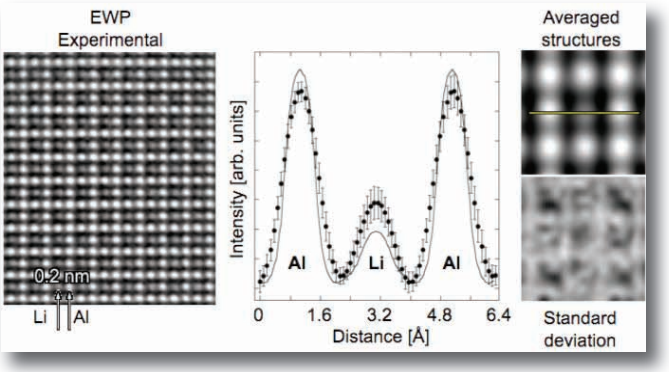

Figure 4. Left: Experimental high resolution exit wave phase image of Al_3Li ordered structure taken close to [001] zone axis. Middle: Line profile across Al and Li columns; white dots are from Al columns and gray dots are from Li columns in averaged structure. Right: 2D representation of the statistics of the experimental data for the average experimental unit cell and the standard deviation image **[9]**.

Li concentration in the core superlattice columns could be calculated from high angle annular dark field image of $Al_3(LiSc)$ nanoparticle core (**Figure 5**, left). This procedure uses an analysis technique that normalizes the signal from the $L1_2$ superlattice columns to the immediately adjacent pure Al columns. By knowing that the total amount of Sc and Li is 25 at.%, the composition of each column can be determined individually (**Figure 5**. middle). This calculation shows appreciable and uniform incorporation of 9.7 ± 2.4 at.% Li in the core of the precipitates, as shown in **Figure 5** (right). These measurements were confirmed by 3D atom probe tomography and energy-filtered TEM imaging **[6]**.

First principles and Monte Carlo simulations confirmed the presence of a wide miscibility gap between the Sc-rich and the Li-rich $L1_2$ phases in the $Al_3(LiSc)$ pseudobinary phase diagram, and predicted, at 190°C, the stable phases $Al_3Li_{.4}Sc_{.6}$ and Al_3Li, which is in very good agreement with experimental measurements. First principle calculation also predicts the core-shell precipitates in the investigated AlLiSc alloy to be thermodynamically stable phases, with no driving force for the diffusion of Li out of the core into the shell.

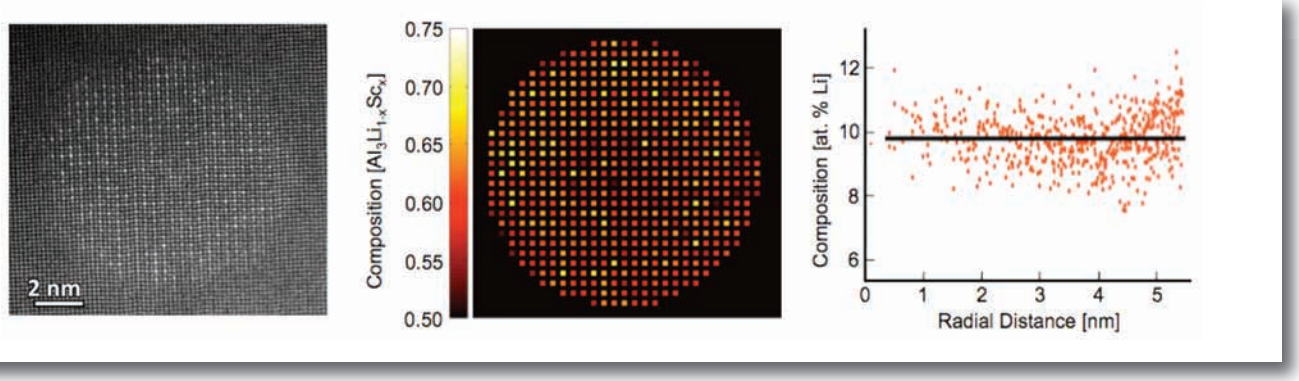

Figure 5. Left: HAADF image of Li and Sc rich core. Middle: Sc and Li composition in atomic superlattice columns obtained from intensity measurements normalized to local neighborhood of Al columns in the core. Right: radial distribution of Li in the core superlattice columns **[5]**.

For the ternary $Al_{8.5}Li_{0.2}Sc$ (at.%) alloy we demonstrated a way of producing an uniform distribution of coarsening-resistant monodisperse $Al_3(LiSc)/Al_3Li$ core/shell particles in an Al matrix with unusually narrow size distribution. A detailed analysis of these precipitates has provided important insights into their atomic structure and composition.

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DANIEL STUDER: "ELECTRON MICROSCOPY OF BULK BIOLOGICAL SPECIMENS: CRYOMETHODS – WHAT ELSE"

Electron Microscopy of Bulk Biological Specimens: Cryomethods – what else.

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Keywords: microbiopsy, high pressure freezing, cryo-sectioning, micromanipulation, oscillating knife, electron spectroscopic imaging.

Cryomethods, i.e.cryofixation (vitrification) followed by investigation of the sample in a cryo-electron microscope, are used nowadays routinely for samples smaller than about 0.4µm in thickness. The applied protocol is in essence what was proposed by Adrian et al **[1]**. A vitreous plunge frozen sample allows describing macromolecular complexes as big as ribosomes at atomic resolution with the help of extensive image processing **[2]**. The method is very well established and is the standard for high resolution electron microscopy of biological macromolecular complexes.

It is important to note that the following explanations deal exclusively with bulk samples (biological specimens thicker than a few micrometer and mostly thinner than 200µm). These samples, prepared on the basis of cryomethods, are still not well recognised in the scientific community. Transmission electron microscopy of chemically fixed and heavy metal stained biological samples has provided most of what is known about the ultrastructural organization (sub-light microscopic resolution) of tissues, cells and organelles. The preparation of the samples is quite sophisticated because vacuum and electron beam (the conditions in an electron microscope) allow only investigating thin solid matter. So far most samples were prepared according to the classical protocol of chemical fixation. During fixation with aldehydes, postfixation with heavy metals, dehydration in a solvent and subsequent embedding into a resin samples are transformed into solid matter. Such a sample can be easily sectioned with an ultramicrotome and the resulting sections after poststaining with heavy metals, are investigated in the electron microscope. The various chemical fixation protocols allow visualisation of almost every sample. Whatever protocol is applied the main component of life (water) is lost, however. The proportion of water is by far the largest in biology compared to all other components. Bone consists of 22% water, most soft tissues (muscle, liver etc) have a water content of 70-80%. With these facts in mind, one needs a rather big audacity to deduce the real ultrastructural features of biological samples from specimens lacking their main component.

Chemical fixation cannot preserve the native ultrastructural details because water is missing. Besides the lack of water, quite some artefacts are introduced by chemical fixation [loss of components, aggregation, shrinking and swelling **[3, 4]**. Furthermore the structures are visualised by heavy metal staining. With the approach of chemical fixation, we investigate heavy metal patterns that depend on the protocol applied **[6]** instead of the biomolecules themselves. In essence, one can modify a protocol until one gets a heavy metal pattern that best fits the ideas of the investigator. This sort of approach is not scientific, however very common in ultrastructure research and rather successful. As stated in the very beginning, chemical fixation has allowed to characterise a lot of features in biology, which were (and still are) not detectable by light microscopy. The protocols are, although sophisticated, comparatively simple and, very importantly, reproducible. A huge variety of samples can be prepared. However this is nowadays not sufficient for describing ultrastructural features (eg macromolecular complexes in situ). The approach of heavy metal stained and chemically fixed samples can only be accepted as long as there is no alternative in preparing specimens.

Since about thirty years, sample preparation based on cryosectioning and subsequent cryo-electron microscopy (CEMOVIS) is established **[6, 7]**. With this approach it is possible to characterise unstained, fully hydrated biological structures in the electron microscope to the level of macromolecular complexes **[8]**. The methods used are very de-manding concerning technical skills. A further disadvantage is sample size, which is very limited. Larger samples cannot be vitrified due to physical limitations **[9]**, namely the bad heat conductivity by water. Therefore very small samples are a prerequisite to get them vitreous (no ice crystals!). Vitrification is a prerequisite to preserve a close to native structure. As soon as ice is formed, segregation will lead to the separation of the sample into water (ice crystals) and the concentrated solutes on the ice crystal surface. Although surrounded by water (or rather ice), structures may be dehydrated and therefore deformed. The vitrification of a native biological bulk sample (not thicker than 0.2mm!) is usually only possible when the approach of high pressure

freezing is applied **[9]**. "Bulk" in the context of vitrification is rather small. This is one of the main reasons why bulk samples are not processed often by cryomethods. It is not really easy to prepare a sample of this small size which in itself is not disrupted. A vitreous sample has to be subjected to cryosectioning. This is the second main point of difficulty: Cryosections suffer a lot of artefacts **[10]** and are usually very small (0.1mm x 0.1mm). The third obstacle is that the method as applied currently is difficult to perform. Users have to be very well trained and steady hands are important. Once established in a lab, the method allows taking images of frozen hydrated bulk samples within one day. This is much faster than what can be achieved with conventional chemical fixation, and it leads to a meaningful result. The benefits of successful CEMOVIS are not questioned, however the rather cumbersome manipulations are difficult to implement in a daily laboratory workflow. An alternative is to generate thin layers (sections) with the help of focussed ion beam (FIB) milling. The approaches proposed so far result in very nice sections **[11]**, however, their production is even more cumbersome than CEMOVIS.

What has to be done to turn CEMOVIS into a routinely used method? First, specimen collection for high pressure freezing has to be improved. There are tools (like a microbiopsy gun **[12]**) available, however they are not reliable enough up to date. The tissue damage evoked by the penetrating needle is too big and the biopsy itself is also too large to be well frozen throughout. The high pressure freezing machines (eg EMPACT **[13]**) are limited by water physics, but work well. So far in most cases copper tubes are filled with the sample and these tubes are frozen and then transferred to a cryo-ultramicrotome. In the microtome the tube is trimmed (this is easy: trimming diamonds, Diatome, Nidau, CH) and then cryosectioned (diamond knives, Diatome). A ribbon is formed at the knife-edge and in the standard procedure, this ribbon is taken by a fibre and guided manually during sectioning. When the ribbon is long enough, with the second hand a grid is placed under the ribbon and with the help of an Ionizer (Crion, Leica-microsystems, Vienna, A) the ribbon is attached to the grid **[14]**. This is a manipulation which can only be performed by well trained operators with very steady hands. For this difficult manipulation a micromanipulator was recently developed **[15]**, which constitutes a major improvement since with its help long ribbons can easily be produced and attached to a grid. Sectioning artefacts remain **(Figure 1)**. Compression, knife marks, crevasses, chattering and creasing are frequently present. For reducing sectioning artefacts knives have to be improved. An approach with oscillating knives **[16]** was showing that in rare cases section artefacts could be reduced considerably. However, in practice the amount of improved sections was not satisfactory. The last step, cryo-electron microscopy is more and more becoming a routinely used approach.

It seems that only tissue preparation and cutting properties of the diamond knives have to be improved, however, these two challenges are not easy to overcome. Hopefully the research community is aware that the future of electron microscopy of bulk samples is based on CEMOVIS. We have to investigate the "real" biological object and not a "mummy".

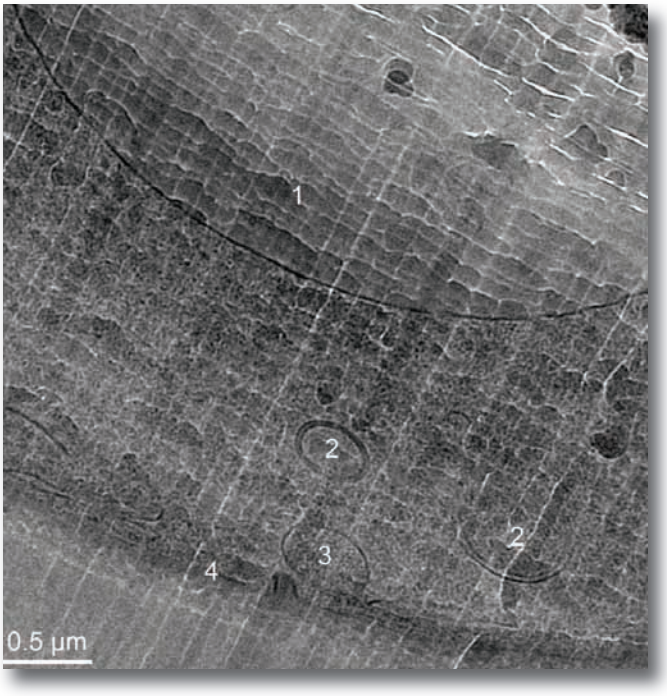

Figure 1. Part of a yeast cell prepared with CEMOVIS. The relatively fine lines (approx. direction upper right to lower left corner) represent knife marks. Crevasses are obvious perpendicular to the knife marks. The profiles of round organelles are slightly compressed. However all features depicted derive from the native biological matter of the yeast cell. The organelles depicted are a vacuole (1), mitochondria (2), vesicle (3), cell membrane and cell wall (4). Although this image may not fulfil aesthetical standards it represents the basis of molecular resolution as for example shown with cadherins in the work of Al-Amoudi et al. (8).

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- **European Atom Probe Tomography Workshop**

  October 21-23, 2013, ETH Zurich/EMEZ, Zurich, Switzerland

7TH MICROSCOPY WINTER SCHOOL 2013 – A PRACTICAL COURSE IN ADVANCED MICROSCOPY, ZURICH, SWITZERLAND

The Winter School is aimed at PhD students and post-graduates with prior experience in microscopy keen to improve their knowledge and skills in a specific microscopic technique. The course took place from January 20 till 25 at ETH Zurich "Science City" (EMEZ and LMSC) and the University of Zurich (ZMB). As every year, between 70-80 participants from 12 different countries were selected from over 120 applicants to participate in the course.

The purpose of the Winter School was to provide the participants with the fundamental knowledge and skills in a specific microscopic technique for life science applications. After the course, participants should be able to apply this technique to their own present and future projects. The focus lied 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 hands-on and in-depth and gave the opportunity to get used to the most state-of-the-art instrumentation in the field. Through the collaboration between the three microscopy centers - ZMB, LMSC and EMEZ - the participants got access to a broad variety of instruments, techniques and know-how. Apart from the practical work in modules, theoretical sessions providing valuable background for all students of all the different techniques were held on Sunday and every morning during the week. The Winter School 2013, thanks to joining forces between ETH and UniZH, was made up of 9 different modules (see list below) and was supported by 21 tutors and instructors from Switzerland, Europe and overseas. The feedback of the participants were overwhelming as demonstrated by each module on the last day in vivid short presentations to all other participants of the course who did not attend this specific module. This way everyone had the impression of being part of the entire course instead of only one module.

Module 1: Basic and Applied Light Microscopy.

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

Module 3: Life Cell Microscopy.

Module 4: Sample preparation for 2D and 3D 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.

As part of the Winter School, an Industry Day took place on Wednesday, January 23rd, 2013 at ETH University of Zurich. Ten representatives from companies and suppliers in the field of light and electron microscopy gave either a talk on upcoming new developments and products or a technical exhibition. The participants got an overview of the latest developments in instrumentation and techniques currently on the market as well as innovative new solutions and ideas to the challenges they encounter today in the field of Microscopy. The keynote speaker for that day, was Alessandro Della Bella, a Swiss photographer who works during the day as a staff photojournalist at one of Switzerlands largest photo agencies. During some nights as hobby he produces astonishing pictures under extreme conditions and from remote locations in the Swiss alps (since we all know "images are worth thousands of words" – please join his work under **http://helvetia-bynight.com/**). In his talk he took us on a journey through the alps by looking at the movements of clouds, stars and lights in the sky and from our urbanization – the short movie: *Helvetia by Night* has become known worldwide - **http://vimeo.com/52123602** - and beside fascinating everyone in the audience he also talked about the hardware and software and challenges he faced during his passion

tours taking photography one step further and out into the wildness.

The school was organized by Urs Ziegler and Andres Kaech from the Center for Microscopy and Image Analysis (ZMB), University of Zurich, Gabor Csucs from the Light Microscopy and Screening Center (LMSC), ETH Zurich and Roger Wepf from the Electron Microscopy ETH Zurich (EMEZ), ETH Zurich.

Bianca Maier and Roger Wepf

EMBO/MRC WORKSHOP ON ADVANCED OPTICAL MICROSCOPY, PLYMOUTH, UK

Thanks to EMS, Sam Hess, co-inventor and notable user of the PALM method, was able to visit Plymouth UK in April 2013 and teach a gathering of some of the best students and postdocs in Europe in the field of optical microscopy.

The 2013 EMBO/MRC Workshop on Advanced Optical Microscopy was the 11th in a series held at the Marine Biological Association Laboratory in Plymouth, UK. The 3:1 ratio of applications to places showed that the 10-day course continues to grow in popularity.

Throughout each day, there were hands-on practical periods and demonstrations and an afternoon was set aside for student posters and a prize (the prestigious Plymouth Optical Glass Jellyfish) was given for the best answers to numerical questions. The lecture on bioluminescence, complemented by shore collection of bioluminescent organisms such as hydroids and their subsequent examination with fluorescence and sensitive low-light-level cameras was a feature unique to this course. Equally special was the high concentration of cutting edge high-cost capital equipment such as multiphoton microscopes to 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. The third unique feature was the use of optical benches to ensure that even the biologist students received hands-on experience in optics (see photo).

Most biomedical scientists use optical microscopes but very few have been taught even the basics of their use. As previously, this course combined basic instruction with detailed demonstrations and labwork in the first three days of practical work with more specialized lectures thereafter. The later lectures were comprehensive, covering inter alia light sources, the nature and application of nonlinear optics to imaging fluorescence and Forster resonance theory, novel multiphoton and second harmonic probes, Bayesian statistics in imaging, and single molecule imaging, leading to the keynote lecture by Hess.

Brad Amos, MRC Laboratory of Molecular Biology, Francis Crick Avenue, Cambridge Biomedical Campus, Cambridge, CB2 0QH, UK

QEM2013 QUANTITATIVE ELECTRON MICROSCOPY, LES ISSAMBRES, FRANCE

QEM 2013 was held at Les Issambres (Saint-Aygulf on the French Riviera) from the 12th to the 24th of May 2013 and funded by ESTEEM2, CNRS, NEXT and EMS. After 2005 and 2009, QEM2013 was thus the 3rd edition of QEM (European School for Quantitative Electron Microscopy).

The school took place as before in the holiday resort La Gaillarde, 30 km west from St Raphael, between Nice and Marseille. The centre is still very convenient for such a school: lots of room for all attendees, full broad for organization convenience, kindness and helpfulness of welcoming staff, a high variety in the room available for lectures and practicals, and even a lot of activities to do besides the school time. Regarding the answers to the general survey given to students at the end of the school (46 answers), the overall feeling about the centre is good (average of 8/10), the staff was clearly appreciated (8.6/10) as well as the location (8.2/10). The only little concern was about the working conditions (7.3/10) and the sleeping rooms (6.2/10). A clear definition of the distinction between such a holiday resort and a hostel was perhaps missing. Anyway, the high quality of the meals offered (8/10) was a good catch up! The only major concern of the attendees was the internet connection bandwidth which was by far very slow for people used to high-speed university standards. Even after trying to improve it by adding an extra telephone line, the bandwidth was not sufficient for more than 100 people (next time a satellite access will be rent).

The school was organized along the following program: lectures were given in the morning and practicals in the late afternoon after a free time that was used for informal and/or official scientific meetings, microscope demos and practice, software presentations and extra activities. One evening each week was dedicated to open questions (a box was proposed at the welcome desk for people proposing anonymous questions).

The lecture "UHV-TEM, ETEM and Liquid Cell TEM: Quantitative measurements of reactions and growth processes" of Frances M. Ross from IBM *(T. J. Watson Research Center, Yorktown Heights, New York, US)* was associated to the EMS partnership of QEM.

The schedule was greatly enjoyed (8.9/10) as well as the choice of themes (9/10) and teachers (8.7/10). The main general remarks where concerning the too short time allocated for practicals (this could be extended at the expense of the beginning of the afternoon break or by simplifying the practical statements). More time on microscopes is also asked. We are currently discussing with the application engineers that were present in order to find out a better organization around the microscopes. Two electron microscopes have been installed during the school by FEI (Osiris) and JEOL (2100 F) companies, the JEOL one being fitted with a Quantum GIF from Gatan. We are thus really grateful to these three companies for accepting to offers such wonderful tools during the school and also really grateful for all the

Picture of the 2 installed microscopes in the main hall.

Picture of the 2 practical rooms.

technicians and engineers who made these machines working for the first day of the school.

The conference room was nicely equipped and well adapted for the lecture. Two rooms were also dedicated to practical (as well as the microscopes and the conference room). The labtop computers were equipped with all necessary plugins to electron microscopy image analysis and quantification, nicely offered during the time of the school by Gatan and HREMResearch (and also lot of open source software like EELSModel or ImageJ).

Aurélien Masseboeuf and Etienne Snoeck

EDGE 2013, SAINTE-MAXIME, FRANCE

Following the very successful workshops in Lake Tahoe, Leukerbad, Port Ludlow, Guadeloupe, Grundlsee and Banff, the international workshop on EELS, electron energy loss spectroscopy and imaging, was held in Sainte Maxime, France from 26 till 31 May 2013, under the local organization of Benedicte Warot and Virginie Serin of the CEMES in Toulouse, France.

The workshop was organized in 7 main topics with invited speakers in each of those, 44 selected talks and more than one hundred posters presented by the attendees. The poster sessions were organized after dinner and the success was impressive with scientists discussing new results around a glass of wine.

The plenary session was given by Christian Colliex and proposed a wide overview of the present and future applications of EELS. Seventeen invited speakers presented results and points of view on different topics while four or five contributors were selected for oral presentations in each session by the two chairs of the workshop, Gianluigi Botton and Peter Crozier. There was only one session at the time with topics on very high energy resolution EELS, beyond traditional spectroscopy, fifty years of modern STEM-EELS, instrumentation advances, spectroscopic imaging, theory, materials and biology applications.

The workshop was supported by institutions, microscopy societies (EMS and SF) and companies, some of which exposed their latest developments. Thanks to these supports, some scholarships were offered so that many young scientists could participate in this important meeting of the EELS community. The Scientific Committee awarded a first prize with honors to Leonardo Basile for his poster presentation. More than 160 people attended this workshop combining formal presentations and informal discussions, the latter especially during the bumpy boat trip along the shore.

Benedicte Warot and Virginie Serin

THE ARCHIE HOWIE SYMPOSIUM, YORK, UK

The Archie Howie symposium was held on 5th September 2013 as part of the EMAG 2013 as a special celebration of the legacy of Archie to electron microscopy in his 80th year. The event concentrated upon one area in which he made key early contributions, *in-situ* studies in electron microscopy, and then highlighted a huge range of the current research in applying this to a wide range of areas.

The event was kicked off with a plenary lecture by Prof. Pratibha Gai on *Atomic Resolution Environmental Transmission Electron Microscopy*. The wide range of speakers from the UK, Europe, the USA and Japan then covered topics including:

- Dynamics in lithium ion batteries.
- Gas reactions with catalysts.
- Imaging biological processes.
- In-situ microscope development.
- Plasmonics in nanostructures.
- Imaging ions in solution.
- Nanorod growth in the microscope.
- Dynamic studies of radiation damage.

Due to the pressure of the large number of invited and contributed talks, there was also an additional plenary lecture connected to the symposium on the previous day given by Prof. Wolfgang Baumeister on electron cryomicroscopy.

Finally, the day concluded with a conference dinner at the National Railway Museum, York, at which Archie Howie gave a speech about his experiences in microscopy over the past sixty years.

Funding from the EMS was used to provide support for the participation of Prof. Jose J. Calvino of the Universidad de Cádiz, Spain, and Prof. Wolfgang Baumeister of the Max Planck Institut for Biochemistry, Martinsried, Germany.

Prof. Ed Boyes speaking at the Archie Howie symposium.

Prof. Archie Howie speaking after the conference dinner.

Dr Ian MacLaren
Senior Lecturer in Physics, University of Glasgow
Chair of the Electron Microscopy and Analysis Group of the Institute of Physics.

MICROSCOPY AT THE FRONTIERS OF SCIENCE, TARRAGONA, SPAIN

The MFS2013 Congress, jointly organized by the Spanish and Portuguese Microscopy Societies, was held at the Palau de Congressos in Tarragona (Catalonia) on September 17th-20th of 2013. The Israel Society for Microscopy, which was invited to this event, was represented by distinguished members. With almost 200 participants, the Congress started with a didactic plenary lecture imparted by Prof. Dr. D. Shechtman, Nobel Prize Laureate in Chemistry 2011, on Quasi-periodic Materials (see picture above). The Congress was divided in two parallel sessions (materials and life sciences) with fourteen invited talks, although some joint sessions were programmed devoted to advancements in microscopy techniques given by vendors as well as to the synchrotron radiation-based X-ray microscopies available at the ALBA storage ring in Bellaterra, near Barcelona.

The facilities of the Conference site allowed a rational distribution of oral scientific and technical sessions in two auditoriums close to the stands hosting the sponsoring companies. Cocktails were offered during poster sessions. A visit to the monumental part of the city, declared a World heritage site by UNESCO in 2000, was also organized. MFS2013 was sponsored by several leading companies in the field of microscopy and EMS contributed to the expenses of Drs. G. Schitter (Technical University of Vienna) and I. Talmon (Technion-Israel Institute of Technology), who gave the talks entitled "Mechatronics and Instrumentation for High-Speed High-Resolution Imaging Systems" and "The Latest in Cryo-EM", respectively.

Jordi Fraxedas & Jordi Arbiol, co-organizers

EUROPEAN ATOM PROBE TOMOGRAPHY (APT) WORKSHOP, ZURICH, SWITZERLAND

The European Atom Probe Tomography (APT) workshop was held from October 21-23 2013 at EMEZ, the Electron Microscopy Facility with the only Atom Probe Tomograph in Switzerland. The APT Workshop was the first Atom Probe focused Meeting in Switzerland and the second formal EU-focused Atom Probe Meeting. 42 participants from all over Europe – thereof 13 from industry and two participants from USA – attended the workshop.

The Workshop was aimed at post-docs from a range of European universities and research laboratories working in the field. The purpose was to enable high levels of interaction and scientific exchange on the hot topics in the field and between colleagues applying Atom Probe Tomography in various fields, aimed at the European realm. With invited plenary lectures, panel discussions, software demonstrations and hands-on practical workshops the meeting was designed to promote continuous transfer of knowledge among the participants. Furthermore the program allowed for adequate time and informal opportunities for constructive discussions and networking among participants.

The main topics that were dealt with during this workshop were:

- Variety and cutting edge APT applications;
- Correlative tomography between APT and other techniques;
- Analysis and simulation methods;
- Reconstruction methods.

The participants gained significantly from the expert knowledge of the three invited speakers – with focus points on field-evaporation processes (Prof. H.-O. Andren from Chalmers University in Sweden), correlative tomography (Dr. W. Lefebvre from University of Rouen in France), and APT simulation (Dr. C. Oberdorfer from University of Muenster in Germany). Two IVAS hands-on atom probe analysis and reconstruction workshops, where both case-studies were presented and discussed, were very well attended and attendees were able to bring their own data as analysis test-subjects. The live-time analysis methods that were demonstrated provided attendees with multiple perspectives to tackle their outstanding questions. Monday afternoon was

dedicated to industry presentations, which were very well received with good discussions due to their overviews of new products, techniques, and innovations. A discussion panel on Tuesday afternoon introduced a new forum for discussion via "figure-supported-questions" which attendees submitted during their registration phase. The figures (or plots, sketches, and pictures) ensured all attendees saw the data at hand and the question to the panel had hard facts to base their follow-up questions and discussion on. It was deemed a successful method for informal discussions and brought a good variety of topics to the forefront that otherwise would not have surfaced during the conference. Finally, tours of the microscopy facilities also instigated collegial brainstorming of future projects that enabled new networks amongst attendees. Frequent feedback received from attendees revealed that they were delighted with new ideas after the few days and took a lot with them, both intellectually and network-wise.

Dr. Stephan Gerstl, Senior Researcher, Electron Microscopy (EMEZ), ETH Zurich.
Dr. Roger Wepf, Director Electron Microscopy ETH Zurich (EMEZ), ETH Zurich.
Dr. Jean-Paul Barnes, CEA-LETI MINATEC, France.
Prof. Dr. Didier Blavette, University of Rouen, France.

REPORTS ON SPECIAL EVENTS

Notes :

THE FRITS ZERNIKE PROJECT OF THE UNIVERSITY OF GRONINGEN

Frits Zernike by Vincent Saffrie (pencil on paper; 2012; private collection). This portrait will embellish the front piece of volume III of *The Collected Papers of Frits Zernike (1888-1966)*.

At the University of Groningen a project on Frits Zernike has been launched in view of the commemoration of the 50th anniversary of his passing away on March 10, 1966. The project is hosted by the University's Zernike Institute for Advanced Materials and the latter's Department of Applied Physics, as headed by Thom Palstra and Jeff De Hosson. Apart from that there is support from Groningen's Johann Bernoulli Institute for Mathematics and Computer Science, directed by Henk Broer. The present author is preparing an edition of The Collected Papers of Frits Zernike (1888-1966). He has been in touch with the late Frits Zernike Jr. and his wife Barbara, who were kind enough to endorse the enterprise. Moreover, Carl Zeiss AG (Oberkochen, Jena), represented by its President and CEO Michael Kaschke, has graciously expressed its willingness to collaborate.

In 2012 the first two volumes were published by Groningen University Press under the benign aegis of the International Union of Pure and Applied Physics, the International Federation of Societies for Microscopy, and the European Microscopy Society, personified by, respectively, Sukekatsu Ushioda (Ibaraku), Barry Carter (Storrs, CT), and Paul Midgley (Cambridge, UK). These first volumes reproduced the greater part of Zernike's original papers. A set of the papers in question had been bound in one volume on the occasion of Zernike's becoming emeritus, on 16 July 1958, and offered to him after his solemn farewell speech in the Aula of the University. In fact two such volumes had been made, one of which became part of the collection of Groningen's University Library. The latter copy was digitized, while the original illustrations were ''rejuvenated''. Actually, the original papers (mostly in French, German and Dutch) are being translated into English, with the kind help of Tony Yen (Taiwan). There will be two volumes of translations (III and IV), followed by a fifth volume, featuring ''Introductions'', explanatory clarifications in the form of notes, bibliographies of primary and secondary literature, and two indexes (names, subjects). The idea is to create an overall picture of the development of physics in the period covered by Zernike's papers, with an evident focus on optics AZ. Here the three volume Physics in the Twentieth Century (1995), as edited by Larry Brown, Abraham Pais and Brian Pippard, will serve as a prime reference. However, the period BZ will also be assessed if only to create a colourful background enabling a better understanding of the crucial novelties brought by Zernike. Fundamental themes are, naturally, the discovery of the phase contrast method, announced in 1933, and the diffraction theory of aberrations (1934) which gave way to the celebrated circle polynomials, whose actuality is still undisputed. Indeed, they are fundamental in the industrial construction of machines for the production of chips on Si-wavers. What the law of free fall is for mechanics, the collection of circle polynomials is for the optics of burning systems. All the scientists playing a role in Zernike's papers will be identified. The final five volume set, once finished, will function in the historiography of physics like a phase-ring in Zernike's microscope: indeed it will visualize subtle variations in the material tissues that constitute the essence of the first of nature's sciences.

Anyone disposing of interesting materials (microscopes, correspondence, photographs, films, ...) concerning Frits Zernike and his professional relations is kindly invited to contact the author.

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NORTEM MEETING IN GOTHENBURG, SWEDEN

Current Trends and Future Needs in Imaging and Spectroscopy of Devices, Materials and Nanostructures were discussed at Chalmers University of Technology, 25-27 March.

More than 80 scientists and equipment manufacturers met in Gothenburg, Sweden, from 25 to 27 March 2013, for the international NorTEMnet Workshop on Advanced Transmission Electron Microscopy, chaired by Professor Eva Olsson from Chalmers University of Technology, Gothenburg.

The delegates shared three days of intense exchange on current research using advanced imaging and spectroscopy methods of electron microscopy in materials science, life sciences and nanotechnology. The contributions highlighted the progress that has been achieved by adding aberration correctors to electron microscopes, as well as current trends in applying advanced characterization tools for the quantitative study of devices, materials and nanostructures.

Quantitative analyses are now possible that utilize the improved resolution and high precision of the modern TEM and STEM instruments for investigations of materials, providing an improved understanding of correlations between the structures, material properties and functions of devices. A lively discussion session resulted in a list of needs for developments in instrumentation and identified future topics in materials research that cannot be investigated using other techniques. A wide range of topical areas was reflected in the content of the invited presentations and in the contributions to the poster sessions. The workshop program focused on the areas of Aberration Corrected TEM/STEM (chaired by Profs Robert Sinclair, Etienne Snoeck, Ferdinand Hofer and Ute Kaiser), In-situ Microscopy (chaired by Profs Wolfgang Jaeger and Velimir Radmiliovic' and Drs Lothar Houben and Ai Leen Koh) and Low Voltage TEM/STEM and Monochromated EELS (chaired by Prof. Rafal Dunin-Borkowski and Dr Mathieu Kociak). In each of these symposia, the invited speakers described new methodological developments and quantitative research applied to devices, materials and nanostructures in materials science, life science and nanotechnology. The fundamental and applied materials topics that were addressed included in situ experiments, allowing dynamic experiments with gases, liquids, electric fields, magnetic fields, optical excitation and manipulation with STM and AFM tips. Advances enabled by the introduction of monochromators into electron microscopes were addressed, and the insight that aberration correction can provide for TEM and STEM studies of materials and correlations between structure and properties were illustrated. New challenges in the study of soft materials with low densities and interfaces between hard and soft materials were discussed, in the context of low voltage TEM and STEM. Stimulating discussions took place during poster and practical demonstrations of several instruments, detectors and holders. These activities included sessions illustrating probe Cs correction on a Titan microscope equipped with a monochromator and in-situ experiments.

A lively discussion session addressed future experimental needs in instrumentation and identified future topics in materials research using aberration corrected electron microscopy. It was concluded that the users may need to take control over several of the requested instrument developments if the manufacturers are not willing to address them in a timely manner.

The full report from this workshop can be read on the M&A website.

Eva Olsson, Chalmers University of Technology, Gotenburg; Robert Sinclair, Stanford University; Wolfgang Jaeger, Christain-Albrechts-University Kiel

Picture captions: Next: Some of the delegates and exhibitors. Top: Scenes from the discussion session. Images courtesy of Peter Widing.

INAUGURATION OF THE FEI X-ANT-EM AT EMAT, ANTWERP, BELGIUM

Armand Béché and Bart Goris (sitting) and Staf Van Tendeloo demonstrating the new X-Ant-EM instrument via remote control to (standing in the back from right to left) the Rector of the University of Antwerp (Alain Verschoren), the head of the department of finances (Martine Janssen), the administrator for personnel (Serge Simon) and the Dean of the Faculty of Applied Engineering Sciences (Walter Sevenhans).

On June 10, at the beginning of the 2013 EMAT Summerschool (formerly known as the biannual EMAT Winterschool) an inauguration party for the FEI X-Ant-EM instrument was organised. This unique instrument was installed in March 2013 and delivers the ultimate performance in analytical STEM available today. Its probe aberration corrector offers an amazing 0.08 nm resolution in STEM. The instrument allows a flexible choice of acceleration voltage between 60 and 300 kV which is crucial for limiting the beam damage in beam sensitive materials (biological, polymers, ...). It offers also the latest GIF Enfinium dedicated spectrometer for electron energy loss spectroscopy (EELS). This spectrometer can record 1000 spectra/s and can work in Dual-EELS mode for recording zero-loss and core-loss spectra quasi simultaneously. In combination with STEM this offers unique opportunities for 2D atomic resolution mapping of elements and electronic properties. The Wien-filter monochromator can provide an energy resolution in EELS better than 150 meV. As an alternative to EELS, the instrument also offers a highly efficient EDX system with a collection solid angle close to 1 Sr. The high efficiency of this EDX detector allows to record atomic resolution EELS and EDX data simultaneously. This feature is ideal to map the atomic positions of both heavy and light atoms, which is especially interesting for those atoms with unfavorable EELS edges. Automated software for 3D imaging in tomography is available as well. The instrument is fully remote controlled from an operator room outside the shielded room of the microscope, which dramatically improves the stability.

In 2013, also a Quanta 250 FEG field emission scanning electron microscope that can be operated at a broad range of pressures was installed at the lab. The microscope can yield high-resolution images (with a spatial resolution of approximately 1 nm) in a saturated water vapour environment, keeping the sample in its native state. A Peltier cooled specimen stage furthermore enables one to switch easily between a hydrated and a non-hydrated phase of the specimen. The ability to operate the microscope at environmental conditions furthermore eliminates the need for conductive coating and will enable us to study surfaces of soft matter without any artefacts and obtain analytical information using the EDX or WDX systems that are also available.

Staf Van Tendeloo, head of the research group, delivering the inauguration speech for the X-Ant-EM.

INAUGURATION OF JEOL MICROSCOPES IN TRONDHEIM, NORWAY

On 10th of September 2013 the new transmission electron microscopes (TEM) at NTNU and SINTEF in Trondheim were inaugurated. The three new JEOL microscopes are a JEM-ARM200F (coldFEG, double corrected) TEM, a JEM-2100F TEM and a JEM-2100 TEM. Laboratories and microscopes were built and installed during the past year, and are all taken into use in the fall of 2013. The microscopes are one part of the large scale infrastructure project NORTEM (Norwegian Centre for Transmission electron microscopy), funded by The Research Council of Norway together with the three partners **SINTEF, Norwegian University of Science and Technology (NTNU)** and **University of Oslo**. The centre has two nodes, in Trondheim and Oslo, which share the investments evenly. In Trondheim the **TEM Gemini Centre**, a research collaboration between SINTEF researchers and NTNU professors and students, is running the instruments. A contract for a JEOL Competence Centre (JCC) in Trondheim was signed by SINTEF's president Unni Steinsmo, the President of JEOL Ltd. Gonemon Kurihara and NTNUs pro-rector for research Kari Melby. Guests and participants were given a guided tour of the laboratories and the new microscopes. After the official opening there was a scientific seminar with seven invited speakers from around the world, giving presentations about what is possible to achieve with the new generation of TEM. The seminar had more than 50 participants.

John Walmsley shows the flagship instrument, a JEOL JEM-ARM200F ColdFEG electron source with probe and image correction. Photo: Irene Aspli.

Speakers at the seminar in advanced TEM. From left Ian MacLaren (Glasgow University), Per Persson (Linköping University), Takeshi Kasama (CEN, DTU), Jian Min Zuo (University of Illinois), Masahiro Kawasaki (JEOL USA), Sarah Haigh (Manchester University) and Williams Lefebvre (University of Rouen). Photo: Randi Holmestad.

Official opening with the president of JEOL: From the left; Unni Steinsmo, and Rudie Spooren, from SINTEF, Kari Melby, NTNU, Spyros Diplas, SINTEF, Gonemon Kurihara, JEOL and Randi Holmestad, NTNU. Photo: Irene Aspli.

Randi Holmestad

LAST ADVANCES IN MICROSCOPY AND IMAGING TOOLS FOR POLLEN RESEARCH PRESENTED IN MADRID, SPAIN

Picture of the participants.

- **More than 150 experts from all the world participated in the Workshop on advanced microscopy and imaging methodologies of the international congress "Pollen 2013".**

- **Recent information reveals pollen as a versatile tool for biotech strategies in crops, and for new models of climate prediction with fossil records.**

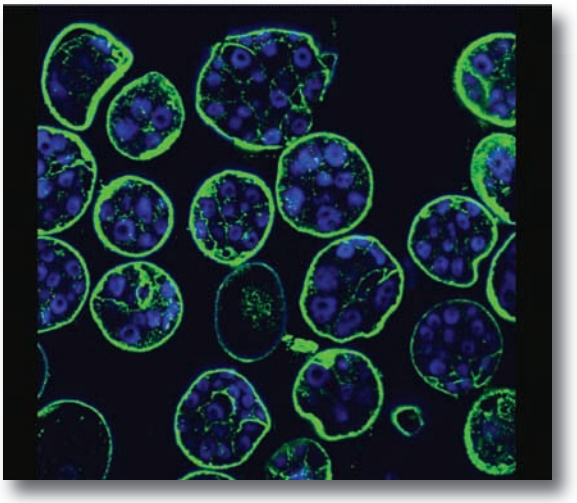
Under the general topic "Pollen Biotechnology, Diversity and Function in a Changing Environment", acronym "Pollen2013", the congress was organized by researchers of the Spanish National Research Council (CSIC), and the Complutense University of Madrid with the Congress Chair Pilar S. Testillano, CSIC researcher, and promoted by the Spanish (APLE) and French (APLF) Societies of Palynology. From September 17 to 20, 2013, the meeting hosted the Workshop on New Methodological Advances on Palynology Research and Imaging, with innovative lectures of Cryoimmobilization techniques in TEM, Digital image processing, Super-resolution microscopy, Machine learning, and Bioimage informatics, as well as New frontiers in paleopalynology. Invited speakers of the Workshop were Surangi Punyasena (University of Illinois, USA), Carmen López-Iglesias (University of Barcelona, Spain), Donatella Magri (University of Rome, Italy) and Gabriel Cristobal (Institute of Optics, CSIC, Madrid, Spain). The Workshop focused on the new developments in bioinformatics and image analysis tools, using machine learning systems and different microscopies, including high-resolution microscopy, for automatic identification of pollen images. These technological improvements will permit the automatic classification and quantification of individual pollen images of complex and numerous samples, as used in airborne pollen analysis for allergy alerts, in the origin certification of honeys, or proxis analysis from sediments for past vegetation and climate predictions.

Together with the Workshop, the meeting organized three Plenary Lectures, thirteen Invited Lectures and seven Scientific Sessions with oral and posters communications. Participants arrived from fifteen countries and four continents, with a wide presence of European assistants and an important participation of young researchers, PhD students and postdoctoral fellows. The meeting hosted discussions about the last advances in pollen biotechnology which unveiled the mechanisms regulating pollen reprogramming and permit to induce and optimize the process in fruit and horticultural crops for double-haploid technology in crop breeding to obtain new varieties in record time. New biotechnology approaches were directed to reduce allergies by

producing male-sterile ornamental plants by engineering male-sterility. Other hot topics discussed in the congress were the recent molecular data on pollen-pistil interaction and pollination in modern and early-divergent angiosperms the increasing impact in world agriculture of declining natural pollinators, mainly due to the high decrease in bee biodiversity and populations, the pollen allergens and their impact in health and environment, and the last records of fossil pollen which have revealed past climatic changes, unknown until now, and permitted to elaborate new models to predict the evolution of present and future climate.

More information in: *www.pollen2013.com*

Pilar S. Testillano
(CIB-CSIC, President of "Pollen2013")



Young pollen-derived embryos of barley (from PS Testillano group).

Discussions in the Auditorium and Posters exhibition hall (CSIC headquarters, Madrid).

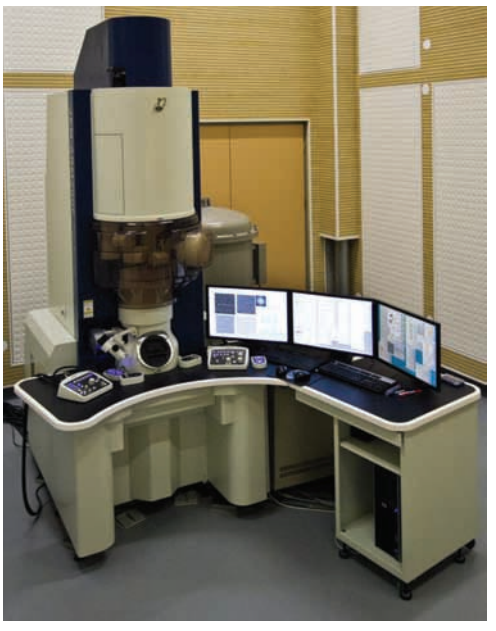
INAUGURATION OF THE FIRST CS CORRECTED TEM IN SLOVENIA

On 19th September 2013 the inauguration of the first Cs corrected transmission electron microscope in Slovenia took place at the National institute of Chemistry in Ljubljana. The instrument, a scanning-transmission electron microscope JEOL JEM ARM 200 CF, fitted with a cold field-emission gun and probe spherical aberration corrector (CESCOR unit from the CEOS, Germany) was purchased as a joint project of the National institute of Chemistry and the Centre of excellence for low-carbon technologies, Ljubljana, Slovenia. It enables atom-by-atom imaging resolution (0.075 nm) and spatial resolution for atom-to-atom chemical mapping of materials. The system is equipped with the new energy-dispersive x-ray spectrometer (Centurio 100 mm^2 from JEOL) for fast elemental mapping and with the new energy filter (QuantumGIF, Gatan) for electron energy-loss spectroscopy with DualEELS capability, energy-filtered TEM (EFTEM) mapping and ultrafast spectrum imaging (SI).

The inauguration that was attended by many distinguished guests was followed the next day with the Scientific symposium on applications of advanced microscopy techniques in materials and life sciences (details at *microscopy.ki.si*). More than one hundred participants from Slovenia and neighbouring countries were enjoying lectures given by renowned microscopists from Europe and the United States.

Dr. Goran Drazic
National institute of Chemistry
Ljubljana, Slovenia

Few of the distinguished guests during the inauguration: prof. Janko Jamnik, director of the National institute of Chemistry (left), the president of the Republic of Slovenia, Borut Pahor (second from the left), prof. Miran Gaberš ek, director of the Centre of excellence for low-carbon technologies, Mr. Masashi Iwatsuki (right), representative director and senior executive officer of JEOL Ltd, and prof. emeritus Manfred Rühle (second row left).



Probe Cs corrected ARM 200 CF microscope is a big achievement for Slovenian science and will enable high-end research in the fields of materials and life sciences.

THE FIRST ENVIRONMENTAL, ABERRATION-CORRECTED TEM IN FRANCE

Participants to IWETEM 2013.

A new unique Transmission Electron Microscope facility in France, the Ly-EtTEM: Lyon Environmental tomographic Transmission Electron Microscope was inaugurated with a symposium on 25 and 26 November, 2013 at the ''Centre LYonnais de Microscopie'' (CLYM, *www.clym.fr*).

The transmission electron microscope, a FEI TITAN ETEM, 60 - 300 kV, was installed at the Institute of Researches on Catalysis and Environment in Lyon, IRCELYON, umr CNRS 5256, University of Lyon. This instrument becomes the 4th dedicated electron microscope at the CLYM, a regional research Federation involved in structural, nano- and microstructural characterization of materials by means of microscopy techniques (an environmental scanning electron microscope FEG-ESEM, an analytical PEELS-EDX equipped 200 kV FEG-TEM, a double-column FIB microscope with EDX and EBSD attachments, and the Ly-EtTEM).

The peculiarity of this new microscope is its environmental capabilities: owing to a dedicated differential pumping, gas pressures up to about 20 mbar can be achieved in the close vicinity of the sample in the pole pieces, thus permitting in situ solid-gas reactions, phase transformations, surface reactivity down to the atomic level thanks to an aberration Cs-corrector for the objective lens. Specimen heating holders also allow these experiments to be performed at high temperature (up to about 900°C even in gas environment) still at atomic resolution.

The opening ceremony took place on the afternoon of Monday, 25 November at the CNRS delegation, Villeurbanne. Short speeches were given by official representatives from the institutions which financed the instrument: the Institute of Chemistry from CNRS, the ''Greater Lyon'', the Rhône-Alpes region. The following day, an International Workshop on Environmental TEM (IWETEM 2013) was held at the INSA (National Institute for Applied Sciences, *www.insa-lyon.fr*), with 6 lectures specialized in different aspects of environmental electron microscopy, including speakers from Japan, USA, Denmark, The Netherlands and France. About 80 people followed these lectures, which announced the start of new exciting research opportunities for all CLYM partners. The Ly-EtTEM will also soon be accessible to the scientific community through the French national network of Advanced TEM and Atom Probe, METSA *(www.metsa.fr)*.

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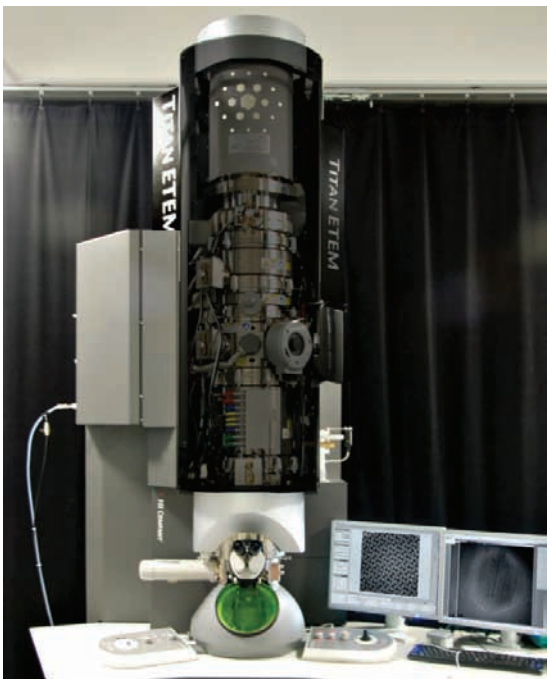


Credit CLYM © 2013

INAUGURATION OF NEW JEOL TEM CS CORRECTED ARM200F IN CATANIA, ITALY

Challenges in materials science beyond the nanoscale: the sub-Angstrom electron microscope at IMM-CNR.

In the field of microelectronics the synergy between public and private is a well-known and travelled road in the Etna Valley.

Here young PhD students, coming from University, have the opportunity to show their skills at the Institute for Microelectronics and Microsystems (IMM-CNR), a National research structure with about 200 researchers, seventy of them in Catania, working in the premises of STMicroelectronics and the University.

The IMM research activity is oriented to the investigations of new materials properties and related technological applications made possible thanks to the collaboration with the Industry.

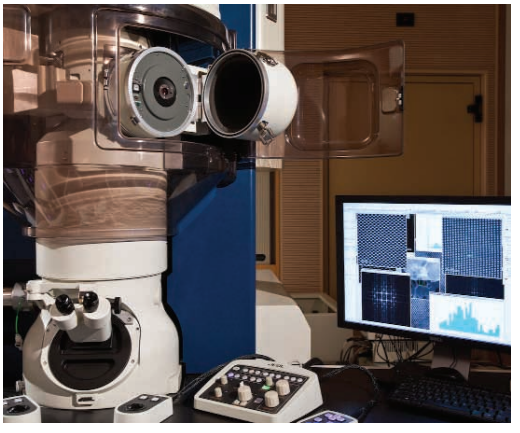
Sophisticated methodologies, such as scanning atomic microscopy and sub-Ångström transmission electron microscopy, have recently been used to achieve important results on science and technology of graphene, a material consisting of a single atom thick carbon layer having unique electrical, mechanical, and chemical properties.

The ARM200, the new scanning transmission electron microscope installed at the IMM laboratories, thanks to the "Beyond-Nano" project of the Italian National Research Council, funded by the Ministry of Education and Research, was inaugurated on Monday November 11. The ARM200 is part of a new class of electron microscopes, called Cs corrected, equipped with a special lens for the correction of spherical aberration, responsible for image distortion. A well-known issue already faced by Galileo Galilei, by Ernest Abbe late 1860, and by Otto Scherzer in 1936, six years later than Ernst Ruska had developed the first electron microscope.

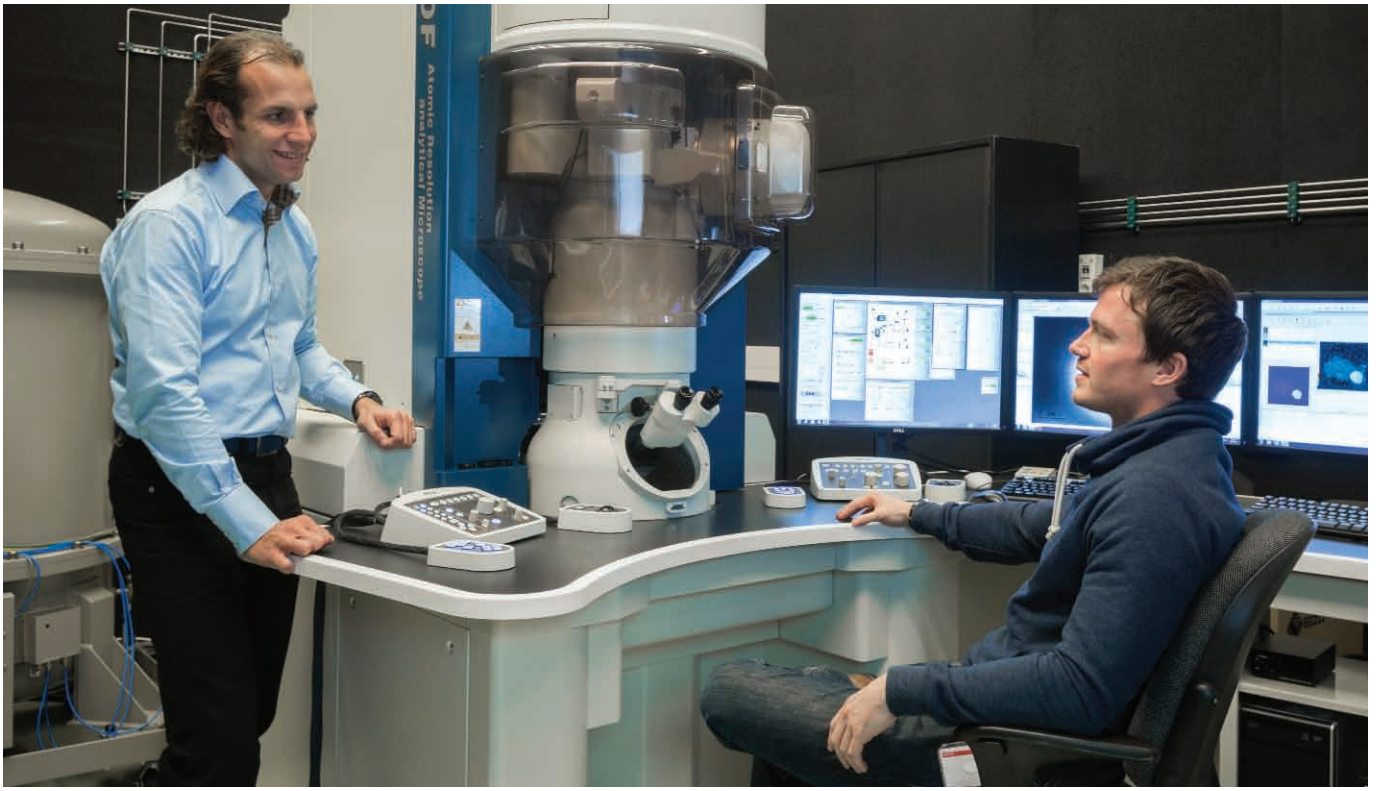
The ARM200 has exceptional features which make it one of the most powerful electron microscopes in Europe. Its sophisticated hardware configuration combines spatial resolution and chemical contrast on a single image, allowing, element by element, the identification of the atomic structure of materials in all three-dimensional projections.

The ARM200 has been installed in a phono-isolated and anti-vibrating laboratory, equipped with thermo-radiating panels. The ARM200 can also operate at low energies, down to 40 keV, allowing the investigation of soft materials and carbon-based structures, such as graphene.

Thus, IMM confirms to be a cutting-edge research facility in the field of materials and nanotechnologies.



NEW LAB FOR TOP-LEVEL RESEARCH INTO SOLAR CELLS, EINDHOVEN, THE NETHERLANDS



Prof. Kessels (left in the photo) at the new JEM ARM200. Photo: Hennie Keeris/Foto Buro Brabant.

A new test facility for breakthrough research into solar cells has been opened by the Eindhoven University of Technology (TU/e) on Wednesday 27 November 2013. The new lab is part of the Solliance PV consortium, and includes a probe-corrected JEOL ARM200 Transmission Electron Microscope that will allow sub-nm studies of materials and interfaces in solar cells.

Solliance

Solliance is a consortium of R&D organizations working on the development of thin-film photovoltaics (PV) in the ELAT region (Eindhoven-Leuven-Aachen). The partners in Solliance are ECN, IMEC, TNO, Holst Centre, TU/e and Forschungszentrum Jülich. Solliance's ambition is to strengthen the position of the region as a world player in thin-film PV technology. Solliance creates synergy among more than 250 researchers with this common goal. It aims to realize this ambition by joint use of state-of-the-art infrastructure, alignment of research programs and close cooperation with the solar business community. Solliance is amongst others supported by the Dutch Province of Noord-Brabant.

Solar research

The TEM facility is part of the Plasma and Materials Processing group of the TU/e, headed by Prof. Erwin Kessels. This group specializes in thin film processing technologies for all type of solar cells by using various deposition techniques. As an example, the Expanding Thermal Plasma (ETP) technique is used to deposit different thin films for solar cells such as a-SiNx:H antireflection coatings for (multi)crystalline Si solar cells, a-Si:H and nc-Si:H absorber layers, as well as ZnO transparent conductive oxides (TCO) for thin film silicon and CIGS solar cells. Atomic Layer Deposition (ALD) is used to deposit both oxides such as Al-doped ZnO as TCO and Al_2O_3 nanolayers for surface passivation of silicon. Also metal films and metal nanoparticles are prepared by ALD, such as Pt nanoparticles for the counter electrode in dye-sensitized solar cells and other catalytic applications. In a collaboration with the research group of Prof. Erik Bakkers, new concepts, such as nanowire solar cells, are being explored, both by exploring the intrinsic structure of nanowires at the atomic scale, as well as by adding functionality to these nanowires by ALD.

The probe-corrected JEM ARM200 is equipped with the Centurio EDS detector, a 100 mm^2 SDD detector. The combination of the probe corrected STEM configuration and the large collection angle for EDS enables studies of ALD nucleation processes on the atomic scale as well as studies of compositional distributions on the mono-layer scale. The ability to perform HRTEM and HRSTEM studies at 60 kV and 80 kV will be explored for investigating solar cells of polymer or organic materials as well as for investigating devices consisting of carbon nanotubes and graphene.

Public–private partnership

The location of the new TEM on the High Tech Campus is next to the Solliance building which is currently under construction. The activities in this new building will include pilot production lines for thin-film solar cells. The TEM is physically housed at Philips Innovation Services on the Eindhoven High Tech Campus, thereby creating synergy between the TEM expertise offered by Philips and the dedicated materials science knowledge available at the Solliance partners. This will allow optimum use to be made of the available knowledge, expertise and facilities in what has now developed into the leading solar region of the Netherlands.

Official opening of the TEM facility by Edzer Huitema (Commercial Director Solliance), Tsutomu Morita (General Manager JEOL Europe) and André Gehring (Division head Philips Innovation Services).

Dr. M.A. Verheijen

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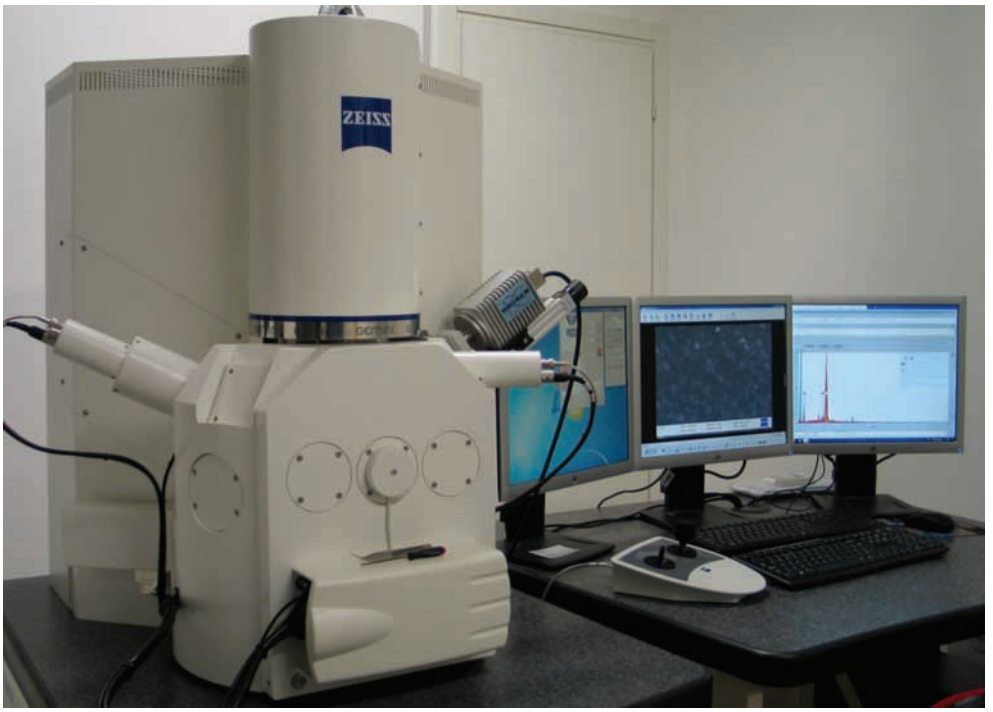
INAUGURATION OF THE CENTRE FOR ELECTRON MICROSCOPY "GIOVANNI STEVANATO" IN VENICE, ITALY



On December 16th the new Centre for Electron Microscopy "Giovanni Stevanato" has been inaugurated. The Centre was born from the collaboration of Ca' Foscari University of Venice and Stevanato Group, in a perfect integration of academic and industrial research activities.

Ca' Foscari University has several years of experience in material synthesis and characterization by means of electron microscopy; the materials characterized through the years include metal surfaces and films, air- and water-borne particulates, ceramic materials, glasses, polymers with nanofillers, carbon nanotubes and fullerenes, nanoelectrodes, magnetic materials and nanocatalysts; in recent years, a special focus has been developed on mesoporous silica nanoparticles used for various applications, specially lighting and nanomedicine.

The Stevanato Group is an Italian multinational company headquartered in Piombino Dese, Padua – Italy. It produces pharmaceutical glass primary packaging for injectable use. Founded in 1949, it is also known in the glass tube forming technology and machinery sector. The Group provides the industry with a full range of pharmaceutical glass tube products with the highest levels of quality and is a partner of leading global pharmaceutical companies.

Together, they decided to join their expertise and create the new Centre for Electron Microscopy "Giovanni Stevanato", whose activity will be dedicated to material characterization with a special focus on the effects upon glass surfaces of both industrial processing and pharmaceutical substances. To the existing instrumentation already held by Ca' Foscari University, a brand new FE-SEM has been added, wholly sponsored by Stevanato Group.

So the Centre provides the following main facilities, all of them already completely operative:

- Jeol JSM-5600LV, a 30-kV variable pressure SEM with thermoionic emission equipped with an Oxford Instruments ISIS Series 300 EDX system;
- Zeiss Sigma VP, a 30-kV Schottky field emission variable pressure SEM with Gemini column, angle-selected backscattered detector, secondary electron detector for variable pressure mode, and a Bruker Quantax 200 EDX system with a 30 mm^2 detector active area (analytical resolution = 126 eV @ MnK$\propto$);
- Jeol JEM-3010, a 300-kV TEM with LaB6 thermoionic emission (point resolution = 0.17 nm) with multiscan camera Gatan Model 794, and an Oxford Instruments ISIS Series 300 EDX system;
- Ion milling system Gatan Model 691 PIPS;
- Cryo-ultramicrotome Leica UC6+FC6.

The Centre is located in the area of the to-be-inaugurated new scientific campus of the Ca' Foscari University of Venice. In particular, all the instrumentation is placed into the Laboratory for Nano- and Bio-material, where a molecular biology laboratory

of the European Centre for Living Technology is also hosted. The presence of expertise coming from various backgrounds creates a synergetic environment very beneficial to all of the activities of the Laboratory, well included those of the Centre for Electron Microscopy "Giovanni Stevanato".

Contact:
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175 YEARS OF RMS

Parliament and honours; another year in the life of the RMS

The Royal Microscopical Society (RMS) followed up its successful staging of emc2012 with another full and active year. It ran its usual programme of meetings, courses and workshops, and took on a more proactive role to campaign on behalf of its members. It did this by hosting a high-level reception - *Innovation under the microscope* - at the Houses of Parliament, the heart of UK government. The event marked the beginning of the Society's 175th anniversary celebrations, and its aim was to encourage parity in the funding of the life and physical sciences.

Campaigning for microscopy

"In countries across mainland Europe and the US, there has been near-parity in the funding of life and physical sciences over the last 20 years. There has also been a steady increase in the total funding over the same period", said Professor Tony Wilson, outgoing President of the Society and the host of the reception. "In the UK in the same period there has been a significant increase in support for the life sciences – particularly medical research. Whilst this is welcome, we as a Society wish to ensure that the physical sciences receive the recognition that they deserve. They provide the springboard for innovation and technology which helps to drive economies and allow our industries to be competitive."
The keynote speaker was Professor David Delpy, Chief Executive of the Engineering and Physical Sciences Research Council. He spoke of the speed of change, and managing the expectations of a public that believes that 3D real-time imaging at the atomic scale is now routine. He also acknowledged the work of the RMS in inspiring the next generation of microscopists through its Microscope Activity Kits, which include microscopes and teacher-developed curriculum-based resources for primary schools. The kits have proved so popular that the Society is committed to funding an additional one hundred Kits which will put a further one thousand microscopes into classrooms.

Microscience – a new era

The anniversary celebrations will culminate in July at the Microscience Microscopy Congress 2014 (mmc2014) in Manchester. This event will bring together the best of emc2012 and the best of the Microscience Conference and Exhibition series. And, it will feature the best of both worlds in the microscopical sense – from the life and physical sciences, and from light and electron microscopy. As usual, the accompanying exhibition will be one of the largest in Europe.
The Society is so pleased with the quality of the Plenary Speakers that it will recognise them all by awarding Honorary Fellowships. This is the Society's highest award and it is very rare for so many to be made in a single year.
Extracts from the award citations remind us of the contributions that these speakers have made and why the Society is so pleased that they will all be attending mmc2014.

Professor Flemming Bessenbacher, Aarhus University, Denmark

"Professor Bassenbacher has had an extraordinarily distinguished career in Scanning Probe Microscopy and in developing microscopy tools for the nanoscale characterization of materials. He was one of the pioneers of Scanning Tunnelling Microscopy in the late 1980s, developing a home-built instrument that was revolutionary in providing some of the very first images of metal surfaces at atomic resolution and at highly elevated temperatures. The stability of the instrument and the images acquired made it possible to record movies of surface processes for the first time."

Professor Mildred Dresselhaus, Massachusetts Institute of Technology, USA

"Professor Dresselhaus and her group have extensively employed advanced electron microscopy and Raman micro spectroscopy to nanomaterials, in particular carbon nanostructures to relate their structure to their electronic properties. As such she has defined some of the basic concepts of using well-defined nanostructures in electronic devices to achieve a specific functional behavior which is key for their use in technological applications."

Dr Ondrej Krivanek, President, Nion Co and Adjunct Professor, Arizona State University, USA

"In 1997 Dr Krivanek founded Nion Co, that designed and built the first correctors for spherical aberration for the scanning transmission electron microscope (STEM) configuration that showed an improvement over the uncorrected performance. This development is undoubtedly the most important improvement in STEM since its initial invention. Many of the experimental "firsts" that aberration correction has allowed have been achieved using Nion instrumentation."

Dr Jennifer Lippincott-Schwartz, National Institutes of Health, USA

"Dr Lippincott-Schwartz and her postdoctoral fellow George Patterson developed photoactivatable GFP, enabling activation of fluorescence with a laser flash, and the newly fluorescent molecules could then be followed through cells. This development also led to 'super-resolution imaging', and the innovation of PALM (photoactivation localization-microscopy). The recommendation for her award is made on the basis of her use of microscopy to understand organelle dynamics and inheritance strategies, leading the field in this area, her leadership in the use of GFP in live cell imaging, and her pioneering work in the development of photoactivatable GFP, spurring on the new microscopical development of PALM."

Professor Michael Sheetz, Columbia University, USA

"Professor Sheetz continues to work at the cutting edge of microscopy and biochemistry developing new tools and protocols for measuring forces at the molecular level in live cells, and recently he set-up the Institute for Mechanobiology in Singapore. Throughout his distinguished career he has developed and exploited the latest advances in microscopy to answer fundamental biological questions, and in the process he has produced an impressive body of scientific work."

Professor Ernst Stelzer, Buchmann Institute for Molecular Life Sciences, Germany

"Professor Stelzer has been a key player in the development of confocal microscopy, and his academic patents were heavily utilised in the development of the highly successful Carl Zeiss LSM series. He was also involved with the development of 4Pi microscopy and other multi-lens detection schemes. These contributions have made a profound contribution to the world of microscopy, especially with regards to bioimaging. Beyond these significant inputs, Professor Stelzer also pioneered light sheet-based fluorescence microscopy (LSFM, SPIM, DSLM). With regards to ''bio'' applications, this technique is still in its infancy and yet it is already enabling high impacting research as it becomes commercially available."

Professor Tony Wilson and Nicola Blackwood MP (left) listening to Professor David Delpy speaking at the RMS Parliamentary Reception.

Professor Stelzer will give the 175th Anniversary Lecture on the afternoon of Wednesday 2nd July. This will be followed by the Congress Banquet.

Full details of mmc2104, including conference, associated meetings, and exhibition are available at *www.mmc2014.org.uk.*

The Microscience Microscopy Congress 2014, 30th June – 3rd July 2014.

Notes :

EMS SCHOLARSHIPS

SCHOLARSHIP LIST

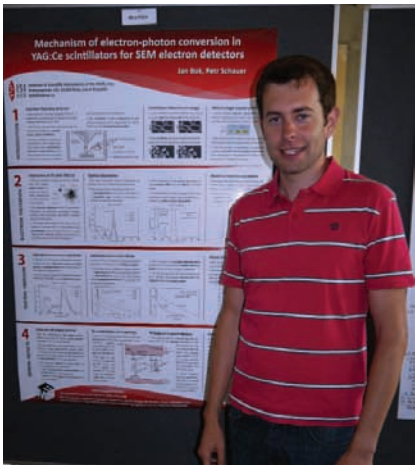
Microscopy Conference 2013 (MC2013), August 25-30, 2013, Regensburg, Germany

Name	Society	Lab & Country
Amin-Ahmadi Behnam	BSM	EMAT, University of Antwerp, Belgium
Bily Tomas	CSMS	Institute of Parasitology, South Bohemia University, Czech Republic
Bok Jan	CSMS	Institute of Scientific Instruments of the ASCR, Brno, Czech Republic
Gonnissen Julie	BSM	EMAT, University of Antwerp, Belgium
Herbst Markus	ASEM	Dept of Cell Biology & Physiology, University of Salzburg, Austria
Hočevar Matej	SDM	Institute of Metals and Technology, University of Ljubljana, Slovenia
Kaya Pinar	TEMD	Dept of Material Science & Engineering, Anadolu University, Turkey
Köroğlu Pinar	TEMD	Istanbul Univ. Faculty of Science, Department of Biology, Turkey
Kozina Viviana	CSM	Department of Histology and Embryology, University of Zagreb, Croatia
Maiorana Alessandro	SISM	Istituto di Fisica, Università Cattolica del Sacro Cuore, Rome, Italy
Miletić Aleksandar	SSM	Faculty of Technical Sciences, University of Novi Sad, Serbia
Mrak Polona	SDM	Biotechnical Faculty, University of Ljubljana, Slovenia
Novak Sara	SDM	Biotechnical Faculty, University of Ljubljana, Slovenia
Ozsoy Cigdem	DGE	Max Planck Institute for Inteligente Systems, TU Darmstadt, Germany
Palmieri Valentina	SISM	Istituto di Fisica, Università Cattolica del Sacro Cuore, Rome, Italy
Schachinger Thomas	ASEM	Institute of Solid State Physics, Vienna University of Technology, Austria
Shawrav Mostafa Moonir	RMS	Vienna University of Technology, Austria
Strnad Martin	CSMS	University of South Bohemia, Biological Chemistry, Czech Republic
Szívós János	HSM	University of Pannonia, Doctoral School of Molecular - and Nano-technologies
Zhou Dan	MSI	Max Planck Institute for Intelligent Systems, StEM, Stuttgart

SHORT REPORTS

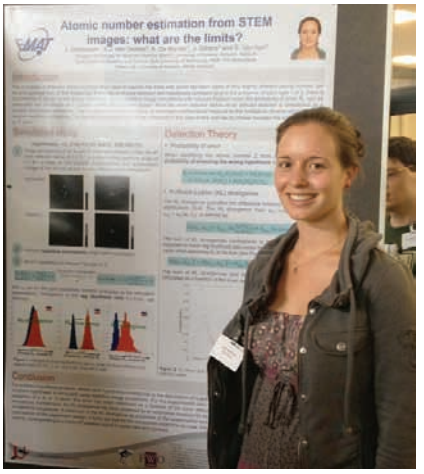
Jan Bok (Czech Republic)

The Microscopy Conference (MC) 2013 held in Regensburg proved my expectations as an exciting meeting full of interesting topics. As a Ph.D. student doing research in the field of electron detection systems, I found a few very interesting talks and poster presentations in the Instrumentation and Methods symposium and also in the Multimodal and Interdisciplinary Microscopies symposium. These presentations allowed me to learn new things in the area of signal detection and image quality improvement. Although the area of my focus wasn't represented at the MC2013 as much as I would wish, I found a big number of excellent talks which increased my general knowledge on different topics of electron microscopy. The talks given by "stars" of electron microscopy, for example by H. Rose, M. Rühle, P. Schattschneider, etc., were absolutely amazing. In addition, the workshop lead by J. Zweck was very inspiring. I also found the commercial lectures beneficial (especially the lectures from companies FEI, Gatan, Bruker) which gave me background information about the possibilities of the modern instrumentation. Apart from listening to the talks, I had a great opportunity to meet interesting people and discuss some research topics including showing our poster presentations to each other. To summarize, **the meeting was excellently organised** (together with the interesting cultural program) and I found the attendance at the MC 2013 very valuable for my scientific growth.



Julie Gonnissen (Belgium)

First I would like to express my sincerest thanks and appreciation to EMS for the financial support, which made it possible for me to attend the MC2013 conference in Regensburg. It was the first conference for me as a starting researcher and it has been a great experience. I especially enjoyed the plenary lectures every morning, but also many other presentations of starting and experienced scientists were very interesting for me. It was a great pleasure to have the opportunity to choose between several lectures about different topics which allowed me to broaden my perspective in the world of microscopy and to learn about new techniques. The poster presentations were also very interesting and gave me the chance to meet other people that are working in the same area and to discuss my work with more experienced researchers. **I was very pleased that my poster was selected for the Best Poster Award** within the category of Quantitative High-Resolution TEM/STEM and Diffraction (IM1). It gave me a lot of motivation to continue with my research activities. Also the conversations with other young researchers gave me new ideas. Therefore I would like to thank EMS again since overall, this conference was a rich experience for me and I am already looking forward to the IMC 2014 in Prague.



Herbst Markus (Austria)

I like to start by thanking the European Microscopy Society for their financial support, which made it possible for me to participate at the MC 2013 in Regensburg, Germany. It is always a great experience to take part at an international scientific conference, which gives one the opportunity to keep informed on the latest progress in the field of microscopy. In addition, I'm very honoured that the EMS choose me among 43 received applications and awarded me with this scholarship to attend such a great conference and to offer me the opportunity to present my work on "Three-dimensional arrangement of the Vasa vasorum of the human great saphenous vein: a scanning electron microscopy and 3D-morphometry study".

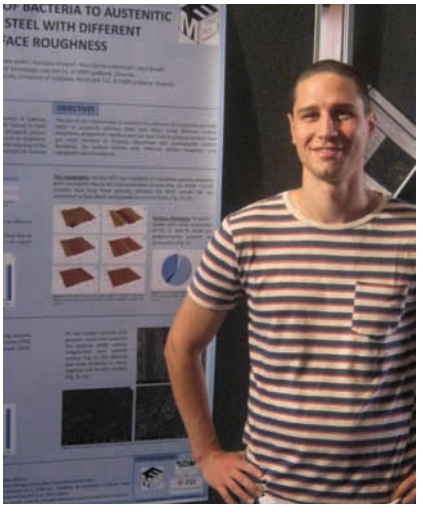
The symposia lectures were very interesting and during the breaks between the lectures I took the opportunity to have a look at the exhibition of companies showing their latest equipment and tools for electron microscopy.

Especially, for me, as a young scientist, the poster session was a great chance to present my work and to meet people who are working in the same or close field of research. I enjoyed it very much to discuss my research and to exchange insights in the field of life science with other young scientists and also well-known experts.

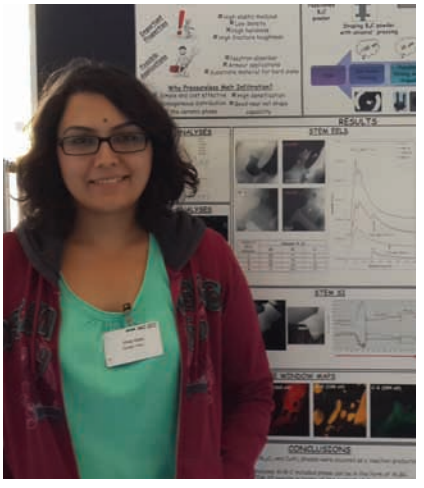
In the evenings we were able to discover the outstanding city of Regensburg and had a good time.
I enjoyed the conference and the participation became not only a great asset for me but also an inspiration. I'm looking forward to the next conference organized by the EMS.

Matej Hocevar (Slovenia)

Firstly, I would like to thank the European Microscopy Society (EMS) for the scholarship provided and for the opportunity to participate at the MC2013 Regensburg Germany with my poster entitled "The adhesion of bacteria to austenitic stainless steel with different surface roughness". The conference met my expectations regarding the content and organization. There were a number of interesting lectures and posters in the field of materials and life science. New techniques, sample preparation methods and new developments were presented. This microscopy conference presented an opportunity to acquire knowledge in the field of electron microscopy and to gain new contacts with colleagues working in these areas. **I was pleasantly surprised by the number of exhibitors and their many presentations of new equipment and techniques** developed in electron microscopy. In addition to the conference program, a rich cultural program with guided tours to the old city, castle, cloister St. Emmer and Museum Neupfarrplatz was organized. Finally, I would like to congratulate the conference organizers for a well-organized and derived conference and I hope we meet again next year in Prague on the 18th International Microscopy Congress.



Pinar Kaya (Turkey)



The Microscopy Conference 2013, MC2013 was held from 25th-30th August in Regensburg, Germany. I was honoured that EMS has selected me among 43 received applications and awarded me with a scholarship to attend such a great and attractive congress and provided me to present my poster on "Analytical electron microscopy investigations of B_4C-Al ceramic - metal composites produced by pressureless melt infiltration technique." The MC2013 in Regensburg was a very good opportunity for me to get knowledge about the latest developments and trends in electron microscopy. **It was interesting not only from the microscopy point of view but also from the materials science and applications.** During the conference I had the chance to attend the lectures, especially related to my thesis.

As a PhD student to discuss with the experts of electron microscopy as well as other young scientists from all over the world working on different topics was a great experience. I also met with new people and visited the exhibition. Therefore, I would like to thank EMS for the financial support which enabled me to participate to MC2013.

Consequently, it can be stated that the conference became a wonderful meeting thanks to the valuable support of the organisers.

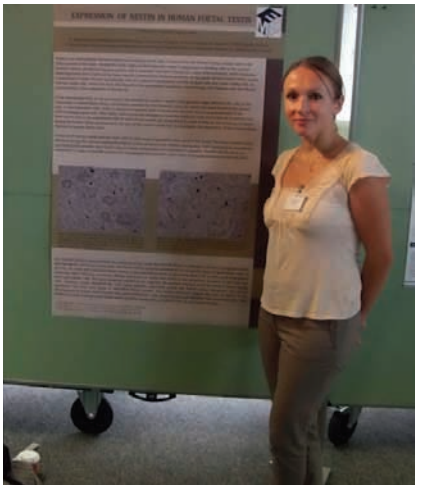
Pınar Köroğlu (Turkey)

I am writing to thank you for your scholarship. I was very happy and appreciative to learn that I was selected as the recipient of your scholarship. I attended the Microscopy Congress (MC) held in Regensburg. The Congress provided an update of the challenges at the frontiers of applied scientific research, bringing together, through all forms of microscopy, advances in nanotechnologies and applications; medicine and much more. I am very grateful to EMS for supporting me to attend the Microscopy Conference in Regensburg.
The poster session gave me a chance to present my work and meet with people that are working in the same area. I liked the concept of a poster session where it was possible to discuss my research with experts. Overall, I enjoyed the conference and I'm looking forward to the next congress.

As a PhD student, I think is very useful to attend to this events since there is a great amount of learning in a very short time and it is also very motivating to get better research done.

Viviana Kozina (Croatia)

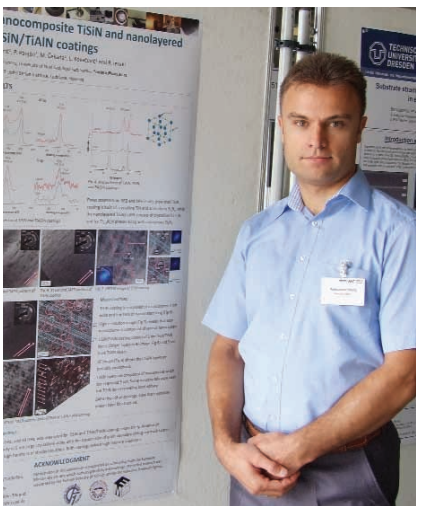
The Microscopy Conference in Regensburg was held under the organization of the European Microscopy Society from August 25th to August 30th 2013. I participated actively with two posters entitled "Expression of nestin in human foetal testis" and "Macrophages and Leydig cells in testicular biopsies of infertile patients: friends or enemies?" with the support of the EMS. For me, a visit to this conference was a very important experience since I was witness of a very precise organization, where nothing was left to chance and everything was accurate and balanced. Additionally, I personally think that the **scholarship as a form of financial assistance is an exceptional motivation** for students because it indicates their importance, work and effort in science, and can be adequately rewarded. Conferences are always a great opportunity for students to meet potential collaborators from other countries, to be better acquainted with their work, to show our work to them, discuss about it with other colleagues and induce further motivation, but also a kind of enthusiasm for science. This is especially true in such large conferences with over 1000 participants. The organization of such an event is certainly demanding and exhausting, but it **deserves praise and congratulations**. I would specifically point out the large exhibition space where there is a great opportunity to resolve all doubts in the use of equipment and learning about new developments in the market.



Thank you for providing me with the support and congratulations for the excellent organization.

Aleksandar Miletik (Serbia)

I would like to begin by thanking the EMS for supporting me to attend the "MC2013" in Regensburg. The conference provided insight in the latest progress in the fields of life science, materials science and microscopy methods. I attended several plenary and invited talks, and followed many lectures in different sessions. My attention was mainly focused on nanostructured materials, their applications and methods used for their characterization. For example, K. Bejtka gave an interesting talk on nanotubes for energy harvesting, while I. Djerdj presented nanorods for CO_2 detection in his invited talk.



Although there were breaks between lectures, **there was no real break from gaining**

new knowledge. During breaks, a large trade exhibition along with lunchtime lectures provided an opportunity to familiarize with the cutting edge microscopy techniques and equipment. This was also the time to meet other researchers and to continue discussion from just finished lectures.

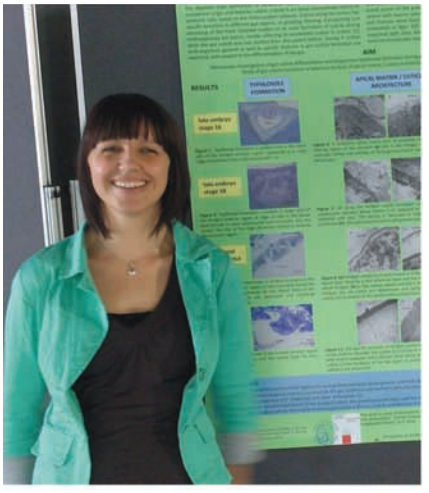
I presented a study on microstructure of nanocomposite and nanolayered nitride coatings in the "Thin Films and Coatings" poster session. At first, I was disappointed not to have a talk. At the end, **I was very satisfied with the poster presentation** while I had a lot of fruitful discussion about my research. It was also enjoyable to have discussions about the work of other researchers who presented their findings in some of the poster sessions.

How not to say a few words about Regensburg. It is a city full of history which can be traced back to Roman times. An ancient Roman wall, the beautiful Thurn and Taxis palace and St. Peter cathedral are just some of the remarkable city center objects. We were lucky to be in Regensburg during the "DULT" festival, or "mini-Oktoberfest" as local people prefer to call it.

At the end comes the question how to call the conference at which I learned a lot, met new people, sheared ideas, arranged future cooperation and had time for pleasure? I would call it a successful conference!

Polona Mrak (Slovenia)

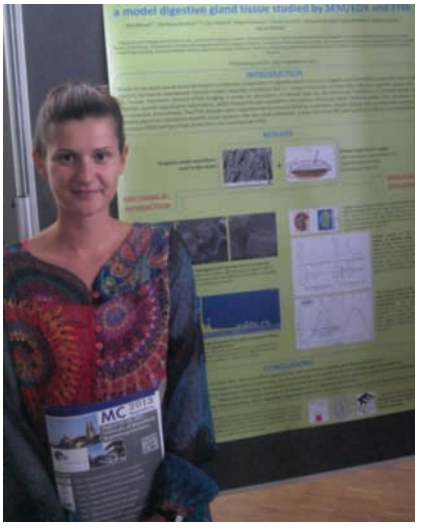
I am very grateful for the opportunity to attend the Microscopy Conference 2013 that was held in Regensburg, Germany. About half a year before the conference actually started, we began our preparations and we decided what in details and in which way we wanted to present our work. In the next few months we had a great motivation for combining different microscopic approaches to obtain more complementary results. Intensive preparations were performed a month before and in that time we extracted the principal data for a meaningful presentation. These preparations were an opportunity to make great progress in my PhD work and in the way to present it to a wider audience. When the conference started I was excited and a little scared at the same time. The event was well organized and in spite of a quite intensive schedule of interesting lectures, there was still enough time and opportunities to talk with people from different countries who have already collaborated with you in the past or who were interested in our work and even in potential future collaboration. The advantage



of these conversations is in gaining different prospects for our work. There were also a lot of opportunities for meeting with the people from different microscopy companies. Me and my colleagues from Slovenia also had time for sociability and for visiting the town of Regensburg with its interesting sights. I had contributions as a poster presentation on ''Stomach and hindgut cuticle differentiation during embryogenesis of the crustacean Porcellio scaber'' and as an oral presentation on ''Cuticle formation during intramarsupial development of the crustacean Porcellio scaber: Imaging and analysis''. **This was a life-time experience for me that gave me a lot of motivation for my further research in this field**. I am really grateful to the European Microscopy Society for providing me the financial support to attend MC 2013.

Sara Novak (Slovenia)

I attendant this year's Microscopy Conference (MC2013) at the University of Regensburg in Germany, with the help of an EMS scholarship award. I presented work of our research group for Nanobiology and nanotoxicology from the Biotechnical faculty, University of Ljubljana, Slovenia.

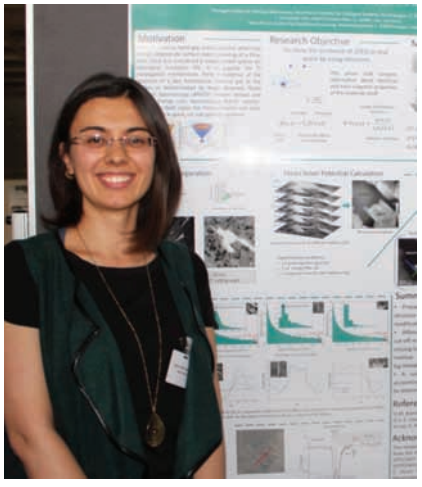


Our poster was entitled "Interaction of ingested tungsten oxide (WOX) nanofibers with digestive gland tissue of model organism (Porcellio scaber, Isopoda, Crustacea)" and was presented in the MC2013 section Multimodal and Interdisciplinary Microscopies (MIM), Nanoma-

terials, Environment, Nanotoxicology and Health (MIM 3).

I am very pleased that I could attend all interesting lectures which will help me to improve my knowledge on preparation and microscopy of biological samples. I met a lot of microscopy expertise and I was very happy to have the opportunity to share our experience in the field of microscopy. **I also found the exhibition of all the new microscopy equipment very interesting and instructive.**

Cigdem Ozsoy Keskinbora (Germany)



I believe that the MC2013 conference was a really instructive, successful and enjoyable conference which caused new questions to arise and promoted new ideas for me. We are working in a world today where we can achieve picometer level resolution with the Cs correctors, and this meeting gave an opportunity to listen to the scientist who invented the Cs correction. There were a lot of **nice talks given by the people whom papers and books I read** and I had a chance to talk with them. Also listening to the talks from young scientist and discussing at the poster section was very helpful to understand what the hot-topics are and how much more we have to study to keep up with the piling knowledge. Beside the electron microscopy, there were also very nice talks about other microscopic techniques. The section called Multimodal and Interdisciplinary Microscopy section was very stimulating. It was also a nice occasion to bring together many people from different parts of the world, so it was also very nice to see some old friends and make new ones to establish a network in the nice city. Because of all these reasons I would like to thank the EMS again for supporting us to attend this very nice conference.

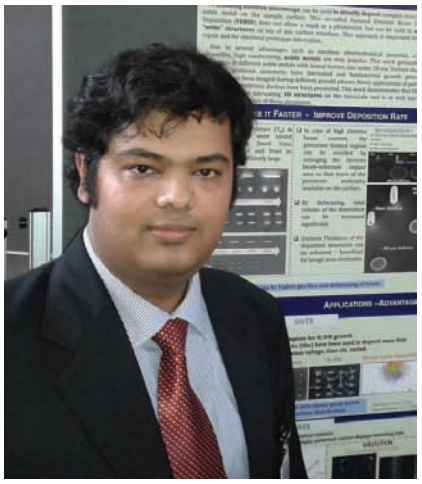
Thomas Schachinger (Austria)

Being the first international conference I attended made it really special for me. Everything seemed to be scaled up by an order of magnitude compared to the national workshops I have participated before. The same was true for my excitement. Certainly, a part of that excitement stemmed from the fact that I was allowed to give a talk about my recent work, but also the venue in Regensburg with its wonderful ancient city centre, and the gathering of more than a thousand microscopists from all over the world added a lot to that feeling. As I am especially interested in electron microscopy techniques and fundamental questions, the "instrumentation and methods" sessions were particularly interesting for me, just as the very enlightening Monday evening workshop from Josef Zweck about the differential phase contrast technique in electron microscopy. A nice opportunity to spend the lunchtime was provided by the lectures given by several manufacturers. Along the way, I found enough time to discuss ideas, under- and misunderstandings after the talks as well as during the poster sessions. It seemed to me as if the unique environment at such a conference bears a very high creative potential. Another aspect was the feeling of **"what an honour to be here"**, when listening to plenary talks and sessions held by very renowned speakers. Later on I was happy to get the opportunity to talk to them in person. As the conference drew to a close, I took the chance to clear my mind by having a walk around the spacious campus. To sum it up, I really enjoyed the conference in Regensburg and attained some very interesting thoughts and new perspectives as well as personal contacts. With that I want to express my gratitude to the EMS for giving me the chance to attend the MC2013 by awarding me one of their 21 scholarships.

Mostafa Moonir Shawrav (Austria)

The Microscopy Conference 2013 took place in Regensburg, Germany. I had been honoured to participate in this EMS extension due to the courtesy of European Microscopy Society Scholarship. The conference was held at Regensburg University, which was convenient to reach from any part of Europe.

The conference was designed in a way that researchers from multidisciplinary microscopy fields could participate and engage in scientific discussion. I personally believe this is a wonderful event for the researchers who are working with transmission electron microscopes. The plenary lectures including the Ernst Ruska Lecture and Harald-Rose-Lecture were really interesting. It was inspiring to see that **renowned companies** (FEI, Carl Zeiss, JEOL etc.) **as well as**



start-up/small microscopy related companies presented their products. Different kinds of microscopes were also exhibited at a same place fulfilling a scientist's dream. I was excited to explore these states of the microscopes' new capabilities and innovative features. I appreciate that Carl Zeiss inaugurated two of their electron microscopes in this conference.

I presented my work on Focused Electron Beam Induced Deposition titled "3-dimensional SEM processing and imaging of Gold and Platinum nanostructures" in the MIM1 poster session. I was happy to explain my work to more than 12 visitors. However, I would appreciate if some more work on Focused Electron Beam Induced Processing can be shown in the future. This is an advanced technique where SEM is used to process (mainly deposit/etch) nanostructures by the help of precursor molecules.

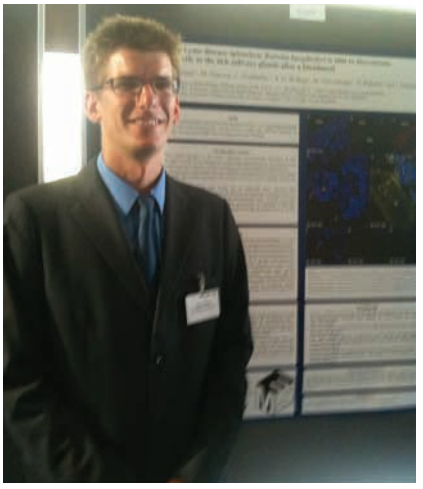
Initially, the date of abstract acceptance was delayed twice. At the beginning this created concern over organizational and administrative management. Perhaps, in future, the notifications can come with proper explanation for delay. I was happy to find later that the conference was well organized. I like the idea that any participant can save his/her choice of lecture using a web account. One way to improve would be to provide a mobile app for this purpose. **I want to specifically mention the much-appreciated helping attitude of conference volunteers.**

This conference gave me a chance to attend EMS General Assembly for the first time, allowing me an insight of the EMS scope. I appreciate the steps EMS is taking to encourage young researchers to participate in different conferences.

This conference has broadened my knowledge on microscopy and helped me to extend my scientific network. Overall, I believe I gained a lot as a young researcher and I encourage all new fellow colleagues to attend conferences like this so that they too can have their way into a better future. Now, I am looking forward to the 18th International Microscopy Conference 2014 in Prague.

Martin Strnad (Czech Republic / Austria)

The MC2013 in Regensburg was my first international conference I ever attended. This way I would like to sincerely thank EMS for the financial support that made it possible for me to participate in this fantastic event. My overall impressions are far more than positive. Starting with a great organization and conference topics, ending with a beautiful city and the very friendly people of Regensburg. As a big fan of correlative light electron microscopy I was very grateful for ample space dedicated to this interesting topic and for a really **great choice of speakers with excellent and entertaining presentations**. The chance to meet the people I had known so far only as first authors of brilliant articles and to assign their names to their faces was really exciting. Realizing that many of them are so young was for me on one side quite surprising, on the other side it is very motivating.



Once again, many thanks to EMS for granting me a scholarship and to the organizers for their great job.

See you next year in Prague!

János Szívós (Hungary)

I'm very grateful to the EMS for the financial support! The present grant covered my main expenses (registration fee, part of accommodation) so it was a great help to be able to participate to the conference. It was a good opportunity to learn the newest results, to attend interesting lectures of widespread topics, and to show my own results in a poster presentation.

My research area is materials science, the subject of my PhD work is the fabrication of ordered nanostructures. In addition to preparation, I investigate my samples with AFM and TEM. Therefore I attended mainly the talks dealing with TEM/STEM, and thin films. For example, G. Radnóczi gave a good talk about ''the impact of electron micro-

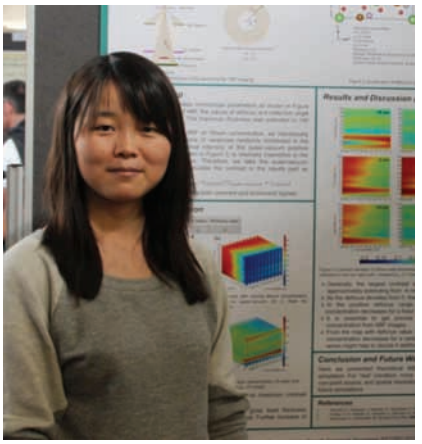
scopy on revealing phase separation mechanisms in alloy thin films". I also learned that nanoscale dynamics in liquids can be visualized with TEM after a clever sample preparation (U. Mirsaidov's lecture). On Wednesday K. Urban demonstrated the performance of a chromatic-aberration corrected microscope with atomic resolution Filtered TEM imaging. I listened to lectures on 3D imaging too, such as ''STEM-EDX nano-tomography in a TEM" held by T. Epicier.

On the other hand, I had graduated as an engineer-physicist, so I'm interested in the theoretical calculations and results as well. In my opinion, the best lectures were those dealing with vortex electrons and their applications. These talks were mainly given by P. Schattschneider and his colleagues.

I presented a poster at the conference, with the title ''Nanoscale masking with UV excimer laser for bit patterned media". There were a number of visitors at my poster, mainly from Hungary and Germany. I also had useful conversions with Dr. Arslan from Turkey, who asked me how will I use the nanopatterned AlOx layer as a mask, and we agreed that a mask requires patterns of at least 10 nm depth. I've visited many interesting posters of other participants, e.g., N. Jöhrmann's ''Optimizing EBSD setup for high lateral resolution to investigate thin $(FePt)_{1-x}Cu_x$ films". The authors investigate how can the $L1_0$ phase with a strong (001) texture be achieved in the case of the most popular magnetic recording layer.

The included social events were great, and I found the Old Town of Regensburg quite impressive. In summary I found the conference very beneficial for my professional progress, it gave me knowledge and generated new ideas!

Dan Zhou (Germany)



Firstly I would like to thank EMS for awarding me the scholarship to attend the EMC 2013, which was held in Regensburg, Germany from 25th to 30th August, 2013.

I have had a great time during the conference, scientifically and non-scientifically. My poster session was in the instruments and methods session on Monday. During that time, I had a lot of inspiring conversations with scientists from both the material and microscopy areas. My work is focused on imaging light elements with annular bright field (ABF) scanning transmission electron microscopy. Both Prof. Harald Rose and Dr. Frank Krumeich's visit suggested me to go to their talks and thus inspired me to look at more possibilities from the low angle signal, both theoretically and experimentally. And people from materials science extended my view on the application and current status of the materials I am currently working on. As an early stage researcher, attending talks and posters ranging from methodology, instruments and application not only broadened my knowledge but also triggered the possibilities for further learning or collaborating. The industries' exhibitions and lunchtime talks provided us the chance to know the most recent developments of instruments and some commercial software. What's more, the **parties of FEI, Zeiss and the conference organizer gave me the chance to enjoy a lot of typical Bavarian stuff**, like food, drink, costumes and music.

Notes :

2012 EMS OUTSTANDING PAPER AWARD

RECENT AND FORTHCOMING BOOKS

FINANCIAL REPORT OF EMS BUDGET

EUROPEAN MICROSCOPY SOCIETIES

EUROPEAN CORPORATE MEMBER ASSEMBLY (ECMA)

EMS CALENDAR 2014

APPLICATION FORMS (MEMBERS - ECMA)

2012 EMS OUTSTANDING PAPER AWARD

By the deadline of the third round of the EMS Outstanding Paper Award, 28 nominations were received with the majority in the Materials Sciences and Instrumentation and Technique Development categories. Some papers were even nominated by different members! 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 2012 EMS Outstanding Paper Award in the respective categories:

1. *Instrumentation and Technique Development:* "'Big Bang' tomography as a new route to atomic-resolution electron tomography", D. Van Dyck, J.R. Jinschek & F.-R. Chen, Nature 486, 243–246 (2012); doi:10.1038/nature11074;
2. *Materials Sciences:* "Toroidal Plasmonic Eigenmodes in Oligomer Nanocavities for the Visible", B. Ögüt, N. Talebi, R. Vogelgesang, W. Sigle & P.A. van Aken, Nano Letters 12, 5239-5244 (2012); doi.org/10.1021/nl302418n;
3. *Life Sciences:* "Virtual nanoscopy: Generation of ultra-large high resolution electron microscopy maps", F.G. Faas, M.C. Avramut, B.M. van den Berg, A.M. Mommaas, A.J. Koster & R.B. Ravelli, Cell Biology 198, 457-469 (2012); doi: 10.1083/jcb.201201140.



Dirk Van Dyck, Burcu Ögüt and Raimond Ravelli, standing for Frank Faas, received their metal-on-wood plaque from the EMS President Roger Wepf and Secretary Nick Schryvers at the congress dinner of the MC2013 meeting in Regensburg.

For the next round, papers published in 2013, a new jury* was elected by the EMS Executive Board in March 2013. The Board likes to thank the members of the first jury for their valuable time spent on reading and grading the manuscripts and for their help to shape the success of this new award.

The Executive Board extends its warmest congratulations to all winners and we look forward to a new round of excellent papers for the 2013 competition.

* EMS Outstanding Paper Award jury members

OutPA 2014 – 2016 jury members (judging on papers from 2013 - 2014 - 2015)

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

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

OutPA 2011 – 2013 jury members (judging on papers from 2010 - 2011 - 2012)

- Alan Craven (Department of Physics & Astronomy, Solid State Physics, University of Glasgow, UK)
- Etienne Snoeck (CEMES, CNRS, Toulouse, France)
- Bob Pond (University of Exeter, UK)
- Wolfgang Jaeger (Mikrostrukturanalytik, Christian-Albrechts-University, Kiel, Germany)
- José Carrascosa (Centro Nacional de Biotecnologia, Universidad Autonoma Madrid, Spain)
- Varpu Marjomäki (Dept of Biology and Environmental Science, University of Jyväskylä, Finland)

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

SOME RECENT AND FORTHCOMING BOOKS

The great revival of interest in electron microscopy and charged particle optics that has resulted from the successful introduction of aberration correctors has also generated many books on the subject. These range from such best-sellers as *Transmission Electron Microscopy* by David Williams and Barry Carter to such highly specialised texts as *Linear and Chiral Dichroism in the Electron Microscope* edited by Peter Schattschneider. The following list of selected titles draws attention to a variety of recent and forthcoming publications in the general field of microscopy, some of which (such as the short text edited by R. Doornbos and S. van Loo) could easily be overlooked.

I am sure that there are books on 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. Many volumes long out of print are now available from the major publishers; for example, Springer have republished the Proceedings of the International Congress of Electron Microscopy held in Berlin in 1958. Elsevier likewise have an active republication programme.

Note: the place of publication of many of the books from Springer is not given here but can be established via the ISBN ; prices should always be checked.

Peter Hawkes

D.C. Bell and N. Erdman (Eds), Low Voltage Electron Microscopy, Principles and Applications, Wiley, Chichester and Royal Microscopical Society, Oxford 2013. ISBN: 978-1-119-97111-5 (Price: £75). Mostly by the editors but includes chapters on Extreme high-resolution SEM using a beam monochromator by R.J. Young et al., Gentle STEM of single atoms: low keV imaging and analysis at ultimate detection limits by O.L. Krivanek et al. and Low voltage scanning transmission electron microscopy of oxide interfaces by R. Klie.

D.A. Bonnell and S.V. Kalinin (Eds), Scanning Probe Microscopy for Energy Research, World Scientific, Singapore 2013. ISBN: 978-981-4434-70-6 (Price: US$148, £98). Covers such subjects as solar cells, fuel cells and future techniques.

A. Claverie (Ed.), Transmission Electron Microscopy in Micro-nanoelectronics, ISTE, London and Wiley, New York 2013. ISBN: 978-1-84821-367-8 (Price: £96.95). Describes many recent uses of HRTEM and electron holography, mostly by members of the CEMES-CNRS in Toulouse.

R. Doornbos and S. van Loo (Eds), From Scientific Instrument to Industrial Machine. Coping with architectural stress in embedded systems, Springer, Dordrecht 2012. ISBN: 978-94-007-4146-1; ISSN: 2181-8112 (Price: US$50, €41.64, £34). A discussion of ways of increasing TEM throughput without upsetting top management.

D.C. Joy, Helium Ion Microscopy. Principles and Applications, Springer, New York and Heidelberg, 2013. ISBN: 978-1-4614-8659-6; ISSN: 2192-1091 (Price: US$ 55, €52.74, £55). A short account and spirited defence of ions.

A.I. Kirkland and S. Haigh (Eds), Nanocharacterisation (2nd ed.), Royal Society of Chemistry, Cambridge 2014. ISBN: 978-1-84973-805-7 (Price: £165). Thoroughly updated with chapters by D.J. Smith, S.J. Pennycook & A. Lupini, M.R. Castell, R. Brydson, R.E. Dunin-Borkowski, P.A. Midgley & M. Weyland, D. Bell & N. Erdman and E. Stach.

J. Kuo (Ed.), Electron Microscopy, Methods and Protocols, Humana Press (Springer), New York 2014. ISBN: 978-1-62703-775-4 (Price: £126). Methods in Molecular Biology vol. 1117.

H. Rose, Geometrical Charged-Particle Optics, 2nd ed., Springer, Heidelberg 2012. ISBN: 978-3-642-32118-4; ISSN: 0342-4111 (Price: US$139, €107, £93.50). Springer Series in Optical Sciences vol. 142. A revised edition of this well-known text.

H. Schatten (Ed.), Scanning Electron Microscopy for the Life Sciences, Cambridge University Press, Cambridge 2013. ISBN: 978-0-521-19599-7 (Price: £75, US$120). The TEM is apparently about to be dethroned.

P. Schattschneider (Ed.), Linear and Chiral Dichroism in the Electron Microscope, PanStanford, Singapore, 2012. Price: US$149.95; ISBN: 978-981-4267-48-9.

A.A. Sousa and M.J. Kruhlak (Eds), Nanoimaging, Methods and Protocols, Humana Press (Springer), New York 2013. ISBN: 978-1-62703-136-3 (Price: €103.52, US$119, £90).

J.C.H. Spence, High-resolution Electron Microscopy (4th ed.), Oxford University Press, Oxford 2013. ISBN: 978-0-19-966863-2 (Price £75). The revolution in HREM during the ten years that have elapsed since the 3rd edition is fully recognised.

J.W. Stirling, A. Curry and B. Eyden, Diagnostic Elecron Microscopy, a practical guide to interpretation and technique, Wiley, Chichester and the Royal Microscopical Society, Oxford 2013. ISBN: 978-1-1199-7399-7 (Price: £75, €93).

J. Thomas and T. Gemming, Analytische Transmissionselektronenmikroskopie, Eine Einführung für den Praktiker, Springer, Vienna 2013. ISBN: 978-3-7091-1439-1 (Price: €29.99, US$39.99, £25.99). Clear and helpfully written.

G. Van Tendeloo, D. Van Dyck and S.J. Pennycook (Eds), Handbook of Nanoscopy, 2 vols, Wiley, Chichester, 2012. Price: £245, €294, US$ 395; ISBN: 978-3-527-31706-6. Follow up of the Handbook of Microscopy, now in 2 volumes, one focusing on techniques, the other on applications.

N. Yoshimura, Historical Evolution toward achieving Ultrahigh Vacuum in JEOL Electron Microscopes, Springer, Tokyo and Heidelberg, 2013. ISBN: 978-4-431-54447-0; ISSN: 2191-530X (Price: US$ 55, £50, €52.74).

BIOGRAPHICAL MATERIAL

A. Authier, Early Days of X-ray Crystallography, Oxford University Press, Oxford 2013. ISBN: 978-0-19-965984-5 (Price: £45).

H.R. Gelderblom and D.H. Krüger, Helmut Ruska (1908–1973): his role in the evolution of electron microscopy in the life sciences and especially in virology. Advances in Imaging & Electron Physics, 182 (2014).

G. von Borries, Bodo von Borries und das Elektronenmikroskop, Fouqué Literaturverlag, Egelsbach, 2001. ISBN: 3-8267-4761-5. Extremely elusive, there are copies in a few German libraries.

FINANCIAL REPORT OF EMS BUDGET

Financial report

Budget 2012 final, budget 2013 running, budget 2014 outlook

Budget 2012, final

Incomings

The majority of incomings were the contributions from the national societies and the ECMA members. By the end of the year fees from 1 society and 4 ECMA members were pending. Further incomings came from individual members, interest rates of the giro and savings accounts and from a job announcement. In summary, an amount of **€ 48.057,60** was accrued.

Expenses

In 2012 no extension meeting was supported due to the EMC 2012 in Manchester. EMS agreed upon support for 4 sponsored meetings, each of them with € 750. 25 scholarships granted to young scientists for their attendance at the EMC 2012 were issued, ranging from € 195 to € 370 depending on travel distances (2 further scholars with granted support could not attend the meeting).
Two board meetings were held, one embedded in the EMC and one extra meeting in February in Lyon (€ 4.649,90). The budget audition by the 2 auditors took place in Vienna in July, with expenses for travel costs for one auditor and a dinner for three (€ 646,38). The three Outstanding Paper Awards plus costs for plaques added up to € 3.701,80. In addition, EMS disbursed the 2 FEI-EM awards. Together with the costs for a half-time secretary and bank costs we had a total of expenses of **€ 57.295,74**.
Thus, in 2012 we ended with a minus of **€ 9.238,14**. At the end of the year we had **€ 66.286,81** at our deposit. As of December 31st, 2012 EMS had total assets of **€ 98.410,99**.

Budget 2013, running; (August 14th, 2013)

Incomings

The major revenues will again be accrued by the annual contributions of EMS members of the national societies and of ECMA members. The one society with pending fees for 2012 submitted these together with the ones for this year. Major incomings were accrued by the EMC 2012 revenues (€ 20.471). Additionally, FEI company submitted the reimbursement for the two FEI-EM awards for 2012 (€ 10.000).
Together with interest rates, incomings can be expected to amount to **€ 56.000**.

Expenses

EMS will sponsor 1 extension meeting (MC2013) with € 1.500. Furthermore, 8 supported meetings can be sponsored this year with € 750. A total of 20 scholarships, each with € 250, will be issued to young colleagues in order to support their attendances at meetings. The Outstanding Paper Awards will amount to € 3.000 plus € 500 for the plaques. In addition, there will be administrative costs covering the salary of a half-time secretary, two board meetings (one extra-meeting in March in Zürich and one embedded in the MC2013) and bank costs, so that the total of expenses is calculated to be **€ 44.500**.
As of August 14th, 2013 there remains € 63.378,05 on the account.

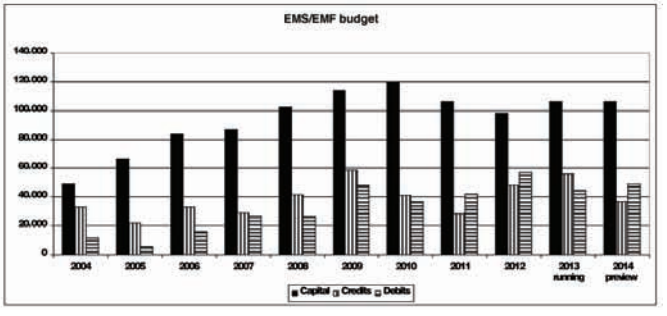
Budget 2014, proposal

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 giro and savings accounts we can expect incomings of **€ 37.200**.

Expenses

As agreed, there will be no EMS extension meeting this year because of the IMC2014 in Prague. EMS will be able to support 8 sponsored meetings (each € 750, in total € 6.000). Approximately 25 scholarships for students and young scientists for attending IMC can be issued (approx. € 10.000, according to scheme). Further expenses will include the Outstanding Paper Awards, costs for one half-time secretary, two board meetings (one extra, one included in IMC) and bank costs, amounting to a total of estimated **€ 49.000**.



Christian Schöfer, m.p.
Treasurer EMS/EMF

Vienna, 14th August 2013

EUROPEAN MICROSCOPY SOCIETIES

Number of EMS Members by societies (2013)

Society			*Number of Members*
Armenian Electron Microscopy Society	AEMS	Armenia	8
Austrian Society for Electron Microscopy	ASEM	Austria	120
Belgian Society for Microscopy	BSM	Belgium	326
Croatian Society for Electron Microscopy	CSEM	Croatia	74
Czechoslovak Microscopy Society	CSMS	Czech Republic	248
German Society for Electron Microscopy	DGE	Germany	342
Electron Microscopy and Analysis Group	EMAG	UK	310
Hellenic Electron Microscopy Society	HSEM	Greece	60
Hungarian Society for Microscopy	HSM	Hungary	102
Israel Society for Microscopy	ISM	Israel	110
Microscopical Society of Ireland	MSI	Ireland	92
Dutch Society for Microscopy	NVvM	The Netherlands	214
Polish Society for Microscopy	PTMi	Poland	91
Royal Microscopical Society	RMS	UK	1402
Nordic Microscopy Society	SCANDEM	Scandinavia	303
Slovene Society for Microscopy	SDM	Slovenia	81
French Microscopy Society	SFμ	France	506
Italian Society of Microscopical Sciences	SISM	Italy	312
Spanish Society for Microscopy	SME	Spain	281
Portuguese Society for Microscopy	SPMicros	Portugal	175
Serbian Society for Electron Microscopy	SSM	Serbia	92
Swiss Society for Optics and Microscopy	SSOM	Switzerland	346
Turkish Society for Electron Microscopy	TEMD	Turkey	107
ECMA	ECMA	Corporate	50
Individual members	IND	Individual	24

EUROPEAN CORPORATE MEMBER ASSEMBLY (ECMA)

Platina member

- Diatome Ltd
- JEOL Europe

Gold member

- Andor Technology
- Deben UK Ltd.
- FEI
- Hirox Europe
- Leica Mikrosysteme Vertrieb GmbH
- Olympus Soft Imaging Solutions
- TESCAN, s.r.o

Silver member

- Bruker Nano GmbH
- Carl Zeiss NTS
- CEOS
- GaLa Instrumente GmbH
- Gatan
- NanoMEGAS
- Oxford Instruments GmbH
- Quorum technologies
- SPI Supplies
- Thermo Fisher Scientific
- Tietz Video and Image Processing

Bronze member

- DENSsolutions
- EDAX
- EO Elektronen-Optik-Service GMBH
- Eumex Instrumentebau GmbH
- Fischione Instruments
- HWL Scientific Instruments
- ISS Group Services Ltd.
- J.J. Bos
- JSC Nanopromimport
- Klocke Nanotechnik
- Märzhäuser Wetzlar GmbH & Co. KG
- MICROS Produktions- und Handelsges. m.b.H.
- Olympus Nederland B.V.
- SmarAct GmbH
- Technoorg Linda
- Ted Pella, Inc.
- Wiley-VCH

EMS CALENDAR 2014

18th International Microscopy Congress

- **IMC2014**

  18th International Microscopy Congress
  September 7-12, 2014
  Prague, Czech Republic

(because of the strong involvement of EMS in IMC2014, no EMS Extension will be organized in 2014)

EMS sponsored events for 2014 (Jan. - Jun.)

- **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, Germany

- **"3D Electron Microscopy: From Molecule to Organism"**

  May 22-23, 2014
  UPMC, Paris, France

- **Workshop on Electron Wave Imaging (Holo-Workshop)**

  June 9-13, 2014
  Dresden, Germany

- **SCANDEM 2014**

  Annual Conference of the Nordic Microscopy Society
  June 11-13, 2014
  Linköping, Sweden

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