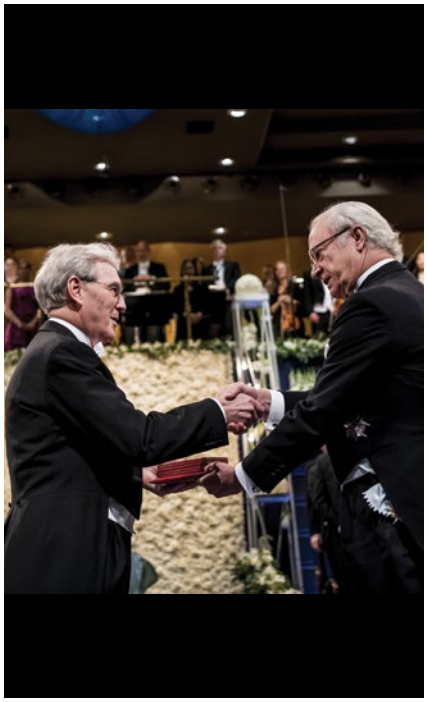

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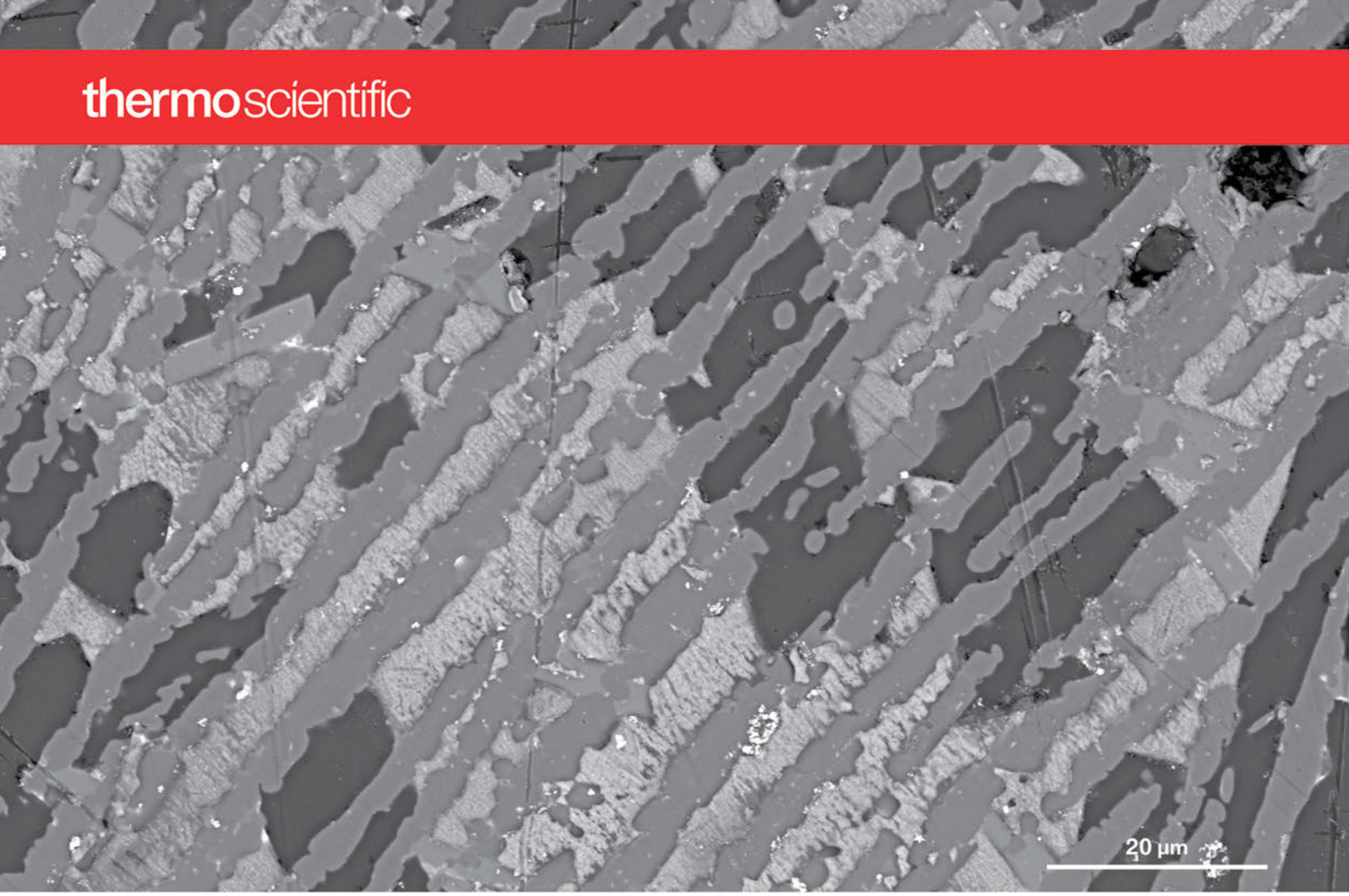

Defects in glass due to the reduction of silica glass into silicon and the relative oxidation of metals (Fe, Cu and others) in their corresponding oxides.
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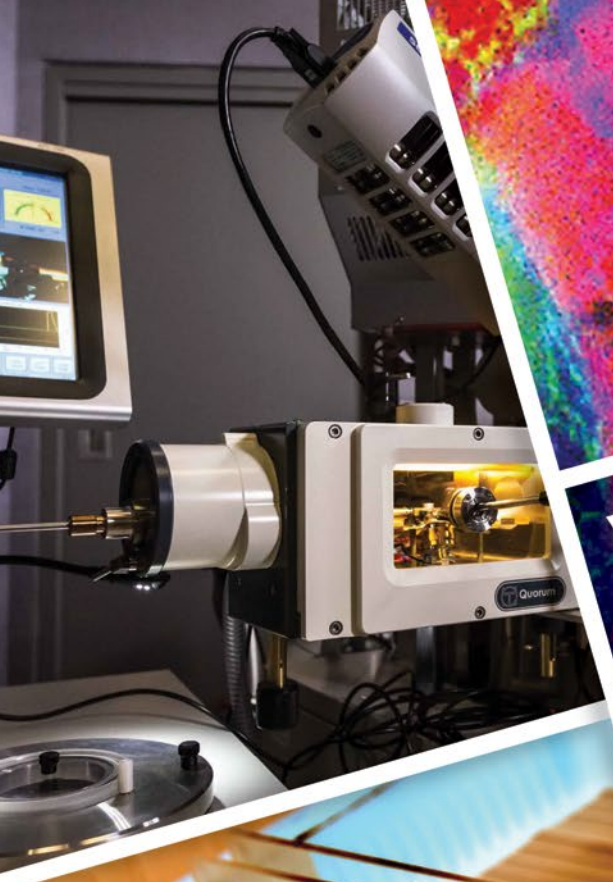
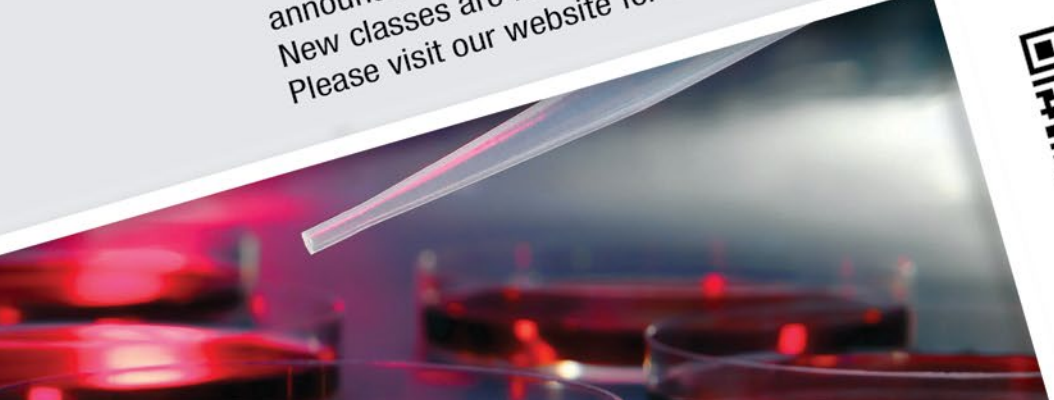
[1] *2017 Nobel Prize Award Ceremony - Chemistry Laureate Jacques Dubochet*

[2] *2017 Nobel Prize Award Ceremony- Chemistry Laureate Richard Henderson*

[3] *2017 Nobel Prize Award Ceremony - Chemistry Laureate Joachim Frank*

Yearbook 2017





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PREFACE

Dear EMS members,

2017 has been a fantastic year marked by major events. First, the whole microscopy community was delighted to learn that, just three years after super-resolution fluorescence microscopy won the chemistry Nobel Prize, another microscopy technique, cryo-electron microscopy (cryo-EM), has just been propelled into the limelight to win this 2017 Chemistry Prize. Jacques Dubochet (Switzerland), Joachim Frank (USA) and Richard Henderson (UK) have been granted for developing cryo-electron microscopy for high-resolution structure determination of biomolecules in solution. This event has been chosen by the executive board to illustrate the cover of this yearbook, and an article from Rachel Reinhard is dedicated to this prize in the present yearbook.

Secondly, in 2017, we had exceptional level EMS extensions (in Lausanne and Rovinj), and 9 remarkable sponsored events. Reports are available in this yearbook.

Many other events, as inaugurations of new machines, prizes, meetings or reports of young researchers are also reported in this issue, proving again the vitality of our society and the activeness of its members. When browsing this issue you will for example find a report on historic microscopes in the 19th century from Henk Kubbinga (following the articles of previous issues), or a report from Peter Hawkes about "la Boule" in Toulouse awarded label "Patrimoine du XXe Siècle" by the French Ministry of Culture and Communication in 2017.

This 2017 EMS yearbook is printed and distributed by ERI company, free of charge for the Society, thanks to the firms who advertise in our pages to support it.

Thanks also to all colleagues who have contributed to this Yearbook and in particular to Serap Arbak for proof reading.

Virginie Serin,
EMS Secretary

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LETTER FROM THE PRESIDENT

Dear EMS members and fellow microscopists,

The EMS is delighted to present the yearbook 2017. Once again it was possible to collect a large number of articles which we strongly believe to be of interest to our community, both for the members who work in life sciences and also for those involved in instrumentation and materials. Let me start with a big "Thank You" for those board members who were involved in the production of the yearbook, to a very large amount our secretary, Virginie Serin and Serap Arbak, who did the proofreading. I want to thank also everyone who took the time to produce an article for the yearbook and to contribute to its success by making it vivid and informative for the readership. The topics are distributed broadly, so we hope that every member will find her / his share to enjoy!

Here, I want to give you a brief summary of its contents and to inspire you for further reading. As always, the first part is devoted to the activities initiated or supported by the EMS, such as the extensions (which have been the conferences in Rovinj and Lausanne in 2017) – whoever had the chance to visit one or both of these conventions will remember them as scientifically highly reputable meetings which served their purpose of bringing together scientists from all over the world in order to discuss their latest research and get new input for further advancement of our common instrument to work with, the (electron) microscope. I am sure that it is not a mere coincidence that one could observe very many attendees not only from the European member societies, but from a much broader area worldwide – obviously word has spread that the European microscopy congresses are very worthwile to visit, no matter where you are from. This is certainly a consequence of the recent well-organized conferences (some of them at least partly co-organized by the EMS) in Europe, which in fact kept the level of scientific content very high. We are committed to follow this line of success also for the future!

As you probably know, EMS also promotes smaller, more specialized activities, and we have done so in the past year on numerous occasions, and you will find the reports on those meetings included in this volume. Let me grab the opportunity to advertise a bit more the possibilities which are offered by the EMS. If you plan to organize a local microscopy related meeting, school, course etc., you should apply for support to cover part of the related cost. EMS offers two instruments of support, the "EMS sponsored events" and the "EMS patronaged events". More information can be found on our website *(http://www.eurmicsoc.org/en/meeting-calendar/ems-sponsored-events/)*.

A very informative article by Henk Kubbinga (University of Groningen) recaps the development of "Micro-scopes in the 19th century", with a focus on aberration correction in optical microscopes. With the help of historical drawings and excellent photographs, the development of microscopes with ever increasing quality is told.

You will be able to find out what happened recently in electron microscopy in our special events section, which comprises reports on microscopy-related awards, including the recent Nobel prize in Chemistry, the Ernst-Ruska prize, the 16th Annual Wiley Prize in Biomedical Sciences and the French society's SFμ Raimond Castaing award. Other reports on instrument inaugurations, special meetings and "La boule", the huge sphere-shaped housing the world's first 1MeV electron microscope in Toulouse can be found in this section!

In 2017, the 2016 outstanding Paper Awards for the three categories **Instrumentation and Technique Development**, **Materials Sciences and Life Sciences** have been awarded on occasion of the Rovinj congress by board member and chairperson of the outstanding paper award jury, Peter Nellist.

Finally, I would like to draw your attention to the short reports written by students who received a scholarship in 2017, and who report on their impressions on the meetings they visited. EMS was able to support 30 students, thus pursuing one of our goals, the promotion of young scientists. This goal could be achieved due to our solid finances and the ongoing effort of EMS's treasurer, Christian Schöfer, whose report is also printed for your attention. Thank you, Christian, for your support!

As you may have noticed already, EMS has decided to get in closer touch with its members via social networking. We also feel that this way allows us to distribute information fast about society affairs and at the same time receive your comments and suggestions. We hope that you will use the communication channels which we provide via Facebook *(https://www.facebook.com/eurmicsoc/)* and Twitter *(https://twitter.com/eurmicsoc)*!

I hope to be able to meet many of you in this year's International Microscopy Congress, IMC19, in Sydney! ■

Josef Zweck,
President of the EMC

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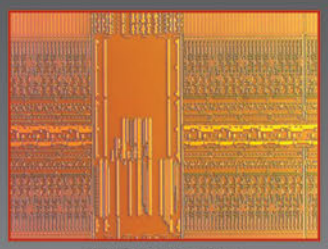

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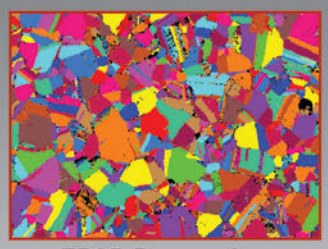

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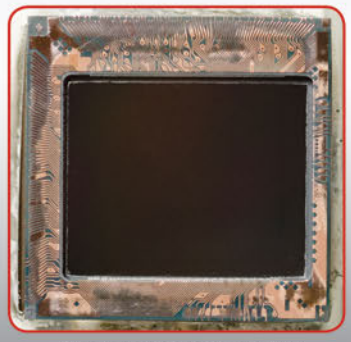
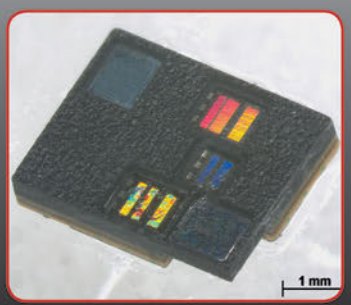
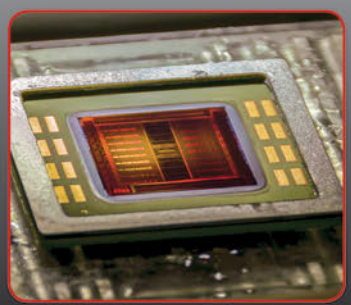


Targeted Stacked Die Exposure



Open areas as small as 100 x 100 µm



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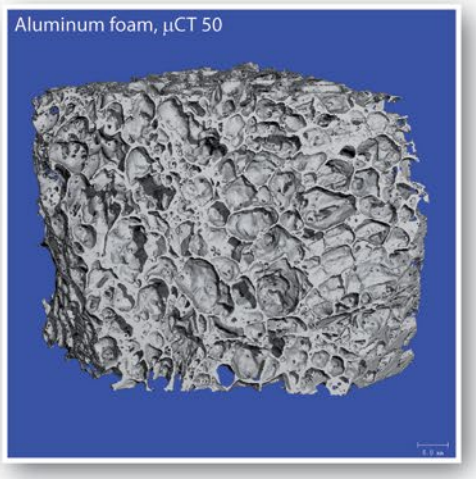

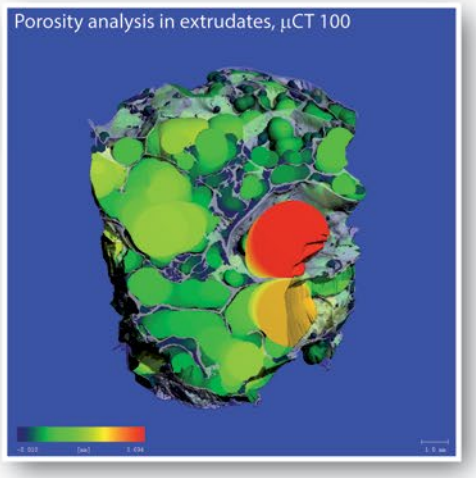

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2017 EMS EXTENSION REPORTS

- MC2017-MICROSCOPY CONFERENCE 2017, LAUSANNE, SWITZERLAND
- MCM2017 - 13TH MULTINATIONAL CONGRESS ON MICROSCOPY, ROVINJ, CROATIA

SENSOFAR «Sneox» optical profiler. New confocal technologies for 3D Surface Metrology

Schaefer-Tec group, since fifteen years, as official distributor of the 3D optical profiler SENSOFAR Sneox, is glad to introduce **TWO new confocal technologies** in addition to the already well-known and established confocal, interferometry (VSI, PSI) and focus variation techniques. These operational modes are located in the same sensor head without any moving mechanical parts; in this way, a regular maintenance will not be needed.

The two new measurement technologies, **Continuous Confocal** and **Confocal Fusion**, developed by Sensofar Metrology, technological leader in this field, represent significant improvements in 3D surface metrology.

The **Continuous Confocal** mode avoids the discrete (and time-consuming) plane-by-plane acquisition of classical confocal microscopy by scanning continuously along the Z-axis thus reducing the acquisition time by a factor of 3 (see Fig. 1). Acquisition speed is comparable to Focus Variation, while results are comparable to Confocal using discrete Z scanning. An ideal solution for quality control where speed is a key factor, essential for reducing acquisition times for large area scans and large Z scans as well as in-line metrology.

Fig. 1 : Speed comparison: Confocal Continuous technique three time faster than Focus Variation and Confocal modes

Confocal Fusion draws the best out of Confocal and Focus Variation especially for spatially highly varying surfaces by using a unique smart algorithm that yields the most reliable data from a single scan (see Fig. 2 and 3).

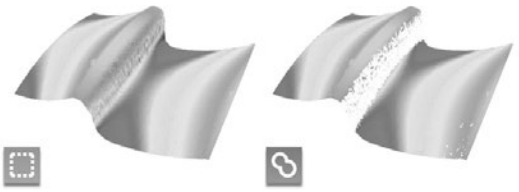

Fig. 2 : 3D topography for a dental implant respectively using Focus Variation and Confocal techniques

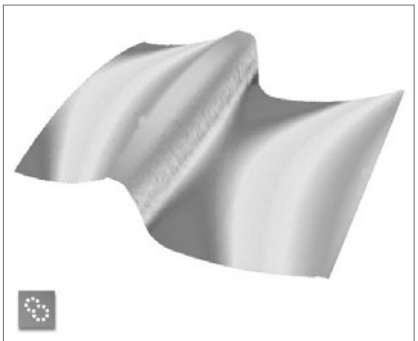

Fig. 3 : 3D topography for the same dental implant using confocal fusion technique

MC2017 - MICROSCOPY CONFERENCE 2017 AUGUST 21-25, 2017 LAUSANNE, SWITZERLAND

Supported by the European Microscopy Society, this year's three-country congress in electron microscopy ("Dreiländertagung") was held in the framework of the Microscopy Conference 2017 (MC 2017), taking place in the SwissTech Convention Center at EPFL in Lausanne (CH) from Monday August 21 through Friday August 25, 2017.

The "Dreiländertagung" is co-organized by the Germany Society for Electron Microscopy (DGE), the Austrian Society for Electron Microscopy (ASEM) and the Swiss Society for Optics and Microscopy (SSOM) and takes place every four years alternating in one of the three co-organizing countries. Like the previous congress, which took place in Regensburg in 2013, also this year's event was organized by Conventus (Jena, DE). Conference chairs were Marco Cantoni (CIME, EPFL Lausanne, CH), Markus Dürrenberger (SNI, University of Basel, CH) and Rolf Erni (Empa, Dübendorf, CH). The scientific program was prepared by a committee consisting of about ten members of the co-organizing societies.

The scientific part of the conference was organized in three major topics, "Instrumentation and Methods", "Life Sciences" and "Materials Sciences", while each of these topics was split in seven topical sessions comprising platform sessions for invited and contributed talks and poster sessions. Along with the scientific program a show took place with more than fifty industrial exhibitors. Introduced by a laudation by Michael Lehmann (president DGE), Hannes Lichte (TU Dresden / DE) was awarded with the Harald-Rose Prize and then delivered an exciting talk about the achievements of off-axis holography in electron microscopy. The last plenary talk was then given by Erdmann Spiecker (University of Erlangen / DE) on complex defects in two-dimensional materials. The conference was concluded by a short summary and outlook given by Marco Cantoni and Rolf Erni, and a farewell reception.

Jacques Dubochet during his plenary talk about the early years of cryo TEM.

The core of the scientific program represented the oral platform sessions together with the vivid poster sessions. The numerous topics addressed in these sessions gave a broad overview of current research activities in the area of electron microscopy. While in-situ measurements in TEM and SEM have gained importance in various fields of research, new detectors and optical setups allow for unprecedented sensitivity and resolution in single-particle analysis in life sciences. Other topics addressed in the sessions were the new levels of sensitivity and resolution in spectroscopies, quantification methods, as well as the handling of large sets of data which come along with the size and enhanced acquisition speeds new detectors enable. This short list of topics addressed is definitely incomplete but shall emphasize that the newest developments in instrumentation also require new strategies of analyzing data and that real progress requires a multi-disciplinary approach whereas the actual microscopy work, i.e. collecting data of high quality, is only one part of it.

Aside from the scientific program, the social highlight of the conference was the conference dinner which took place on Thursday evening. On this occasion, prizes for best images and posters were awarded.

An important ceremonial act of the “Dreiländertagung” is the nomination of the organizers and location of the next such congress by handing over of the famous golden key. With this it can be announced that the next “Dreiländertagung” takes place in Vienna organized and chaired by Johannes Bernardi and Michael Stöger-Pollach (Technical University Vienna, AT). ■

Marco Cantoni & Rolf Erni

Michael Lehmann, President of DGE, together with Hannes Lichte, awardee of the Harald-Rose prize.

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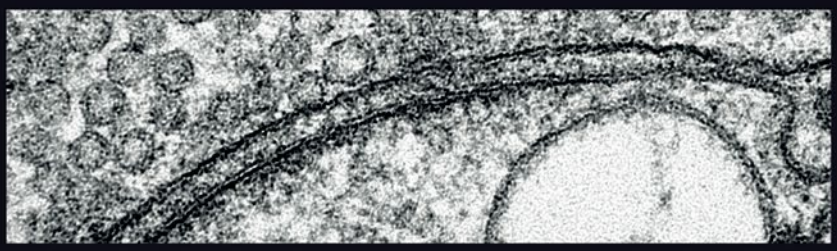

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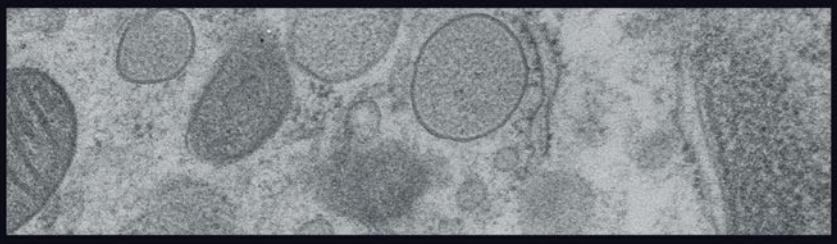

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MCM2017 - 13TH MULTINATIONAL CONGRESS ON MICROSCOPY SEPTEMBER 24-29, 2017 ROVINJ, CROATIA

After 14 years and the conference in Pula, the Croatian Microscopy Society, jointly with the Ruđer Bošković Institute in Zagreb, again hosted the Multinational Congress on Microscopy in the Hotel Lone in Rovinj, Croatia, from September 24-29, 2017. We are thankful to European Microscopy Society for granting MCM2017 the status of an EMS extension. The EMS support enabled us to invite two excellent plenary speakers, Elvio Carlino from CNR-IOM in Trieste (Italy), and Erich Stach from Brookhaven National Laboratory (USA).

The biannual MCM conference series is coordinated by 8 societies: Austrian Society for Electron Microscopy (ASEM), Croatian Microscopy Society (CMS), Czechoslovak Microscopy Society (CSMS), Hungarian Society for Microscopy (HSM), Italian Society of Microscopical Sciences (SISM), Serbian Society for Microscopy (SSM), Slovenian Society for Microscopy (SDM) and Turkish Society for Electron Microscopy (TEMD). MCM conferences have always been an excellent opportunity for microscopists to exchange ideas and experience and to establish new cooperations and joint projects. Their main aim is to provide an optimal balance between talks given by world-renowned scientists and a possibility for talented young scientists to introduce themselves to an international audience. Keeping to the spirit of the MCM conference series, we kept the registration fees at a minimum (80 EUR for PhD students and 180 EUR for EMS members), in order to enable as many microscopists as possible to attend.

In its 13th issue, this traditional conference returned to Istria, this time to the beautiful coastal town of Rovinj. Rovinj was already inhabited in pre-Roman times, and has always been one of the most important towns in Istria. Rovinj is one of the most developed tourist destinations in Croatia, boasting rich natural and cultural heritage with beautiful landmarks such as the old town and the lush Zlatni Rat (Punta corrente) forest. Zlatni Rat is a protected forest park, while Rovinj's islands and coastal area are protected landscapes/seascapes. In the last 40 years Rovinj has developed into a popular tourist destination thanks to its lovely nature, indented coastline with a necklace of islands and mild weather. These features are complemented by diverse activity programs, world-class amenities and historic treasures.

MCM2017 brought together leading experts and young researchers that develop microscopy methods and apply them in the fields of life and material sciences. Altogether, **more than 450 delegates** from **30 countries** participated. Besides a keynote and seven plenary lectures, we had **42 invited talks** and **84 short talks** in 3 parallel sections (Life Sciences, Materials and Instrumentation) and **175 posters** were on display. A real highlight was the Keynote Lecture delivered by a pioneer of the aberration-corrected electron microscopy, Harald Rose (Ulm University, Germany). Besides giving a first-hand historic perspective on the development of electron microscopy, which included a slide of the original part list, prices included, of the very first electron microscope constructed by Ernst Ruska, he presented preliminary results of the SALVE project that achieved sub-Å resolution at 40kV. Superb plenary lectures were given also by Jürgen Plitzko (Max Planck Institute of Biochemistry, Martinsried, Germany), Paul Midgley (University of Cambridge, United Kingdom), Marko Kreft (University of Ljubljana,

Slovenia), Miran Čeh (Jožef Stefan Institute, Ljubljana, Slovenia) and Eva Roblegg (Karl-Franzens-Universität Graz, Austria). A satellite workshop, COEX - Combining electrons with X-rays for integrated in-operando experiments, has been organized by SISM in Trieste prior to the congress (September 23-24, 2017).

MCM2017 hosted the EMS Outstanding Paper Award Ceremony, which included short presentations by one awardee (Daniel Jacobsson) and on behalf of two others (by Jürgen Plitzko and Eli Zeldov). Best poster awards have also been presented to Veronika Blahnova from Charles University in Prague (Life Sciences), Daniel Knez from Graz University of Technology (Instrumentation), and Gregor Kapun from National Institute of Chemistry in Ljubljana (Materials).

MCM2017 also included a trade exhibition in order to encourage exchange between the producers of microscopy-related equipment and researchers. We are especially thankful to our platinum (ThermoFisher), Golden (Jeol and Tescan), Silver (Leica) and Bronze (Bruker) sponsors, whose contributions aided organization of a rich scientific and social program of the conference. The social program included the Welcome reception where guests were entertained by a jazz band featuring singer Leila Kaplowitz accompanied by the members of the Croatian Radio-television jazz orchestra, the Istrian Delicacies Reception, a Rovinj guided tour including a surprise drink at sunset near the Church of St. Euphemia overlooking the town, and the Conference Dinner in Istrian inland near Žminj featuring the swinging Gelato Sisters.

We believe this conference was a highly rewarding professional and networking experience for all participants, who also had an opportunity to explore highlights of the coastal town Rovinj with its beautiful surroundings and to experience the unique local blend of nature, culture and gastronomy.

At the meeting of the MCM steering committee it was decided that the next, 14th MCM congress will take place in Belgrade, Serbia, on September 15-20, 2019.■

Andreja Gajović & Igor Weber
Conference Chairs

REPORTS ON EMS SPONSORED EVENTS

EMS SPONSORED EVENTS IN 2017

- **ICHC2017 - 15th International Congress of Histochemistry and Cytochemistry**
  Antalya - Turkey
- **SCANDEM 2017 - 68th Annual Conference of the Nordic Microscopy Society**
  Reykjavic - Iceland
- **Cryo Tomography - Advanced Workshop on Cryo-Electron Tomography**
  Vienna - Austria
- **EMHTR 2017 - Electron Microscopy with High Temporal Resolution**
  Strasbourg - France
- **QEM2017 - 4th Edition of Quantitative Electron Microscopy School**
  Balaruc les Bains - France
- **SIMDALEE 2017 - Sources, Interaction with Matter, Detection and Analysis of Low Energy Electrons 2017 Conference**
  Pula, Sardinia - Italia
- **EM 2017 - XVIth International Conference on Electron Microscopy**
  Jachranka, Warsaw - Poland
- **MFS2017 - Microscopy at the Frontiers of Science 2017**
  Zaragoza - Spain
- **MAF2017 - 15th Conference on Methods and Applications in Fluorescence**
  Bruges - Belgium

ICHC2017 - 15TH INTERNATIONAL CONGRESS OF HISTOCHEMISTRY AND CYTOCHEMISTRY - MAY 18-21, 2017 ANTALYA, TURKEY

The 15th International Congress of Histochemistry and Cytochemistry (ICHC2017) have been held on 18-21 May 2017 in Antalya Turkey. ICHC 2017 had 274 participants from 21 countries.

Five plenary and **41 invited lectures, 21 scientific sessions** with **59 oral presentations,** including society-sponsored and journal-sponsored sessions and **2 poster sessions** with **276 poster presentations** were within the scientific programme of ICHC 2017.

Opening remarks by Serap Arbak-President of ICHC 2017

During Opening Ceremony, Prof. John COUCHMAN has delivered the prestigious David Glick Lecture entitled as' Syndecans: receptors with signalling functions and roles cell adhesion and disease'. Paul Nakane Prize, awarded by Executive Committee of IFSHC, has been presented to Prof. Toyoshi FUJIMOTO and Prof. Serap ARBAK.

Plenary lectures were presented by Prof. Vasıf HASIRCI '*The Dialog Between Biomaterials and Cells*', Prof. Christopher CREMER '*Single Molecule Localization Microscopy of Nuclear Genome Nanostructure*', Prof. Pavel HOZAK '*Uncovering roles of lipids in genome regulation*', Dr. Bruno HUMBEL '*Correlative Light and Electron Microscopy Approaches in Cell Biology*'; Prof. Dr. Nadine PEYRIERAS '*3D+time imaging data and image analysis for the reconstruction of multilevel dynamics in animal morphogenesis*'.

As Special sessions; ''Let seniors share their expertise with juniors'' and ''Young Histochemists Awardees'' sessions took place within the scientific programme. Five young histochemists **Dr. Kaya** (Turkey), **Dr. Burini** (Italy), **Dr. Kiezun** (Poland), **Dr. Lopes** (Czech Republic) and **Dr. Kurshed** (The Netherlands) have been awarded following their oral presentations in ''Young Histochemists Awardees''.

Three workshops (W1- Immunogold Staining; W2- Introduction to 3-Dimensional Modeling and Animation in Histology and Embryology; W3- Basic Stem Cell Culture Techniques and Applications) and a sponsored company-based exhibition have been organized during the congress. FEI has been the main sponsor company of the Congress.

Photography Show ''My Beloved Turkey'', by Mr. Ibrahim Zaman during the Opening Ceremony, as well as Welcome Reception & Gala Dinner were among the highlights of ICHC 2017.

Overall, the Congress was a successful scientific event with very lively activity and a considerable number of attendees, with many young participants.

ICHC 2017 has been organized with kind sponsorship from the European Microscopy Society, which enabled the organizers to invite two plenary lecturers. Executive Committee of Turkish Society for Electron Microscopy deeply acknowledges this kind support provided by EMS. ■

Serap Arbak
Conference Chairs

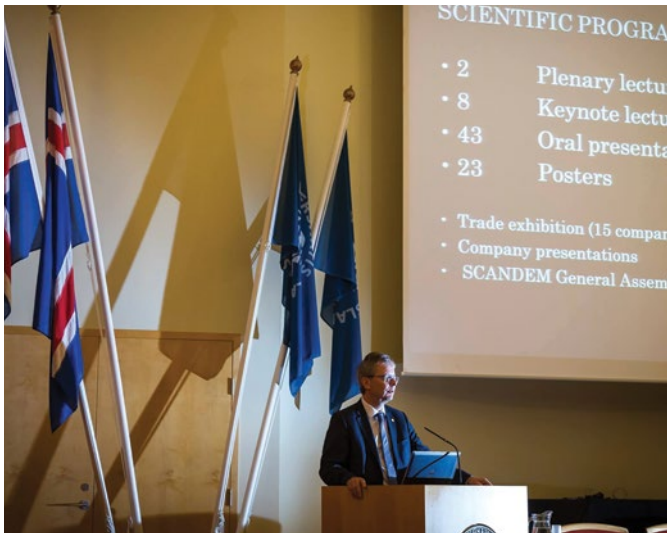
(From left to right) Zbigniew Kmiec, Hinke Multhaupt, John Couchman (this year's David Glick Lecturer) and Serap Arbak

One of this year's Paul Nakane Prize receipients was Prof. Serap Arbak (sixth from the right) seen here surrounded by colleagues and friends.

Young Histochemists 2017 (from left to right) Dr. J. Kiezun (Polish Society for Histochemistry and Cytochemistry), Dr. O. T. Kaya (Turkish Society for Electron Microscopy), Dr. D. Burini (Italian Society of Histochemistry), Prof. Z. Kmiec (Secreatary-General IFSHC), Prof. S. Arbak (President IFSHC), Prof. H. Multhaupt (Treasurer IFSHC), Dr. M. Khurshed (Dutch Society for Cell Biology) and S. Escudeiro-Lopes (Society for Histochemistry).

SCANDEM 2017 - 68TH ANNUAL CONFERENCE OF THE NORDIC MICROSCOPY SOCIETY - JUNE 5-9, 2017 REYKJAVIK, ICELAND

On behalf of the Local Organizing Committee of SCANDEM 2017, I would like to thank all the participants, both in the scientific programme and the trade exhibition, for having made the meeting a great success. The 68th Annual Conference of the Nordic Microscopy Society took place in Reykjavík, Iceland, from Monday the 5th to Thursday the 9th of June 2017. SCANDEM 2017 was hosted by the University of Iceland, organized jointly by the School of Engineering and Natural Sciences and the School of Health Sciences, in collaboration with the Innovation Center Iceland. It was such a great honour for us to have the opportunity to host SCANDEM conference in Iceland for the second time. The first one in Iceland was SCANDEM 2009, to mark the 60th anniversary of the Society.



SCANDEM 2017 focused on the latest development and applications of microscopy in physical and life sciences. The scientific programme was organized following two themes and four sessions each: [A] Life Sciences, including (1) Technology and Methods, (2) Health and Biomedical Applications, (3) Cellular and Organismic Biology, and (4) Environment in the Global Context; and [B] Physical Sciences, including (5) Technology, Instrumentation and Methods, (6) Materials and Nanoscience, (7) Geology, Volcanology and Earth Sciences, and (8) Industrial Applications. The scientific programme featured two plenary lectures, eight keynote lectures, and 44 oral presentations by conference participants in parallel sessions, 24 posters and trade exhibition by 15 companies. The all-day pre-conference workshop on light- and fluorescence microscopy was attended by 16 participants, comprising six from the conference and additional ten PhD students and post-docs from the University of Iceland. The main conference itself had 149 participants in total, from 21 countries from around the world. In terms of number of participants, the top six countries represented were Sweden (40), Iceland (33), Finland (23), Norway (14), Denmark (7) and UK (7).

Two plenary lectures sponsored by the University of Iceland were on human genome instability and cancer by Jórunn E. Eyfjörð from the Faculty of Medicine and on carbon fixation into volcanic rock by Sigurður R. Gíslason from the Faculty of Earth Sciences. Three keynote speakers on physical sciences included Peter Nellist (EMS-sponsored) from Oxford University, UK; Yubin Zhang from Technical University of Denmark;

and Kristján Leósson from Innovation Center Iceland. Five keynote speakers on life sciences include Terezie Mandakova (EMS-sponsored) from Masaryk University, Czech Republic; Eeva-Liisa Eskelinen from University of Helsinki, Finland; Björn Högberg from Karolinska Institutet, Sweden; Gerald Kleywegt from EMBL-EBI Cambridge, UK; and Carolyn Rasmussen from the University of California at Riverside, USA. Six young-career researchers received Best lecture or Poster Awards during the closing ceremony.

SCANDEM 2017 received contribution from various organizations, both Icelandic and from abroad. The University of Iceland provided the venue and staff support. The European Microscopy Society (EMS) helped with the travel cost for two invited speakers. The Nordic Microscopy Society (SCANDEM) allocated seven travel grants to allow students and young-career researchers to attend this Reykjavík conference. Companies sponsored the conference generously, by taking part in the trade exhibition and participating in the scientific programme. I sincerely thank you all, whose names are here-mentioned and not, for the support. I faithfully thank every member of the Local Organizing Committee and the Scientific Programme Committee for your hard work and dedication since the onset of the preparation in 2015, through the event in 2017 and to the post-conference follow up. ■

Reykjavík, 5th September 2017
Kesara Anamthawat-Jónsson
Conference Chair

CRYO TOMOGRAPHY-ADVANCED WORKSHOP ON CRYO-ELECTRON TOMOGRAPHY - MAY 6-12, 2017 VIENNA, AUSTRIA

From May 6 to 12, 2017 the Electron Microscopy Facility of the Vienna Biocenter Core Facilities (VBCF) and Nexperion – Solutions for Electron Microscopy together jointly organized an international advanced workshop on cryo-electron tomography at the Vienna Biocenter in Austria. 22 participants from Austria, Denmark, France, Germany, Japan, Portugal, South Korea, Sweden, The Netherlands, United Kingdom and the USA attended the two parts of this workshop: a weekend pre-course for less-experienced participants providing the basics of Linux, electron tomography and IMOD followed by a five-day long main workshop for more advanced participants addressing the complete cryo-electron tomography workflow starting with cryo sample preparation, followed by tilt series recording using Serial-EM, tomogram reconstruction and visualization with IMOD to finally subtomogram averaging with PEET.

An intense scientific program including 45 lectures and practical hands-on training sessions allowed participants to develop an in-depth understanding of all important steps in cryo-electron tomography – and provided the perfect justification for some well deserved distraction during multiple social activities in the evenings to network and explore the city of Vienna.

Sponsoring by Diatome, FEI, Gatan, JEOL, Leica Microsystems, Sciences Services, Quantifoil and a travel cost contributions by the European Microscopy Society allowed the organisers to get support by a renowned instructor team including Drs. Mikhail Eltsov (Göthe University Frankfurt, Germany), Johanna Höög (University of Gothenburg, Sweden), David Mastronarde (University of Colorado Boulder, United States), Reinhard Rachel (University of Regensburg, Germany), Christiane Riedel (University of Veterinary Medicine, Vienna, Austria) and Sharon Wolf (Weizmann Institute, Israel) as well as several guest lecturers.

A similar course is planned for May 2019 in Vienna, Austria. ■

Thomas Heuser, VBCF-EM Facility
(http://www.vbcf.ac.at/em)

Günter Resch, Nexperion e.U.
(http://www.nexperion.net)

EMHTR 2017 - ELECTRON MICROSCOPY WITH HIGH TEMPORAL RESOLUTION - MAY 29-31, 2017 STRASBOURG, FRANCE

Strasbourg, France, 29-31 May 2017

An international workshop about time-resolved electron microscopy was held in Strasbourg from 29 to 31 May 2017. The workshop was hosted by the Institut de Physique et Chimie des Matériaux at the University of Strasbourg and the CNRS on the Cronenbourg Campus. The scope of the workshop with about 70 participants was the presentation and discussion of the state of the art in electron microscopy from the millisecond to the femtosecond. Exciting scientific results and technical developments were reported that make this new direction of electron microscopy a highly productive field of nanocharacterization.

The main topics of the workshop were ultrafast electron microscopy with pulsed electron beams to achieve nano- to femtosecond resolution and fast electron microscopy with continuous electron beams and millisecond resolution. The scientific program was composed of 17 invited and 16 contributed talks as well as poster presentations. Impressive instrumental and scientific progress was reported, showing that electron microscopy is no longer moving just into small spatial dimensions but also into small time scales.

An important topic was laser-driven photoemitters which are used to generate ultrashort electron pulses. In a pump-probe approach, imaging, electron diffraction, and EELS with sub-picosecond electron pulses are carried out. Microscopes working in the stroboscopic mode to study reversible phenomena are now spreading in many countries and produce outstanding results from materials science to quantum electron optics. The single-shot approach, where irreversible phenomena on the nanosecond time scale can be studied, is still under development in only a few instruments. The millisecond regime is now getting accessible in standard electron microscopes with continuous electron beams. This has been made possible by the development of direct electron detection cameras and powerful image processing hardware that allows recording of dynamic transformations with higher speed and sensitivity. An important subject of the workshop was the difficulty of combining the highest spatial with the highest temporal resolution. Interesting aspects for future developments were discussed.

The workshop was supported by the EMS and the University of Strasbourg as well as by the companies Jeol, IDES, Amplitude, and LOT.■

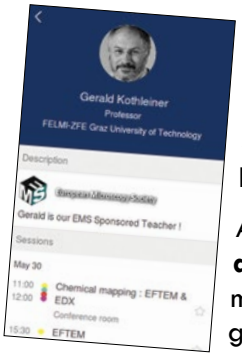
Florian Banhart

QEM2017 - 4TH EDITION OF QUANTITATIVE ELECTRON MICROSCOPY SCHOOL - MAY 21-JUNE 2, 2017 TOULOUSE, FRANCE

QEM2017 - CEMES, CNRS
29 rue Jeanne Marvig
F - 31400 Toulouse
eMail: qem2017@gmail.com
www.qem2017.com

QEM2017 (4th edition) took place from Sunday May 21st to Friday June 2nd 2017 (12 consecutive days) in Lo Solehau - Touristra Vacances, Balaruc-les-bains, near Sète (Hérault). We welcomed 98 students, 33 teachers and 25 engineers from factories or institutions

A 1st room welcomed two **FEI** and **JEOL** microscopes as well as numerous detectors, cameras, sample holders and other extras from **GATAN**, **DENSsolution** and **PROTOCHIPS**. Three other room have been fitted with **35 computers** putted into lan and fitted with a whole Microscopy and Scientific computing Open Source softwares as well as commercial softwares made available by **GATAN**, **HREMResearch** and **FEI**, (we also gained from a free access to **Elsevier** publications). A dedicated room for file and Licence servers was made possible through a loan from **DELL**. A last room was used for **students posters presentation** as well as welcome desk for QEM2017 time.



Communication along the conference was made via **website,** dedicated **smartphone App** (see left) and a daily newspaper, La Gazette, locally printed every morning.

Among other noticeable events, **a Live demo** of the Daresbury SuperSTEM microscope has been proposed and giant Quizz has ended the conferences with gifts from various TEM related manufacturers (Delta Microscopies, Springer, Elsevier, Gatan, ...)

The whole QEM2017 budget is corresponding to the projected one, a little bit **more than 150 k** (EMS sponsorship thus representing 0.5% of the final budget).

QEM2017 organizers have made the EMS logo appear on all the communication of the conference, including Smartphone Application Notification, Twitter feed, Newspaper, etc. and especially we have labelled the invitation of Gerald Kothleiner as an EMS sponsor teacher (see view of the smartphone app). ■

SIMDALEE 2017 - SOURCES, INTERACTION WITH MATTER, DETECTION AND ANALYSIS OF LOW ENERGY ELECTRONS 2017 CONFERENCE SEPTEMBER 18-22, 2017 - PULA, SARDINIA, ITALIA

The EMS supported event "SIMDALEE2017-Conference" took place on September 18-22, 2017 in Pula, Sardinia (IT).

The conference was organised by the European project "Simdalee2" which is funded from the People Programme (Marie Curie Actions) of the European Union's Seventh Framework Programme FP7/2007-2013/ under REA grant agreement n 606988.

65 participants from all over Europe, Canada and the United States of America joined this conference on "Sources, Interaction with Matter, Detection and Analysis of Low Energy Electrons". About 35 plenary, invited and expert talks addressed the fields of Secondary Electron Emission, Electron-Solid Interaction, Correlation Spectroscopy on Surfaces, Electron Entanglement, Vortex Beams, Photo- & Field-Emission, Electron Microscopy and Spectroscopy, Scanning Probe Microscopy, Nanotechnology & Novel Materials, Biomaterials - Interaction with LEE and Spin and Magnetism. A poster session with 25 posters took place on Tuesday evening. Further information concerning the conference can be found in the book of abstracts (available online on the homepage *(http://www.iap.tuwien.ac.at/www/simdalee2017/program)* as well as on the homepage itself. Two students from Texas received the fee-reduction (as required by the EMS).

The conference included a conference outing and a gala dinner, the coffee breaks took place overlooking the mediterrenean (see picture). All in all the conference was very successful in that the presentations were of very high quality, the scientific debate was very lively and the invited speakers all agreed to try to emphasize the importance of the topic of the conference from their perspective by submitting an invited review to a topical special issue of a peer-reviewed journal. Corresponding negotiations with the editors of such journals are currently underway. ■

EM 2017 - XVITH INTERNATIONAL CONFERENCE ON ELECTRON MICROSCOPY - SEPTEMBER 10-13, 2017 JACHRANKA, WARSAW, POLAND

The XVIth International Conference on Electron Microscopy was held in Jachranka, close to Warsaw from September 10th to 13th of 2017. The Conference took place in Windsor Hotel, close to Warsaw, in the area of Lake Zegrze. In the conference took part 185 participants including 30 from abroad.

The conference was organized by WUT Warsaw University of Technology Faculty of Materials Science and Engineering, Polish Society for Microscopy and Committee of Materials Science of the Polish Academy of Science.

The conference consisted of symposia with invited speakers, oral and poster presentations and a plenary session to provide an international forum for discussing recent advances in the field of electron microscopy, materials science and life science.

The scientific program covered a broad spectrum of topics and contained the following sessions:

- Analytical Electron Microscopy,
- SEM/STEM imaging,
- HRTEM,
- 3D Imaging,
- In-situ testing,
- Orientation mapping,
- Electron Crystallography,
- Electron Microscopy in Materials Science,
- Electron Microscopy in Chemistry and Life Science,
- Young Scientist Session.

Plenary talks were given by:

- **Prof. Randi Holmestad:** *"Precipitates in age hardenable aluminium alloys studied by advanced TEM techniques".*
- **Prof. Dr. Rafal E. Dunin-Borkowski:** *"Electron holography of two-dimensional transition metal dichalcogenides".*
- **Dr. Marco Cantoni:** *"Advanced FIB Nano-Tomography techniques for Materials- and Life-Science".*
- **Prof. Robert (Bob) Sinclair** *"In Situ High Resolution and Environmental Electron Microscopy Studies of Material Reactions".*

During the conference the image competition was realized in two categories:

- Physical Sciences (the winner- **Dr Robert Chulist**)
- Life Sciences (the winner- **Dr P. Bazarnik**).

The conference was augmented by an exhibition of products and services of interest to the conference participants. ■

MFS-2017 - MICROSCOPY AT THE FRONTIERS OF SCIENCE 2017
SEPTEMBER 5-8, 2017
ZARAGOZA, SPAIN

September 5-8, 2017
Zaragoza, Spain
http://ina.unizar.es/mfs2017

The Spanish and Portuguese Societies of **Microscopy organized the 5th Joint Meeting Microscopy at the Frontiers of Science 2017 (MFS-2017)** in Zaragoza, Spain. This meeting was held during the 5th - 8th September 2017 at the Paraninfo of the Universidad de Zaragoza *(http://ina.unizar.es/mfs2017)* and was organized by a Local Committee from the Laboratorio de Microscopias Avanzadas (LMA), from the Instituto de Nanociencia de Aragon (INA) of the Universidad de Zaragoza and from the Servicio de Ayuda a la Investigacion (U. Zaragoza). Above 130 delegates from Spain, Portugal, France, U.K., USA, Germany, Netherland, Check Republic, Israel, Switzerland and India attended this meeting.

The Scientific Committee put together an exciting programme covering different aspects of Microscopy applied to Life and Materials Sciences, as well as to other relevant fields in which Microscopy plays a pivotal role. More importantly, this joint meeting offered the opportunity to discuss and exchange the most recent experiences, as well as to strengthen scientific and technical collaborations. Plenary lectures were presented by Prof. Christian Colliex (LPS Orsay, France), Dr. Paula da Fonseca (MRC Cambridge, UK), Dr. Ute Kolb (U. Mainz, Germany) and Dr. Nestor Zaluzec (Argonne National Lab., USA). In addition, there were 8 invited speakers from Spain, Portugal, Israel, Switzerland, U.K. and France. The contributed oral and poster presentations were organized in 12 different sessions. Two of these sessions were devoted to the technical presentations from the EM manufacturers and for the three awardees of the Best Thesis Prize of the 2015-2016 period, offered by the Spanish Microscopy Society.

In parallel to this event, at the LMA-INA, it has been organized a Workshop on FIB and different TEM techniques *(https://sites.google.com/a/unizar.es/tem-fib_workshop)*.

We acknowledge the support of the Gold sponsor THERMOFISCHER Scientific, as well as the one from the other sponsors: ANAME, ELECMI (ICTS), Grupo ALAVA, IESMAT, IZASA, LEICA, MONOCOMP, OXFORD Instruments and ZEISS. The sponsorship of the European Microscopy Society (EMS), the Spanish and Portuguese Societies of Microscopy (SME and SPMicros) and of ARAID (Spain) is also acknowledged. **Raul Arenal** (ARAID and U. Zaragoza, Spain), Chair of the MFS-2017. ■

MAF2017 - 15TH CONFERENCE ON METHODS AND APPLICATIONS IN FLUORESCENCE - SEPTEMBER 10-13, 2017 BRUGES, BELGIUM

MAF2017 (15th Methods and Applications in Fluorescence Conference) attracted over 425 registered participants for the scientific program which consisted of 10 thematic topics, covered by 5 plenary lectures, 20 invited lectures and 70 oral contributions. Furthermore, over 220 participants presented their work via a conference-long poster session. The international character of this meeting becomes obvious by looking at the countries from which the registered researchers originate from; next to the 90 Belgian participants the remainin participants came from 38 countries, including participants from Singapore, Mexico, Brazil, Singapore, Saudi Arabia, Israel, Australia, New Zealand, Japan, China,… and important delegations from Germany with more than 60 scientists, France (over 35 participants) and the UK (more than 20 registered researchers).

The MAF series of conference has a long-standing tradition of bringing together world-leading experts in fluorescence, one of the most powerful spectroscopic and imaging methods with applications ranging from materials research to life sciences.

The unrivalled versatility of fluorescence methods relies on continuous developments in (super resolution) fluorescence microscopy, lifetime spectroscopy, imaging and probe design, but also in nanomaterials, opto-electronics, data acquisition and data processing.

Topics covered include:

- Novel developments in fluorescence spectroscopy and microscopy
- Single molecule spectroscopy
- Super-resolution microscopy
- Photonics
- Fluorescent probe development
- Labels, quantum dots…

Next to method development, MAF2017 also focused on applications of fluorescence based methods in biosciences and material sciences. Development and applications in both bioscience and material were well-balanced in the program of the 2017 conference.

What has set MAF apart from the other meetings is it's the strong focus on fluorescence. The fact that 2014 Nobel laureate WE Moerner was one of invited speakers testifies for the outstanding reputation the meeting has in the field of fluorescence. Furthermore, the MAF meeting has an extended international steering committee that is very committed to safeguard the quality and the future of this conference series.

The conference was well-received by the participants, they all praised the strong scientific program and the way the meeting was organized. Below are some email extracts we received after the meeting from a number of participants.

Comments of participants:

"Congratulations on putting together a first-class conference! You have set a high bar! We will have to work hard to put together such a quality meeting".

Prof. Yithzak Tor
University of San Diego, Organizer of the next MAF meeting

"Congratulations on a superbly organized conference! I enjoyed it thoroughly and I am sure all other attendees did so too; Bruges is a wonderful place too!".

Dinesh Soares,
Managing editor of ACS Omega

"Thanks a lot for this information and for arranging a fabulous conference!".

Prof. Bo Albinsson
Chalmers University and Organizer of MAF in 2020

"Thanks for the opportunity to participate in MAF 2017 and enjoy the meeting. The entire organization was superb and you have taken care of every little thing. Both Shobha and I enjoyed the stay thoroughly. Thank you for the great hospitality."

Prof. Prashant Kamat
University of Notre Dame, Editor in Chief of ACS Energy Letters

"Well done on the successful organization of the MAF conference. I hope you're having a well-earned rest – or at least a well-earned beer!".

Sharon D'Souza-Harris,
Managing editor IOP publishing

Summary of the scientific highlights

While it is impossible to summarize the full scientific content of a meeting of this size, below we present a short summary of the lectures that to us, as organizers, were most appealing (own scientific interest as well as feedback we received from participants and members from our laboratories).

Prof De Cola

The talk of plenary lecturer **Luisa De Cola**, University of Strasbourg, Strasbourg, France was the opening of the scientific program of the meeting and was dealing with luminescent assemblies for imaging diagnostics and sensing, fully in line with the scope of the meeting.

Luminescent molecules that can undergo self-assembly are of great interest for the development of new materials, sensors, bio labels. The talk illustrated some of the recent results of Prof. De Cola on the use of platinum complexes as building block for luminescent assemblies, and the tuning of their emission color, by pressure and temperature leading to a new class of materials possessing reversible properties. The monitoring of the different emission properties, used as fingerprint for each of the assembled species, allowed an unprecedented real-time visualization of the evolving self-assemblies. In addition, she demonstrated that the use of the self-assembled systems can lead to sensors for drugs and toxins affording a supramolecular emission-switch-on chemosensor in water. Finally, detection of analytes using electrochemiluminescent assays was demonstrated and new labels based on self-assembled systems as well as carbon dots were discussed.

The talk of **Prof. Prashant Kamat** (plenary speaker), University of Notre Dame, Notre Dame, United States of America, chief editor of ACS Energy Letters, was dealing with one of the most researched materials to date, perovskites. The title of the talk was 'Photochemistry of lead halide perovskites with an intrigue'.

Mixed halide lead perovskites offer a useful strategy for continuous tuning of the semiconductor bandgap. For example, by varying the halide composition of methylammonium lead iodide/bromide ($CH_3NH_3PbBr_xI_{3-x}$ (x=0 to 3)) it is possible to tune the bandgap between 1.55 eV and 2.43 eV. In addition to photovoltaic applications these mixed halide perovskites offer rich photophysical properties with lasing applications. These interesting aspects motivate investigation of the underlying optical and electronic properties of such systems. An intriguing property of mixed halide lead perovskites (e.g.,$CH_3NH_3PbI_{3-x}Br_x$) is phase segregation to create Iodine-rich and Bromide- rich regions when subjected to visible irradiation. This intriguing aspect of halide ion movement in these mixed halide films can be tracked from the changes in the photoluminescence and absorption spectra. In order to probe the reversibility of this effect we have now employed emission and transient absorption spectroscopy tools and succeeded in elucidating the time scale with which such separation occur under laser (405 nm) irradiation followed by dark recovery. $CsPbBr_3$ films cast from colloidal suspension can be transformed into $CsPbI_3$ via a halide exchange reaction upon exposure to a heated PbI_2 solution (~70°C). The internal structure of hybrid $CsPbBr_xI_{3-x}$ varies with increasing thickness of the exchanged film. The gradient structure thus allows us to probe the charge transport within the film. Implication of such halide ion migration in mixed halide perovskite solar cell was also discussed.

The third plenary speaker of the meeting was **Prof. WE Moerner, Nobel Laureate Chemistry 2014**. His talk was entitled '*The Promise And Challenges Of 3D Super-Resolution Microscopy And Single-Molecule Tracking In Cells And In Solution*'.

He started out with an historical overview of the field of optical detection of single molecules, pointing out that the field arose out of an industrial research lab in the late 1980's, while exploring the fundamentals of molecular frequency domain optical storage at low temperatures. This work led to the observations of blinking and optical switching, key concepts that provide the foundations of super-resolution imaging with single molecules. Super-resolution microscopy has opened up a new frontier in which biological structures and behavior can be observed in fixed and live cells with resolutions down to 20-40 nm and below, and many examples abound. Current methods development research addresses ways to image in thick cells and to extract more information from each single molecule such as 3D position and orientation, as well as to assure not only precision, but also accuracy. Further, he pointed out that new labels are needed which provide more photons before photobleaching. At the same time, he noted that in spite of all the current focus on super resolution, even in the 'conventional' low concentration, single-molecule tracking regime where the motions of individual biomolecules are recorded rather than the shapes of extended structures, much can be learned about dynamic biological processes when ensemble averaging is removed.

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Prof Lasser

The one but last plenary lecturer of the meeting was **Prof. Theo Lasser**, EPFL, Lausanne. The title of his talk was '*Voir fait Savoir*', obviously a lecture about microscopy.

He was talking about super-resolution optical fluctuation imaging (SOFI) providing an elegant concept for 3D super-resolution imaging. He and his team intend to expand the scope of this imaging technique based on new applications in life sciences and medicine.

As a first example he showed the higher order cumulant statistics of SOFI, which allows to assess quantitatively the receptor distribution and clustering on T-cells. In a further extension he combined SOFI with a novel label-free white light quantitative phase tomography to provide high-speed 3D imaging (>100 Hz) and spatial super-resolution. Finally, he reported on recent progress concerning the gut-Alzheimer Disease link. This project demands a realm of optical techniques ranging from functional brain imaging to a novel way for a fast read-out of the microbiome.

These selected examples based on new optical concepts clearly demonstrated the growing potential of optical imaging for medicine and life-sciences. The lecture of Prof Lasser was the kick off of the special session on the EU projects Beyond Sequence and AD-Gut, with a general focus of fluorescence techniques in DNA analysis.

Prof. Petra Schwille from the MPI Martinsried was the last plenary speaker and closed the meeting. Her talk was entitled '*From single molecules to artificial cells*'. She mentioned that applications of methods with single molecule sensitivity in living cells are extremely attractive, but often doomed to be unsatisfactory, because of the enormous complexity of relevant molecules and parameters. In order to arrive at better defined systems that allow high precision measurements with good reproducibility, biological phenomena are often reconstituted in cell-free systems, retaining only a sizeable number of variables. Her intention is to explore whether fundamental features of living organisms, such as cell division ad replication, can in principle be reconstituted from the bottom-up. She argued that the future vision shared by many synthetic biologists and biophysicists is to construct artificial cell-like entities, in which all components and processes are well defined and controllable, to understand the necessary and sufficient conditions for a chemical system to become biology.


Prof Sauer

Next to the very much appreciated plenary talks, there was many other talks that the participants praised during breaks. The one that probably stood out most was the one from **Prof. Sauer** (invited talk) entitled '*Super-Resolution Microscopy Coming Of Age: From Concepts To Biomedical Applications*'.

He argued that super-resolution microscopy by single-molecule photoactivation or photoswitching and position determination (localization microscopy) has the potential to fundamentally revolutionize our understanding of how cellular function is encoded at the molecular level. According to Prof. Sauer, among all powerful high-resolution imaging techniques introduced in recent years, localization microscopy excels as it delivers single-molecule information about the distribution and, adequate controls presupposed, even absolute numbers of proteins present in subcellular compartments. This provides insights into biological systems at a level researchers are used to think about and model biological interactions. He briefly introduced basic requirements of localization microscopy, its potential use for quantitative molecular imaging, and discuss present obstacles and ways to bypass them. He demonstrated the advantageous use of *d*STORM for quantitative imaging of synaptic proteins, the study of plasma membrane organization, and the molecular architecture of multiprotein complexes. Finally, he outlined how *d*STORM can be used advantageously to improve next generation medical therapies.

We have been very happy with the list of speakers we could attract (with the support of EMS), among which were a considerable number of outstanding female scientists whom prominently featured at the meeting. We would like to end with thanking explicitly the FWO-Flanders for the financial support that helped us to organize what can be described as a fantastic scientific meeting. ■

Yours sincerely,
Johan Hofkens & Maarten Roeffaers

MICROSCOPES IN THE 19TH CENTURY PART I (1800-CA.1860)

MICROSCOPES IN THE 19TH CENTURY - PART I (1800-CA.1860)

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Early in the 19th century a first series of achromatic microscopes was constructed by Harmanus van Deijl, Amsterdam. At last, glass itself, as a physico-chemical material, became subject of systematic investigations (Fraunhofer). What had been an exclusively English speciality, was rediscovered and improved - independently - in Germany and France. Achromatism had perhaps been an ideal for quite a while, spherical aberration, coma, and astigmatism stayed on and now came to the fore. In despair, Amici revived Newton's reflector microscope. At last, conditions for almost aberration-free lens combinations were found by Joseph Lister; they came to be called 'aplanatic'. The study of ever finer gratings brought more exact data: wave lengths. Optics inaugurated the era of state-supported technoscience.

Achromatism, aplanatism; glass

A triplet-objective consisting of a slightly hollow plano-convex and a biconvex crown lens with inbetween a biconcave flint lens became Van Deijl Jr.'s hallmark (1807). Brewster (1813) showed that immersion, too, was useful, e.g. in cinnamon- or annise-oil. He also experimented with a biconvex objective having a large difference in sphericity. In Germany, Joseph Fraunhofer (1787-1827), too, succeeded in creating achromatism (1811). Fraunhofer mastered all aspects of the production, that is, both the glass-making and the grinding. His flint and crown were indeed unrivaled, as were the lenses: no striae, no veins, no bubbles, and a perfect curvature. In studying refraction by prisms, Fraunhofer first created a strong white light source by a 6 lamps-6 slits system, a prism, and a slit, the produced light ray being intercepted by a second prism at a large distance, part of a theodolite. The spectrum, then, was studied with the theodolite's telescope in view of measuring refraction indices for the successive colours. Quite unexpectedly dark lines showed up in sunlight and Fraunhofer was quick to realize that these could be used as bench marks for high-precision refraction measurements. Refraction, after all, was straightforward, dispersion being defined along the spectrum, for successive combinations of dark lines. Through his 6 slits' experiments Fraunhofer indirectly touched upon 'interference', as it had been recently dubbed by Thomas Andrews. The slits became gratings (parallel wires; gold foil-with-slits on glass; ruled gratings) and within the framework of Fresnel's theory Fraunhofer measured the first 'wavelengths' (1823). Precision optics as the *nec plus ultra* in the making !

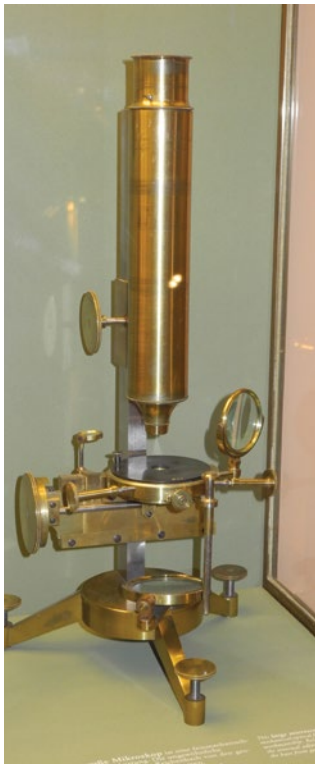

Figure 1: *Fraunhofer's achromatic microscope (1811). Artistic e-realism by Eric Clark (Florida State University, Tallahassee, FL). Courtesy: Eric Clark.*

Unaware of Fraunhofer's activities Giovanni Battista Amici (1786-1863) in a way revived Italian optics, while contributing to Europe's scientific future. At home, in Modena, he received Herschel Jr. (1824) who had just visited Fraunhofer in Munich and Benediktbeuern to discuss the measurement of refraction indexes. Amici himself traveled all the way to Paris and London to show his creations. In 1814 already he had produced a first catadioptric variant of Newton's reflector, that is, with an *elliptically* shaped - and hence definitely aberration-free - mirror (Fig.2), the technical prowess of which made a lasting impression. The horizontal tube was characteristic for Amici, that is, in the beginning. Its advantages were hailed in the literature, compared to the *vertical* compound bodies, let's say, that of Fraunhofer. There are dramatic sketches by Amici fans in the literature of a scholar's eye-moisture streaming from all corners over the eye-ball downwards to the pupil, tears dripping from thence on ocular and object stage, of course only when s/he worked with a *vertical* microscope; in much the same vain the neckpain was called unbearable. Anyway, in practice, Amici's catadioptrics worked best with transmitted light. There was, moreover, only *one* objective, another limiting factor, one that reduced the magnification range. It worked quite well, all the same; Amici himself made the first discoveries

Figure 2: *A catadioptric microscope built by Amici with its accessories. Courtesy: Museo Galileo, Florence (inv. N°3171; ©Franca Principe).*

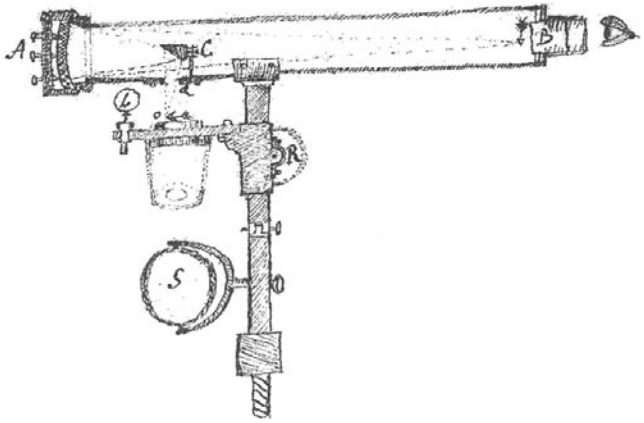

Figure 3: *Drawing by Amici of the light path through his catadioptric microscope (from Ref.1, p.6). The object o (arrow) is at focus of the spherical illuminating mirror S and close to that of the elliptical mirror A (first focus). S sheds an image at a flat mirror, C (at 45°), in the compound body; this image is reflected to A. The resulting secundary image is further magnified by eye-piece, B, a combination of two plano-convex lenses.*

with his instrument (sap circulation in plants; pollen tube). Microscopy was hot. It was the time that someone like Henri Dutrochet, a physician-naturalist, studied, with an Amici-microscope, the red blood corpuscles - for him the 'molécules du sang' - , their structure and dye, and their relation with the nutrients, on the one hand, and the structure of the bodily materials, on the other (published in 1824). The rapid developments of the early 1820's brought the Italian back to dioptrics. Later it was Amici who introduced the hemispherical front lens, which, it is said, notwithstanding the required smallness, was relatively easy to produce. Again a great success for Amici (1838), as was his systematic use of water immersion, from 1847 onwards. In hindsight Amici's craftmanship in grinding elliptical *mirrors* makes us wonder why, as far as we know, he didn't try his hand to produce elliptical *lenses*. The same question holds in fact for Fraunhofer, a technical as well as a mathematical genius and as such a rare bird in the company of naturalists and opticians-craftsmen.

In France, Chevalier and Selligue had been innovating: they combined 2 or 3 triplets to form *one* objective. A profound study of the nature of spherical aberration in achromatic *doublets* by Joseph J. Lister (1786-1869), a wealthy hobbyist-naturalist, showed something new, namely its varia-tion along the optical axis, with two dis-tinct points separating zones of undercorrection and overcorrection. Lister called these points 'aplanatic', 'errorfree' (πλανη, deviation, error), a term which was already current amongst opticians to express the ideal. Did his doublets behave like *elliptical* lenses? His doublets had the simplest form: a planoconcave flint covered by a biconvex crown lens. The two parts were cemented with colourless Canada balsam of a similar refractive index, another novelty; it reduced reflections and in so doing eliminated 50% of the losses of light. The cement also avoided dew and vegetation to creep in. The result, then, was approximately a classical planoconvex single glass behaving like an achromatic spheroelliptical lens. Lister described the new effect by referring to an observer who moved such a doublet carefully along its axis to and fro a point-like light source (Fig.4).

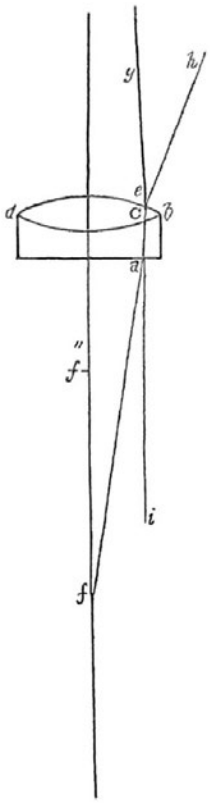

Figure 4: *Lister's achromatic doublet with its two aplanatic points, f and f'' (from Ref.2).*

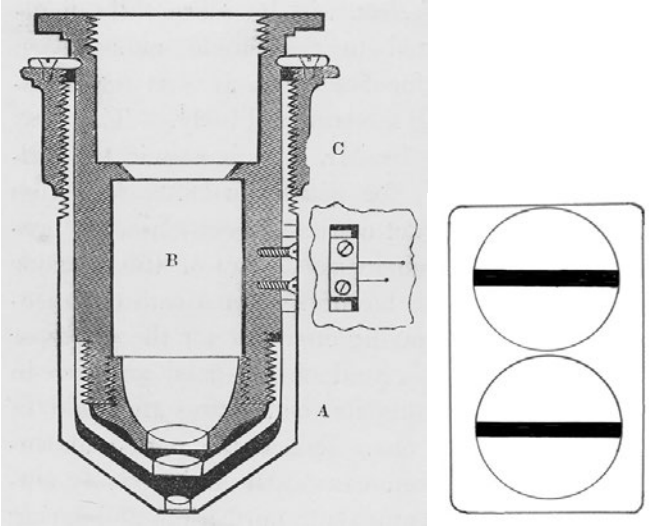

Figure 5.a: *(left) Section of an objective consisting of three doublets. The anterior doublet is tunable with respect to the other two, which allowed the study of preparations with or without cover plate (from Ref. 3, p.42). The two bolts, through a slot in the outward cylinder screwing in the main body, indicate the two positions. For their relative positions, see* ***Figure 5.b****: Length ca. 30 mm. Courtesy: University Library Groningen.*

Figure 5.b: *(left) The (presumed) positions of the two bolts and the geometry of the slot in the outward cylinder. In the indicated position of* ***Figure 5.a*** *it is farthest from the other doublets and therefore most suited for objects-without-cover-glass.*

On approaching the light source, there is a point *f'* which marks the transition from undercorrection to overcorrection; at *f''* the reverse takes place. On passing through *f'* the angles of incidence and emergence, that is, *f'*ai and *geh*, change: *f'*ai increases, while *geh* decreases. As to surface *dcb* the ray behaves more and more like the perpendicular *he*. As a consequence the spherical aberration caused by the lower two surfaces will be more than outweighed by that of the upper surface. This corresponds to overcorrection. On coming closer to the lens the overcorrection first increases to subsequently decrease and become nil, that is, at *f''*, before turning into undercorrection. A combination of two such doublets would perfectly work when the object was put at the shorter aplanatic focus of the front doublet, the rays being guided through the longer aplanatic focus of the second; *f''* of the third doublet, then, should coincide with the second's *f'*. Importantly, the smearing out of extra-axial details—our *coma*—, too, appeared to be eliminated. In other words: a flat object was perfectly pictured as such, not only in the middle but likewise at the periphery. Compared to biconvex single lens objectives of the same diameter a doublet achromatic was, of course, far more powerful, because the for single lenses essential diaphragm could be dispensed with. The consequence, then, was a far greater angular aperture for the same focal distance. Lister's objectives were produced in quantity by Andrew Ross (1798-1859), a distinguished instrument-maker, later also by the firm R. and J. Beck, directed by two of Ross' grand-nephews. It can scarcely surprise that Lister was the first - with Thomas Hodgkin, in 1827 - to recognize the true biconcave form of the red blood corpuscles, a topic that kept on fascinating both doctors and naturalists.

Apart from the absence of tremor-problems a good microscope presupposed, for its objective, not only sufficient resolution, penetration and definition, but also flatness of field. '*Resolution*' referred to the distinctness of details, a property depending on the quantity of light, that is, on the angular aperture (and hence on the focal distance of the first lens). '*Penetration*' concerned the depth of the object distinctly visible without adaptation, let's say the 3D-effect. '*Definition*', to conclude, was meant to concern particularly the distinct visibility of details at boundaries. It was the time that the cover plate (glass, talc) was introduced to get uniformly thin preparations. However thin it was - let's say 0,25 mm - , it caused a new aberration, which appeared to vanish when the front-doublet was slightly retracted with respect to the other two (Fig.5).

An interesting case of an instrument which could be used both as a single lens and as a compound microscope was designed by the naturalist William Valentine

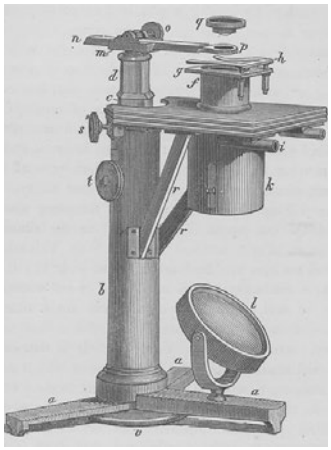

Figure 6: *(left) An innovative model of a single-lens microscope that can be transformed into a compound one. It was contrived by William Valentine and built by Andrew Ross, London (1831; from Ref.3, p.68). Courtesy: University Library Groningen.*

Figure 7: *(right) An original Valentine microscope as built by Ross (1831) in its compound version. Valentine's own copy. Do notice the long tube underneath carrying the mirror and meant to reduce false light. Courtesy: the Tasmanian Museum and Art Gallery.*

(1808-1876) and constructed for him by Andrew Ross in 1831. The single lens version is reproduced in Fig.6. It consists of a firm pillar on a tripod in bell metal - a bronze rich in tin - whose feet may be closed together. The pillar houses a triangular tube, *c*, in which an equally triangular bar, *b*, slides. On top we see the single lens or doublet holder *mnop* which may be moved horizontally.

The object table is positioned above *a* Wollaston condenser, *k*, that is, *a* biconvex lens and a diaphragm focusing the light beam coming from reflector *l*, concave on one side, flat on the other. The milled heads *v* (underneath), *t*, *s* and *o* allow the adjustments of, respectively, the triangular bar *d* (coarse), the triangular tube (fine), of the object stage *f* (fine) and the lens arm (fine). The lens arm with the triangular bar may be exchanged for a compound body on a triangular bar of its own.

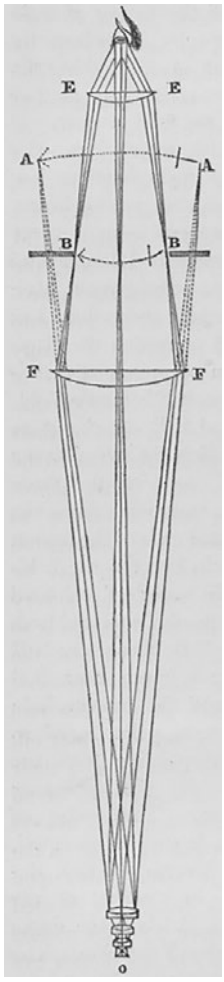

Figure 8: *Light path through an achromatic Lister-type compound microscope (from Ref.3, p.151). Courtesy: University Library Groningen.*

The light path, then, through a Lister-type microscope could be represented as in Fig.8. The objective consists of three doublets; o is the object. The eyepiece EEFF is composed of an eyelens EE and a fieldlens FF. Diaphragm BB is situated in focus. The eyepiece is of the type proposed by Huygens in which spherical aberration is minimized by opposite refractions; the distance of the two lenses, then, is half the summed focal distances. As was noticed by Ruder Boscovich, about 1765, this combination also eliminated a large part of the remaining chromatism produced by Dollond's then-newly invented triplet object-lens (Fig.9). Boscovich's brilliant analysis reduced to the following. In the *absence* of the field lens that chromatism rest would cause a series of images BBRR, the blue image BB laying farther than the red one RR. By introducing that field lens, however, the two extremes come closer together, the curvature being reversed. As a consequence, the images B'B'R'R' are perfectly suited as object to eyelens EE. Indeed, not only the curvature is appropriate, but the slightly more remote B'B' is also a bit *smaller* than R'R'. Blue being more refracted than red, by the eyelens, the latter's effect will be to make coincide the two images, in just *one*, perfectly *flat* magnified image.

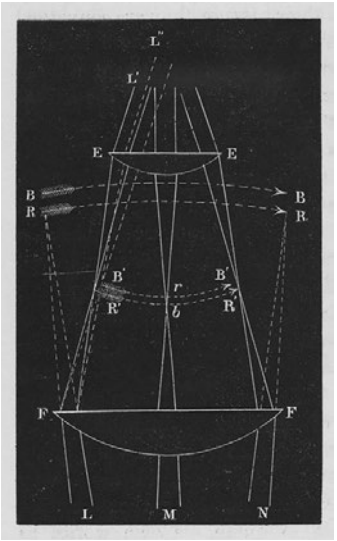

Figure 9: *Huygens' eyepiece; a diaphragm should be imagined in focus, at B'B'R'R'. Meant to eliminate spherical aberration it also reduced chromatism. For Ruder Boscovich's explanation (ca.1765) see the text (from Ref.3, p.152). Courtesy: University Library Groningen.*

Among the countless newly invented accessories perhaps one of the most important concerned a measuring device, which came to be known as the *micrometer*. In the old days, it will be recalled, Leeuwenhoek had estimated the diameter of '*blood globules*', by using a length scale gauged on a cubic inch (1677): one such inch corresponded to 80 grains-in-a-row of a particular kind of sand or 600 hairs from his whig laying side-by-side. On inspecting the 'blood globules' he estimated that 5 in-a-row corresponded to the diameter of 1 whig-hair, 100 in-a-row to the diameter of a sand grain. Importantly, Van Leeuwenhoek's (excellent!) results can be easily recalculated into modern units because he reproduced his cubic inch exactly in his correspondence with the Royal Society; his inch equals 2,25 cm.

Later investigators have tried to provide their compound microscopes with a *mechanical* measuring device. The length of the compound system was first standardized such that the object was at a distance corresponding to the near-point of the average eye. The magnification, then, could be estimated by comparing the image of an object of known dimensions with a scale at the object table. A more straightforward technique made use of a Huygens eyepiece: between the two lenses of the eyepiece, covering the hole of the diaphragm, a plane glass was positioned featuring a network of engraved lines at known distances from each other (about 0,1 to 0,025 mm). It produced clear images of the object against the vague background of the network. A variant was proposed by Jesse Ramsden (1735-1800). It consisted in an inverted field lens, such that the convex sides of the two eyepiece lenses

opposed each other, while the network was installed in the lower focal plane of the field glass. In this case the micrometer network dominated the imaging. Apart from these, there was also a stage micrometer having a subdivision similar to that of a normal ruler. In parallel tests were developed to express the power of microscopes in terms of their resolution. The scales of butterfly wings and all kinds of other biological parts came to be exchanged, about 1846, for the test plates of Friedrich A. Nobert (1806-1881), featuring a series of 19 groups of engraved parallel lines of ever decreasing distances, from 443 (group 1) to 4430 (group 19) lines mm^{-1}. Again the technical craftmanship involved stupefied the world of learning. Nobert though, like Fraunhofer before him, remained uncommunicative as to the details

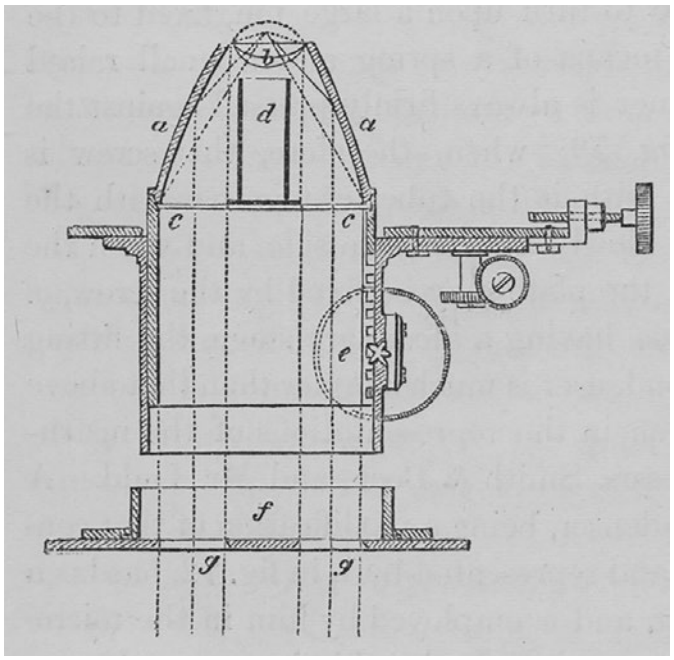

Figure 10: *Parabolic reflector, aa, as condensor invented by Francis Wenham (1851; from: Ref.4, p.132) to bring about what came to be known as dark field illumination. With the two-holes' diaphragm fgg joined to it, its length was about 70 mm. The light beam produced by a flat mirror underneath is directed at the diaphragm.Two pencils are produced which, after reflection, pass from opposite directions through the meniscus-lens b, on top, before entering the glass plate carrying the object. The curvature of the meniscus-lens is chosen such that it corrects the aberration caused by the glass plate. The distance of the dark well, d, to the meniscus may be adapted to optimize the effect. Courtesy: University Library Groningen.*

of his art.

Another important development concerned the illumination, which ought to be strong enough without putting the object or the eye into danger. For evening studies, Hooke's candle-plus-brine-ball for on top illumination was replaced by (spirit or paraffin) lamps with a bull's eyelens as condenser. A substage mirror allowed for the transmission of light - be it diffuse sunlight, or that of a candle or lamp - through transparent objects. A most ingenious novelty, then, was proposed by Francis H. Wenham (1824-1908; 1850). Wenham had noticed that when such an object was indirectly illuminated - that is, obliquely, without any direct light entering the objective, it appears against a dark background. So he designed a condenser which optimised that effect. It consisted of a truncated paraboloid reflector of silvered brass, with the object, screened from direct rays by a stop, at its focus (Fig.10). As can be seen, it obliquely illuminates the object from opposite sites without allowing direct rays to enter the objective; its light is achromatic. Only light diffused by the object contributes to its visibility, making it stand out with all its colours against a dark background. Understandibly, the use of this illuminator was limited to strong, high aperture objectives, but the results were great. As with Amici, the mathematics behind the mirror was allright, the production in the workshop being the weak point.

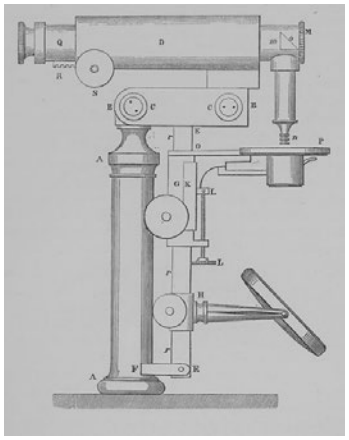

Figure 11: *Charles Chevalier's 'universal microscope' made about 1825 after Amici's horizontal example (see Fig.2 and 3; from Ref.4, p.118). Courtesy: University Library Groningen.*

Figure 12: *An original Chevalier 'universal microscope' (Oxford Museum of the History of Science). Artistic e-realism by Eric Clark (Florida State University, Tallahassee, FL). Courtesy: Eric Clark.*

All kinds of construction variables were tested, among which the double pillar with trunnions to carry the optical parts and the stage, and various footings, sometimes filled with lead to increase the stability. Moreover, binocular microscopes came on the market. An interesting hybrid microscope, a technical achievement of the first order, was produced about 1834 by Charles Chevalier, in Paris (Fig.11 and 12). It was called

a '*universal microscope*', since it could be used both as a horizontal instrument, style-Amici, and as a vertical, '*classical*' compound microscope. It consisted of a solid pillar AA on a tripod (or screwed upon its packing box) carrying a T-piece of brass, the upper part BB of which is provided with two cradle joints, CC, one of which supports the dioptrical system. The vertical arm of the T-piece features a rack-work on its back: the milled heads S drive pinions to move mirror and object stage. Do notice the prism, which transmits the light of the vertical object-glass. That part may be exchanged for a straight objective.

The microscope, then, becomes a vertical one simply by turning the dioptrics tube upwards. In the vertical state the brass T-piece supporting the optical system may be turned around the other cradle-point, the one directly linked to the pillar. A very practical feature indeed, because it implied an additional manner to optimize the observations. The lower end of the T-piece in question features a brace projection EF which normally rests against the pillar.

Acknowledgments:

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REPORT ON SPECIAL EVENTS

NOBEL PRIZE IN CHEMISTRY 2017

The Nobel Prize in Chemistry 2017 was awarded to Jacques Dubochet, Joachim Frank, and Richard Henderson, "for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution"

For many biochemists and structural biologists working on the structure-function relationship of macromolecules, this was definitely the highlight at the end of the year 2017. It came as a logical consequence after breakthroughs in the development of direct electron detectors and image-processing software enabled the determination of protein structures beyond 4 Å resolution at a rapidly increasing pace. This resolution is sufficient to provide the information about not only the peptide backbone, but also the positions of most amino acid side chains within a polypeptide and thus to solve the atomic structure of a protein *de novo*. Since 2013, this technological breakthrough therefore helped to provide fundamental information on the structure-function relationship in many macromolecular complexes and triggered a *'resolution revolution'* in the field of cryo-electron microscopy. Today, in principle the structure of any sufficiently pure, stable and suitably large protein complex can be solved by cryo-EM, circumventing technical challenges inherent to x-ray crystallography and NMR spectroscopy, the two other methods used in the past for high-resolution structural analysis of biomolecules. Already at the end of 2015, Nature Methods named cryo-EM the Method of the Year.

What is the contribution of the three laureates? Briefly, Jacques was head of a small EMBL group in Heidelberg, dedicated to electron microscopy method development. At that time, most electron microscopists who investigated biomolecules were worried about the destructive effect of electrons to organic matter, and it was clear that this “beam damage” was decreased at liquid nitrogen temperature. Jacques and his team aimed at investigating biomolecules without cryo-protectants. Consequently, they started to plunge samples on grids into liquid ethane, to cryo-immobilize aqueous solutions of macromolecules in a life-like status, without denaturation and dehydration artefacts and without the formation of disruptive ice crystals. This was quite remarkable for the early 1980's; it is timely to recall that the existence of a vitrified, i.e. non-crystalline status of water was proven only a little earlier (1980). The development became rapidly visible with early applications visualizing liposomes, viruses, DNA, proteins, and even cells in their native state. Thus, the technique was soon adopted by other laboratories. Later, Jacques and his co-workers honed and diversified this technique in various directions, e.g. towards CEMOVIS, the cryo-EM analysis of sections in the vitrified state. In addition, Jacques remained interested in the many configurations of DNA, e.g. in the nucleus and in viruses, by consequently analyzing them using cryo-EM (and other techniques). He was also always very keen on teaching younger scientists in his lab and thus disseminating his experiences to successors.

Joachim Frank was initially a PhD student in the Munich lab of Walter Hoppe, thus he had a solid background in physics and crystallography. His first contributions to the field in electron microscopy of biological macromolecules was to make image processing of noisy images possible, at all: first in two dimensions, and very soon, also in three dimensions. His contributions go back to the 1970's when he explored the search for *'motifs'* (noisy projection images of macromolecules) using cross-correlation, and improving the signal-to-noise ratio by averaging. It is fair to mention that cross-correlation is presumably one of the most-used algorithms in low-dose biological cryo-EM, daily, hourly, every minute and second. It is used to correct specimen drift in cryo-EM, and to detect and quantify specimen movement in 3D-EM. In the following, he was key and/or co-author in numerous studies describing novel and fundamental image-processing methods, in particular classification, for both 3D-EM and cryo-EM, implemented in a software package. This culminated in books with him as editor in which the methods were described in detail, and summarized. The main biological macromolecular complex under investigation was, from early on, the ribosome as analyzed by cryo-EM, with fundamental contributions. To date, Joachim is still actively working in this field.

Richard Henderson has been actively involved in electron microscopy of macromolecules since the early 1970's, in the MRC Laboratory of Molecular Biology in Cambridge (UK), a laboratory that was home to other Nobel Prize laureates: among them, Aaron Klug, already in 1982, for *"crystallographic electron microscopy"* – for his electron microscopy investigations on bacteriophage tails. Thus, Richard also had early insight into fundamentals of crystallography, electron microscopy, and structural elucidation of biological complexes. His work on bacteriorhodopsin, a membrane protein forming two-dimensional crystals, started in the 1970's, and after many years, in 1990, it culminated

in the first cryo-EM based, high-resolution structure of a protein. The analysis of bacteriorhodopsin helped to understand a fundamental biological process, the function of a light-driven proton pump in the membrane of a prokaryotic cell, the archaeum **Halobacterium salinarum**. Since his early EM investigations, Richard is not only interested in various (membrane) protein complexes, but also in technical developments. It was his initiative and activity to improve one of the weakest parts of electron microscopy, the image-recording step, finally ending in the development of the CMOS-based direct electron detector. It is now used to not simply record individual still images, but image movies, thus overcoming the limitation of sample 'drift' during the data recording process. The introduction of this new type of camera in 2012/13 to cryo-electron microscopy marks the turning point when suddenly, an increasing number of protein structures with a resolution better than 4 Å were published. ■

Reinhard Rachel

ERNST-RUSKA PRIZE 2017

The Ernst-Ruska Prize is awarded by the German Society for Electron Microscopy (DGE e.V.) every two years for outstanding achievements in the field of electron microscopy. The prize is given for work carried out by younger scientists pioneering new capabilities of electron microscopy as a scientific technique through innovative instrumentation or novel methods of basic and general interest. The decision is made by the independent Ernst-Ruska Prize committee.

The Ernst-Ruska Prize 2017 is shared between two outstanding scientists: **Prof. Sandra Van Aert** (University of Antwerp, Belgium) and **Dr. Radostin Danev** (Max-Planck-Institute for Biochemistry, Martinsried, Germany). The prize has been handed over at the electron microscopy conference MC2017 in Lausanne.

Radostin Danev is awarded the one-half of the Ernst-Ruska Prize 2017 for his work in developing a new type of hole-free phase plate with applications in cryo-EM.

In Martinsried, Radostin Danev made the key discovery that the charging that caused unacceptable effects at the edge of the hole in a thin carbon film, could by itself be used to produce a 90-degree phase shift of the unscattered electrons. Danev's development uses a continuous (hole-free) carbon film with the amount of charging controlled by heating the carbon film to ~250°C. This effect allows the "*Volta*" phase plate, which has been commercialized to be reused an indefinite number of times. Stunning results have been achieved in the context of electron cryo-tomography using this device, including one describing the structure of the 20 S proteasome at a resolution of 3.2 Å and one describing the nucleosome at a resolution of 3.9 Å.

Sandra Van Aert is awarded the other half of the Ernst-Ruska Prize 2017 for her work in the development and application of new techniques for optimum quantitative analysis of electron microscopy data.

She has pioneered the development and application of statistical, model based methods for atom counting in STEM data in both two and three dimensions, which led to the publication of a full 3D structure of a nanoparticle at atomic resolution. The method developed is based on an accurate measurement of column-by column scattering cross sections based on statistical parameter estimation theory. This has enabled atom counting with single atom sensitivity. More recently, Sandra Van Aert has also shown that this method can be extended to use only a single image enabling a potential, significant reduction in the required electron beam dose. The method has also been extended to mixed element systems and has been disseminated to the wider community through the open source STATATEM software. The deadline for nominations of the Ernst-Ruska Prize 2019 is November 30, 2018. Please find the announcement and corresponding details on the homepage of the German Society for Electron Microscopy *(www.dge-homepage.de)*. ■

The Ernst-Ruska Prize 2017 Awardees Sandra Van Aert (middle) and Radostin Danev (right) together with Michael Lehmann (left) as DGE president.

Prof. Michael Lehmann
(DGE President 2016-2017)

WILEY PRIZE 2017 IN BIOMEDICAL SCIENCES

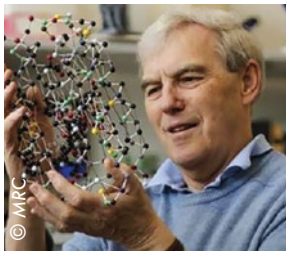
Monday, February 27, 2017
Cryo-electron microscopy pioneers have won the 16th Annual Wiley Prize in Biomedical Sciences.

Joachim Frank, Richard Henderson and **Marin van Heel** have been recognised for electron microscopy developments that are transforming structural studies of biological molecules and complexes.

As Dr Günter Blobel, Chairman of the awards jury for the Wiley Prize, highlights: *"The 2017 Wiley Prize honors scientists who have developed cryo-electron microscopy to be the most important new tool for establishing atomic structures of large molecular complexes."*

Dr Joachim Frank is an HHMI investigator, a Professor of Biochemistry and Molecular Biophysics and of Biological Sciences at Columbia University, and Distinguished Professor of the State University of New York at Albany.

Dr Richard Henderson is a scientist at the MRC Laboratory of Molecular Biology in Cambridge, UK. He was Director from 1996 to 2006, and is a fellow of the Royal Society and a Foreign Associate of the US National Academy of Sciences.



Dr Richard Henderson wins Wiley Prize alongside Joachim Frank and Marin van Heel.

Dr Marin van Heel is a visiting Professor at the National Nanotechnology Laboratory – LNNano/ CNPEM, Campinas, Brazil. He is an Emeritus Professor at the Institute of Biology Leiden (NeCEN) and the Department of Life Sciences, Imperial College London.

"We are pleased to highlight the impact that cryo-electron microscopy has had in advancing knowledge of molecular structure and resulting cellular functions," says Deborah E. Wiley, Chair of the **Wiley Foundation**.

"The Wiley Foundation honors leadership and innovation in the development of techniques that greatly advance scientific discovery," she adds. *"The work of the 2017 Wiley Prize recipients Joachim Frank, Richard Henderson, and Marin van Heel truly upholds this mission."*

First awarded in 2002, The Wiley Prize in Biomedical Sciences is presented annually to recognize contributions that have opened new fields of research or have advanced concepts in a particular biomedical discipline.

Among the many distinguished recipients of the Wiley Prize in Biomedical Sciences, six have gone on to be awarded the Nobel Prize in Physiology or Medicine.

This year's award of $50,000 will be presented to the winners on April 7, 2017 at the Wiley Prize luncheon at The Rockefeller University.

The winners will then deliver an honorary lecture as part of The Rockefeller University Lecture Series.

This event will be live streamed via the Current Protocols' Webinar Series and registration is free. ■

THE SFμ RAIMOND CASTAING AWARD

Raimond Castaing prize is a great award that has been initiated by the French society of microscopies (La Société Française des Microscopies, Sfμ).

This great distinction is aimed at rewarding scientists who have made outstanding research in the field of microscopy and microanalysis, including both instrumentation, theory and applications and all types of methods (TEM, optical microscopy, near-field approaches (AFM, STM, SNOM…), atom probe tomography…).

This great award pays homage to Raimond Castaing, a pioneer in the field and who is the father of numerous instruments (electron microprobes, SIMS with Georges Slodzian, energy filtered electron microscopy with Lucien Henry…). R. Castaing was also the first President of Sfμ (1959-1961).

The Raimond Castaing awards two high level scientists every two years in both life and material science. For its first edition, **Didier Blavette** was chair of the jury, and the prize has been given to

Bruno Klaholz

Marcel Tencé

Bruno Klaholz (IGBMC, Strasbourg) for his remarkable work in integrative biology using cryo-electron microscopy and to **Marcel Tencé** (LPS, Orsay) for his outstanding contribution in the development of EELS techniques and cathodo-luminescence at the Orsay Lab (LPS). These two Raimond Castaing prizes were awarded in July 2017 during the bi-annual Sfμ congress that was held in Bordeaux. ■

LA BOULE DE TOULOUSE A 20TH CENTURY HERITAGE SITE

La Boule is the large silvery sphere that was built in the late 1950s to house the world's first million-volt electron microscope. In 2017, the French Ministry of Culture and Communication awarded la Boule the label "Patrimoine du XXe Siècle" or 20th Century Heritage site (Fig. 1).

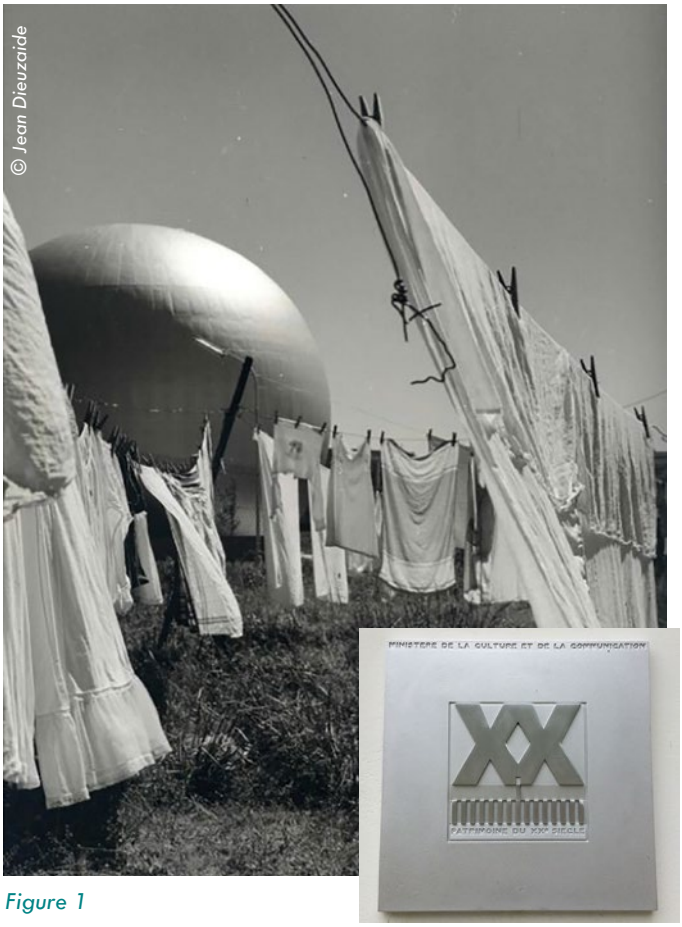


Figure 1

How did this first high-voltage microscope come to be built in Toulouse and why was it enclosed in such a dramatic envelope? To answer these questions, we need to return to 1900, when Gaston Dupouy, later Professor of Physics in the University of Toulouse and Director-General of the CNRS for seven years, was born in the little town of Marmande, 180 km from Toulouse. His father died young and Dupouy was brought up by his mother, whom he adored and to whom he bore tribute on all the great public occasions of his life, notably the presentation of the sword when he was elected member of the Academy of Sciences. After passing the baccalauréat, Dupouy was fortunate to obtain a post as *'surveillant d'internat'* [supervisor of the boarders] in a prestigious Paris Lycée, which left him time to work for the Licence (first degree) at the Sorbonne. After graduation, he was invited to join Aimé Cotton at the laboratory at Bellevue–Meudon (not far from Paris) that housed his 100-ton electromagnet, where Dupouy gained a thorough knowledge of magnet design. In 1930, he was appointed Assistant-Director of the laboratory and during the 1930s, he followed the early publications on the newly developed electron microscope, quickly realising that an electron lens is just an electromagnet with a hole in the middle. In 1937 (after two years as university lecturer in Rennes), he was nominated Professor of Physics in Toulouse, and set about modernizing the department and launching new research projects. Among these was the design and construction of an electron microscope with magnetic lenses and, despite the wartime conditions, such an instrument was constructed and yielded its first images in 1943 (Fig. 2). A few publication recorded these results and the whole project was described at length in a lecture delivered in 1945 as one of a series organized by Louis de Broglie and published as a book soon after [1]. In 1950, Dupouy was made Director-General of the CNRS, with the mission to transform it into a major French research organization. He threw himself into this enthusiastically and laid the foundations of the CNRS as it is today. But in 1957, he knocked on the door of the Minister responsible for research: *"Good morning, Dupouy, what can I do for you?" " I have come to say good-bye, Monsieur le Ministre. I agreed to direct the CNRS for 7 years, which have now elapsed". "But that's impossible, Dupouy, everything is going so well, you cannot leave us now!"* But Dupouy was adamant and returned to Toulouse, where a new Laboratory of Electron Optics had been established on a new site, which at that date was relatively isolated on the eastern outskirts of the city. The decision to embark on the construction of an electron microscope operating at a million volts was taken, not without considerable opposition from many scientists. In Dupouy's words, "C'était à l'époque une entreprise audacieuse et les prognostics émis de divers côtés étaient empreints

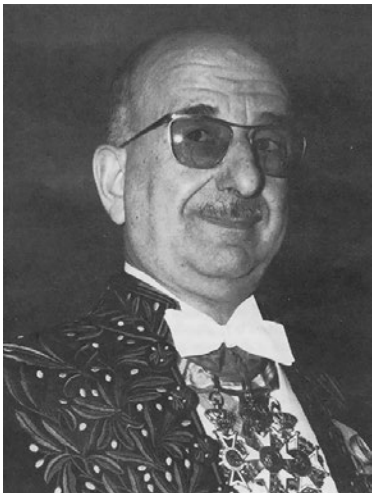


Figure 2

d'un total pessimisme [A list of 'insuperable' obstacles follows]. Il va sans dire que j'avais beaucoup réfléchi, de mon côté, à toutes ces questions avant de me lancer dans l'aventure. On la disait vouée à l'échec: elle fut couronné de succès" *[At the time, it was a bold project and the the opinions aired on every side were uniformly pessimistic....I had of course given considerable thought to all these questions before embarking on this adventure. Everyone was convinced that it would fail: it was a resounding success.]*. The decision to aim for a million volts or more was the result of Dupouy's hope that living specimens could be seen at the resolutions obtainable with electrons, far better than the limit of the light microscope. For this, it would be necessary to enclose the specimen in a chamber containing air and water vapour. The electron beam would therefore have to be sufficiently energetic to traverse the windows of the chamber as well as the atmosphere and the specimen inside it. The first publication recording images obtained with the microscope [2] did indeed claim that these represented bacteria in the living state but this proved over-optimistic, the x-ray dose to which the specimen was exposed was too high for anything to survive. But this was no obstacle to the success of the microscope. It was reliable, stable and quickly found users from the world of metallurgy [3] and also among life scientists, who could study specimens much thicker than at the 60–100 kV of the commercial instruments of the time.

But why was the microscope enclosed in a huge sphere and not in a more conventionally shaped building? The microscope consisted of two parts: upstairs was the high-voltage generator (Fig. 3), of the symmetric Cockcroft–Walton type in air (not enclosed in SF6 gas); below this was the microscope column itself (Fig. 4). To prevent the risk of electrical breakdown, it is certainly necessary to avoid any sharp points near the generator, but a square room with suitably curved corners would have been quite sufficient. Sufficient but not photogenic. The Boule, on the contrary, was a dramatic symbol of this new instrument and caught the imagination of journalists and the general public alike. Postcards illustrating La Boule could be bought in tourist shops, next to those illustrating the cathedrals and other historic sites of Toulouse.

Dupouy's life is not well known, so let me include a few lines about his later career. In 1950, he was elected a member of the Academy of Sciences and two years later, at a magnificent ceremony in Toulouse, Paul Dottin, Rector of the University, presented him with his academician's sword. The hilt is decorated with symbols recalling various aspects of Dupouy's career: a female nude, representing scientific thought (according to Monsieur Dottin at least); a romanesque capital, a reminder of the architecture of Toulouse; pine cones to recall the Landes of Dupouy's childhood; an agate since the subject of Dupouy's doctoral thesis had been the magnetic properties of certain crystals; helices, like the trajectories of electrons in a magnetic lens; and diatoms, which were among the first specimens studied in the wartime microscope.

In 1957, Dupouy was raised to the rank of Commander in the Order of the Légion d'Honneur and a year later, was awarded the CNRS gold medal (which he had himself instituted a few years earlier). Among very many recognitions by universities and learned societies, let me just mention that he was the eleventh recipent of the Distinguished Scientist award (Biological Sciences) of EMSA in 1985, the year that Ernst Ruska was the Distinguished Scientist (Physical Sciences). Dupouy's interests were by no means confined to electron

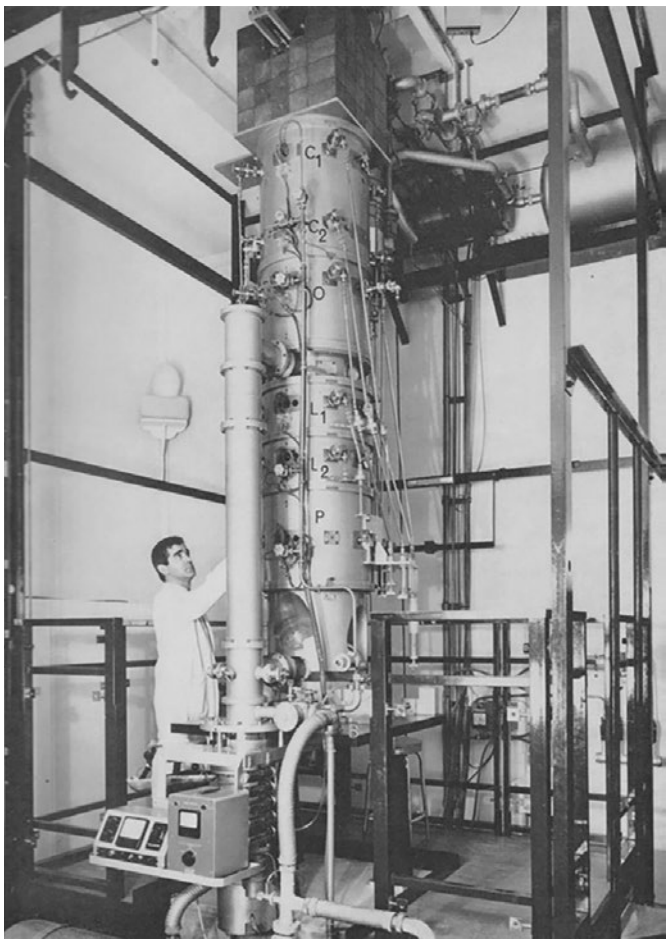


Figure 3

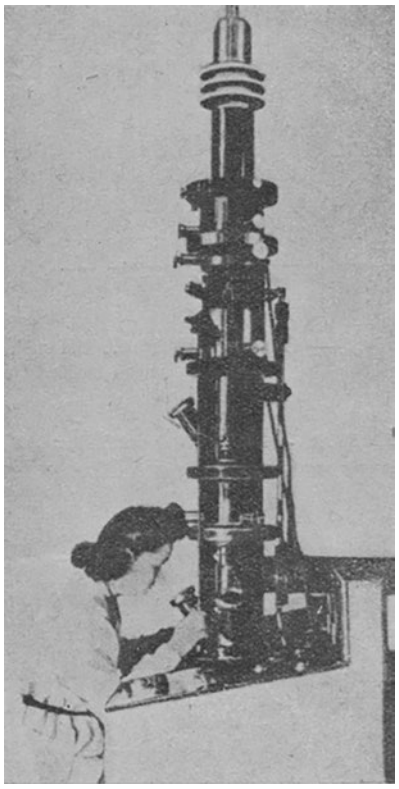


Figure 4

microscopes. He was very pleased to be named Mainteneur of the Académie des Jeux Floraux, a very ancient club, founded in the 14th century, whose members meet regularly in Toulouse to read and share poetry and to award the *'Flowers of Clémence Isaure'* (who may never have existed) to deserving poets. I am not aware that Dupouy composed any poems but he tells us how much poetry meant to him: "Au cours de nos réunions... c'est avec un plaisir toujours renouvelé que je me laisse entraîner, par d'autres avenues du Savoir, jusqu'en domaines où la Poésie transcende la Science: ceux de la beauté, de l'amour, du merveilleux, de l'idéal".

In 1970, the seventh International Congress on Electron Microscopy was held in Grenoble, with Dupouy overseeing every aspect of the organization. Shortly before the date of the congress, Dupouy suffered a minor heart attack and was forbidden by his doctors to deliver the opening speech as he planned to do. The former Director-General paid no attention to them and gave his speech as planned. In the wings were his cardiologist and the emergency services with an ambulance parked nearby – fortunately they were not needed.

La Boule still houses the Cockcroft–Walton generator but in 1988, the direction of the laboratory was entrusted to a chemist, with no background in electron microscopy. Unaware of the historic importance of the microscope, he had the column dismounted and disposed of the parts for scrap. Today, the laboratory, renamed the CEMES, is again one of the major centres of electron microscopy, an important node in the network of European laboratories in this domain. ■

Peter Hawkes

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REPORT ON THE INAUGURATION OF THE CC/CS-CORRECTED SALVE MICROSCOPE ON DECEMBER 11TH, 2017 AND ON THE 3RD SALVE SYMPOSIUM FROM DECEMBER 12-14, 2017

On December 11th, 2017, the University of Ulm was very pleased to welcome honored guests and friends from 17 countries to celebrate the successful finishing of the SALVE (Sub-Angstrøm Low-Voltage Electron Microscopy) project and the inauguration of the Cc/Cs-corrected SALVE microscope in its new purpose designed building.

As host Prof. Michael Weber, president of Ulm University, opened the event followed by greetings expressed by Ulrich Steinbach (Ministerial Director, Baden-Wuerttemberg Ministry of Science, Research and Art), Dr. Burkard Jahnen (Program Director, German Research Foundation - DFG), Prof. Michael Lehmann (President of the German Society of Electron Microscopy), Prof. Josef Zweck (President of the European Society of Microscopy) and Prof. Barry Carter (Vice President of the International Federation of Societies of Microscopy).

The core of the ceremony was the speech of Prof. Ute Kaiser presenting the outline and the changeful history of the SALVE project as well as important results obtained already with the new spherical and chromatic aberration-corrected technology, showing unprecedented resolution in the voltages range from 80kV-20kV. Prof. Max. Haider (CEOS, Heidelberg) reported technological advances in electron optics triggered by the project.

The invited lecture of Prof. Klaus Müllen (Max Planck Director, Mainz) lightened the diversity of graphene chemistry, Prof. Klaus von Klitzing (Nobel Laureate, MPI Stuttgart) presented the inherent presence of electron microscopy in most ambitious and prominent research and technological projects of the last century awarded with Nobel prize.

The ceremony was completed by two after-dinner talks performed by Prof. Hannes Lichte (Senior Professor, Technical University Dresden) and Prof. Wolfgang Schleich (Head of Institute for Quantum Physics, Ulm University) giving a greatly enjoyable retrospective on the importance of creativity, serendipity and inspiration in scientific life and on the development of the important Schrödinger equation, we all are using in electron microscopy.

The celebration had a profound festive note supported by musical arrangements of talents of the Kaiser group, the string quartet and the chamber choir of Ulm University, and a performance of the Ulm University ballet as well as live music in the evening.

On December 12-14th, 2017, the 3rd Sub-Angstrom Low-Voltage Electron Microscopy (SALVE) Symposium, organized by Ute Kaiser followed the inauguration. This symposium brought together distinguished scientists from all over the world (17 countries) to discuss low-voltage instrumentation and its applications. A particular focus was given to the manufacturing of low-dimensional materials and the assessment of their properties by theoretical calculations. Various TEM techniques were discussed - (S)TEM imaging, in-situ TEM, electron holography, cryo-TEM and spectroscopy. Finally, challenges and prospects of low-voltage imaging of biologically relevant objects were also addressed. The symposium finished with a lively round table discussion on application-related request for low-voltage electron microscopy.

The inauguration and the symposium were sponsored by the DFG, ThermoFisher, CEOS, Gatan, JEOL, UUlm, and the DGE. ■

The abstract book is available under: *http://www.uni-ulm.de/einrichtungen/hrem/events/article/salve-inauguration-3rd-salve-symposium/.* Further information: *www.salve-project.de. http://www.uni-ulm.de/einrichtungen/hrem/*

INAUGURATION OF THE NEW TITAN THEMIS 60-300 KV - CENTRE COMMUN DE MICROSCOPIE ÉLECTRONIQUE, UNIVERSITY LILLE 1, FRANCE

The Institut Michel-Eugène Chevreul[1] (CNRS FR2638) – UMET[2] (Unité Matériaux Et Transformations, CNRS UMR8207) hosts at the University Lille 1 an electron microscopy facility, the Centre Commun de Microscopie Électronique[3] (CCM). The CCM is a key regional and national electron microscopy facility serving tens of scientists from research institutions and industry. In the 28 years since its foundation, it has played a major role in raising the level of excellence of the regional materials science community.

On the 9th of November 2017, the CCM has officially inaugurated its new TITAN Themis 60-300 kV (Thermo-Fisher Scientific), which is fully operational since September 2016. The Titan Themis, the latest generation of Thermo-Fisher aberration correction microscopes for materials science, is a highly versatile instrument capable of state-of-art STEM imaging, diffraction and spectroscopy at atomic resolution.

The current configuration includes:

- High brightness X-FEG electron gun with monochromator. Energy resolution: < 0.18 eV@300 kV (with at least 100 pA)
- DCOR Probe Cs corrector. Spatial resolution: 70 pm@300 KV
- High resolution Quantum ERS 966/U GIF with duals-EELS and high-speed spectrum imaging options
- SuperX (in-lens) EDX detector, a four quadrants, windowless Silicon Drift Detector
- Precession module
- 4k x 4k CETA camera with high dynamic and wid-field of view
- HAADF, BF, and two dark-field DF detectors one of which is segmented for STEM imaging of light and heavier elements at atomic resolution in the same image using Differential Phase Contrast (DPC).

Four holders are available:

- Single tilt
- Double tilt for chemical analysis. Tilt range: +/_ 70 °
- 3-axes HATA tomography holder for tomography of dislocations (oriented tomography)
- Gatan Cryo-transfert (N2) tomography holder

The microscope is thus specifically designed for:

- STEM-EELS mapping with atomic resolution and high energy resolution
- STEM-EDX mapping with high efficiency and up to atomic resolution
- Atomic resolution HAADF and Annular Bright Field (ABF) imaging with atomic resolution
- TEM and STEM images and analytical tomography
- Local structure analysis using precession electron diffraction tomography. Diffraction mapping combined with EDX
- Simultaneous HAADF, EDX and EELS acquisition

Offical inauguration of the CCM's TITAN Themis in presence of representatives of the financial funders (the Conseil Régional Hauts-de-France, the European Regional Development Fund (ERDF), the National Center for Scientific Research (CNRS) and the University of Lille).

Odile Stephan


Paul Midgley

The wide beam energy range (60-300keV) and the cryo-holder provide high flexibility in tailoring the experiment to e.g. reduce beam damage in sensitive materials and optimize spatial and/or energy resolution. Hence, this microscope is suitable for the analysis of a wide range of materials, from soft matter and carbonaceous materials to metals, oxides and minerals.

At the occasion of this inauguration day, a scientific afternoon dedicated to transmission electron microscopy has been held. **Odile Stephan**, LPS Orsay, presented last developments in electron and optical spectroscopy at the nanometre scale. **Paul Midgley,** University of Cambridge, gave a talk on Multi-Dimensional Electron Microscopy. Recent TEM results obtained in various research field developed at the University of Lille have been then exposed. ■

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INAUGURATION AT THE UNIVERSITY OF COPENHAGEN

From the left: the Titan Krios microscope, Professor Guillermo Montoya (Novo Nordisk Foundation Center for Protein Research), Birgitte Nauntofte (CEO Novo Nordisk Foundation) and Ulla Wewer (Dean of the Faculty of Health and Medical Sciences).

The new Titan Krios G3 transmission electron microscope that is anchored at Novo Nordisk Foundation Center for Protein Research (cpr.ku.dk) at University of Copenhagen was inaugurated on 20 November 2017. The microscope is placed at the Core Facility for Integrated Microscopy at the Faculty of Health and Medical Sciences and is part of the Danish Cryo-EM national facility. Access is granted after selection of projects submitted via the Cryo-EM national facility portal (krios-denmark.ku.dk/).

The Novo Nordisk Foundation contributed with DKK 60 million to the installation of the Titan Krios. In her speech at the inauguration the CEO of the foundation, Birgitte Nauntofte, stressed the research potential.

'This facility really has the potential to take research in proteins, among other things, to a completely new level. It was important for us to ensure that the microscope would be accessible to anyone from the research environment with an interesting and ambitious idea. Both at the universities and the industry, in Denmark and abroad', she said. ■

Link to press release from Faculty of Health and Medical Sciences, University of Copenhagen:

http://www.cpr.ku.dk/cpr-news/2017/ground-breaking-microscope-ready-for-use_kopi/

XENON PLASMA FIB FACILITY OPENED AT THE UNIVERSITY OF GLASGOW

The Kelvin Nanocharacterisation Centre gained an additional capability this year. A FEI (now Thermo Fisher) Xenon Plasma FIB facility was installed in the spring and was officially inaugurated on 15th June 2017 by Tony Chapman from EPSRC and Profs. Chris Pearce and Muffy Calder from the University of Glasgow. A plenary talk was presented by Prof. Grace Burke of the University of Manchester. Tours of the facility were provided to the assembled guests and a scientific seminar on topics related to focused ion beam microscopy was held in the afternoon.

The facility is now available for scientific collaborations, especially in the following areas:

- High quality preparation of specimens for TEM, STEM and 3D-APT via liftout techniques, without gallium damage or implantation.
- 3D reconstruction via serial sectioning, including the use of EDX and EBSD signals with the Bruker detectors and QUBE software.
- Nanopatterning of magnetic structures using electron beam deposition of Co and Fe.

We invite proposals for access. For more information and to access the facility, please access:

https://www.gla.ac.uk/schools/physics/research/groups/mcmp/knc/facilities/

Or contact phas-knc@glasgow.ac.uk ■

ROYAL MICROSCOPICAL SOCIETY

mmc2017, a new Chief Executive and our first event in America were just some of the highlights for the RMS this year.

As we approach the end of 2017, we are proud to have over 1,700 members from all around the world, including 300 students. This year we announced seven new Honorary Fellows of the RMS, the highest accolade that we can bestow to eminent microscopists. We have welcomed; Prof. Lawrence Michael Brown, Prof. Stefan Hell, Prof. Wolfgang Baumeister, Prof. John Spence, Dr. Frances Ross, Dr. Bridget Carragher and Prof. Brian J Ford.

Four of these Honorary Fellowships were awarded at the flagship event of the RMS - mmc2017, which took place in Manchester, UK in July and attracted over 1,300 delegates and over 120 manufacturers and suppliers. The busy scientific programme included many lectures and free workshops covering all aspects of microscopy and the huge exhibition offered a great place to meet with company representatives and learn about the new equipment on the market.

This spring, we were honoured to be selected as the PCO for the next European Microscopy Congress. We will be working alongside the EMS and SCANDEM to create an unforgettable emc2020 which will take place in Copenhagen from 23 - 28 August 2020. The website is now live at *www.emc2020.eu* where you can register your interest as either an attendee or an exhibitor.

In June of this year, the RMS travelled to Austin, Texas for the first ever ToScA USA Meeting, taking our well-established tomography symposium across the pond! As in the UK, this event brought industrial and academic delegates together to discuss this rapidly emerging technique and the huge variety of applications it lends itself to.

We were very pleased to see CryoEM given the recognition it deserves with Professor Dubochet and Drs Henderson & Frank awarded the Nobel Prize for Chemistry in October. We celebrated this exciting news with a free special issue of the Journal of Microscopy containing papers published in our journal by the Nobel Laureates, including some of the papers cited by the Nobel committee.

Our Facilities Database, in collaboration with BioImagingUK, now lists information for virtually all the imaging facilities in the United Kingdom. Over 80 facilities are listed alongside details of the equipment housed within them and the services they provide. In 2018 we will be extending the database further to include flow cytometry facilities.

Finally, 2017 saw Allison Winton appointed as the new Chief Executive of the RMS and Dr Vikas Trivedi, University of Cambridge as the new Deputy Editor of infocus magazine. Allison will continue to steer the RMS towards its vision of being the 'go to' place for anyone wanting to know anything about microscopy, imaging and cytometry and Dr Trivedi joins infocus just ahead of the publication of its 50th issue in summer 2018.

Continuing to look ahead to next year, we will be getting off to a busy start with our facility meetings for light and electron microscopy and flow cytometry all taking place in January.

The summer will host our more focussed meetings; SPM 2018, Frontiers in BioImaging and flowcytometryUK where we will be presenting our biennial Medal for Flow Cytometry for which nominations are currently open.

We will also be running our annual calendar of hands-on training courses, covering CryoEM, grain size determination, electron, light and confocal microscopy and flow cytometry.

We look forward to serving the microscopy community again throughout 2018 and to meeting many of you at events throughout the year. ■

Find out more about our activities at:
www.rms.org.uk

RMS
Royal Microscopical Society

emc2020
COPENHAGEN

2ND SINO-GERMAN SYMPOSIUM ON ADVANCED ELECTRON MICROSCOPY AND SPECTROSCOPY IN MATERIALS SCIENCE, OCTOBER 12 – 16, 2017, XI'AN, CHINA

The second Sino-German Symposium on Advanced Electron Microscopy and Spectroscopy in Materials Science was held in Xi'an Jiaotong University in Xi'an, China. The 4-day symposium was organised by Professor Rafal Dunin-Borkowski from the Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons in Forschungszentrum Jülich, Professor Wolfgang Jäger from the Christian-Albrechts-Universität zu Kiel and Professors Chunlin Jia and Zhiwei Shan from the School of Materials Science and Engineering in Xi'an Jiaotong University.

The event attracted more than 90 participants from more than 25 research institutes and universities, including more than 50 students and young scholars. During 12 scientific sessions that comprised more than 40 presentations given by invited experts from China, Germany, Denmark, Australia and the United States, the participants discussed current developments and challenges in advanced and in situ electron microscopy and spectroscopy, including aberration-corrected electron microscopy, in situ characterisation methods, correlative methods, and their applications to current and future materials science problems and to the processing of materials for the future development of materials and devices.

A wide spectrum of methodological and materials research topics was covered, including (1) novel instrumentation and imaging and spectroscopic methods in aberration-corrected high-resolution and scanning transmission electron microscopy (TEM) and related novel developments, such as electron ptychography and electron wavefront engineering, (2) advances in high-resolution and scanning TEM and in simulations of atomically-resolved elemental maps, (3) advances in electron spectroscopy and spectrum imaging for probing plasmonic properties of nanomaterials, the electronic structure of interfaces, and magnetic circular dichroism, (4) imaging of fields using differential phase contrast imaging and quantitative off-axis holography for the characterization of the electrical and magnetic properties of materials and devices, (5) in situ and environmental transmission electron microscopy, involving nanometre-scale investigations of materials, reactions and processes at different temperatures in gases and liquids, and the development of novel methods and instrumentation for the in situ manipulation and measurement of nanomaterials, (6) novel developments in oxides and ferroics, (7) applications of electron microscopy and spectroscopy and correlative scanning TEM-atom probe tomography to advanced materials research on structural and functional materials, including two-dimensional materials, soft materials, materials for applications in bioscience, materials for hydrogen storage, materials for solar cells, catalytic materials, nanostructured and nanoporous functional materials, devices, metallic alloys, composite materials, and structural materials for industrial engineering.

The symposium presented insights into many current research areas related to materials for energy technology, nanotechnology, future nanoelectronics, transport, product development, and the environment. The novel developments in instrumentation and materials that were presented documented the impressive progress

2ND SINO-GERMAN SYMPOSIUM ON ADVANCED ELECTRON MICROSCOPY AND SPECTROSCOPY IN MATERIALS SCIENCE, OCTOBER 12 – 16, 2017, XI'AN, CHINA

that has been made possible by applying aberration-corrected electron microscopy to the characterisation and understanding of novel materials and devices and their properties. It was shown that correlative approaches that involve the application of different characterisation techniques to the same problem and the use of in situ and environmental transmission electron microscopy can be used to provide an improved understanding of the fundamental properties of structures and mechanisms and of reactions in materials and on surfaces on the atomic and molecular scale.

This outstanding and well attended symposium reflected the large interest in these research areas and provided valuable opportunities to establish collaborations through academic student exchange and scholarship programmes, collaborative projects, international workshops and teaching, which will accelerate research collaborations between Germany and China in the fields of electron microscopy and materials science. It also provided a forum for discussions between sponsoring companies and the conference participants. The next workshop in the series is planned to be held in Beijing in 2018.

The detailed programme of the symposium is available here *http://www.er-c.org/news/images/fsgsaemsms-2.pdf*

The organisers are grateful for generous financial support from Xi'an Jiaotong University, Forschungszentrum Jülich, Thermo Fisher Scientific, Hitachi High Technologies, DENSSolutions, Nanomegas, CEOS, Leica and LOT Quantum Design. ■

Chunlin Jia, Zhiwei Shan,
Rafal Dunin-Borkowski, Wolfgang Jäger

OUTSTANDING PAPER AWARDS FOR 2017

2016 EMS OUTSTANDING PAPER AWARD

The EMS Outstanding Paper Awards for 2016 were chosen from a strong field of entries and were awarded by Professor Peter Nellist (the Chair of the Jury) in Rovinj, Croatia, at MCM2017. The winners received a glass plaque plus a prize of €1,000.

The following papers received the 2016 EMS Outstanding Paper Award in the respective categories:

Winners 2016 EMS Outstanding Paper Award:

1. Instrumentation and Technique Development:

"*Nanoscale thermal imaging of dissipation in quantum systems*", D. Halbertal, J. Cuppens, M. Ben Shalom, L. Embon, N. Shadmi, Y. Anahory, H. R. Naren, J. Sarkar, A. Uri, Y. Ronen, Y. Myasoedov, L. S. Levitov, E. Joselevich, A. K. Geim & E. Zeldov; Nature 539 (2016) 407-410. DOI:10.1038/nature19843

2. Materials Sciences:

"*Interface dynamics and crystal phase switching in GaAs nanowires*", D. Jacobsson, F. Panciera, J. Tersoff, M.C. Reuter, S. Lehmann, S. Hofmann, K.A. Dick, F.M. Ross; Nature 531 (2016) 317-322. DOI:10.1038/nature17148

3. Life Sciences:

"*Visualizing the molecular sociology at the HeLa cell nuclear periphery*", J. Mahamid, S. Pfeffer, M. Schaffer, E. Villa, R. Danev, L. Kuhn Cuellar, F. Förster, A. A. Hyman, J.M. Plitzko & W. Baumeister; Science 351 (2016) 969-972. DOI:10.1126/science.aad8857

EMS extends its warmest congratulations to all winners.

OutPA 2017 – 2019 Jury Members (judging on papers in 2016 - 2017 - 2018)

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

EMS SCHOLARSHIPS

SCHOLARSHIP LIST

Microscopy Conference 2017 (MC2017), August 21-25, 2017, Lausanne, Switzerland

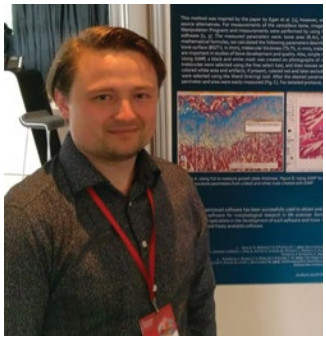
Name	Society	Lab & Country
Bijelic Nikola	CMS	Department for Histology and Embryology, Faculty of Medicine Osijek, Croatia
Burini Debora	SISM	Dipartimento di Scienze Biomolecolari, Urbino University, Italy
Čadež Vida	CMS	Laboratory for biocolloids and surface chemistry, Ruđer Bošković Institute, Croatia
Cora Ildikó	HSM	Institute for Technical Physics and Materials Science, Centre for Energy Research, Hungarian Academy of Sciences, Hungary
Costanzo Manuela	SISM	Department of Neurosciences, Biomedicine and Movement Sciences, University of Verona , Italy
Eckhard Margret	ASEM	University of Vienna , Austria
Götsch Thomas	ASEM	Institute of Physical Chemistry, University of Innsbruck, Austria
Hrabar Jerko	CMS	Laboratory of Aquaculture, Institute of Oceanography and Fisheries, Croatia
Kozina Franjo	CMS	Faculty of Metallurgy, Croatia
Kozina Viviana	CMS	Department of Histology and Embriology, University of Zagreb, Croatia
Lammer Judith	ASEM	Institute of electron microscopy and nanaoanalysis (FELMI-ZFE), Austria
Lovric Ivana	CMS	Department for Histology and Embryology, Faculty of Medicine Osijek, Croatia
Meljanac Daniel	CMS	Division of Materials Physics, Ruđer Bošković Institute, Croatia
Mandić Vilko	CMS	University of Valenciennes and Hainaut-Cambresis (UVHC), Ruđer Bošković Institute (IRB), University of Zagreb (UNIZG), Croatia
Mario Matošević	CMS	Faculty of Mining, Geology and Petroleum Engineering, University of Zagreb, Croatia
Manfred Nachtnebel	ASEM	TU-Graz, Institute of electron microscopy and nanaoanalysis (FELMI-ZFE), Austria
Ivana Panžić	CMS	Division of Materials Physics, Ruđer Bošković Institute, Croatia
Martina Radić	CMS	Ruđer Bošković Institute, Croatia
Vuk Radmilovic	SSM	Innovation Center, Faculty of Technology and Metallurgy, University of Belgrade, Serbia

Edi Rodak	CMS	Department for Histology and Embryology, Faculty of Medicine Osijek, Croatia
Nadežda Stanković	SSM	Department of Materials Science, Vinča Institute of Nuclear Sciences, Serbia
Fogarassy Zsolt	HSM	Research Institute for Technical Physics and Materials Science, Hungarian Academy of Sciences, Hungary

13th Multinational Congress on Microscopy 2017 (MCM2017), September 24-29, 2017, Rovinj, Croatia

Name	Society	Lab & Country
Agrawal Piyush	SSOM	EMPA, Electron Microscopy Center, Switzerland
Bologna Nicolas	SSOM	EMPA, Electron Microscopy Center, Switzerland
De Wael Annelies	BSM	EMAT, University of Antwerp, Belgium
Fatermans Jarmo	BSM	EMAT, University of Antwerp, Belgium
Görens Immanuel	DGE	Department of Biology I - Botany, Ludwig-Maximilians Universität in Munich, GermanyNicolas Bologna
Harreiß Christina	SEMS	CENEM, Universität Erlangen-Nürnberg, Germany
Kozak Roksolana	SSOM	Department of Electrical Engineering, ETH Zurich, Switzerland
Koroglu Pınar	TEMD	University of ıstanbul, Turkey
Lalić Ivana	SSM	Faculty of Medicine, University of Belgrade, Serbia
Müller Andreas	DGE	Paul Langerhans Institute Dresden of the Helmholtz Zentrum München at TU Dresden, Germany
Przybilla Thomas	EMS	CENEM, Universität Erlangen-Nürnberg, Germany
Samaeeaghmiyoni Vahid	BSM	EMAT, University of Antwerp, Belgium
Stančić Ana	SSM	Faculty of Medicine, University of Belgrade, Serbia
Wallisch Wolfgang	ASEM	TUW, University Service Centre for Transmission Electron Microscopy (USTEM), Austria

Nikola Bijelić (Croatia)



I am very glad that EMS continues its tradition in supporting young scientists via scholarships for international microscopy conferences. MCM2017 in Rovinj was a true international conference with diverse sections and experts from many different fields of microscopy. It was a very stimulating environment for research advancement and networking. Talk topics were inviting and poster sections were diverse and colorful. While presenting my poster entitled "*A method for measuring volume and surface-related parameters on microphotographs by using free and open-source image processing software*" I was approached by many colleagues from very diverse backgrounds with whom I had a chance of discussing different approaches to image analysis and overcoming the obstacles we are facing in our work. As a life scientist working in the field of histology and embryology, I have always enjoyed microscopy conferences such as MCM2017. Such interdisciplinary environment is a great platform for creating new ideas and concepts in scientific research.

My colleagues and I enjoyed the conference venue and the beautiful Istrian town of Rovinj. The conference was very well organized and the topics covered many interesting and contemporary topics in modern microscopy. It was a great pleasure to be a part of this conference and I thank EMS for helping me to attend.

Nicolas Bologna (Switzerland)

Events such as the Microscopy Conference 2017 held in Lausanne are fundamental building blocks for the career of a young scientist. In fact, the possibility to share our own work during these events and network with science experts from all over the world is of inestimable value. It is common knowledge that most of the greatest innovations in the history of science and technology are indeed coming from deep discussions among different researchers where everyone is giving an important effort based on an always different background. And this was the case of the MC2017.

For this reason, I would like to thank all the people who perfectly organized this incredible event in the state-of-the-art congress building of the SwissTech Convention Center. The environment in which EPFL is continuously growing is extremely inspiring. Of course, I would like to thank the European Microscopy Society, not only for supporting my participation at the MC2017 but also for actively working to improve year-by-year the microscopy world.

Debora Burini (Italy)

My name is **Debora Burini**, I'm a first year PhD student in Life Sciences, Health and Biotechnology, at Urbino University (Italy). It was a really pleasure to participate at my first MCM. It was very interesting and rich of excellent speakers and works. I presented a poster titled "*The role of exercise in tenocyte activation at myotendinous junction level*". The subject of this study is the myotendinous junction (MTJ), which is the anatomical interface between muscle and tendon. Our findings confirm the plasticity of MTJ in relation to mechanical loading; in particular, an increased contact-surface between muscle and tendon could be explained as an adaptation to the increased tension induced by exercise. In addition, our data concerning the physiological effect exercise on the MTJ appear to support its role in rehabilitation following muscle injury.

As regards the sessions, I participated in those of life sciences. There were many interesting presentations, and I appreciated one in particular: "*Effect of intracytoplasmic morphologically selected sperm injection (IMSI) imaging system on intracytoplasmic sperm injection outcomes*" (Seda Karabulut, Medipol University, Turkey). In brief, with a high-resolution technique, they identified healthy spermatozoa of infertile men and implant them in ovules, and many pregnancies have ended with a birth. Therefore, these techniques could be a great achievement to remedy male infertility.

Finally, I would like to thank the organizing committee and EMS who gave me the opportunity to present my data at the MCM 2017 in the beautiful town Rovinj.

Vida Čadež (Croatia)

I am honored that EMS has supported my participation at MCM2017, the 13th Multinational Congress on Microscopy in Rovinj, Croatia. There was more than 430 participants and a rich program with 21 sections, held in a great venue, five-star hotel Lone in Rovinj. Such congress enables people from diverse countries to reconnect and to exchange ideas, which were rich and plentiful. Because of this diversity, I have gained interesting ideas about my future research. The most beneficial for me was the section biomaterials where I have also presented my new research regarding the possibilities to mimic the biomineral scaffold in order to produce biomaterials. This talk was well received and enabled me to further improve mine connections, and chances for a new postdoc position at multiple foreigner institutions. It is my honor that I had the opportunity to give an oral talk in such multinational environment and I thank EMS for financial support and for enabling this event and I strongly recommend to PhD and postdoc students to apply for similar scholarships because events of this kind are truly beneficial for the advancement of researcher careers.

Cora Ildiko (Hungary)

I would like to thank you for the scholarship provided by the European Microscopy Society (EMS) which made it possible that I could attend at the MCM2017 Conference and for the Conference Organizers for this nice Meeting. I was listening to a lot of good presentations which were near to the area of my research topic, and nice presentations from the cutting edge of the present microscopy and from possible developments in future. Harald Rose's lecture was very interesting for a young scientist.

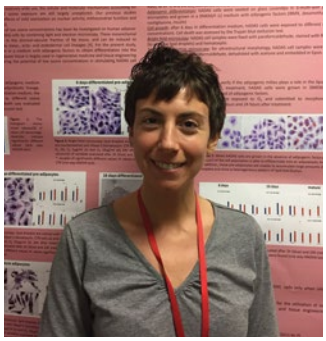
I took 3 posters and I had the opportunity to meet people with similar research topics, in addition to my own work as well as promoting new scientific relationships from all over the word. During the lectures and the poster sessions I got plenty of new ideas in my different research topics.

My poster topics was: TEM study of the as-deposited and annealed Ga2O3 films grown by vapor phase epitaxy.

In this work a new polymorph of Ga-oxides were grown that was we studied by TEM. Previous XRD studeies stated that the grown thin film is single crystalline and has the hexagonal structure, the so-called ε-phase. However it turned out that this phase has a real structure: it consists of 2-5 nm large (110)-twinned domains, and the 6 twin members together give a pseudo-hexagonal ε-phase structure, if the coherent length of the used radiation is below the domain size. We described the crystal structure of the orhtorhombic domains (in Pna21 sg.) as a new polymorph among Ga-oxides and call it as κ-phase based on analogousity with κ-alumina. We studied further the phase transition of the κ-phase to the stable monoclinic β-phase and revealed the main crystallographic relationships between them during transformation.

In addition Rovinj was a beautiful place for organizing a conference and that was a great experience to swim in the Adriatic Sea.

Manuela Costanzo (Italy)



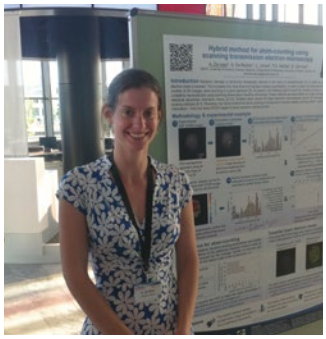
First, I would like to thank the European Microscopy Society (EMS) and the Italian Society for Microscopical Sciences (SISM) for the scholarships, which allowed me to attend at 13th Multinational Congress on Microscopy (MCM2017), in Rovinj.

In my poster, "Adipogenic effect of mild ozonisation on human adipose-derived adult stem cells" I demonstrated, by combining light and transmission electron

microscopy, that low ozone concentrations exert a significant adipogenic effect on primary cultures of human adipose-derived adult stem (hADAS) cells. During the poster session, I had the opportunity to meet PhD students and post-docs, as well as more experienced researchers and professors from different Countries: it was nice and inspiring to discuss with scientists involved in a variety of research subjects and expert in different methods and technologies. I mostly attended the life science sessions, where the lectures and the oral presentations were of high quality and gave me the possibility to improve my knowledge, especially on the applications of novel microscopy techniques: at this subject, the presentation of the most recent technological improvements at the lunch workshops were also very stimulating.

The overall organization of the MCM2017 was excellent and I wish to congratulate the Organizing Committee for the special attention paid to the young researchers. I know this is one of the main characteristics of the Multinational Congresses on Microscopy and I look forward to attending the next one, in 2019.

De Wael Annelies (Belgium)

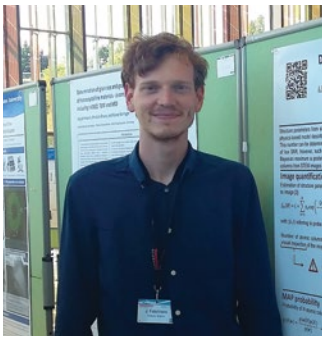


I would like to take this opportunity to thank EMS for their financial support, enabling me to take part in the Microscopy Conference 2017 (MC2017) in Lausanne, Switzerland. I had imagined a microscopy conference to be very interesting, but did not know exactly what to expect yet, as I had only started my PhD in October 2016. I am pleased to report that it was great experience! I met a lot of interesting people and had discussions about a broad variety of topics. Furthermore, I could admire a lot of very accomplished people talking about the hot topics and challenges in today's electron microscopy research.

I presented my research on a novel method for atom-counting I recently developed through a poster entitled "*Hybrid statistics-simulations based method for atom-counting using scanning transmission electron microscopy*". The poster presentation was a very nice experience for me, and two short hours flew by very quickly while I was discussing with interested researchers.

I met a lot of interesting people, and I now have a lot of notes about all sorts of topics I would like to look into in more detail. In short, MC2017 was a great learning opportunity for me and I look forward to the next conference!

Jarmo Fatermans (Belgium)

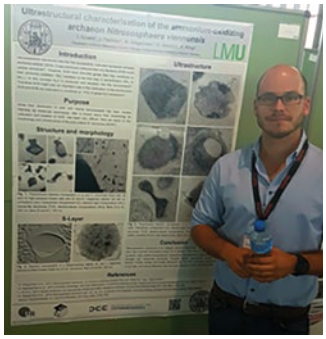


First of all I would like to thank the European Microscopy Society (EMS) for providing me financial support to attend the Microscopy Conference 2017 (MC2017) in Lausanne, Switzerland. The conference has truly been a great experience, because it gave me the opportunity to be surrounded by experts and other young scientists in the field of electron microscopy.

MC2017 allowed me to widen my knowledge about different topics in microscopy by attending a great variety of talks and by visiting a lot of posters. Furthermore, I had the pleasure to present my own results in the form of a poster on "*Detection of atomic columns from noisy STEM images*".

Overall, this conference was a great learning opportunity and it gave me even more motivation and inspiration for my future research. Finally, I would like to thank the organizers for the interesting conference at a wonderful location in the city of Lausanne. I am looking forward to the next conference.

Immanuel Görens (Germany)



Firstly, let me thank the EMS for the generous scholarship to help me with the costs of traveling to Lausanne, Switzerland, for MC2017. As part of the conference, I presented my work on using electron microscopy to reveal the

ultrastructure of the ammonium-oxidizing archaeon Nitrososphaera viennensis. During the poster session, I received many objectives and comments of which my future work will benefit from. Furthermore, I had some very enjoyable debates around my field of research. The conference itself was full with inspiring talks, fascinating posters and commercial exhibitions that made a packed experience. The friendly and relaxed atmosphere gave room to exchange and discuss ideas as well to network and socialise with colleagues and make friends with other research groups. A personal highlight for me was meeting Harald Rose, who, with his inspiring stories and his encouraging words, left an unforgettable impression. To sum it up, the MC2017 exceeded all of my expectations and I am very much looking forward to the next conference.

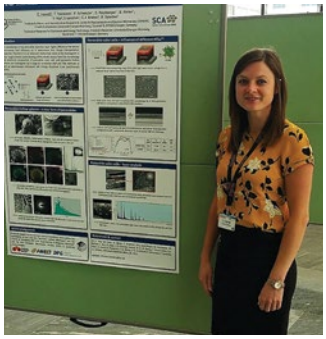
Götsch Thomas (Austria)

I am grateful to the European Microscopy Society for granting me the EMS Scholarship, which allowed me to participate in the 13th Multinational Congress on Microscopy (MCM2017) in Rovinj, Croatia. At this conference, I gave a talk entitled "*Spectroscopic Investigation of the Electronic Structure Phase Diagram of Yttria-Stabilized Zirconia in an Electron Microscope*", which dealt with my work regarding the determination of the electronic structure of one of the most commonly used oxygen ion conductors, YSZ – a material that thus is found in applications such as chemical sensors and solid oxide fuel cells. Giving this talk was very beneficial as I received some helpful and positive feedback, and the presentation also led to fruitful discussions.

The attendance at this conference was useful as these meetings are excellent opportunities to get updates on the general trends in microscopy-related research. As such, the MCM2017 gave me new ideas that will be of use for the rest of my PhD thesis as well as for my Postdocs phase. Also, the new developments presented by the various manufacturers, which primarily focused on scanning electron microscopy, were very interesting to see.

Hence, I'd like to thank the EMS for giving me the opportunity to take part in this conference. Also, I'd like to thank the people responsible for the conference for their excellent job as the conference was well organized. Also, the location was very nice and the different locations were very close together, which facilitated getting to different sessions and lunch workshops quickly.

Christina Harreiß (Germany)



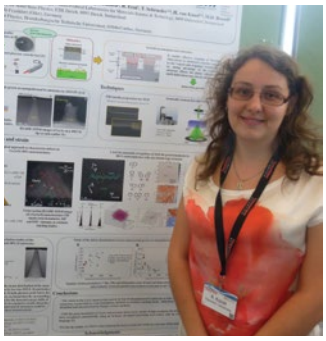
The MC 2017 took place from the 21st to 25th of August this year in Lausanne in a beautiful ambiance close to the Lake Geneva. Since it was my first conference, I was very excited and pleased that I was awarded with an EMS scholarship to attend such a big conference. The congress offered a great opportunity for young researchers like me to learn from highly experienced researchers about their latest work and results but also about the development and the learning process they had to undergo during their own scientific career.

During my PhD studies I work on the morphology analysis of different organic solar cell types like bulk heterojunction solar cells but also on perovskite solar cells which attracted great attention during the last years due to their enormous efficiency increase over such a short period of time. The correlative analysis of perovskite solar cells by SEM and TEM was also the subject of my poster presentation where I had a lot of interesting discussions and got in contact with many experts in the field of electron microscopy as well as with other young scientists working on many different topics. Unfortunately there haven´t been so many talks and nearly no posters that were related to my thesis subject of organic solar cells, but I could learn quite a lot on different instrumentation techniques and whats new in the field of in situ transmission electron microscopy that inspired me for new ideas for my future work.

Beside the scientific talks and posters I found the developments and presentations in the lunchtime lectures of the different exhibitors interesting and enjoyed my first instrument demonstration at one of the booths. All in all it was a very nice experience for me and I learnt

a lot from the high-quality talks, posters and discussions which will help me in my future researches. The conference was organized very well and was strongly marked by very interesting presentations and a very enjoyable conference dinner.

Kozak Roksolana (Switzerland)



Dear all,

It was a great pleasure for me to attend the Microscopy Conference, 21-25 August 2017, in Lausanne, Switzerland. I would like to thank the Organizers for their excellent job in organizing this unforgettable event and to express my sincere gratitude to Electron Microscopy Society for the financial support. It was a great selection of topics and discussions with outstanding leaders in the field were extremely interesting and useful for me.

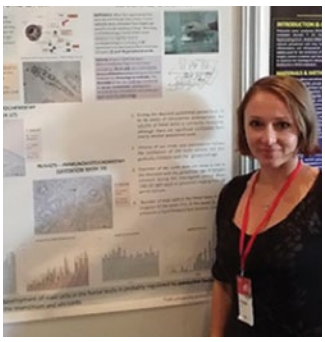
To my mind, a variety of presented plenary talks have given all the participants an exceptional opportunity to expand knowledge in understanding of fundamental aspects of electron microscopy methods, to share experience about new recently developed advanced techniques and to broaden the scope of research. From this perspective, I would like to admit a talk given by Prof. G. Kothleitner from Austrian Centre of Electron Microscopy and Nanoanalysis about complexity of spectroscopic imaging in 2D and 3D.

As a young scientist working on analysis of strain and defect distribution in GaAs nanocrystals epitaxially grown on nanopatterned (001) Si substrates (poster), I was also deeply impressed and really enjoyed the talk presented by Prof. K. Volz from University of Marburg in the first day of the conference.

And, of course, the Ernst Ruska lecture on "*New techniques for optimum quantitative analysis of electron microscopy data*" given by Prof. S. van Aert from University of Antwerp, I believe, has inspired all of us - young researches - for new extraordinary ideas, discoveries and remarkable future achievements.

Kind regards,
Roksolana

Kozina Viviana (Croatia)



Multinational congress on Microscopy was held for the 13th time under the organization of 8 different countries. Conference venue was Hotel Lone, award winning boutique hotel in the beautiful city of Rovinj on the west coast of Istrian peninsula. I actively participated with the poster entitled *"Mast cells in the foetal testis"* that triggered interest discussion about the possible mechanism of treating the infertility in men by acting on the paracrine factors.

Conferences as this one provide an unique opportunity for participants to be up-to-date with the latest achievements in the field of microscopy and the latest research, especially in the field of nanotechnology that offers great opportunities in future cancer and other disease treatments. I would like to compliment brilliant plenary lectures, escpecially the one given by Eva Roblegg about the interaction between nanoparticles and the membranes in the oral cavity.

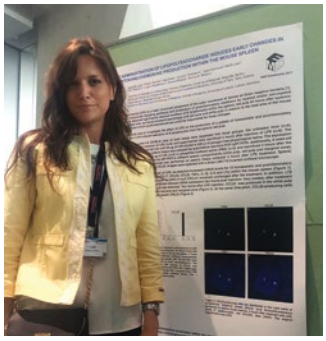
Hand in hand with the lectures were presentations given by the sponsors of the event, top companies like ThermoFisher, Diatome, Leica, Bruker, Jeol and others where they presented new tools on the market that could be use to overcome technological limitations that the scientists are coping with in their daily work.

Having the opportunity to discuss certain topics with over 400 participants is a praiseworthy opportunity, in particular when it's supported by scholarships, enabling younger researchers to participate in the big conferences.

Would like to use this opportunity to congratulate the organizers of the MCM2017 for great work and excellent organization, and to thank European Microscopy Society for financial support.

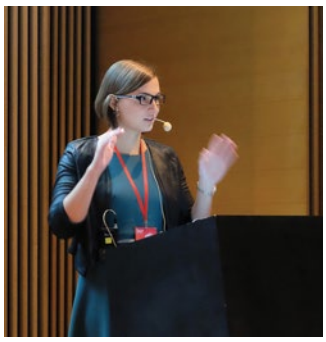
Sincerely yours,
Zagreb, October 3rd 2017.
Viviana Kozina

Lalić Ivana (Serbia)



First of all, I would like to thank the European Microscopy Society for the scholarship, which allowed me to participate at the Microscopy Conference 2017 (MC2017), which was held in Lausanne, Switzerland. During the conference, I had the opportunity to present a poster entitled *"Systemic administration of lipopolysaccharide induces early changes in cytokine/chemokine production within the mouse spleen"*. The conference took place at the beautiful SwissTech Convention Center and it was perfectly organized by three hosting microscopy societies of Austria, Germany and Switzerland. The scientific program included three main topic areas: Materials Science, Instrumentation and Methods and Life Sciences. MC2017 offered numerous interesting lectures and poster presentations, especially in the field of X-ray microscopy, live/in vivo imaging and correlative approaches. This conference gave me the opportunity to meet the colleagues from all over the world and to gain insight into new techniques and approaches. I am very grateful that I was given the chance to participate in this valuable international event and I highly recommend the conference to early stage career researchers.

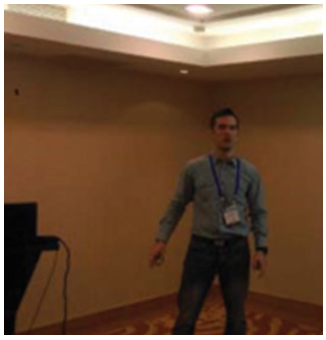
Lammer Judith (Austria)



From 24th to 29th of September 2017, I was allowed to take part at the MCM2017 in Rovinj where I presented part of our work within an oral contribution with the title "*How Sample Holder Geometries Influence the Quantification of X-ray Spectra*". It was a great opportunity to share our findings with other experts in the field of energy-dispersive X-ray spectrometry and to have fruitful discussions with them. Furthermore, I met new people, could strengthen relations to colleagues from other institutions and found out how their research developed. I enjoyed the large amount of interesting talks and posters covering a huge range of microscopy topics. The high variety of techniques gave me lots of new ideas for my future work and the chance to broaden my perspective.

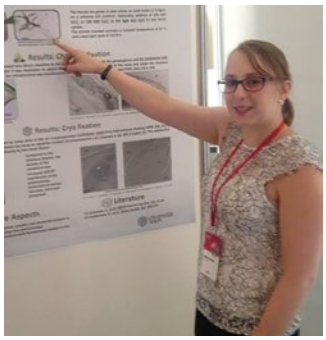
I am very thankful for the scholarship, which the EMS gave to me. This kind of young researcher's support motivates young scientists to participate in conferences, which is important for a future career in research and science.

Mandić Vilko (Croatia)



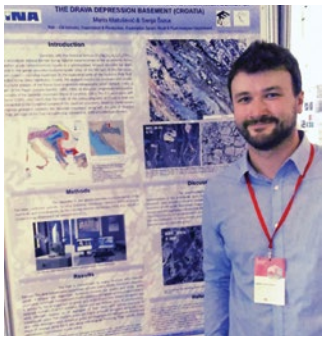
I participated at the 13th Multinational Congress on Microscopy which took place in Rovinj, Croatia from 24-29, September 2017. I held a very nice lecture entitled *"Low thermal treatment optimisation of sol-gel derived composite coating for multi-purpose functionality and protection of all-metals"* in the Materials 3 section: Materials in Geology, Mineralogy and Archaeology, Ceramics and Composites. The Conference turned out to be not only the favourable place to gather information of the recent highlights in the scientific applications and technical achievements of the microscopy- related technology, but also a really effective platform enabling broad networking. Personally I think the Conference was structured very well to meet the demands of participants from both scientific and private sector, while offering comfortable socialisation conditions. That also includes background organisation, i.e. the preparations and supports form Croatian and European microscopy societies where I also turn out to be helpful by providing chairing technically assistance in majority of sessions. I use the opportunity to acknowledge the EMS 2017 Scholarship which enabled me to participate in this conference. As the available presentation photo does not show appropriate slide with EMS logo I additionally enclose handouts; first and last slide. Additionally, I highlighted myself in MCM2017 participants group photo.

Eckhard Margret (Austria)



The 13th Multinational Congress on Microscopy (MCM2017) took place from 24 to 29 September 2017 in Rovinj, Croatia. The organizers had chosen the Hotel Lone as conference hotel which is a real impressive design hotel. The conference started with an interesting and formidable keynote lecture "*From micrometer to Sub-Angstroem resolution - the development of the electron microscope*" given by Prof. Harald Rose. During the week I listened to several talks like "*Imaging therapeutic efficacy of toxin releasing stem cells in recurrent brain tumor*" by Nihal Karakas and "*Developments in cryo-electron tomography for in situ structural biology*" held by Jürgen Plitzko and many more. I was impressed to hear from the new developments they achieved in the electron and light microscopy and for what different purposes and scientific questions they are using microscopy techniques. An example for extraordinary specialization was the talk titled "*Fast 3D imaging of neuronal coding in spine, dendritic, and neuronal assemblies in the visual cortex of behaving animals*" held by Balazs Rozsa. I had the possibility to get into contact with new scientific groups and companies, like "*Micro to Nano*" in a pleasant atmosphere. As consequence I got varies input for my work. The attendance at the lunch hosted by JEOL, where they introduced all new developments they provided in their newest products I found well presented, interesting and informative. An additional opportunity for personal contact between the participants of the MCM 2017 was a guided old town tour with the harbor, its narrow alleys and the idyllic located church "*Hl. Euphemia*". On the last evening I attended a really opulent and delicious gala dinner at a vineyard. To sum up everything it was really an interesting and well organized congress. I want to thank the organizers for this nice congress and also the EMS for the scholarship, so that I could participate for the first time at an international congress and present my data on a poster.

Matošević Mario (Croatia)



Multinational Congress on Microscopy 2017 (MCM2017) taking place September 24-29 2017, in Rovinj, Croatia, was a unique opportunity to meet some of the leading scientists, young researchers and best producers of microscopy instruments, all at one place.

The congress, co-organized by 8 European microscopy societies, allowed me to experience all the applications of modern microscopy techniques in both material and life science, but perhaps more importantly it helped me establish valuable connections with experts from many different fields of research.

Such an experience is invaluable to any young scientist and I would like to thank the European Microscopy Society for supporting my participation at the MCM2017 by providing me with the scholarship.

As a PhD student at the University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering I am glad a had the chance to present parts of my work to the colleagues at the Congress through a poster presentation on Microstructural characteristics of staurolite from mica schist of the Drava depression basement, Croatia.

For me personally, the most interesting part of the conference was the meeting with colleagues in the session on Materials in Geology, Mineralogy and Archaelogy, Ceramics and Compisites, who also had many interesting research topics. I was in the audience for many great speakers where I learned a lot and will surely benefit from their insights in the future. Attending the MCM2017 gave me some new ideas to implement in my further research.

Not the least important, the organization of the MCM2017 was at the highest level. I would especially like to emphasize delicious Istrian food and wines served, that made the meeting even more relaxing and very comfortable.

Meljanac Daniel (Croatia)

The 13th Multinational Congress on Microscopy was organized in Rovinj, Croatia from 24th to 29th September, 2017. The conference brought together scientists and experts in the fields of Life sciences, Materials sciences and Instrumentation. Altogether, there were approximately 450 participants from 30 countries attending the conference. Also, professor Harald Rose, the pioneer of modern Electron Microscopy, gave a Keynote Talk which was very impressive. The conference was well organized, with plenty of great lectures, poster sessions, and workshops.

I would like to thank the European Microscopy Society for the financial support, which allowed me to participate in this congress. It also allowed me to present my results, *"Structural investigation of nanocrystalline ZnO:Al thin films deposited by PLD in RF excited oxygen atmosphere"*, in the form of a poster presentation. This was a great opportunity to meet other scientists and experts in the field of microscopy, to discuss with them and listen to their new ideas and talks. Learning about new research and participating in such a great congress is an invaluable experience and motivation for future work, especially for young researchers.

Andreas Müller (Germany)

The MC 2017 was held from 21-25 August 2017 in the format of the Dreiländertagung in the beautiful city of Lausanne, Switzerland. I would, first of all, like to express my gratitude to the EMS for the financial support and also the organizers of my session for allowing me to present my work. Being a biologist I focused on sessions with topics related to biological science. The organizers did a fantastic job in putting together exciting talks presenting a variety of topics ranging from sample preparation to answering scientific questions with the help of microscopy.

I was especially impressed by the recent advances in cryo-electron microscopy, that were demonstrated by scientist from Martinsried. Miroslava Schaffer presented her recent important developments in FIB-milling of lamellas for cryo-EM. Later, Benjamin Engel showed the spectacular results they achieved with the technique in Chlamydomonas. Radostin Danev, who has developed the phase plate for cryo-EM, gave a fantastic Ernst-Ruska-lecture on the topic and has very well deserved this award.

One absolute highlight of the conference was the plenary lecture by Jacques Dubochet just a few weeks before the announcement that he will receive the Nobel prize. It was fascinating to hear how he developed the tools for the vitrification of ice. His presentation was also very entertaining and he made important statements on the importance of cryo-EM for the future of biology.

There were also very interesting talks and presentations about correlative light and electron microscopy (CLEM), one of my main topics of interest. Ludek Stefanek from Dresden was presenting his impressive project on TIRF-CLEM to investigate intraflagellar transport. In the same session, Mattia Karremann presented a sophisticated CLEM approach to track single tumor cells in a mouse brain by combining two-photon microscopy, µ-CT and 3D electron microscopy. Maarten Tuijtel presented the fluorescence of uranly acetate at cryogenic temperatures in his poster. A very uselful finding for future CLEM projects.

Overall, the meeting was a great inspiration for me. I met old and new friends and also found potential new collaborators. I am looking forward to the next microscopy conferences in 2018.

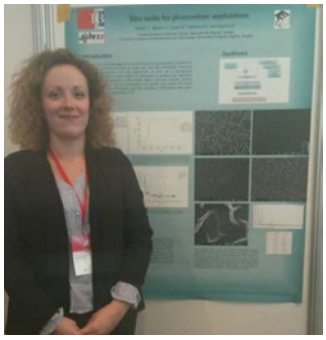
Nachtnebel Manfred (Austria)

For every young scientist like me it is a great opportunity and experience to present his or her work at a conference like the Multinational Conference on Microscopy 2017 (MCM 2017) that took place in Rovinj. Firstly, I want to thank the European Microscopy Society (EMS) for the financial support, which made it possible to give a presentation about one of my PhD

topics. I presented the 3D reconstruction of parts of the fracture regions. The fracture behavior of polymeric blends in general is a topic I have been working on for months. Thanks to the subsequent input from the audience or later discussions at coffee breaks gave me additional conceptions on my work and food of thoughts for its further improvement. Apart from that, the presentations of and discussions with scientists of various fields – be it my own field of study or others – gave me new insights into state of the art investigations and experiments. Furthermore, the exhibitions and lunch workshops offered me the possibility to have a look at modern scientific methods and equipment.

Overall, thanks for the excellent organisation and for the support from the European Microscopy Society which makes the MCM 2017 for me a memorable time. I hope that I will be able to attend also the next MCM in Belgrade.

Panžić Ivana (Croatia)



First of all, I want to thank the European Microscopy Society (EMS) for the financial support, which allowed me to participate at the 13th Multinational Congress on Microscopy (MCM2017) in Rovinj from 24th to 29th September. During the congress I had the opportunity to present my work with two poster presentations (*Zinc oxide for photovoltaic applications and TiO2 modified by Sm and catechol for photovoltaic use*).

Attending the congress and the many talks and poster presentations was very helpful and I have learned a lot and gained insights for my future research and I have also met a lot of people and received feedback based on their experience.

Overall the congress was an excellent learning opportunity that will benefit me in my PhD.

Sincerely,
Ivana Panžić

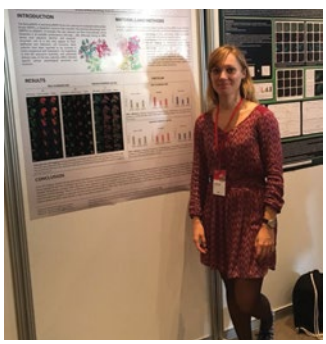
Pınar Köroglu (Turkey)

I would like to thank the European Microscopy Society for supporting my participation at 13th Multinational Congress on Microscopy, MCM 2017. I was very pleased to learn that I had selected as the recipient of your scholarship. Bursary position offered me the opportunity to present a poster on "*New Study on Metformin Action Against Testicular Injury: Prostate Cancer, Diabetes and Diabetes-Cancer*". The conference was an interesting experience. I was excited to meet different colleagues involved in the same research field, attended lectures on new and interesting topics. More than 450 delegates from 30 countries gathered at the MCM 2017! During the conference I had the opportunity to share part of my work through a poster presentation and got in contact with people interested in it. I had also have chance to discussed other people's research. I have also visited the well-organized exhibition hall where new developments from the companies were nicely exhibited. Moreover, a lot of posters and talks allowed me to meet many scientists and to expand my knowledge about different microscopy technique, as well as to take different ideas for future collaborations. I was very glad with the organization and execution of the congress. In conclusion, this participation became a great asset for me and it was very motivating to get better research done. I also enjoyed the perfect organization of the conference, and the beautiful city of Rovinj. I'm looking forwards to the next one already!

Sincerely, **Pınar Köroglu**

Istanbul University, Faculty of Science, Department of Biology, Istanbul, Turkey

Radić Martina (Croatia)



Attending conferences enables young scientists to share their results with the scientific community and to expand their knowledge in the field of research. That is why I would like to thank the European Microscopy Society for financial

support which allowed me to participate at the 13th Multinational Congress on Microscopy in Rovinj, Croatia. It was a big opportunity for me, as a PhD student, to meet other young scientists with similar interests and experienced researchers with valuable advice. The scholarship allowed me to achieve these goals and to establish a network of professional contacts for possible future collaboration.

I had an opportunity to present my poster under the title NDPK A and NDPK B – subcellular dynamics and interactions. Following discussions about my work on live cell imaging and FRET analysis helped me to look at my results from a different angle. The suggestions I received will surely influence my future work.

I really enjoyed attending Life Science sessions, especially the talks of invited speakers. It is inspiring to watch the lectures of researchers from all over the world using cutting-edge techniques in their work. The plenary talks, of which I especially liked Juergen Plitzko's talk on Developments in cryo-electron tomography for in situ structural biology, were excellent.

Lastly, I would like to compliment the organizers for all the effort they invested to coordinate the scientific programme as well as the leisure activities. The conference was perfectly organized on all levels allowing business and personal growth of participants.

Radmilovic Vuk (Serbia)

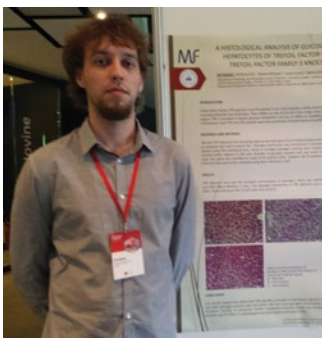
The European Microscopy Society's Multinational Congress on Microscopy, held every 2 years, marked this year its gathering with the lucky number 13. This year's MCM, held from 24.9.2017 to 29.9.2017 in the beautiful Adriatic coastal town of Rovinj, was organized by Ruđer Bošković Institute from Zagreb, Croatia. The conference featured over 130 oral presentations and over 170 poster presentations, divided into 3 sessions: 1) Life Sciences, 2) Instrumentation and 3) Materials, each with 7 appropriate thematic categories. Besides oral presentations by young researchers, plenary lectures were held by experienced and well-established scientists, like the keynote speaker prof. Harald Rose, with whom I had the pleasure of talking several times during the conference, as well as workshops held by leading microscope manufacturers like Thermo Fisher Scientific (FEI), JEOL, etc. with various topics, both general and specific to an area of research where electron microscopy is of the outmost importance.

I myself gave a 15 minute presentation with the title "Advanced electron microscopy characterization of silver nanowires for transparent electrode applications" on the 4th day of the conference (September 27th) in the session Materials M5 - Nanostructures and Materials for Nanotechnology, with M. Klementova and Z. Zovko Brodarac as the session chairs. My talk consisted of introducing the audience to the seriousness of the global energy problem and how the choice of solar energy is the only way to deal with this issue. Subsequently, I went on to present results from my research which included dedicated microscopy characterization of nanowelded silver nanowires covered by a layer of aluminum doped zinc oxide which have an application as transparent electrodes in photovoltaics i.e. solar cells. After the talk, I received some interesting questions from colleagues which, after the session, continued with an insightful discussion.

Since I have received a scholarship for this year's MCM, I would like to thank the European Microscopy Society for helping me be a part of a very insightful and very well organized conference which allowed me to meet colleagues, especially from the materials science and engineering world with whom I have constructively interacted, a promising step towards future scientific collaboration. Additionally, I am delighted to say that the next MCM, in 2019, will be held in Belgrade, Serbia and will be organized by the Serbian Microscopy Society of which I am an active and contributing member and hence will have the pleasure and honor of contributing in the organization of this great event to which I, in this manner, invite young scientists to participate!

Vuk Radmilović

Edi Rođak (Croatia)

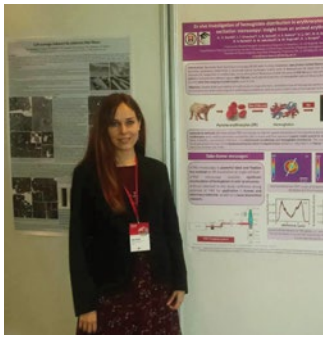


MCM 2017 in Rovinj was the second congress I ever attended. As a young scientist, at the start of his journey into the world of science, attending the congress was highly beneficial. I had a chance to see what cutting edge science looks like, and

what new technology can offer. Various methods, instruments and ideas that were presented at MCM opened a complete new window for me and provoked my mind to think in new directions. From all lectures I had a chance to attend, I'd like to highlight the plenary lecture given by Eva Roblegg with title: "*Nanoparticle interactions with human biological barriers*". It was really interesting to see the whole process from the idea to the product that has potential to be used in clinical trials, and, maybe, as a therapeutic. Ways in which problems and ideas were solved and tested, gave me an insight in methodology that can be applied to my own ideas. I am also glad I was able to present my own poster entitled "*A histological analysis of glycogen content in hepatocytes of trefoil factor family 2 and trefoil factor family 3 knock-out mice*".

In the end, I'd like to thank EMS for supporting their young members with scholarships. Their support enabled me to attend this great congress and to meet plenty of people with similar interests to my own.

Stančić Ana (Serbia)



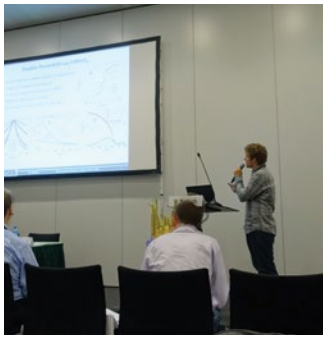
13th multinational congress on microscopy held in the end of September in Rovinj, Croatia was a wonderful experience for me – a PhD student coming from a Southeast European country in which doing science is never-ending challenge. I have never before attended an event of this scale and I want to thank the European Microscopy Society (EMS) one more time for awarding me the scholarship without which my attendance at this event would be highly uncertain. Topics and lecturers of plenary lectures were well chosen in my opinion, allowing the audience to stay up-to-date to state-of-the-art science. Instrumentation and material presentations were a little bit challenging for me to understand since those are not my fields of interest, but I loved the fact that this conference actually made all of us to get out of our comfort zones and allowed us to explore horizons beyond of what we usually do, know and work with. So, although I spend most of the time on life science presentations and lectures, I occasionally visited the other sessions as well, just to find out how much I do not know and what is like doing research in those areas new to me. Since my Phd thesis is based on working with stem cells, I was particularly interested to hear Mr. Ozkan from Turkey and I have gathered much valuable information from his presentation. My personal favorite at each conference are poster sessions since they allow us to get to know one each other in more informal and relaxed atmosphere and that is exactly how poster sessions at MCM 2017 Rovinj were. I used the most of time during poster sessions to talk with people of the same interests, exchange contact information, invite them to visit me and my research group in Serbia and make promises for future collaborations.

Stanković Nadežda (Serbia)

I would like to start by thanking the European Microscopy Society for their financial support, which made it possible for me to participate at MCM 2017 in Rovinj, Croatia. It was a great opportunity for me to meet many leading experts as well as young researchers in the field of electron microscopy and material science. My contribution to this conference was a poster presentation with the title *"Structural characterization and luminescence properties of Y2MoO6 powders doped with various rare earth elements (Eu3+, Sm3+, Yb3+/Er3+)"*. The very inspiring keynote speech was given by emeritus Professor Harald Rose who, in a very interesting manner, presented the development of electron microscopy through the years as well as his personal impressions and experience. During the entire conference, I had the opportunity to enjoy not only extraordinary plenary lectures, but many oral and poster presentations of up-and-coming scientists. Among the three sessions in the conference Materials, Life Sciences and Instrumentation, the latter was the most useful to me as I was able to learn about new developments in the world of microscopy i.e. new techniques that could be very useful for my future research.

Congratulations on this successful conference and I am looking forward to the next MCM in 2 years!

Wallisch Wolfgang (Austria)



The Microscopy Conference in Lausanne was a great experience and gave me the opportunity to meet international colleagues, experts and manufactures in the field of electron microscopy.

Beside many interesting talks and discussions the plenary talks fascinated me at the conference. In particular, I want to highlight the talks about the future of the electron microscopy (Gustaaf Van Tendeloo), field mapping in the semiconductor research by off-axis electron holography and diffraction based techniques (David Cooper) and electron waves for comprehensive analysis of materials properties (Hannes Lichte). In the exhibition area I got in touch with manufacturers of electron microscopes, energy filters and cameras. Also an overview of the latest developments and innovations was shown. At the edge of the conference, I had the chance to discover the beautiful city Lausanne situated at the Lake Geneva.

I would like to thank the European Microscopy Society for providing me financial support and giving me the opportunity to present my results on "*Influences of the CMR effect on energy loss signal*". I picked up a lot of experiences and look forward to new challenges.

Fogarassy Zsolt (Hungary)

First of all, I would like to thank for the EMS scholarship provided by the European Microscopy Society (EMS) which made it possible that I could attend on the MCM2017 conference, secondly I would like to thank the conference organizers for the excellent arrangements. I was able to listen to a lot of very good presentations which are near to the area of my resource topic, and there were very nice large lectures from the cutting edge of the present microscopy and from possible developments of future. During the presentation a lot of new ideas were formed, which I can hopefully utilize in my work. In the poster presentation, I had the opportunity to talk to working with similar research topics, in addition to my own work as well as promoting new working relationships with scientist from all over the word.

Our poster topic was "*TEM investigation of magnetron sputtered TiC, TiC/Ti, Ti(C) thin films*". In that work the structure of TiC coatings were shown which were grown on amorphous Si-O substrate by parallel magnetron sputtering of Ti and carbon targets without heating the carrier. The Ti composition is changed in the different layers. The nano-hardness was interpreted with revealing the structure. c-TiC and h-Ti layers could be formed by magnetron sputtering of carbon and titanium targets with Ti content between 58 and 95 at.%. c-TiC structure is formed in the layers with at 58-86 at.% Ti content. The h-Ti structure is formed in layers with approx. 86 at% or with higher Ti content. In layers with approx. 86 at.% the c-TiC structure can transform to h-Ti structure with stacking faults. c-TiC layers with Ti content of 58-71 at.% and nano-hardness around 25 to 27 GPa can be produces by magnetron sputtering. Previously, layers with similar hardness values were achieved by similarly grown condition containing about 45 at.% Ti, but at these layers the c-TiC particles are embedded in an amorphous carbon matrix. From 71 at.% Ti concentration the nano hardness decreases with the increasing Ti content at the grown samples. At the h-Ti layers with 90-95 at.% titanium content the nano hardness is still around 7-10GPa, which value exceeding the nano hardness of the often used, implant material TiAl6V4 alloy.

In addition to the participation in the conference it was a great experience to take a look around in Rovinj, test the local food and drinks and to swim in the Adriatic Sea. ■

FINANCIAL REPORT OF EMS BUDGET

EUROPEAN MICROSCOPIES SOCIETIES

EUROPEAN CORPORATE MEMBER ASSEMBLY

EMS CALENDAR 2018

APPLICATION FOR MEMBERSHIP

EUROPEAN CORPORATE MICROSCOPY ASSEMBLY (ECMA)

FINANCIAL REPORT OF EMS BUDGET

Financial report of EMS budget

Budget 2017 final, budget 2018 running, budget 2019 outlook

Budget 2017, final

Incomings

The majority of incomings came from contributions of the national societies and the ECMA members with further incomings from individual members, interest rates and from job postings for non-EMS members. Furthermore, EMS received revenues from the EMC2016 in Lyon (€ 24 240) and a donation of € 10 000 from the SFμ dedicated to young colleagues as travel support for the IMC19 in Sydney. In summary, an amount of **€ 85 946.76** was accrued.

Expenses

EMS granted 34 scholarships to young scientists for their attendance at MC Lausanne and MCM Rovinj (in sum € 8 500). Both meetings were supported as EMS extensions (together € 3 000) and EMS sponsored eight supported meetings (in sum € 6 000). Two board meetings, one embedded in the MC Lausanne and one extra meeting in March in Toulouse, professional secretarial support and three Outstanding Paper Awards added up to € 32 884.70

Together with further costs EMS had total expenses of € 52 241.52. Thus, the balance for 2017 ended with a surplus of € 33 705.24. At the end of the year, EMS had € 70 201.60 at the savings deposit. As of December 31st, 2017, EMS had total assets of **€ 130 809.76**.

Budget 2018, running; (as of February 16th, 2018)

Incomings

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

Together, incomings can be expected to amount to **€ 49 350**.

Expenses

There will be no EMS extension meeting this year due to IMC19 in Sydney but EMS can support 10 sponsored meetings this year (together € 7 500). EMS can issue 24 scholarships, á € 800, for attendance of young European microscopists at the IMC19 (together € 19 200), including the 2017-donation of the SFμ. Further expenses will include the Outstanding Paper Awards (€ 3 000), two board meetings, this one in Copenhagen and one embedded at IMC19, professional secretarial support and bank costs. Expenses are estimated to amount to **€ 60 550.00**. It is thus calculated to end the year 2018 with a minus of € 11 200.00.

Budget 2019, proposal

Incomings

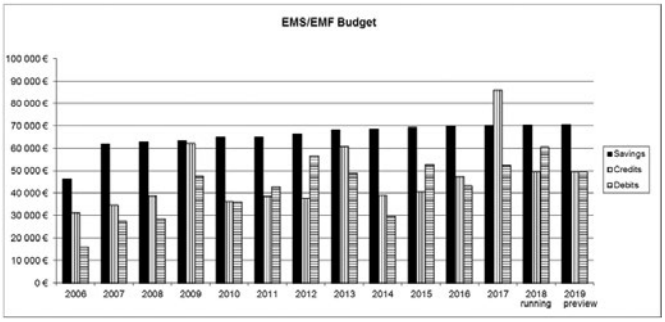
Major incomings will be accrued by the annual fees of EMS members of the national societies and of ECMA members. Together with interest rates of the savings account and advertising for non-EMS members, we can expect incomings of **€ 49 350**.

Expenses

EMS can support one extension meeting and eight sponsored meetings (in total € 7 500) and can issue 32 scholarships for travel support (in total € 8 000). Further expenses will include the Outstanding Paper Awards, costs for professional secretary, two board meetings (one extra, one included in a meeting) and bank costs, amounting to a total of estimated **€ 49 350.**

It is thus calculated with a balanced budget to end the year 2019.

Christian Schöfer, m.p.
Treasurer EMS/EMF
Vienna, 26th April 2018



EUROPEAN MICROSCOPIES SOCIETIES

Number of EMS Members by Societies (2017)			
National and regional societies			Number of members
Armenian Electron Microscopy Society	AEMS	Armenia	**8**
Austrian Society for Electron Microscopy	ASEM	Austria	**185**
Belgian Society for Microscopy	BSM	Belgium	**322**
Croatian Microscopy Society	CMS	Croatia	**94**
Czechoslovak Microscopy Society	CSMS	Czech Republic	**220**
Dutch Society for Microscopy	NVvM	Netherlands	**228**
Electron Microscopy and Analysis Group (Institute of Physics)	EMAG	United Kingdom	**314**
French Microscopy Society	SFμ	France	**417**
German Society for Electron Microscopy	DGE	Germany	**396**
Hellenic Microscopy Society	HMS	Greece	**60**
Hungarian Society for Microscopy	HSM	Hungary	**111**
Israel Society for Microscopy	ISM	Israel	**270**
Italian Society of Microscopical Sciences	SISM	Italy	**356**
Microscopical Society of Ireland	MSI	Ireland	**101**
Nordic Microscopy Society	SCANDEM	Scandinavia	**281**
Polish Society for Microscopy	PTMi	Poland	**109**
Portuguese Society for Microscopy	SPMicros	Portugal	**53**
Romanian Electron Microscopy Society	REMS	Romania	**78**
Royal Microscopical Society	RMS	United Kingdom	**1 478**
Serbian Society for Microscopy	SSM	Serbia	**66**
Slovene Society for Microscopy	SDM	Slovenia	**107**
Spanish Society for Microscopy	SME	Spain	**279**
Swiss Society for Optics and Microscopy	SSOM	Switzerland	**304**
Turkish Society for Electron Microscopy	TEMD	Turkey	**77**
Corporate members EMS (43 companies)	ECMA		**66**
Individual members	IND		**16**

EUROPEAN CORPORATE MEMBER ASSEMBLY

Corporate members 2017 list

Platinum members

- Diatome Ltd.
- JEOL Europe

Gold members

- Andor Technology
- DELONG INSTRUMENTS a.s
- Hitachi High-Technologies Europe GmbH
- Leica Microsytems Vertried GmbH

Silver members

- Akademiai Kiado
- Bilz Vibration Technology AG
- Bruker Nano GmbH
- Carl Zeiss Microscopy GmbH
- CEOS GmbH
- DENSsolutions
- Electron Microscopy Sciences
- IMINA Technologies SA
- Intelligent Imaging Innovations GmbH
- Nanomegas SPRL
- Oxford Instruments GmbH
- Quorum technologies
- SPI Supplies Structure Probe Inc.
- Ted Pella, Inc.
- TVIPS GmbH
- XEI Scientific Inc.

Bronze members

- Advanced Microscopy Techniques
- AMETEK B.V.
- Deben UK Ltd.
- EMSIS GmbH
- EO Elektronen-Optik-Service GMBH
- Eumex Instrumentebau GmbH
- FEI
- FemtoTools AG
- Fischione Instruments, Inc.
- Gatan GmbH
- Hirox Europe
- ISS Group Services Ltd.
- JSC Nanopromimport
- Klocke Nanotechnik
- Micro to Nano
- MICROS Produktions- und Handelsges. m.b.H.
- Protochips
- Science Services GmbH
- SmarAct GmbH
- Spectral Solutions AB
- Thermo Fisher Scientific

EMS CALENDAR 2018

International Workshop on Electron Holography

26 to 28 June 2018
Zeuthen - Germany

Second European FIB Workshop

19 to 20 June 2018
Grenoble - France

Advanced Topics in Cs-corrected STEM and Spectroscopy: Theory meets Experiment

29 June to 4 July 2018
Daresbury - UK

EMAG 2018

4 to 6 July 2018
Coventry - UK

Electron Microscopy of Nanostructures ELMINA2018 Conference

27 to 29 August 2018
Belgrade - Serbia

In-Situ and Correlative Electron Microscopy (CISCEM)

10 to 11 October 2018
Saarbrücken - Germany

Advanced Microscopy Techniques for Plant-microbe Interaction Analysis

26 to 30 November 2018
Tulln - Austria

22nd International Chromosome Conference

2 to 5 September 2018
Prague - Czech Republic

19th International Microscopy Congress 2018 (IMC19)

9 to 14 September 2018
Sydney - Australia

26th International Conference on Materials and Technology (26 ICM&T)

3 to 5 October 2018
Portorož - Slovenia

International Workshop on Advanced and In-situ Microscopies of Functional Nanomaterials and Devices (IAMNano-2018)

14 to 17 October 2018
Hamburg - Germany

NOTES

APPLICATION FOR MEMBERSHIP

EUROPEAN MICROSCOPY SOCIETY (EMS)

Individual Member Subscription form

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

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

Prof./Dr./Mr./Ms.: _____ Last Name: _____

First Name: _____

Institute: _____

Department: _____

Address: _____

Zip code: _____ City: _____

Country: _____

Tel.: _____ Fax.: _____

E-mail address: _____

Website: _____

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

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

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

Date / Signature: _____
* please print for clarity

EUROPEAN CORPORATE MICROSCOPY ASSEMBLY (ECMA)

Subscription form

To subscribe to the ECMA, please complete this form* and mail or fax to:
Virginie Serin, Secretary EMS, CEMES - CNRS
Centre d'Élaboration de Matériaux et d'Etudes Structurales (UPR 8011)
29, rue Jeanne Marvig, BP 94347, 31055 Toulouse Cedex 4, France
email: virginie.serin@cemes.fr , Fax: +33 (0)5 62 25 79 99

Prof./Dr./Mr./Ms.: _____ Last Name: _____

First Name: _____

Representing the Company: _____

Address: _____

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We select the following category (thick one)

- ○ Platinum minimum 1.000 €
- ○ Gold 500 €
- ○ Silver 250 €
- ○ Bronze 100 €

and will transfer the corresponding amount in favour of account: 4443344 (ING/Postbank) of EMS, UMC St.Radboud, P.O. Box, 9101, 6500 HB Nijmegen, The Netherlands.

Swift code: INGBNL2A
IBAN: NL46INGB0004443344

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

Date / Signature: _____
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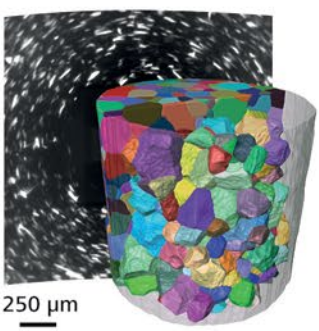

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