

YEARBOOK 2024  
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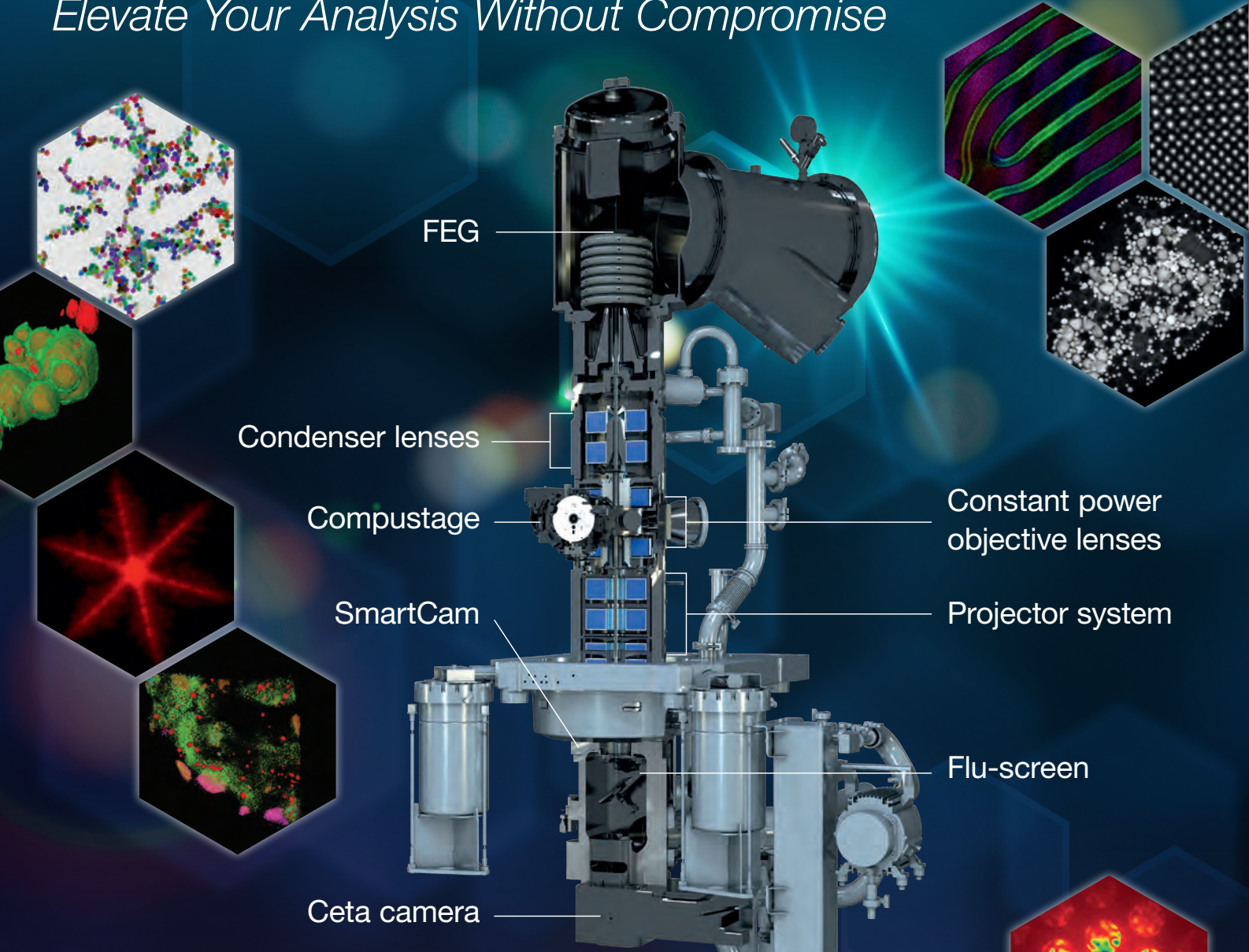


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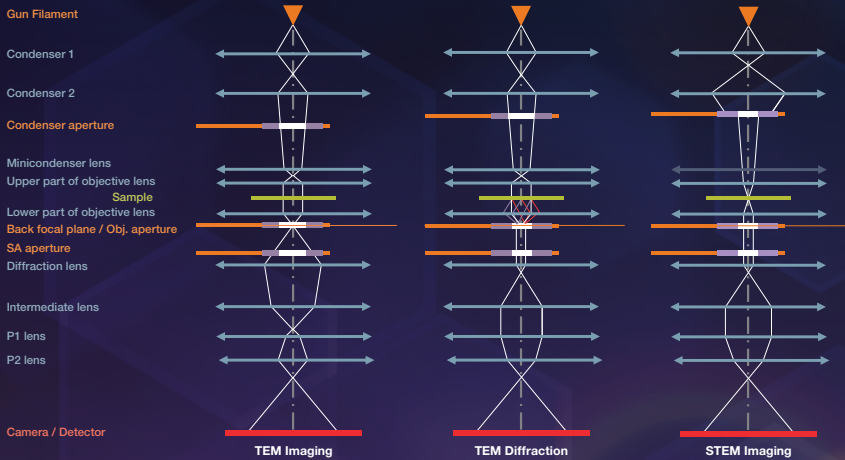


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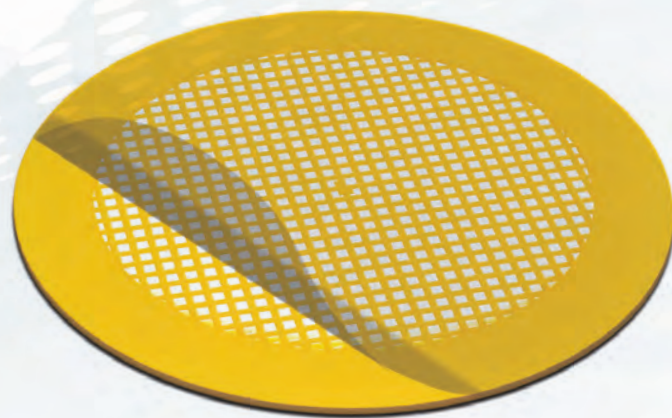
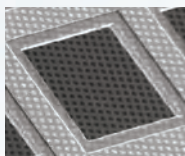
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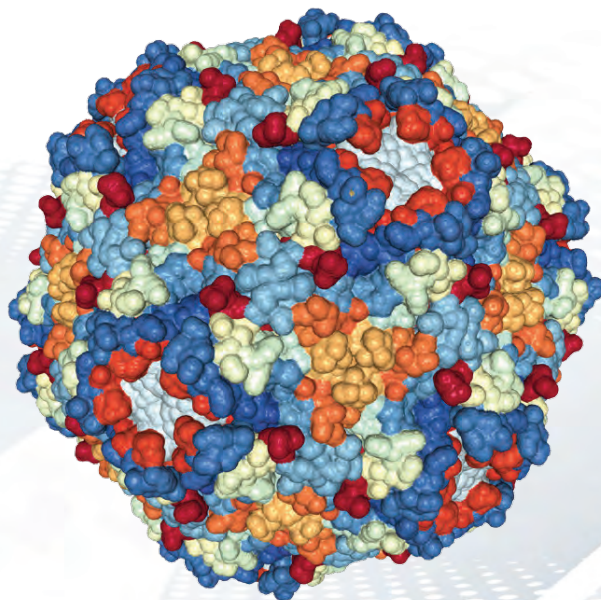
## Articles

An improved holey carbon film for cryo-electron microscopy. Quispe J, Damiano J, Mick SE, Nackashi DP, Fellmann D, Ajero TG, Carragher B, Potter CS, (2007). *Microscopy and microanalysis*, 13(5), 365-371.

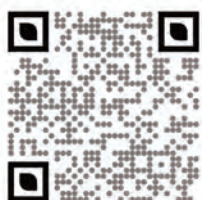
Improving the technique of vitreous cryo-sectioning for cryo-electron tomography: electrostatic charging for section attachment and implementation of an anti-contamination glove box. Pierson J, Fernández JJ, Bos E, Amini S, Gnaegi H, Vos M, Bel B, Adolfsen F, Carrascosa JL, Peters PJ., *J Struct Biol*. 2010 Feb;169(2):219-25. Epub 2009 Oct 12.

Cryo-EM structure of the 2019-nCoV spike in the prefusion conformation. Daniel Wrapp, Nianshuang Wang, Kizzmekia S. Corbett, Jory A. Goldsmith, Ching-Lin Hsieh, Olubukola Abiona, Barney S. Graham, Jason S. McLellan, 2020. *Science*, 13 Mar 2020: Vol. 367, Issue 6483, pp. 1260-1263, DOI: 10.1126/science.abb2507

**Below:** 2.9 Angstrom Resolution Cryo-EM 3-D Reconstruction of Close-packed PCV2 Virus-like Particles: PDB ID: 3JCI Liu, Z., Guo, F., Wang, F., Li, T.C., Jiang, W. (2016) *Structure* 24: 319-328



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# AUTOMATED SPECIMEN PREPARATION FOR TEM: SEEDING ASTROCYTES ON COVERSGLIPS

Astrocytes are star-shaped glial cells which perform a variety of tasks involving neurogenesis, neuron growth, and neuron maintenance. Astrocytes also serve as intercellular structural support within the central nervous system and help transport nutrients to their associated neurons. Being able to routinely differentiate human pluripotent stem cells (hPSCs) into astrocytes allows researchers to examine their physiology. This is often accomplished by seeding onto glass coverslips in 24-well polystyrene culture plates.<sup>1</sup>

## Optimizing the visualization of astrocytes

After chemical fixation for imaging by Transmission Electron Microscopy (TEM), two important questions are beneficial to answer to optimize for consistently high-quality image generation:

1. Are there detectable differences between phosphate or cacodylate buffer used during fixation?
2. Does post-fixation with osmium tetroxide or osmium tetroxide reduced with potassium ferrocyanide affect contrast with regard to membrane preservation?

It is crucial that initial TEM fixation and subsequent specimen preparation of cultured astrocytes be reliable and consistent to generate timely and reproducible experimental results. Conventional methods often involve numerous labor-intensive exchanges of liquid reagents between various containers and the possibility of damage to glass coverslips from excessive handling.

## Comparing reagents via automated processing

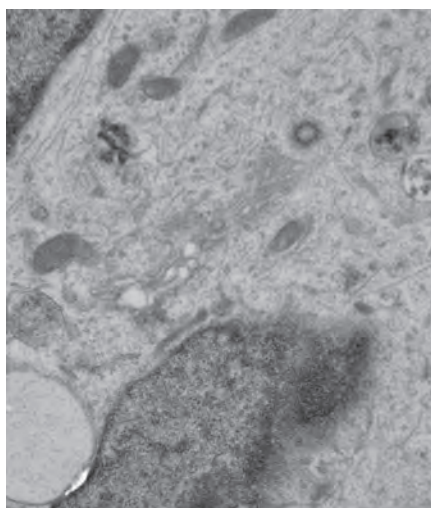
TEM laboratory technicians might universally desire improved sample preparation protocols, but time and resource limitations often lead to the use of previously relied on methods. Head-to-head comparisons of potentially better performing reagents are very difficult using traditional manual techniques. However, simply and easily preparing multiple identical specimens to test various fixation and staining protocols is now possible using automated processing.

Shown below are TEM micrographs produced after using the PrepMaster™ 5100 Specimen Preparation Robot to compare various alternatives for preparing cultured cells on glass coverslips in the same polystyrene plate in which they were cultured.

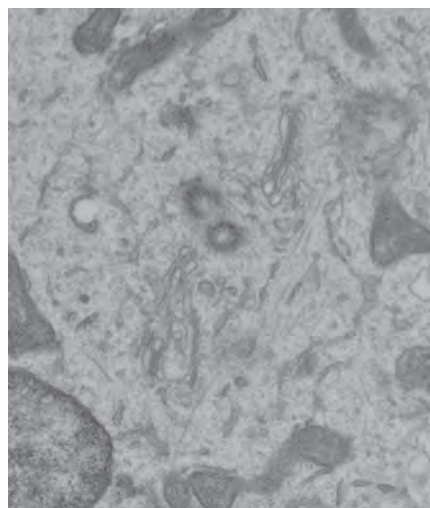
## Results

All combinations resulted in generally acceptable images (Images 1, 2, and 3). However, osmium reduced with potassium ferrocyanide, in both cacodylate buffer and phosphate buffer applications, appears to show greater membrane contrast, lower cytoplasmic background, and more easily discernable cytoskeletal elements (Image 4).

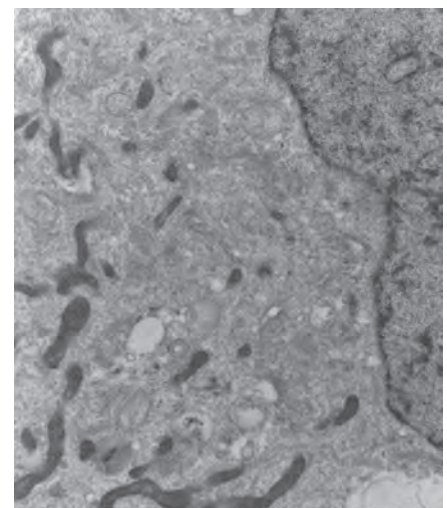
Membrane preservation, contrast, and ultrastructural details did not appear to be affected by the choice of phosphate buffer versus cacodylate buffer.



**Image 1.** (Phosphate buffer/OsO4) Phosphate buffer combined with unreduced osmium tetroxide produces clearly identifiable Golgi and centrosome.



**Image 2.** (Phosphate buffer/OsO4-KFC) Phosphate buffer with reduced osmium tetroxide gives low cytoplasmic background with well-defined centrosome and Golgi apparatus, including clear, well contrasted membrane preservation of the microtubules in the centriole.



**Image 3.** (Cacodylate Buffer/OsO4) Cacodylate buffer with unreduced osmium tetroxide shows Golgi apparatus however lack of clear and easily discernable membranes makes it difficult to resolve against the dense background cytoplasm.

The Prepmaster 5100 enabled easy and precise testing of 4 variables in one simple experiment using computer-controlled automated liquid handling. A complicated array of reagents was delivered to each individual sample properly and precisely. Human inaccuracy was eliminated. This revolutionary increase in performance is due to the Prepmaster 5100 having zero possibility of decision-making errors, plus liquid handling accuracy and precision unattainable by a human being.

### Equipment: Prepmaster™ 5100 Specimen Preparation Robot

Cells seeded on delicate and fragile coverslips are particularly difficult to prepare due to fear of breakage. The Prepmaster 5100 effortlessly prepares them quickly and safely for you so you can spend your valuable research time more effectively.

### Advantages

- Easy to set up and clean up.
- Versatile — can process most biological samples.
- Can effortlessly prepare up to 24 coverslips in less than 2 hours. Can prepare 8 kidney specimens in less than an hour or 96 kidney specimens in less than 2 hours.
- Effortlessly prepares coverslips for TEM or SEM in the same 24-well polystyrene microplate in which the cells were seeded and maintained. No transferring glass coverslips and fear of breakage.
- Excellent choice to run Ellisman rOTO protocol for vEM specimen prep.
- Up to 24 unique reagents or rinses.
- Reliable unattended overnight operation.
- High quality, consistent processing.

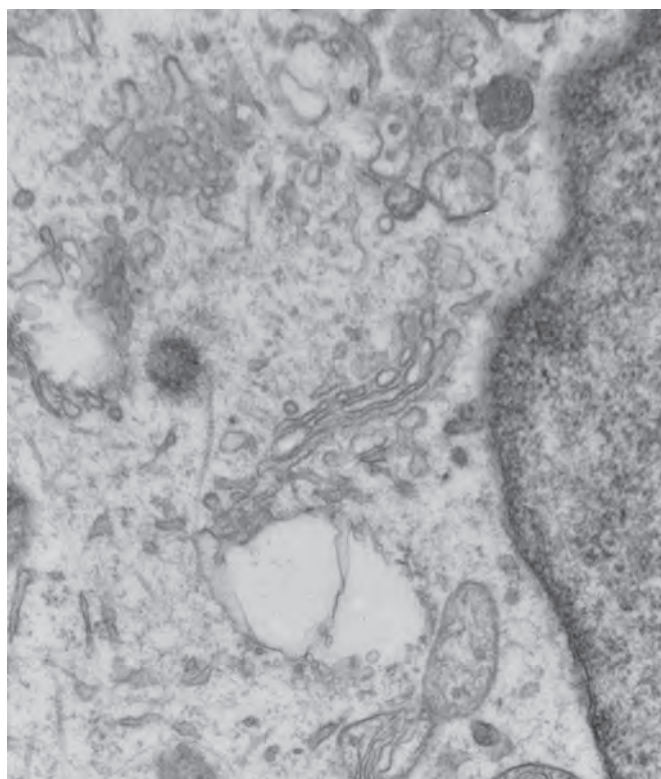
The Prepmaster 5100 ensures repeatability and reproducibility. It reliably accomplishes your dull, dangerous, repetitious, and error-prone tasks, increasing confidence in your results and freeing your time for more complex and interesting work.

### Features

- Heated (RT–60°C) Agitation Station™ specimen dock provides gentle, constant shaking movement for rapid and thorough post-fixation and rinsing.
- Heated (RT–60°C) reagent reservoir for enhanced post-fixation with hot heavy metals or other reagents.
- Cooled (5°C–RT) reagent reservoir for cold dehydration or cold reduced osmium in the Ellisman rOTO protocol for example.
- Windows® laptop computer control for easy creation, modification, and storage of unlimited protocols.
- UV light protected ventilated enclosure keeps noxious fumes contained and vented. Small (60 x 60cm) footprint enables convenient in-hood option with enclosure removed.

### References

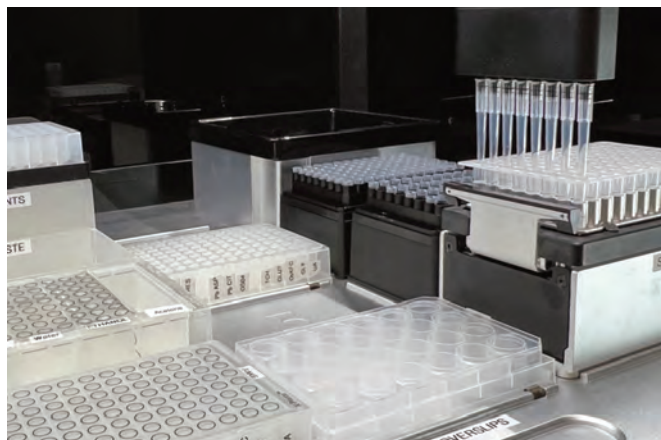
1. <https://www.waisman.wisc.edu/stem-cell-research-program/zhang-lab/>



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TEM Mode: Imaging  
Microscopist: AMT  
Camera: BIOSPR12, Exposure(ms): 1000 Gain: 1.5, Bin: 1  
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**Image 4.** (Cacodylate buffer/OsO4-KFC) Cacodylate buffer with reduced osmium tetroxide shows beautifully preserved Golgi apparatus membranes, low cytoplasmic background, and easily visible microtubules.



Deck of the Prepmaster 5100.

For more information about the EMS Prepmaster 5100, please visit [www.emsdiasum.com](http://www.emsdiasum.com)

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# Preface

## Dear EMS members,

Welcome to the 2023, edition 2024, yearbook of the European Microscopy Society (EMS)! We are delighted to present you this annual publication that showcases the latest developments and achievements in the field of microscopy in Europe and beyond.

2023 has been a rewarding year for the EMS and the microscopy community. We have successfully managed to continue our mission of promoting the use and the quality of advanced microscopy in all its aspects. We have organized or sponsored several events mentioned in the yearbook, and were present at the top level IMC20 congress in Busan, where we granted several scholarships to support the outstanding work of our members, especially the young researchers and students. Furthermore, we have strengthened our collaborations and partnerships with the International Federation of Societies for Microscopy (IFSM) and European national microscopy societies.

The field of microscopy is constantly evolving and expanding, with new techniques, applications, and challenges emerging every day. In this yearbook, you will find a selection of short reports, articles, and reviews that cover some of the most exciting and relevant topics in microscopy, such as nanoscopy, correlative microscopy, artificial intelligence, cryo-electron microscopy, super-resolution microscopy, and more. You will also find information about the EMS activities, events, awards, publications, and members, as well as some useful resources and opportunities for microscopy enthusiasts.

As I prepare to leave my position of EMS secretary in 2024 after 8 years of service, it is here my last preface! I would like to express my sincere gratitude and appreciation to all of you for the opportunity and the support you have given me during this time. It has been an honor and a privilege to serve the EMS and the microscopy community in this role, as adapting to the COVID-19 pandemic, enhancing our online presence, and expanding our membership and outreach. Being the secretary of the EMS has been a very gratifying and challenging experience. I have learned a lot and grown professionally and personally. I am proud of the achievements we have made together, such as the organization and promotion of Microscopy Congresses, publishing the yearbook, granting awards and scholarships, regular news and job vacancy diffusion. I am also grateful for the challenges and the difficulties that we have faced and overcome.

Last, but not the least, I would like to thank all the authors, reviewers, editors, sponsors, and partners who have contributed to the production and dissemination of this yearbook. Without their valuable input and support, this publication would not have been possible. I would also like to thank you, the readers, for your interest and support in the field of microscopy. I hope that you will enjoy reading this yearbook and that you will find it informative and inspiring. We welcome your feedback and suggestions for future improvements, as we strive to make this yearbook a useful and attractive publication for the microscopy community.

I'm strongly looking forward meeting you at EMC17, end of August 2024 in Copenhagen, it has been prepared for 8 years, and will be for sure fantastic!

Your secretary and friend,

A handwritten signature in black ink, appearing to read 'V. Serin', with a horizontal line underneath.

**Virginie Serin**  
EMS Secretary



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**Cover:**

CoPd nanoparticles prepared by organometallic approach. STEM images using BF or HAADF detectors were performed on the probe-corrected ARM-200F electron microscope equipped with a cold field emission gun (FEG). A spatial resolution of ~0.8Å was obtained.

Credits: *Teresa Hungria - UAR R. Castaing Toulouse; Felipe Quiroga-Suavita, Lise-Marie Lacroix and Bruno Chaudret - LPCNO Toulouse*

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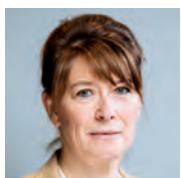
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# Letter from the President

## Dear EMS members,

You are now browsing the EMS yearbook 2023, which contains a summary of the activities of the EMS national societies and their members. This Year our Society has commemorated its 25 anniversary and to celebrate it, the EMS has organised two initiatives. The first one was a special symposium held at the International Microscopy Congress (IMC20) in Busan in September 10-15th, in which Prof. Wolfgang Baumeister, one of the founders of EMS, glossed the movements that gave rise to the society. A second initiative is the publication of book with articles from personalities from the EMS, an effort coordinated by our Past President, Prof. Josef Zweck, to whom we all should be thankful.

A core aspect of EMS duties is the support to meetings and workshops organised by EMS members, including scholarships for young scientists. You will find information on these events, which are funded by money received from our members and corporate sponsors. During this year, the EMS has maintained the support of a number of these activities, in particular scholarships to the IMC20. In these pages you will find a report of this event by the President of its Organising Committee, Prof. Keesam Shin. Other activities have been supported by EMS and you will find a summary of them in these pages, as well as reports from the activities of our national societies.

One of the duties of our society is to support excellence, and this is done by organising the annual Outstanding Paper Awards (OPA) in the three disciplines (Materials Sciences, Life Sciences and instrumentation and Technique Development). This activity is coordinated by our board member Prof. Randi Holmestad, to whom I thank for her efforts.

In 2024 it will take place the culmination of the EMS activities, the long-awaited European Microscopy Congress (EMC), which will be held in Copenhagen, during 25-30th August. Let me thank its Organising Committee, and in particular its head Prof. Klaus Qvortrup, for the efforts in organising this event and overcoming the effects of its cancellation in 2020 due to COVID19. The congress will host the talks of the EMS 2024 awardees in Life Sciences and Material Sciences for which the call is underway. The congress will also witness the General Council of the EMS, which among other things will serve to sanction the new board of EMS, which will oversee the workings of our society during 2024-2028.

I would like to thank the members of the current EMS board for their continuous support, but in particular the work of the EMS secretary (Prof. Serin) and the treasurer (Prof. Schöfer), of whom you can find in these pages a report of the economic status of the society. A special thanks to all our sponsors, which are not only active in assisting the scientific activities of EMS members, but also in supporting each meeting and workshop, and who have made possible that this yearbook reaches you free of cost.

Another special thanks go to Prof. Servet Turan, and the EMS PCO liaison, Marina Vita, for coordinating this yearbook, which summarises the work of a very active community representing 24 national societies.

I look forward to seeing you at some of the activities that the year 2024, but certainly in August in Copenhagen.

**José M. Valpuesta**  
EMS President







---

# EMS ANNIVERSARY

## A Quarter Century of EMS: what happened scientifically in this period?

On the occasion of the 25<sup>th</sup> anniversary of the European Microscopy Society, the EMS board decided to compile a booklet that briefly summarizes the major achievements in microscopy during the last 25 years. The intention is to recall what has happened during these 25 years for those whose “scientific life” covered that time span, and on the other side to present a brief “vade mecum” of major achievements in that time for those who have not (or only partly) experienced in person the progress made. Especially the students and younger scientists find it sometimes hard to get a short introduction into recent advances, achieved in their field. While the senior scientists handle the new developments as a matter of course, the younger community does not always find a written description and explanation of these new methods, techniques and discoveries, as they are often too recent for a concise summary and possibly still only accessible after an extended study of highly technical papers in the literature.

So, while we want to give our seasoned members a collection of recent advances to let them reappear in their minds, the booklet is also intended for our young scientists and students to serve as an introduction to recent

developments, where they can easily absorb the essence, while not being subdued to too many technical details – those may be found easily from the references given with each description.

The difficult (and probably impossible) task is to define what were the major achievements in microscopy during the past 25 years. We took the path to look out for those advancements which have been awarded one of several prestigious prizes, such as the Ernst-Ruska-Prize (German Society of Electron Microscopy, DGE), the European Microscopy Award (European Microscopy Society, EMS), the IFSM awards (International federation of Societies for Microscopy), the Kavli and the Nobel Prizes.

Today we can proudly proclaim that we received more than 20 manuscripts from former awardees which cover a broad spectrum of microscopy progress over the last 25 years, written by prominent fellow scientists. They will be compiled for a booklet which will be distributed to the members of EMS, free of charge, either during EMC2024 (Copenhagen) or afterwards by mail.

To wet your teeth already now for the booklet, and without saying too much about the actual contents, we only want



to reveal that the “hors d’oeuvre” is a poem written by A. Howie, followed by a menu of multiple courses, certainly some for every taste.

We hope that our members will enjoy this gourmet menu, enriched with many delicatessen, and find it really helpful, either as a first step into the matter or as an afterglow. Let us tackle the next quarter century in microscopy and do our best – there is still a vast field of discoveries ahead of us! ■

### For the EMS board:

**Josef Zweck**

Past President of the EMS

**José Maria Valpuesta**

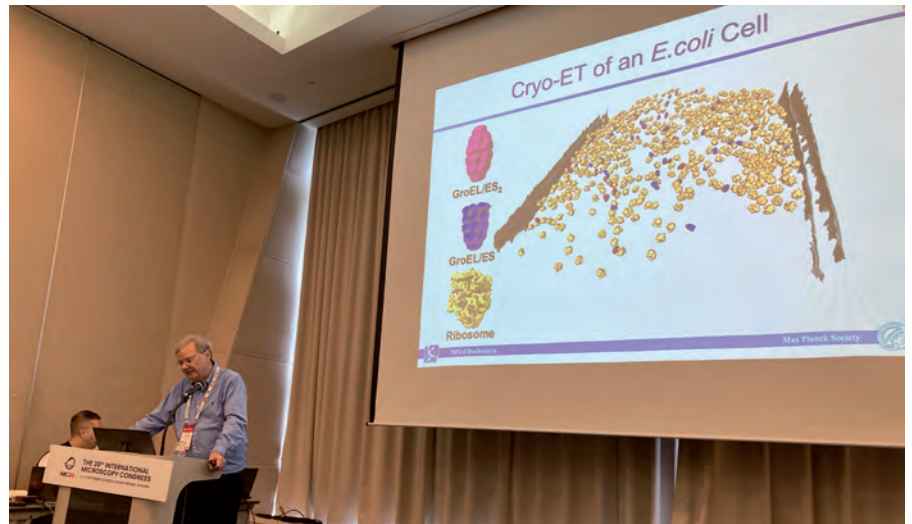
President of the EMS

**Virginie Serin**

EMS Secretary

## Celebration of the EMS 25<sup>th</sup> anniversary at IMC20 (Busan)

This year marked the 25<sup>th</sup> anniversary of the establishment of the European Microscopical Society and, in the absence of a major event on European soil, a symposium was held at the International Microscopy Congress in Busan, South Korea. The symposium ("Commemoration of 25 years of the European Microscopical Society") featured two major presentations by researchers representing the fields of Life Sciences and Materials Sciences. In the first case, Prof. Wolfgang Baumeister (Max Planck Institute, Martinsried, Germany), one of the founders of the EMS, before his talk ("Cryo-electron tomography or the power to see the whole picture") dedicated a few minutes to a very interesting account of the beginnings of our society. The second talk was given by Prof. Johan Verbeeck (University of Ghent, Belgium), who spoke on "What can the TEM learn from the particle physics community?". ■







EMC2024

# EMC24 Forthcoming Event Report

It is with great pleasure that we welcome you to EMC24, Sunday August 25 - Friday August 30, 2024. EMC2024 will be an in-person conference, only, hosted by Scandem - The Nordic Microscopy Society.

EMC2024 is the 17<sup>th</sup> of its kind and will bring the world of scientific imaging together in one of Europe's most beautiful cities - Copenhagen, Denmark.

Incorporating a balanced conference program of light and electron microscopy in both physical and life sciences - microscopists, manufacturers, and suppliers will come together to share new and exciting techniques, applications and technology.

The EMC24 will take place at Bella Center, Center Boulevard 5, 2300 Copenhagen, Denmark, and will on Sunday August 25 feature pre-congress workshops and an opening reception.

Monday the 26<sup>th</sup>, Eva Olsson IFSM President, will give the opening address followed by Prof. Carolyn Larabell as the first plenary speaker. The following days will feature Prof. Claus Ropers, Prof. Emma Lundberg, Prof. Vincenzo Grillo, and Prof. Moritz Helmstaedter as morning plenary speakers. The conference

days will continue with six parallel sessions and each day will close with drinks in the Poster and Exhibition area. The last day of the Congress will conclude with a farewell reception.

The main symposia feature Life Science (Chair, Eija Jokitalo), Physical Science (Chair, Jakob Wagner), and Instrumentation and Methodology (Chairs, Julia Fernandez-Rodriguez and Randi Holmestad) – all sessions topics are described on the conference homepage. Abstract submission will start early January 2024, but registration for the conference is already open – early bird registration is open until July 6, 2024.

Ongoing fundraising will attempt to fund as many travel bursaries (€ 400) as possible for young students and technicians.

The exhibition is one the largest of its kind featuring more than 100 exhibitors and a Nordic Corner for smaller enterprises, start-ups, and organizations, and 50% of the available exhibition space has already been reserved. Day passes will be available for a visit of the exhibition only. On January 17 the EMC2024 Corporate Advisory Board (Chair, Kornelia Weidemann, Thermo Fisher Scientific) will meet for an introduction of EMC2024 scientific content and not least an inspection of the venue.

The congress will among other address a range of microscopy related subjects, ranging from dynamic interactions in cells, organoids, tissue, and entire organisms, pathology, immunocytochemistry, and biomolecular labelling, volume Electron Microscopy in Life Sciences, semiconductors, heterostructures, and devices, geological materials and bio-mineral systems, quantum materials, advances in 3-dimensional image reconstruction, new Instrumentation, and dynamic studies using micro-nano labs.



Kayak in christianshavn © Mathias Brandt, the Copenhagen Media Center



As one of the leading conferences in the field of microscopy we invite sponsors and exhibitors to show their commitment to and engage in a more sustainable congress by matching their choices and actions with their organization's values and strategies. The congress itself will lead the way by making more sustainable choices when it comes to e.g. food and transportation.

For information on program, exhibition, sponsorship opportunities, and conference venue, please visit the conference website ([www.emc2024.eu](http://www.emc2024.eu)).

We welcome you to Copenhagen for the EMC2024 Congress and Exhibition, On behalf of the EMC2024 Local Organizers. ■

**Prof. Klaus Qvortrup**  
Conference Chair

**Københavns Universitet, Biomedicinsk Institut, CFIM, Blegdamsvej 3, København N, Denmark**

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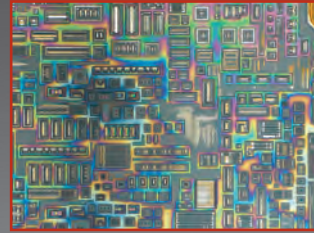


# The MultiPrep™ System

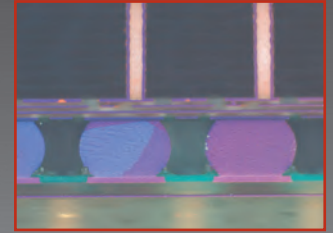


The MultiPrep™ System enables precise semiautomatic sample preparation of a wide range of materials for microscopic (optical, SEM, FIB, TEM, AFM, etc.) evaluation. Capabilities include parallel polishing, angle polishing, site-specific polishing or any combination thereof. It provides reproducible sample results by eliminating inconsistencies between users, regardless of their skill.

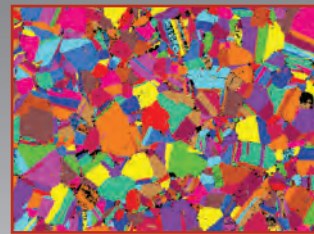
Common applications include parallel circuit delayering, cross-sectioning, substrate thinning, serial/3-D preparation, wedge polishing and more.



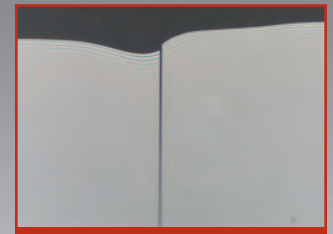
IC Delayering



Cross-Sectioning



EBSD Preparation

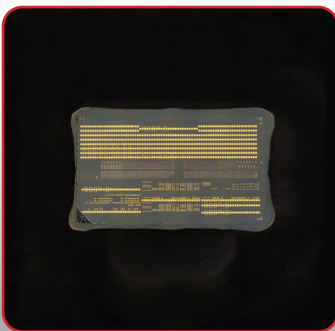


Thin Film TEM Preparation

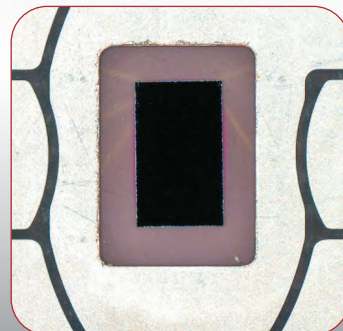
## Unequaled Sample Preparation Results

### The X-Prep®

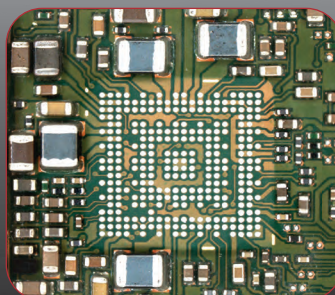
The X-Prep® is a specialized 5-axis CNC-based milling/grinding/polishing machine designed to support electrical and physical failure analysis techniques and other applications requiring high precision sample preparation.



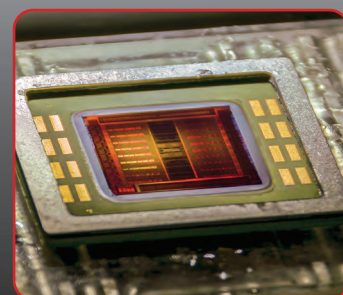
TSV Exposure



Smart Card Security Chip Exposure



Mobile Phone Chip-Off Component Removal



Uniform silicon thinning to less than 2 μm

**ALLIED**  
HIGH TECH PRODUCTS, INC.

info@alliedhightech.com  
www.alliedhightech.com

# The Green and Cultural Note

This informative note fights against the preconceived ideas of paper use and its environmental impact.





## Did you know?



Sources : ADEME - Greenliving National Geographic - EVEA Conseil - Digital power group - Cepi Sustainable Report - IDEP - FAO - WWF

**500,000 ha**  
in 10 years

In France, the forest has gained nearly 500,000 hectares (the equivalent of a department like the Bouches du Rhône) over the last 10 years.

**1 invoice**   
=  
**15 invoices** 

One invoice sent by internet releases 242 grams of CO<sub>2</sub>, which represents the production and sending of 15 invoices in paper format.

**1 page**   
=  
**3 minutes on** 

The display of a page on a screen for 3 minutes uses more energy than the production of its printed version.

**+30%**  
of European forests

The area occupied by European forests has increased by more than 30% since 1950, which represents about 5 times the area of Paris.

**99%**  
of the wood in Europe  
is sustainably managed

99% of the wood used for paper production in Europe comes from sustainably managed forests.

 vs 

A person uses an average of 212 kg of wood per year, i.e. 500 Kw/h of energy consumption, while a traditional computer uses an average of 800 Kw/h over the same period.





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IMC20



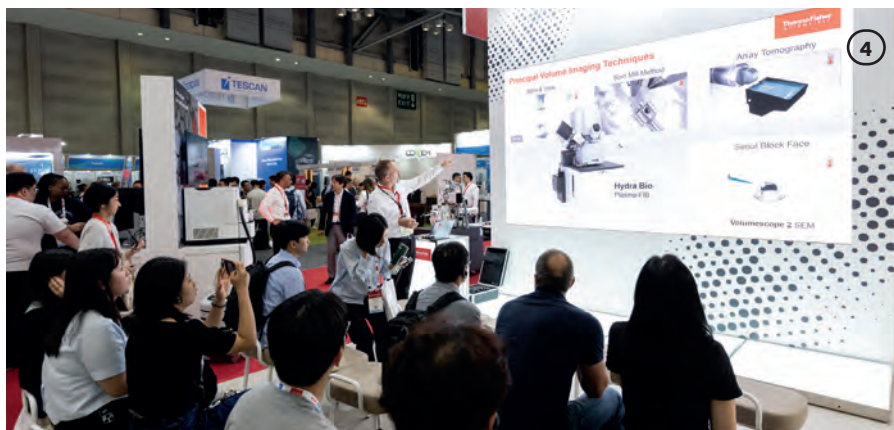
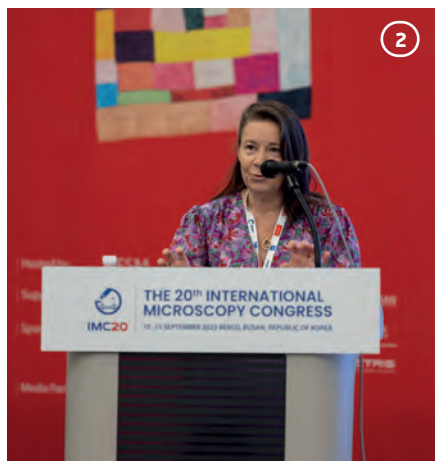
# The 20<sup>th</sup> International Microscopy Congress

*BEXCO, Busan, Korea; September 10-15 2023*



With a record-high number of 3,056 participants from 53 countries, the 20<sup>th</sup> International Microscopy Congress, the Olympics in Microscopy, was successfully co-hosted by Korean Society of Microscopy and International Federation of Societies for Microscopists (IFSM) at BEXCO in the beautiful port city of Busan, Korea (September 10-15). In the Congress, there were a big demonstration of the cutting-edge microscopy technologies strongly supported by the major electron microscope manufacturers such as Thermo Fisher Scientific, Zeiss, JEOL, Hitachi and many more related industries with over 150 exhibition booths from international microscopy industries.

In addition to the 5 plenary talks with 3 Nobel laureates and 51 scientific symposiums in Physical Science, Life Science, Analytical Science and Special Symposiums, there were a variety of additional programs such as Pre-congress workshops for beginners, IFSM Young Scientists Assembly for the selected early stage scientists providing guidelines and opportunities for getting acquainted with career mentors, Special Reception of the 80 key



participants for efficient microscopy propagation, Nobel Laureates lectures for open public and high school students in the area, and many more.

The venue BEXCO Busan is located at a walking distance from the beautiful coasts in the vicinity of world's largest department store. The immaculate running of exhibition and Gala dinner had a strong scent of wonderful Korean music and food in addition to the strong leading industries such as Samsung, LG, POSCO, SK and many more. The world's largest microscopy festival with a motto of "Scientific Innovation and Convergence through Microscopy Platform" demonstrated leading technology and cutting-edge research in microscopy. ■

**Prof. Keesam Shin**  
 Congress Chair, President of the Korean Society of Electron Microscopy  
 Dept. of Metallurgy & Materials Engineering, Changwon National University, Ulchang-gu  
 Changwon-si, Gyeongsangnam-do, Korea  
<https://www.imc20.kr>



1. Opening ceremony
2. IFSM Young Scientist Assembly Tour
3. Special reception
4. Exhibition
5. Nobel Laureates lectures
6. Cafeteria
7. Poster session
8. Gala dinner



## Notes



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## Reports on EMS sponsored events

# Sixth edition of the BIST Symposium on Microscopy, Nanoscopy and Imaging Sciences

## Barcelona, Spain; March 10, 2023

The 2023 edition of the Symposium, which is also the culmination of the BIST Master's Winter School, paid especial attention to the topic of machine learning on image analysis. The Meeting took place on March 10, 2023 in Castelldefels, Barcelona, Spain.

The ICFO Auditorium hosted on March 10, 2023 was a new edition of the BIST Symposium on Microscopy, Nanoscopy and Imaging Sciences, an annual event open to the entire community which brings together internationally renowned keynote speakers and members of the BIST Community.

The four morning talks focused on electron microscopy and some of its latest developments and applications, with reference speakers as Christina Scheu, from the Max-Planck-Institut für Eisenforschung, who presented the use of scanning transmission electron microscopy to solve imperfections in solar cells dedicated to generate electricity, and Sergei V. Kalinin from the University of Tennessee, who talked about the recent progress in automated experiment in electron microscopy. The audience could also learn from Patricia Abellan (Institute of Materials of Nantes Jean Rouxel, CNRS) and Carmen Rubio-Verdú, who has recently joined ICFO as a new faculty member and Group Leader.

In the afternoon, the talks by Sophie Brasselet (Institute Fresnel), Ricardo Henriques (Instituto Gulbenkian de Ciência) and Giovanni Volpe (University of Gothenburg), focused on optical microscopy and machine learning.

### An opportunity for Master Students to present their work!

The Symposium is part of the BIST Master of Multidisciplinary Research in Experimental Sciences curriculum. Its celebration marks the culmination



of the Winter School on Microscopy, Nanoscopy, and Imaging Sciences, coordinated by the ICREA research professors at ICFO and ICN2, respectively, Maria García Parajo and Jordi Arbiol. During the Symposium poster session, the students present their projects in front of a dedicated evaluation panel, which later decides on the best ones to award.

“This experience is very enlightening as you get to meet a lot of new people from different backgrounds. It’s challenging and brainstorming” you get to listen to new ideas, which you never thought could exist in your study.” said the MMRES student Mrinalini Parmar, who also won the “Prize from the public” for her poster “Quantitative estimation of oral Microbiome in Health and Disease”, a work done at IRB Barcelona under the supervision of Toni Gabaldón.

The two students awarded by the evaluation committee were Alex Barclay, who presented his work on genome engineering in colorectal cancer, done at CRG and supervised by Marc A Martí-Renom; and Guillem Posas, with the work “Deciphering the communication between tissues during circadian rhythms”, done at IRB Barcelona and supervised by Salvador Aznar-Benitah and Thomas Mortimer.



The 2023 BIST Symposium on Microscopy, Nanoscopy and Imaging Sciences is organized in collaboration with ICFO and ICN2, and sponsored in part by the Sociedad de Microscopia de España, the European Microscopy Society and Thermo Fisher Scientific. ■

**Jordi Arbiol**  
**ICREA Professor**  
**Leader of the Advanced Electron Nanoscopy Group (GAe-N)**  
**Institut Català de Nanociència i Nanotecnologia (ICN2), CSIC & BIST**  
**Scientific Coordinator of the Joint Electron Microscopy Center at ALBA Synchrotron (JEMCA)**  
**Executive Board Member of the International Federation of Societies for Microscopy (IFSM)**  
**ICN2 Website: [www.icn2.cat](http://www.icn2.cat)**  
**Edifici ICN2, Campus UAB - 08193 Bellaterra (Barcelona) Spain**

# Super-resolution workshop

*University of Leeds, Leeds, United Kingdom; July 7 2023*

The aim of this workshop was to talk about advanced imaging, and specifically to address the challenges and problems that are commonly encountered. This highly popular workshop was attended by approximately 70 people, including the 6 invited speakers, and company representatives, some of whom gave short technobyte talks.

The first talk was from Joerg Bewersdorf (Yale, USA), who gave an overview of his new DNA Exchange Paint related approach to super-resolution imaging (Schueder et al., preprint available on BioXriv) doi: <https://doi.org/10.1101/2023.05.17.541061> called "FLASH PAINT". He pointed out that the problem with exchange PAINT is that it requires multiple imaging DNA strands, which are expensive to make, that the sample requires extensive washing to remove each one, before adding the next, and is best used in total internal reflection fluorescence microscopy (TIRFM). In this new, faster approach, TIRFM isn't required, and only a single imager probe is required in this multiplex imaging approach, removing the

need for extensive washing and making the cost of this approach much cheaper. Lothar Schermelleh (Oxford), an expert in structured illumination microscopy (SIM), talked about using this approach to image chromatin in nuclei, and how well his results matched those of EM. He explained how it was important to check if SIM was working correctly and not introducing any artefacts. Hari Shroff (Janelia) provided a great and clear introduction to image restoration via deep learning approaches, something he has used effectively in iSIM to enable long term imaging at low light (and low signal to noise) intensities. He explained how we need better predictors of when these methods fail, how to be aware of failures, what was sensible to try and what should be avoided. Sandrine Leveque-Fort (Paris) how she is adapting her single molecule microscopy approaches to image thicker specimens such as spheroids., using an approach called "Modloc" (time-modulated excitation for enhanced single-molecule localisation microscopy) to increase resolution x2.4 in one direction, showing beautiful images that demonstrated this new approach. Juliette Griffié (Stockholm)

explained inputs, encoders and decoders in AI and how she could use AI to assign fluorescent images of bacteria sequentially to specific points in the cell division cycle, if the data is presented in the right way (backed up with simulations), together with all the pitfalls to look out for. Finally, Christian Eggeling introduced his work on diffusion at the plasma membrane: picket fences or not? He gave a great overview of all of the different imaging methods he has used to try to understand this process, and the advantages and disadvantages of each, and how potential errors in the measurements might arise. In addition to the main speakers, we had 7 short talks from early career researchers on a range of topics related to the main meeting, from expansion microscopy to using nanodiamonds in microscopy.

Among feedback from attendees, we quote Dr Debora Keller Olivier (Abbeville, France) who said, "It was a fantastic event and gathering of super-resolution researchers". Dr Ralf Richter (Leeds, UK) said, "I thoroughly enjoyed the talks, and perhaps even more importantly, the discussions that they generated. Well done for getting an excellent set of speakers covering a range of topics and willing to communicate both pros and limits of their pet techniques."

We are very grateful to the EMS for supporting this event, with the funds helping to cover the expenses of two invited speakers. ■

After lunch and discussions: awaiting the next talk!



**Michelle Peckham**  
University of Leeds, Faculty of  
Biological Sciences, Leeds, United  
Kingdom

**Izzy Jayazinge**  
University of Sheffield, Sheffield,  
United Kingdom

# TEM-UCA 2023 European Workshop. Transmission Electron Microscopy of Nanomaterials

*Puerto Real, Cádiz, Spain; July 17-21 2023*



## Introduction and concept

TEM-UCA European Workshop Transmission Electron Microscopy of Nanomaterials is devoted to review the advancements of Transmission Electron Microscopy, both imaging and spectroscopic techniques, in the characterization of a wide range of nanomaterials. A series of conferences illustrate how S/TEM techniques as High-Resolution Transmission Electron Microscopy, High Angle Annular Dark Field imaging, Electron Tomography, Electron Energy Loss Spectroscopy, and Cs corrected S/TEM studies can be combined to obtain structural and chemical information of the analyzed materials at the atomic scale. Some examples illustrate the practical aspects of nanomaterials characterization and its applications in different fields.

## Location and infrastructure

TEM-UCA European Workshop Transmission Electron Microscopy of Nanomaterials was held at the Faculty of Science of the University of Cádiz in Puerto Real, Spain. The Faculty has all the infrastructure required to host the workshop with conference rooms and computer labs. The Electron Microscopy Division at the Faculty of Science of the University of Cádiz (DME-UCA) was created in 1989 as an instrument to boost the research in the field of Scanning/Transmission Electron Microscopy. This division has been dedicated to continuous improvement in organizational issues, equipment resources and the qualification of technical personnel, to guarantee high quality services. DME-UCA is equipped with state-of-the-art instrumentation, among them: an Ultra High Resolution Double Corrected S/TEM Titan Themis 60-300 and a High-Resolution SCIOS2 DUAL BEAM Station.

Participant accommodation was organized by the “TEM-UCA European Summer Workshop”. The participants were lodged at “Colegio Mayor de la Universidad de Cádiz” located at Cadiz city center.

## Scientific content and program:

The program consisted of:

- 5 lectures
- 6 practical Sessions, where the students were trained in the practical use of different software packages, some of them developed at CME-UCA, with application in 2D and 3D S/TEM imaging and analytical techniques.
- A poster Session, where the attendees could present their work and discuss with experts in the field
- A visit to the Electron Microscopy Division at the University of Cádiz (DME-UCA), including demos of different techniques.

The participants of the workshop were divided in 2 groups (A & B) to participate at the computer labs. The topics covered in these computers labs were: High Resolution Electron Microscopy (HREM), Digital Image Processing and Simulations, Modeling of Nanoparticle-based materials, Electron Energy Loss Spectroscopy (EELS), X-Ray Energy Dispersive Spectroscopy (EDX) and Electron Tomography.

## Information

The workshop was attended by 22 participants from 7 countries: Germany, Algeria, Slovenia, Spain, Lithuania, Morocco, and Portugal. The acceptance followed a first come, first served procedure.

The TEM-UCA 2023 School has been sponsored by the Spanish



Group photo of TEM-UCA 2023 European Summer Workshop.

Microscopy Society (SME), The European Microscopy Society (EMS), the UCA Institute for Research in Electron Microscopy and Materials (IMEYMAT) and the following companies: Aname, Gatan, IZASA, and Thermo Fisher Scientific. The Spanish Unique Infrastructure for Electron Microscopy of Materials (ELECMI), the “División de Microscopía Electrónica de la Universidad de Cádiz” (DME-UCA) and the European Project ESTEEM3 have also supported the TEM-UCA 2023 School.

The School has been administratively managed by FUECA, and organized by the Research Group “Structure and Chemistry of Nanomaterials”, at the Faculty of Science of the University of Cádiz (Departamento de Ciencia de Materiales, Ingeniería Metalúrgica y Química Inorgánica). ■

**José A. Pérez-Omil**  
Director of the TEM-UCA 2023  
School, University of Cádiz, Cádiz,  
Spain.

<http://tem.uca.es>



# The 2023 “Microscopy at the Frontiers of Science” Meeting (MFS2023)

From September 26-29<sup>th</sup> 2023, the Portuguese and Spanish Microscopy Societies hosted the Iberian Microscopy Community at the International Iberian Nanotechnology Laboratory in Braga, Portugal. The 2023 “Microscopy at the Frontiers of Science” Meeting (MFS2023) was the first in-person one since the 2019 meeting, that gathered the community together in Granada, Spain. The long absence of opportunities to meet together was reflected in the high attendance numbers and the impressive quality of the science presented.

Meeting attendees had the opportunity to interact with the three superb international keynote speakers: Jürgen Plitzko (Max-Planck-Institute of Biochemistry), Errin Johnson (Dunn School Bioimaging Facility), and Nigel Browning (Chair of Electron Microscopy, School of Engineering | Director of the Albert Crewe Centre for Electron Microscopy, University of Liverpool).

The conference exhibition hall hosted poster presentations and company demo booths and was a vibrant place during coffee breaks and social gatherings.

Seven exceptional students received well deserved recognition for their PhD Thesis work.

The recipients of the 2021/2022 Best Thesis awards were:

- SPMicros 2021/2022 Best Thesis Award in Technical Developments  
Recipient: *Francisco Rosário de Figueiredo*; Sponsoring company: Thermo Fisher Scientific
- SPMicros 2021/2022 Best Thesis Award in Life Sciences  
Recipient: *Andreia Pinto*; Sponsoring company: Izasa Scientific
- SPMicros 2021/2022 Best Thesis Award in Material Sciences



- Recipient: *Ricardo Manuel Oliveira Sousa*; Sponsoring company: ZEISS Research Microscopy Solutions
- SME 2021/2022 Best Thesis Award in Technical Developments  
Recipient: *Sergi Plana Ruiz*; Sponsoring company: Thermo Fisher Scientific
- SME 2021/2022 Best Thesis Award in Life Sciences  
Recipient: *Marta Pérez Illana*; Sponsoring company: Tescan
- SME 2021/2022 Best Thesis Award in Material Sciences  
Recipient: *Ting Zhang and Xu Han*; Sponsoring company: ZEISS Research Microscopy Solutions

As the dust settled, the final numbers from MFS2023 were 3 social gatherings, 3 plenary speakers, 5 invited speakers, 15 gracious corporate sponsors, and 17 awards recognizing the excellence of the students in the community. The scientific schedule was packed with 43 posters, and 125 talks, which were presented by the almost 200 registered scientists.



If that was not enough there was also a satellite meeting around the MultEMplex COST Innovators Grant (CIG), which brought together scientists developing a new biological electron microscopy grid. This was a meeting of a diverse community of life and material scientists, and company representatives who together have the shared goal of expanding technical capabilities in the CryoCLEM field.

Overall, the MFS2023 conference was a meeting with great science fuelled by good food where wonderful friends and colleagues could come together and build collaborations and memories



all at the world class venue of the International Iberian Nanotechnology Laboratory.

We want to thank all the event sponsors who supported our meeting, including the EMS. Also, we would like to congratulate all the speakers and poster presenters for their excellent contributions. A special thank-you to all the student volunteers who helped us throughout the meeting. A whole community is needed to organize and host such a conference, and the conference organizers are grateful for the support that was given.

The next MFS will be held in 2025 and it will be hosted in Spain by the Spanish Microscopy Society. We are of (the (potentially biased) opinion that you should watch out for the meeting announcement and reserve some of your time to join us in Spain! ■



**Erin Tranfield (President of SPMicros)**

Instituto Gulbenkian de Ciência, Rua da Quinta Grande, 6, 2780-156 Oeiras, Portugal

**Juan de Dios Alché**  
President of SME

Dpto. Biología Reproductiva de Plantas Estación Experimental del Zaidín EEZ-CSIC, Granada

# CMD 30-Fismat. New perspectives in electron microscopy for condensed matter Physics.

## Mini-colloquium

Milano, Italy; September 4-8 2023



Mini-colloquium - New perspectives in electron microscopy for condensed matter Physics: opening session.

The mini-colloquium on the “New perspectives in electron microscopy for condensed matter Physics” took place on the fourth and fifth day of the CMD 30 – Fismat conference (September 4<sup>th</sup>-8<sup>th</sup>, 2023 – Milano, Italy), which joined a worldwide audience of 1600 participants and boasted up to 30 daily sessions.

Scientists, researchers and students mostly working in the European countries attended the 18 talks distributed over the three sessions of the minicolloquium, with lively and participated questions & answers times during and

after the sessions and in the EMS sponsored networking dinner on the evening of September, the 7<sup>th</sup>.

A variety of topics on the frontiers of electron microscopies for the investigation of condensed matter were covered by the speakers, ranging from the development of new facilities and networks on the European scene (R. Ciancio, G. Nicotra and A. H. Tavabi) to the efficient data analysis by machine learning (S. Conesa-Boj), the investigation of advanced materials (F. Morabito, L. Rovatti, S. M. Pietralunga, A. Konecna), the investigation of the dynamics by

time-resolved imaging (G. M. Vanacore, M. Zaghloul, T. Chloubka), the evolution of energy and momentum selective spectromicroscopy in TEM and SEM microscopy (G. M. Vanacore, C. Rodenburg, F. Mika, W. Cao, A. Khursheed, A. Knápek, A. Kosari Mehr), and finally to the methods of simulation of electron-matter interaction (S. Taioli). ■

**Alberto Tagliaferri**  
Politecnico di Milano,  
Milano, Italy

**Jacob Hoogenboom**  
TUDelft, Delft,  
The Netherlands

**Filip Mika**  
ISI CAS, v.v.i., BRNO,  
Czech Republic

**Silvia Pietralunga**  
CNR-IFN, Milano, Italy

<https://eventi.cnism.it/cmd30-fismat/minicolloquia>



Mini-colloquium - New perspectives in electron microscopy for condensed matter Physics: EMS sponsored networking dinner

# Winter School 2023

Zurich, Switzerland; January 23 - 27 2023

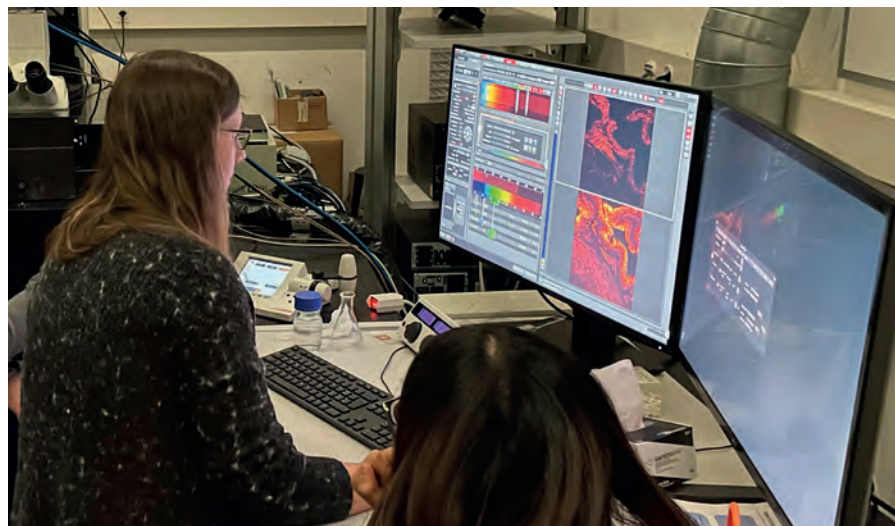
This advanced microscopy course is organized by the Center for microscopy and Image Analysis of the University of Zurich and the Scientific Center for Optical and Electron Microscopy of ETH Zurich. The course is intended for PhD students and post-graduates with prior experience in microscopy. The goal of the course is to teach and train fundamental knowledge and skills in a specific microscopic technique. Subsequently, students should be able to apply the knowledge in their own present and future projects. Practical work consists of five different modules each covering a specific topic. Each practical module lasts the entire duration of the course. Students participate in one module only and use state-of-the-art instrumentation. Theoretical sessions cover basic and advanced knowledge about all the different techniques and topics. The Winter School 2023 was attended by 51 students, mainly PhD students from universities in the Zurich region and other universities in Switzerland, but also some students from Germany, Austria, Denmark and Slovenia. More than 25 teachers and lecturers from Switzerland and abroad were involved to impart knowledge and practical skills during these five intensive days.

## Advanced Light Microscopy

In this module, participants learned how to select the most appropriate advanced light microscopy technique such as confocal laser scanning, multiphoton or super resolution (STED) microscopy for their projects. Practical training comprised advanced widefield, confocal laser scanning, multiphoton, and super resolution microscopes with cell and tissue samples for multicolor and 3D imaging, including image processing such as deconvolution.

## Super Resolution Light Microscopy

Students were taught how to identify the most appropriate super-resolution light microscopy technique to address



the specific needs and sample. Numerous super-resolution or “quasi” super-resolution methods were covered including Structured Illumination Microscopy (SIM), Stimulated Emission Depletion (STED) microscopy, Single Molecule Localization (SMLM), Airy-scan, Re-scan, Super Resolution via Optical Re-assignment (SORA), and Super-Resolution Radial Fluctuations (SRRF).

## Sample Preparation for 2D and 3D Electron Microscopy

In this module, techniques to prepare biological specimens for 2D and 3D electron microscopy techniques were taught. Biological samples were processed by chemical and cryo-fixation techniques (high-pressure freezing, freeze-substitution) to preserve the ultra-structure. Subsequently, resin-embedded samples were sectioned by ultramicrotomy and imaged by transmission, scanning and focused ion beam scanning electron microscopy. The cellular ultra-structure in the resulting micrographs was reviewed in context to preparation.

## 3D Correlative Light and Electron Microscopy

Correlative Light and Electron Microscopy (CLEM) combines the best of two worlds: large-scale imaging using light microscopy and

high-resolution electron microscopy. This module covered the basics of methodology and preparation techniques needed to perform light and electron microscopic investigations on identical sample areas. Starting with imaging of living cells, samples were subsequently prepared for electron microscopy, and images were acquired by focused-ion beam SEM and serial blockface SEM. Additionally, post-processing of volume data such as aligning the acquired light and electron microscopy data in 3D, visualizing the correlation, and creation of 3D models was performed.

## Volume Scanning Electron Microscopy

In this module, scanning electron microscopy (SEM) based techniques for volume imaging were practically conducted: (1) Focused ion beam SEM, (2) serial blockface SEM and (3) array tomography. 3D data of the same sample were acquired using all three types of techniques. The practical session also covered image processing to visualize and model 3D data and structures of interest. ■

**Andres Kaech**

Deputy Head, Center for Microscopy and Image Analysis, University of Zurich, Winterthurerstrasse 190, 8057 Zurich



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## Reports on special events

# The International Workshop on Advanced and In-situ Microscopies of Functional Materials and Devices (IAMNano) 2023

*Matsue City, Japan; June 28 - July 1 2023*

The IAMNano 2023 international Workshop on Advanced and In-situ Microscopies of Functional Materials and Devices was organized by Prof. Yuichi Ikuhara, Prof. Naoya Shibata and Prof. Ryo Ishikawa from the University of Tokyo and held in Matsue City, Shimane Prefecture, Japan, from June 28 to July 1, 2023. This workshop was connected with the annual meeting of the “Japanese Society of Microscopy (JSM)” and provided an excellent opportunity to move the field forward, promoting scientific advances and international collaboration in a congenial atmosphere. It served as a venue for researchers and other specialists in different areas of microscopy, materials science, and materials engineering to discuss and exchange their latest findings and ideas with each other. The workshop was an outstanding event and a great success - it showed top-level research activity, provided ample opportunities to forge new friendships and planted the seeds for future collaborations.

The 3-day workshop was attended by 236 participants in total, among those 174 scientists and 62 company representatives. The program comprised 31 invited presentations given by international speakers from Australia, China, Germany, Japan, South Korea, Sweden, UK and the USA, a poster session with 76 contributions presenting the research of young scientists, and 5 vendor presentations and an exhibition showing latest developments of the manufacturers.

Impressive progress that has been made possible by aberration-corrected electron microscopy was shown by many of the world’s leading scientists in this field. Novel developments and challenges in instrumentation and instrumental methods and in advanced imaging, spectroscopic and in situ TEM / STEM characterizations were presented and discussed as well as their applications to physics and to materials science and to understanding novel materials and devices and

their properties. The topics included: electron ptychography at low dose, 3D atomic structure of crystal defects and amorphous materials, heterogeneities in phase transformations, multi-modal in situ characterization applying electrons and x-rays, in situ electron microscopy of strain effects and optical properties of semiconductor nanostructures and interfaces, phonon phenomena at interfaces and vibrational spectroscopy, topological properties, applications of 4D-EELS, 4D-STEM for 2D and 3D characterization of nanomaterials, magnetic-field-free atomic resolution STEM, nano-scale crystal structure analysis using CBED, electron holography study of the charge state of catalyst nanoparticles, novel contrast mechanism in 4D-STEM, 4D-STEM and crystal structure via the scattering matrix, 3D imaging by STEM depth sectioning, energy storage materials, nanoscale-light matter interactions using fast electrons, STEM and EELS for data-driven materials research, cryogenic electron microscopy for





quantum materials, electron microscopy and spectroscopy of low-dimensional hybrid materials, single-atom vibrational spectroscopy with chemical bonding sensitivity, electronic structure of hetero-interfaces for spintronics, high-energy electron energy loss spectrometry system for advanced analytical electron microscopes, correlative CT and TEM in the development of battery technology, atomic-resolution TEM for high-speed dynamic observation, ferroelectricity in oxides, atomic mapping of topological domains in ferroelectric films, in situ TEM of the dynamics of lattice defects in metals, in situ scanning transmission electron diffraction of individual electrically biased phase change memory line cells, twisted epitaxy of gold nanoparticles in twisted MoSi<sub>2</sub> bilayers.

Poster presentations as an essential component of the workshop provided multiple occasions for discussions on a wide array of topics, including contributions on: phase and field imaging, electron holography, 4D-STEM, DPC-STEM, advanced spectroscopy investigations with EELS and EDS, in situ and environmental TEM and STEM, advanced characterization of functional nanomaterials and devices, a new FIB-SEM system, dose optimization in STEM, vacuum transfer system with a cryogenic technique, TEM analysis solutions towards carbon neutrality, imaging and analysis of beam-sensitive materials, atomic-resolution secondary electron imaging for surfaces of nanocatalysts, and more.

The IAMNano 2023 was an outstanding workshop in every aspect – the scientific program, the excellent talks, the informative updates by the vendor representatives, the impressive research, presented also in the poster sessions, the vivid interactions in exhibition areas and at the posters, and the many lively discussions among the participants. Two out of many opinions: “The openness of the discussions is of great benefit.” “Such smaller conferences with high quality contributions are really beneficial for all.” The international invited speakers appreciated the congenial manner in which Prof. Ishikawa acted as the overall Master



IAMNano 2023 The Organizers Professors Ryo Ishikawa Yuichi Ikuhara Naoya Shibata University of Tokyo Japan

of Ceremonies. Several outstanding social events contributed to the success of this workshop, enabling the participants to sample some of the rich cultural legacy of Matsue city and its environments and to enjoy its superb hospitality with regional delicacies and delicious seafood from Shinji Lake and the Japan Sea.

The organizers sincerely wish to acknowledge Matsue City, Mr. Akihito Uesada, Mayor of Matsue City, Shimane University, many organizations, and related companies for their strong support and collaboration for this workshop. Please see <https://webpark2165.sakura.ne.jp/iamnano2023/> for more information on the workshop.

IAMNano was first held in Krakow, Poland (2012), and subsequent workshops were hosted in Rio de Janeiro, Brazil (2014), Hamburg, Germany (2015), Port Elizabeth, South Africa (2016), Singapore (2017), Hamburg, Germany (2018) and Duesseldorf, Germany (2019). Unfortunately, the workshop series was disrupted from 2020 to 2022 because of the Covid-19 pandemic. Being the 8<sup>th</sup> in the series,

IAMNano 2023 kick-started the workshop as an annual event once again. An IAMNano 2024 international workshop will take place from June 26 – 28, 2024, at Chalmers University of Technology, Gothenburg Sweden. ■

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# Ernst Abbe's diffraction theory of imaging

## Introduction; light as rays and waves

Optics was essentially geometrical—linear—optics until the discovery of “interference” by Young and Fresnel in the early 19<sup>th</sup> century, a phenomenon which caused a reevaluation of Huygens’ age-old wave theory. Light became a transverse phenomenon with waves that could “interfere” constructively and destructively while being subject to polarisation e.g. by reflection (Malus). Particular colours of light could be identified by their wavelength, whose measurement, since Fraunhofer, allowed for an unprecedented precision.

In dioptrics, the path of a light ray through a lens could still be constructed & calculated in the traditional order with compass, pencil and ruler by making use of the refractive indexes air → glass (3/2) and glass → air (2/3). In the last quarter of the 19<sup>th</sup> century millimetre paper was introduced, a new tool that, in due course, would greatly simplify the procedures.

## Ernst Abbe (1840-1905); microscopes

What had been a matter of artisanal trial and error in the construction of microscopes became a branch of applied science thanks to the physicist Ernst Abbe. Abbe had been recruited, in 1866, by Carl Zeiss, Jena (DE), the owner of a workshop for the production of optical instruments. Zeiss charged Abbe with an *ab initio* analysis of the working of microscopes on scientific principles. One of Abbe’s first innovations, then, was the development of a so-called “refractometer”, a high-precision instrument to measure the refractive index of a particular glass—in trigonal prismatic form—for a particular wavelength, and so in four or even five decimals. In much the same spirit additional instruments were introduced, initially only for domestic use, in Jena, but later on also commercially made available. Just think of the “spherometer” for the determination



**Figure 1:** Ernst Abbe (ca.1876; lithography by Peter Halm). Courtesy: Carl Zeiss Archive, Jena.

of the radius of curvature of lens surfaces, the “focometer” for that of focal lengths and the “apertometer” for that of the aperture. Liquids were also interesting: for immersion (e.g. water), for kitting lenses (e.g. Canada balsam) and for liquid lenses (e.g. CS<sub>2</sub>). For these, a special refractometer was designed. By and by the stage was set for a revolution in microscopy as an exact science. In 1873, Abbe presented a summary of his findings and conclusions, demystifying in the process quite some claims in the literature, i.a. concerning the tubus length, the maximum attainable magnification, the elimination of aberrations (spherical and chromatic) and artefacts, i.e. non-conformal images. Abbe’s paper, entitled “Beiträge zur Theorie des Mikroskops und der mikroskopischen Wahrnehmung”, was duly translated into English (1875) and French (1877). We will discuss its message—and the latter’s context—on the base of Abbe’s *Gesammelte Abhandlungen* (ref.4) and refer to Felix Auerbach’s biography, *Ernst Abbe [...]* (ref.5). Crucially, anno 1873,

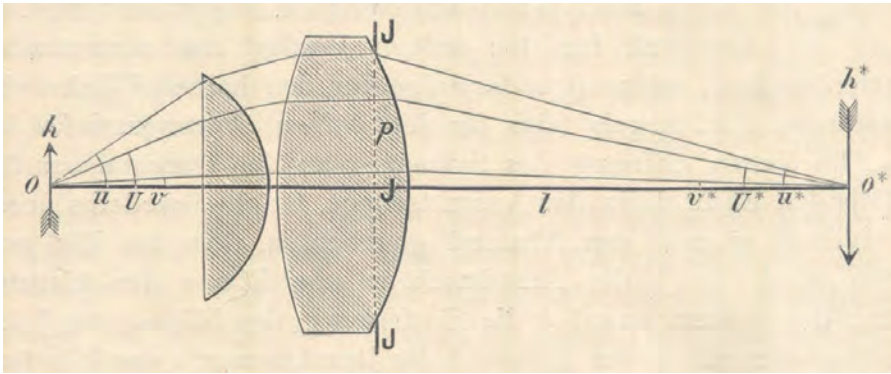
the optical glass trade was still dominated by two manufacturers: Charles Feil (Paris) and Chance Brothers (near Birmingham). Their assortments were limited to crown glass and flint of otherwise varying composition and quality. No wonder, then, that producing series of lenses of identical numerical properties (diameter, radii of curvature, focal lengths) was a challenge, to say the least.

## The compound microscope; imaging; aberrations, anomalies

In the traditional view of the working of a *compound* microscope, it reduced to the production of a real, enlarged, inverted image in the back focal plane of the objective, to be further enlarged by the ocular which, as a traditional loupe, produces a virtual image at proximity distance. However useful in a first approximation, this presentation doesn’t account for the superior quality of the images produced by *compound* microscopes as compared to the *simple* ones. Indeed, even in cases where a “simplex” appropriately magnifies an object, the *quality* of the image produced by a “compositum” of similar magnification is far superior. It is all a matter of “definition” and “resolution”, terms which, on their own, also needed clarification. Essentially, then, the imaging of a compositum is not a matter of stepwise magnifications. Indeed, the objective should be regarded as a loupe, whose virtual image is observed by the ocular, which functions, with Abbe, as a telescope by transforming beams of parallel rays of light into an image. Abbe’s reasoning, here, is charmingly straightforward in that he refers to the experimental fact that a given *telescope* may be transformed, on an optical rails, into a microscope simply by putting a loupe before the telescope’s objective.

The ideal microscope, then, is aberration-free and produces what Abbe calls “aplanatic” and “orthoscopic” images: each point of the object corresponds to a particular image point





**Figure 2:** The sine condition for an “aplanatic” optical system with a large opening angle:  $\sin U^* : \sin u^* = \sin U : \sin u$ . It states formally that all rays stemming from an object point should converge to one and the same image point (from: ref.1, p.331).

and the local geometrical relations between object points and image points are identical, in other words: object and image are conformal. The mathematical expression became known as the “sine rule” (see Fig.2).

What, then, are the optical particularities of the microscope? The most important is the unusually large opening angle,  $\alpha$  (small focal distance,  $f$ ), a fact that causes imaging errors of two kinds. The first concerns the focalisation proper, the other the magnification. To the first belong the well-known “aberrations”, spherical and chromatic, which determine the optimum achievements of the microscope. The second concerns a series of “anomalies” characterized by images of varying magnification, whose effects determine predominantly the non-central parts of the image; here the foremost are coma and astigmatism. The structure of the objective thus is crucial for the imaging; the ocular, for its part, only produces, like any telescope, an angular magnification and may be considered as approximately error-free.

### Diffraction, of two kinds

For any given objective, then, there is a maximum angular magnification, which can be attained in various ways by various combinations of ocular and tubus length, that is: for a root-mean-square observer with a proximity distance of 250 mm. We cannot be too exact in these matters, according to Abbe, since the light source and the structure of the object also concur. At the least, it is clear that many manufacturers—among

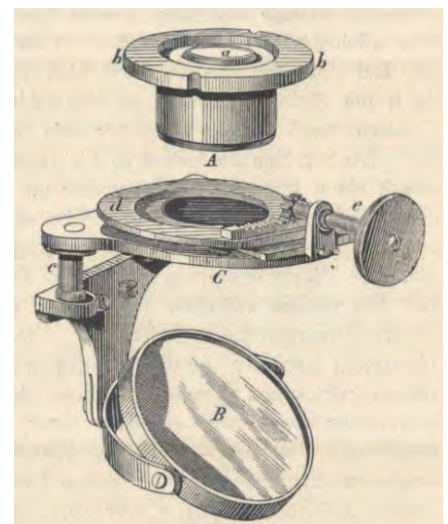
whom the most renowned—exaggerate the power of their microscopes where they claim magnifications of several thousands up to  $\times 10.000$  or even more. For Abbe, then, the angular magnification by the ocular is at best  $\times 8$  for relatively weak objectives (with e.g.  $f = 4$  mm). Stronger objectives have been made indeed, but most of the time their technical perfection leaves much to be desired. One of the limiting factors, here, has been overlooked up till now: it is the diffraction—that novelty of Young and Fresnel—brought about by the rim of the tiny opening. This effect transforms the image of each object-point into a diffraction ring and the smaller that opening the greater its influence on the imaging. If anything, therefore, progress is only feasible by further perfecting the objectives in the range of  $f = 3$ -4 mm. Broadly speaking, the quality of the virtual image produced by the objective depends on the angular magnitude of the diffraction rings that derive from aberrations and anomalies.

Aberrations and anomalies occur together and depend on each other, hence the importance of trying to isolate them and study them individually. Here, artificial 2D objects have proven indispensable. They consist of gold or silver foil of less than 1 micron thick carrying 10-50 grooves per mm, glued between cover plate and object glass. These “gratings”, then, should be illuminated at the same time by several, adaptable plane light beams (of the same source) within the opening angle of the objective under investigation.

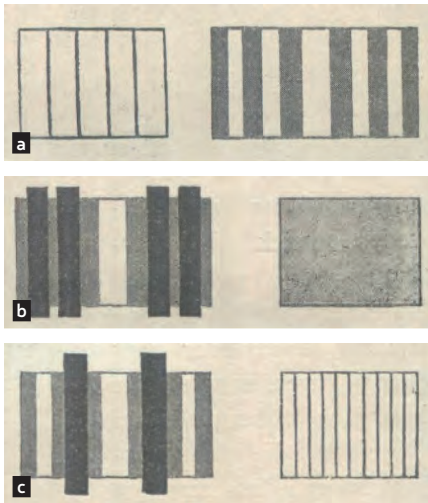
The set-up will allow to study the effects on the central and peripheral circular zones of the opening angle and to compare these *inter se*. All errors in the focalisation will become visible in this way, that is: the aberrations proper.

The illumination, therefore, is of crucial importance. A flat mirror, for instance (cf. Fig.3), produces a beam of light which, by the condenser, is focused on the object such that each detail in the object becomes a light source of its own. Part of that light, a cone, will be intercepted by the front lens of the objective and further converge to the latter’s back focal plane.

Here the opening angle  $\alpha$  comes in. Abbe, then, takes his time to study its effect in case of a whole series of natural products (butterfly wing scales, diatoma, ...) and artificial objects (parallel grooves in glass or in silver-foil-on-glass, powders, ...). As long as the free aperture of the front lens is big enough to make the diffraction effect of its rim vanish, there is in principle no problem. On the other hand it appears that a larger opening angle is favorable for the study of details: the smaller the

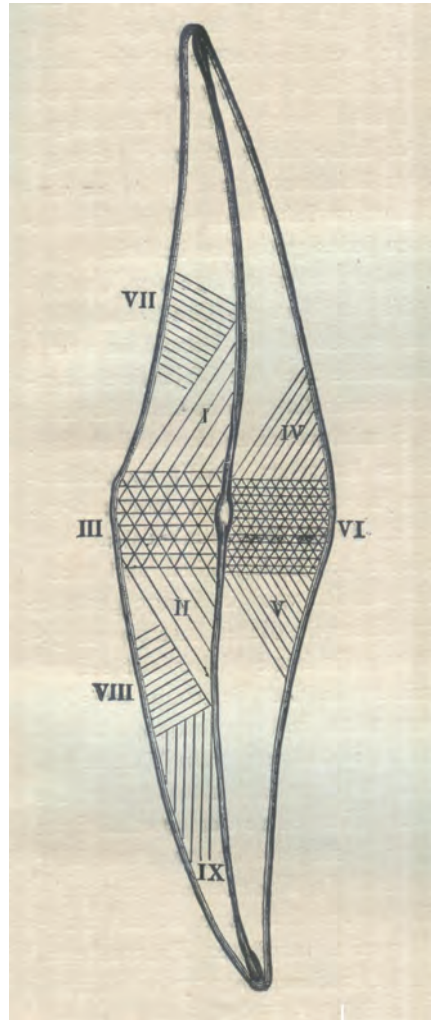


**Figure 3:** Abbe’s newly developed illumination device, the “condenser”. Aa consists of two lenses with  $f_a = 2$ -3 mm,  $f_A =$  ca. 15 mm, a being hemispherical. It is mounted in a brass ring bb which neatly fits in the object table. C functions as (adaptable) diaphragm, allowing, through e, for radial shifts and rotation over  $120^\circ$  to create skew illumination; a set of perforated discs ( $\phi = 1$ -7 mm) may be put in place under d. B is a flat mirror



**Figure 4:** A grating, its primary image and secondary diffraction images according to Abbe (a). When all secondary images are covered by a diaphragm close to the back focal plane, the image observed through the ocular reveals no detail (b). When only the innermost two are covered, the number of lines observed is double that of the object. Abbe's conclusion was clear: diffraction is key to understanding the imaging of details. (from: ref.2, p.107).

details, the larger the opening should be. In case of fine stripes or lines, the use of skew illumination—skew with respect to the optical axis of the microscope—enables the observation of finer details: it increases the “resolution” because secondary images survive. Skew illumination is just one of the external tricks to improve the working of the microscope. Again diffraction effects show up, this time caused by regularities in the details of the object: layers, stripes, point series. White light becomes dispersed in spectral series, the distances depending on those between the details. This effect adds to that of the opening. Indeed, in case of a grating as object, we observe, when looking into the tubus *without the ocular* a series of secondary images on the right and on the left which feature spectral colours (**Fig.4**). Cross-gratings—or natural objects of a similar structure—feature those secondary images not only in orthogonal series but also along the diagonal. Diatomae and butterfly scales abound in these effects. A celebrated case of those days was the Diatoma genus *Pleurosigma* whose structure, because



**Figure 5:** Pleurosigma genus schematized (from: ref.5, p.203).

of the countless diffraction patterns of its various parts, enchanted the micrographers (**Fig.5**).

### Imaging by superposition

The image that results from an appropriately thin and flat object thus is a superposition of the central “absorption image” and the “secondary images” deriving from diffraction. Typically, that “absorption image” determines the overall picture, the “definition”, while the “secondary images” add the details; the latter, therefore, determine the “resolution”. The larger the free aperture and the opening angle, the more secondary diffraction beams enter the front lens and the larger the “resolution”. Hence it is that the

immersion technique is such a success, since it allows to maximise that opening angle. ■

### Acknowledgment:

I am greatly indebted to **Carl Zeiss AG**, Jena, for its hospitality and to **Wolfgang Wimmer**, Director of its Archive, for his generous support. This is also the place to thank **Birgitt Hellmann** of Jena's City Archive for kind info.

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### References

1. E. Abbe, “On the estimation of aperture in the microscope”, in: *Journal of the Royal Microscopical Society* 2 (1) 388-423 (1881). Also in ref.4, p.325-374 (German translation by A. König).
2. E. Abbe, “Über einen neuen Beleuchtungsapparat am Mikroskop”, in: *Archiv für mikroskopische Anatomie* 9 469-480 (1873). Also in ref.4, p.101-112.
3. E. Abbe, “Beiträge zur Theorie des Mikroskops und der mikroskopischen Wahrnehmung”, in: *Archiv für mikroskopische Anatomie* 9 413-468 (1873). Also in ref.4, p.45-100.
4. E. Abbe, *Gesammelte Abhandlungen*, volume I, Jena: G. Fischer, 1904 (reprint Hildesheim: G. Olms, 1989).
5. F. Auerbach, *Ernst Abbe. Sein Leben, sein Wirken, seine Persönlichkeit*, Leipzig: Akademische Verlagsgesellschaft, 1918.

### Background literature

- L. Dippel, *Das Mikroskop und seine Anwendung*, Braunschweig: F. Vieweg, 1867 (vol.I), 1869 (vol.II) (reprint, London: Forgotten Books, 2018).
- H. Kubbinga, “Ernst Abbe's research program (1878-1886). How did he succeed in creating the ‘apochromatic’ objectives?”, in: *Imaging and Microscopy* 24 (1) 14-16 (2022).

Online accessible through:



# 19<sup>th</sup> edition of the Competition FOTCIENCIA scientific photography

**P**olysaccharide galaxy. A SEM micrograph of a starch gelatinized granule was awarded a prize, under this surprising title, in the scientific photography competition FOTCIENCIA19, organized by CSIC (Spanish National Research Council) and FECYT (Spanish Foundation for Science and Technology).

The picture (by Antonio D. Molina-Garcia, researcher of the Institute of Food Science and Technology and

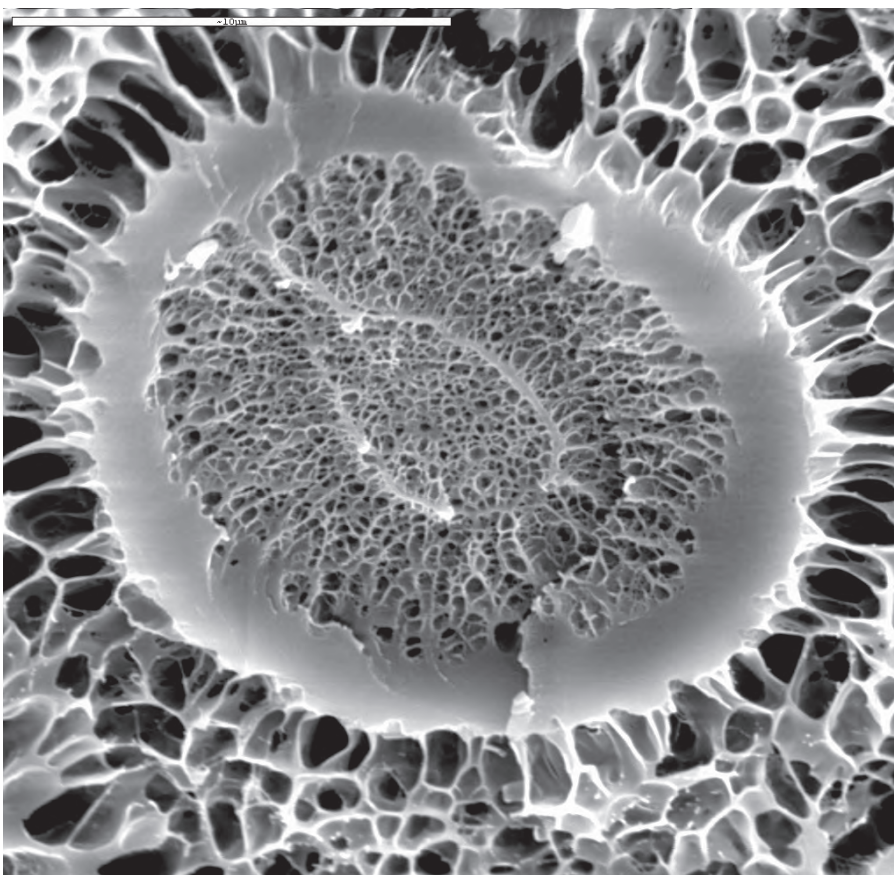
Nutrition, ICTAN-CSIC) was obtained within a research work on the effect of High Hydrostatic Pressure on starch (a growing-use food process). To achieve (or to avoid) starch gelatinization is critical to accede the main plant glucose and energy reservoir (or to obtain modified starch which less and slower glucose release). In the picture, a tapioca starch granule was observed after treatment at 400 MPa in excess water, as its structure (a very tight and complex packaging that cannot be

enzymatically digested) starts disintegrating from the inside of the granule, interchanging intramolecular hydrogen bonds with water. When this granule was observed under low-temperature scanning electron microscopy (cryo-SEM), the image scarcely resembled native starch. An “exploding far-away galaxy”, a “neural ganglioma”, a “dissected sea-urchin”, or even “Sauron’s eye”..., appear as more likely captions.

A small amount of water in the sample (allowed, as cryo-SEM observation takes place at  $-150^{\circ}\text{C}$ ) is partially responsible of the granular remains showing a deployed, not collapsed, state. A Zeiss DSN-960 scanning microscope with an Oxford Cryotrans CT-1500 coldplate was used at the Environmental Science Center, CCMA-CSIC, Madrid, Spain, operated by Fernando Pinto.

Among the other prized images in FOTCIENCIA19, exhibited around Spain during 2023, there were a number of spectacular micrographs, obtained by different microscopic techniques. They are a prove of the fascination of images and the suggestions of the infinite range of possibilities linking the micro and macro world. ■

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<https://www.fundacionjesusserra.org/eng/research-and-education/scientific-photographic-contest-fotciencia>



Polysaccharide galaxy

## The Beyondnano Sub-Å lab

**B**eyondnano Sub-Å lab electron microscopy center, with its staff, three electron columns and its full set of specimen preparation instruments, in one of the most advanced electron microscopy laboratories of the southern Europe. The laboratory is right now located into the premises on STMicroelectronics the biggest European semiconductor factory, and shortly will move to the newly constructed headquarter. The laboratory is runned by 5 researchers and two engineers, as well as many PhD students and postdoc. The activity of the laboratory is mainly focused on atomic resolved structural and chemical analysis of materials for application in semiconductors, environment and energy. The main techniques are Cs corrected S/TEM, EELS and EDX. The laboratory was born in the early 90's, and in the last 10 years consolidated the acquisition of instruments for structural and chemical

characterization, such as a cutting-edge probe corrected JEOL ARM200. Very recently the laboratory became part of the strategic infrastructure beyondnano upgrade and thanks new funds is experiencing a deep upgrade in the fields of low dose characterization, in-situ/ in operando techniques, nano ablation and nanoprototyping. A Gatan high sensitive single electron camera has been acquired together with a fully equipped monochromated FIB, Thermo Scientific Helios 5, a Leica UC7 Ultramicrotome and a complete set of protochips specimen holders for making experiments into the TEM in liquid and controlled atmosphere. Electron dose, temperature, as well as bias may also be monitored and varied while observing the specimens.

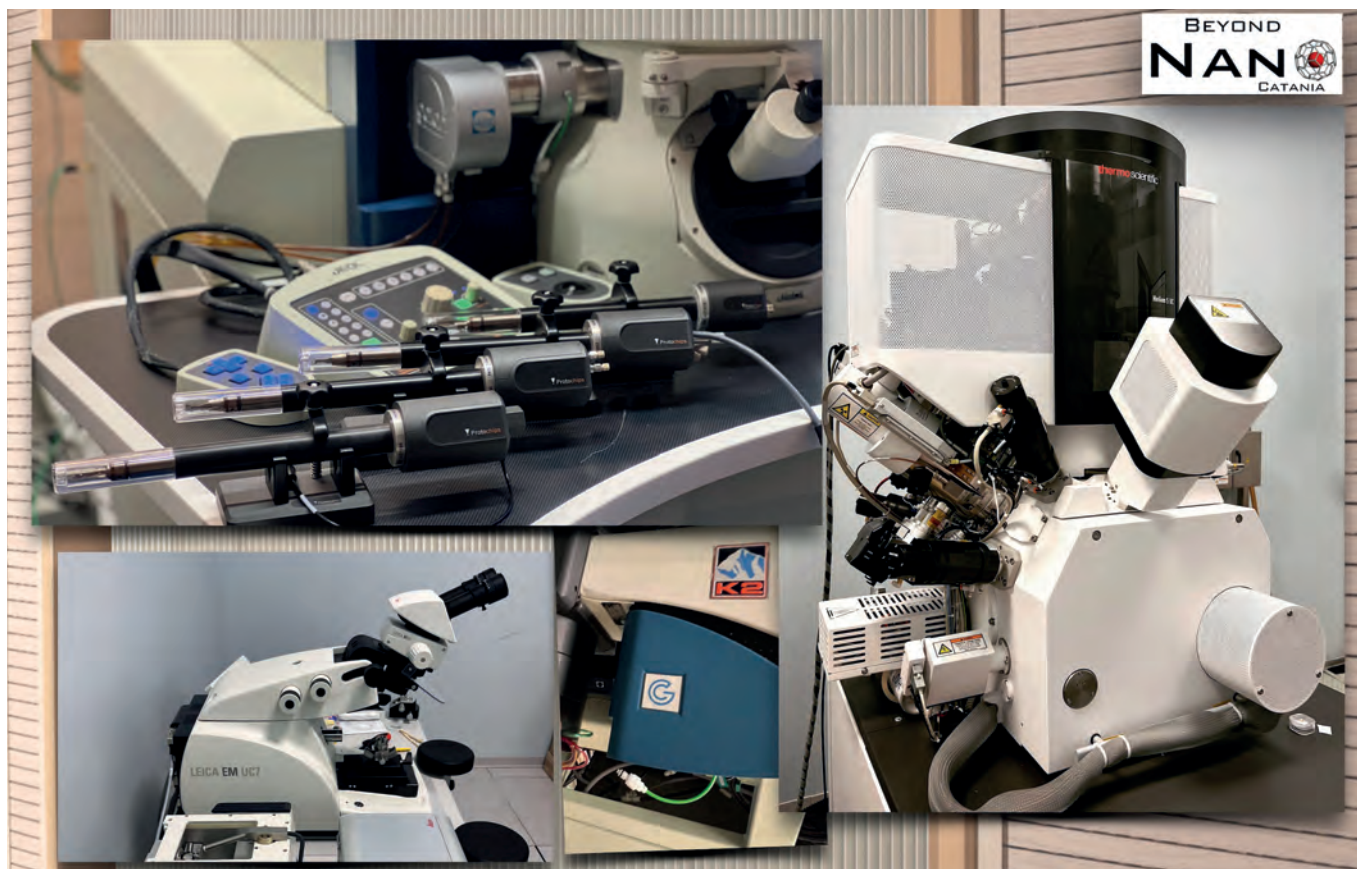
Beyondnano Sub-Å lab is now proud to announce the organization of the international congress Frontiers of

Electron Microscopy in Materials Science "FEMMS 2024", which will be held in Catania from 29<sup>th</sup> September to 4<sup>th</sup> October 2024. FEMMS is a biennial meeting focused on the application of electron microscopy, primarily TEM, in materials science.

Traditionally, FEMMS brings together approximately 40 invited speakers plus one distinguished lecturer that are world-renowned experts, principal investigators and project leaders, to present their latest advances in the field of electron microscopy in the materials sciences.

Stay tuned on [www.femms2024.it](http://www.femms2024.it) ■

**Giuseppe Nicotra**  
Head of the lab, Beyondnano  
microscopy lab. Center for  
Transmission Electron Microscopy,  
Catania, Italy



# 2023 Yael Mutsafi Memorial Prize

Dr. Jenny Capua Shenkar was awarded the 2023 Yael Mutsafi Memorial Prize for outstanding achievements in the field of microscopy in life sciences, by the Israeli Society for Microscopy (ISM): “I wish to extend my gratitude to the Israeli Society for Microscopy for acknowledging our research and its potential to positively impact various areas of study. Receiving this prestigious award is truly an honor”.

## Examining Atherosclerotic Lesions in Three Dimensions at the Nanometer Scale with Cathodoluminescence, Cryo-SEM and cryo-FIB/SEM.

Jenny Capua-Shenkar<sup>1</sup>, Neta Varsano<sup>1</sup>, Noya-Ruth Itzhak<sup>1</sup>, Ifat Kaplan-Ashiri<sup>2</sup>, Katya Rechav<sup>2</sup>, Vlad Brumfeld<sup>2</sup>, Lia Addadi<sup>1</sup>. <sup>1</sup>Department of Structural Biology, Weizmann Institute of Science, Rehovot 76100, Israel <sup>2</sup>Department of Chemical Research Support, Weizmann Institute of Science, Rehovot 76100, Israel.

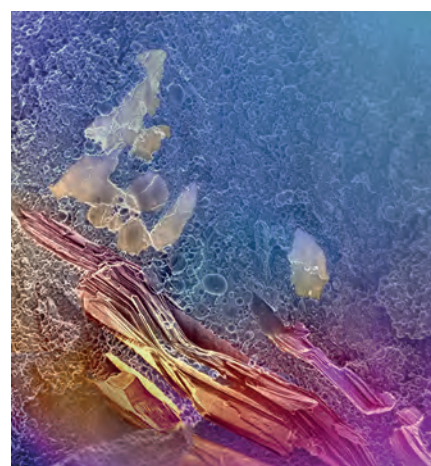
**A**therosclerosis is the primary contributor to cardiovascular diseases which constitute the leading cause of mortality worldwide. Cholesterol crystallization within atherosclerotic lesions is a central process in atherogenesis. Cholesterol crystals lead to plaque instability and rupture, which may result in myocardial infarctions, strokes and peripheral disease. Cholesterol crystals are associated with intra-lesional macrophages, however, the processes of crystallization as well as plaque regression following cholesterol crystal dissolution are still obscure.

We developed a designated workflow to allow systematic progress from low-resolution-high-volume examination of voluminous human atherosclerotic tissues, employing Micro CT, to high-resolution-low-volume examination of regions of interest using cryo-electron microscopy. The otherwise challenging detection of cholesterol deposits, was accomplished employing a correlative combination of Cathodoluminescence (CL) with Cryo-SEM and cryo-FIB/SEM in a systematic manner. Examination of both human and rabbit atherosclerotic lesions was performed in two and three dimensions, with minimal sample processing, maintained in hydrated, close to native state, conditions, with a resolution of tens of nanometers<sup>(1,2)</sup>.

In both rabbit and human tissues, early stages of crystalline cholesterol are

associated with intra- or extracellular lipid droplets and the outer membrane of multi-lamellar bodies. However, in humans, many of the mature crystals were associated with intriguing foamy lysosome-like structures comprising parts of mature, partially disintegrated cholesterol crystals, indicative of possible plaque regression through cholesterol crystal disassembly and clearance. Evidence for cholesterol crystal disassembly was detected only in the cellular regions of the lesions, while most of the lysosomal-like structures, some of which contained fragments of mature crystal morphologies, could be linked to individual cells. These intra-cellular lysosome-like structures were filled with aqueous vesicles, that were found to be associated with sites of crystal disintegration. Moreover, using our high-resolution 2D and 3D imaging techniques we showed that these same structures contained cholesteryl-esters. These observations suggest that active processing of cholesterol crystals by the intra-lesional cells is involved, through enzymatic esterification of cholesterol to cholesteryl-esters, which aggregate into intra- and extracellular pools.

Lipid droplets/multi-lamellar bodies play a role in cholesterol crystal nucleation which may partially occur intracellularly<sup>(1)</sup>. In humans, plaque regression may occur through active cell-mediated chemical transformation of crystalline cholesterol to form non-crystalline pools of intra- and extra-cellular



Cryo-SEM micrograph displaying cholesterol crystals within a human atherosclerotic lesion.

cholesteryl-esters. Combination of CL, cryo-SEM and Cryo-FIB/SEM allows direct, correlative and contextual high-resolution, three-dimensional examination of cholesterol deposits in atherosclerotic lesions. The developed workflow procedures could potentially benefit to diverse pathology-related fields of research. ■

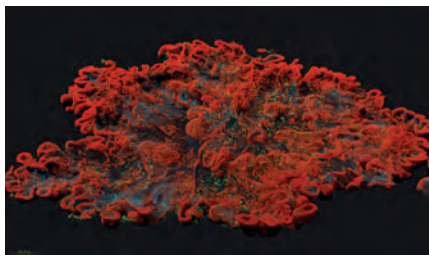
**Jenny Capua Shenkar**  
Department of Chemical and Structural Biology, Faculty of Chemistry, Weizmann Institute of Science, Rehovot, Israel

### Related publications

1. Capua-Shenkar, J., Varsano, N., Itzhak, N. R., Kaplan-Ashiri, I., Rechav K. Jin, X., Niimi, M., Fan, J., Kruth, H., Addadi, L. Examining atherosclerotic lesions in three dimensions at the nanometer scale with cryo-FIB-SEM. PNAS, 2022.
2. Capua-Shenkar, J., Kaestner, A., Rechav, K., Brumfeld, V., Kaplan-Ashiri, I., Avinoam, O., Speter, C., Halak, M., Kruth, H., and Addadi, L., (2023) Cell-mediated cholesterol crystal processing and clearance observed by 3D cryo-imaging in human atherosclerotic plaques, submitted for publication.

## Huygens Image Contest 2022

In early 2023, the first five prize winners of the Huygens Image Contest 2022 were honored with their respective prizes, among which the premier award was an impressive laptop. Each participant was bestowed with a desirable SSD drive bearing a printed reproduction of the winning image. Notably, the winning image was a frame extracted from a movie of a 2-photon tile scan showing a 40-day-old lung organoid, co-cultured with endothelial cells (depicted in green). The blue hue represents the DAPI nuclear marker, while the orange signifies the beta-Catenin. The sample, meticulously prepared by Anna-Lena Ament and Ana Ivonne Vazquez-Armendariz, PhD/AG Herold,



was captured using a 25x water/1.0NA objective at a 2-photon excitation of 1045nm. Post-acquisition, the final volume underwent deconvolution using the Huygens Essential software and was rendered at high quality with the Huygens SFP Renderer. Image acquisition and processing was performed by Dr. Ioannis Alexopoulos from ILH/CIGL

Multiscale Imaging Platform, Justus Liebig University Giessen, Germany. For a visual exploration of all five prize-winning images, kindly visit this webpage: <https://svi.nl/ImageContestWinners>.

It's noteworthy that the annual deadline for image submissions to the Huygens Image Contest falls in December each year. ■

**Vincent Schoonderwoert**  
 Director Marketing & Science,  
 Scientific Volume Imaging BV,  
 Laapersveld 63, 1213VB, Hilversum,  
 The Netherlands.

## Virtual Huygens Imaging Workshop 2023

*Virtual; April 25 - 26 2023*

Over the afternoons of April 25 and 26, 2023, Scientific Volume Imaging (SVI) hosted a highly successful virtual workshop, titled "Stay True to Your Imaged Object!" This event aimed to enlighten researchers about Nyquist image acquisition, and true restoration, visualization, and analysis of microscopy images utilizing the powerful Huygens Software. The workshop included topics such as PSF measurements, deconvolution, high-quality stitching, crosstalk

and chromatic aberration correction, and object and colocalization analysis.

With an attendance of nearly 200 enthusiastic participants who derived value from insightful lectures and interactive hands-on demo sessions, the workshop garnered widespread acclaim. The online chat box was actively used promoting a dynamic exchange of ideas among the participants and SVI staff.

Furthermore, over 35 participants actively took part in the examination, earning themselves a well-deserved certificate and bolstering their expertise.

Our next online workshop is scheduled for April 16<sup>th</sup> and 17<sup>th</sup>, 2024! Tailored to more advanced microscopists, this event will place a strong emphasis on escaping the Pyramid of Frustration, quality control, processing pipelines, and advanced super-resolution techniques. The workshop's timings are thoughtfully designed to accommodate



participants in the European and (East-) American time zone.

Secure your spot by saving the date, registering for free, and exploring more details on our website, [svi.nl](https://svi.nl).

We eagerly anticipate to your participation in what promises to be another enlightening experience! ■

**Vincent Schoonderwoert**  
 Director Marketing & Science,  
 Scientific Volume Imaging BV,  
 Laapersveld 63, 1213VB, Hilversum,  
 The Netherlands.





# Molecular Diagnostics Training School & Digital Pathology and Image Analysis Training School 2023

Vienna, Austria (hybrid); February 20 – 24 2023

This year the fifth *Molecular Diagnostics Training School (MDTS, 20-22 Feb 2023)* and the fourth *Digital Pathology and Image Analysis Training School (DP&IATS, 23-24 Feb 2023)*, being a joint venture of the Department of Pathology (Medical University of Vienna, Austria) and the Nottingham Molecular Pathology Node (University of Nottingham, United Kingdom), were – for the very first time – hosted as **hybrid** events.



Top left-hand corner: The Chair of the MDTS & DP&IATS 2023, the following images constitute a subset of the speakers who gave consent to use their photographs for this report.

Albeit being a great challenge, this global health crisis has also acted as a potent catalyst in the shift from the analogue to the digital space, not only in the academic educational setting. After three years, it was a delightful experience for delegates to be able to meet the speakers in person again, ask questions or have interesting discussions with them during breaks. Hence, the current events put a new complexion and depth of meaning on one of our main themes of the *training school (TS)*:

***“Digital Pathology and Image Analysis: Prepare, the future is here!”***

Being aware of the importance of introducing these new and emerging technical methodologies, the TS also aimed at providing sound post-graduate education in molecular diagnostics which was encapsulated in the second main theme of the TS:

***“Applying Molecular Diagnostics is important, not a miracle!”***

In line with this statement, lectures on basic methodologies, quality assessment/assurance as well as the implementation of molecular diagnostics that shall be performed on a daily basis, on an organ system level, were given by a number ( $n = 41$ ) of world-renowned experts in these fields.

After a week of intense lectures (~8.30 am – 6 pm) and lively discussions with a daily average **online** attendance of 59 attendees (MDTS: range: 58-61) and 31 attendees (DP&IATS: range: 30-33), and an average attendance **on site** of 17 attendees (MDTS: range: 17-18) and 11 attendees (DP&IATS: range: 10-12), we were delighted by the feedback from attendees (representative feedback statements were as follows):

- “Very informative course.” (MDTS)***
- “[...] highlights relevant content for general pathologists.” (MDTS)***
- “Nice and valuable presentation on a complicated field of pathology.” (MDTS)***
- “A lot of good insights from the laboratory.” (MDTS)***
- “I will use knowledge about image processing in my work which I learned in your course.” (DP&IATS)***
- “Very informative and well explained.” (DP&IATS)***

The majority of attendees noted that the sessions offered new insight or ideas that they could take back and apply to their jobs.

Hosting these TS on our dedicated event platform (Webex) also added to

the success of this hybrid event, which is reflected by the feedback and the consistent and animated engagement of attendees, and we are looking forward to next year’s *MDTS & DP&IATS*, which we plan to hold as hybrid events again over several days, to meet the demand from delegates and also provide a platform for the latest developments arising in this fast-paced and dynamic environment of molecular diagnostics and digital pathology. ■

**Chairs:**

**Univ. Prof. Dr. Renate Kain, PhD**  
Medical University of Vienna,  
Department of Pathology, Austria

**Prof. Mohammad Ilyas BSc, MBChB, DPhil, FRCPath**  
University of Nottingham,  
Division of Cancer and Stem Cells,  
United Kingdom

**Ao. Univ. Prof. DDr. Leonhard Müllauer**  
Medical University of Vienna,  
Department of Pathology, Austria

**Organizing Committee:**  
**Mag. Gertrude Krainz**  
Medical University of Vienna,  
Department of Pathology, Austria

**Maximilian Köller**  
Medical University of Vienna,  
Department of Pathology, Austria

# Three More Leeuwenhoek Microscopes

After more than three centuries, another unknown Leeuwenhoek microscope came to light last year. It was authenticated by Prof. Brian J Ford in Cambridge and is the third he has identified. In March 2014, he was asked to inspect a small silver magnifier at Christie's, the London auction house. Prof. Ford has studied and examined the Leeuwenhoek microscopes in the European collections for over 40 years, and by examining the method of manufacture, he ascertained this was a method utilised by Leeuwenhoek in the 1600s. The microscope was privately sold to a Dutch collector and is now on display in the Boerhaave museum in Leiden, Netherlands.

Just nine months later, he was told about a similar brass microscope being offered on Ebay. It was privately purchased by a Spanish collector, who contacted Prof. Ford. Prof. Ford was able to use the Hitachi S-3400N variable-pressure microscope at the Cavendish

Laboratory, which has a sufficiently large specimen chamber to accommodate the historic instrument. The SEM images and EDX data substantiated the authentic nature of the instrument. It is on display at the Museum of Science and Technology (MUNCYT) in La Coruña, Spain.

The third emerged in November 2023. It was found in a drawer in East Anglia and taken for appraisal at Christie's, who asked Prof. Ford to examine it. His new techniques proved the point once again. These unique investigations are all published with open access. The three new microscopes are invaluable resources for scholars of the history of microscopy. ■

### Brian J Ford

**Brian J Ford is a microscopist, an authority on the history of microscopy, and also an author, lecturer and broadcaster. He has affiliations with the universities of Leicester, Kent, Cardiff (where he is a Fellow) and Cambridge. [mail@brianjford.com](mailto:mail@brianjford.com)**



**Brian J Ford AvL microscope.** Prof Ford with his third new Leeuwenhoek microscope - found in a drawer in East Anglia, England, during house clearance. It was sold at Christie's in December 2023.



### avl-3mic1.

(L-R) From 2014, a silver Leeuwenhoek microscope now on display in Leiden. Later that year, a brass instrument from canal mud in Delft, now in La Coruña. In December 2023, a third microscope.



## In memoriam

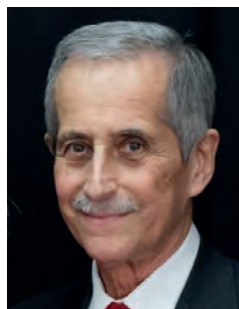
### *Kristóf Kovács (1948 - † 2023)*

**K**ristóf Kovács graduated as a chemical engineer in 1972 from the University of Chemical Industry in Veszprém and was employed by the University of Pannonia. In 1974 he received his doctorate, in 1994 his PhD in chemistry, and in 1995 he was appointed associate professor at the University. He later became Director of the Institute of Materials Engineering. After his retirement he continued to be actively involved in teaching and research and development.

He was an internationally renowned expert in imaging techniques (microscopy, electron microscopy, computed tomography, computer image processing), with particular expertise in the correlation between the structure and properties of technical ceramics, the utilisation of glass and electronic waste, and the development of functional material systems for alternative energy sources. In addition to his mother tongue, he also spoke English, Russian and German.

He was a member of the Veszprém County Chamber of Engineers, the Hungarian Society for Microscopy, the European Microscopy Society and the Society for Materials Science. Throughout his career, he worked continuously - for many years as Head of External Relations of the University - to strengthen the links between the University and its city, Veszprém and the region, with particular emphasis on the promotion of the scientific results of the University, the exploitation of scientific results and the promotion of the engineering profession. His city honoured him this spring the Pro Urbe medal of Veszprém.

We, the members of the Hungarian Microscopy Society (HSM), remember him as an outstanding member of our society. Kristóf succeeded Professor Pál Röhlich as President of the then Hungarian Electron Microscopy Society between 1994 and



2002. Besides to being the organizer of the annual national conferences in Balatonalmádi, he was one of the initiators of the Multinational Congress on Microscopy (MCM), a biennial conference series that brings together nine countries from 2015 and promotes collaborations. He was also the chairman of the fourth MCM event, held in Veszprém in 1999.

This alone should be enough for us, the members of the HSM, to remember him with respect and appreciation, even if we did not mention his professional recognition, the fact that he was one of the favourite lecturers at the University of Pannonia, his excellent popular scientific lectures, and that his company (SPI) sponsored even this year's our conference. Most of these facts will be eventually forgotten in time, but we will remember the always energetic, active, helpful, warm-hearted friend who loved us - and we loved him.

### *Arvid B. Maunsbach (1937 – † 2023)*

Arvid Bernhard Maunsbach, born May 9, 1937, passed away Sunday evening May 14, 2023, in Århus, Jylland, at the age of 86. We wish to extend our sincere condolences to Arvid's wife, Kaarina Pihakaski-Maunsbach, his children and grandchildren.

Arvid Maunsbach was honorary member of the Nordic Microscopy Society (SCANDEM). On behalf of SCANDEM Board, I have the honour of presenting here a brief summary of Arvid Maunsbach's life-long contribution to microscopical sciences

and to the Nordic Microscopy Society. Arvid Maunsbach began his medical study in 1956 at Karolinska Institute in Stockholm. During the first three years of study, he had a unique opportunity to visit University of California at Los Angeles as a research associate, to train on electron microscopy methods in ultrastructural studies. At the time electron microscopy was still a very new but fast-growing methodology. Arvid Maunsbach returned later to the University of California to work at the laboratory of Professor Fritiof Sjöstrand, whom he had

known at Karolinska before Sjöstrand moved to California. In 1966, Arvid Maunsbach defended his doctoral thesis at Karolinska, including eight published papers based on ultrastructural studies he had performed in Sjöstrand laboratory. One of the articles in his thesis was re-published over 30 years later, 1997, in the Journal of American Society of Nephrology (8, 323-351), with the comment that his study had in a fundamental way increased the understanding of the kidney structure and function.

Only 32 years old, in 1970, Arvid Maunsbach was appointed professor of anatomy at Aarhus University, Denmark, but in 1971 he was also affiliated to Yale University, USA. At Aarhus, he successfully continued his research. Together with Professor Peter Leth-Jørgensen, he received the Novo Nordisk Prize 1991, in recognition of their pioneering work on the fundamental correlation between the structure and function of the kidney. During his professorship at Aarhus, he also attended administrative work, as prorector (1977-80) and dean of the Faculty of Health Sciences (1992-99). He retired in 2007.

Arvid Maunsbach was among the leading members of SCANDEM. Just a few months before he passed away, he gave the society the original hand-typed minutes of the founding meeting (Protokoll vid sammanträde den 16 oktober 1948) at Manne Siegbahnlaboratoriet (Nobelinstitutet

för Fysik) in Stockholm, signed by Docent Fritiof S. Sjöstrand, appointed Secretary. The meeting was chaired by Docent K. Siegbahn and was attended by professors, physicists and engineers from Sweden, Denmark, and Norway, with the purpose to establish Scandinavian collaboration on electron microscopy. Kai Manne Börje Siegbahn (1918 – 2007) was a Swedish physicist who was awarded the 1981 Nobel Prize in Physics, for his contribution to the development of high-resolution electron spectroscopy.

Fritiof Sjöstrand (1912 – 2011), one of the founders of SCANDEM, was a pioneer in developing electron microscopy methods and especially ultrathin sectioning. As Arvid Maunsbach got to know him already during his studies in Stockholm and later at Sjöstrand laboratory in California, he had a unique insight into the history of electron microscopy as well as about SCANDEM. Arvid Maunsbach

became involved in the society early during his career, and later served both as President (1977-80) and Treasurer of the society. Many colleagues remember Arvid delivering SCANDEM travel grants in cash(!) at the annual conferences, as well as his friendly way of supporting and encouraging young researchers. In 1996 Arvid Maunsbach wrote, together with Björn Afzelius, the paper entitled 'The Development of Electron Microscopy in Scandinavia' including a brief history of the SCANDEM society (Advances in Imaging and Electron Physics 96, 301-321). Today SCANDEM includes all the Nordic countries (Sweden, Denmark, Norway, Finland, and Iceland), but has also members from other countries. The by-line "Scandinavian Society for Electron Microscopy" was in 2002 changed to "Nordic Microscopy Society".

**Kesara Anamthawat-Jónsson,  
SCANDEM President (2014-2024)**

<https://www.euremicsoc.org/en/european-microscopy/in-memoriam/>



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# European Microscopy Societies

# European Microscopy Societies

Number of EMS Members by Societies (2023)			
National and regional societies			# members
Armenian Electron Microscopy Society	(AEMS)	Armenia	
Austrian Society for Electron Microscopy	(ASEM)	Austria	143
Belgian Society for Microscopy	(BSM)	Belgium	314
Croatian Microscopy Society	(CMS)	Croatia	100
Czechoslovak Microscopy Society	(CSMS)	Czech Republic	238
Dutch Society for Microscopy	(NVvM)	Netherlands	228
Electron Microscopy and Analysis Group (Institute of Physics)	(EMAG)	United Kingdom	370
French Microscopy Society	(SFμ)	France	417
German Society for Electron Microscopy	(DGE)	Germany	438
Hellenic Microscopy Society	(HMS)	Greece	36
Hungarian Society for Microscopy	(HSM)	Hungary	87
Israel Society for Microscopy	(ISM)	Israel	311
Italian Society of Microscopical Sciences	(SISM)	Italy	130
Microscopical Society of Ireland	(MSI)	Ireland	84
Nordic Microscopy Society	(SCANDEM)	Scandinavia	434
Polish Society for Microscopy	(PTMi)	Poland	205
Portuguese Society for Microscopy	(SPMicros)	Portugal	21
Romanian Electron Microscopy Society	(REMS)	Romania	77
Royal Microscopical Society	(RMS)	United Kingdom	1323
Russian Society of Electron Microscopy	(RSEM)	Russia	
Serbian Society for Microscopy	(SSM)	Serbia	92
Slovene Society for Microscopy	(SDM)	Slovenia	114
Spanish Society for Microscopy	(SME)	Spain	192
Swiss Society for Optics and Microscopy	(SSOM)	Switzerland	89
Turkish Society for Electron Microscopy	(TEMĐ)	Turkey	87
<b>Total</b>			
Corporate members EMS (44 companies)	(ECMA)		36
Individual members	IND		27



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# European Microscopy Societies - reports

# French Society of Microscopy (Sf $\mu$ ) report



In July 2023, the French Society of Microscopy (Sf $\mu$ ) held its 18<sup>th</sup> congress in the city of Rouen. This conference was a great success thanks to Williams Lefebvre from the Groupe de Physique des Matériaux of Rouen (GPM) and his organizing committee. The conferences and exhibitions attracted 350 participants during the week and received about 150 contributions, placing this conference among the most successful for a meeting of the Society. Indeed, after a long period with most meetings organized on-line, everybody was happy to participate to a live event, just like before 2020. The inaugural conference entitled “Ultrafast Imaging; how to record images at the speed of the light” with the ultrafast technique of “Single shot”, was given by Thomas Godin, from the University of Rouen Normandie. This conference was followed by 12 symposia in Materials Sciences, Life Sciences and Common Symposia.

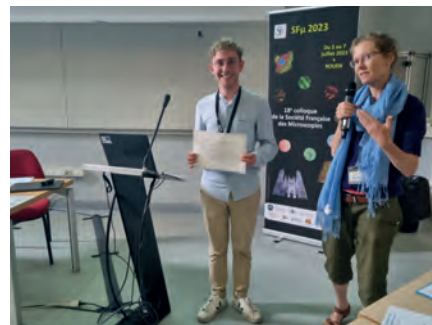
The Raimond Castaing prize dedicated to advanced researchers was awarded to Pr Alexandre Dazzi from Paris Saclay University, in Material Science. Alexandre Dazzi has developed an original technique of AFM-IR, to measure the local dilatation of a sample under IR radiation by AFM and then to acquire the local infrared spectra. Among various applications, this technique allowed the cartography of organic matter in an asteroid, coming from a spatial expedition.

In life science, the prize was shared by Professors Alain Brisson from the University of Bordeaux and Claude Antony from the University of Strasbourg, now at the Curie Institute. Alain Brisson has been a pioneer in cryo-EM and image analysis for biological macromolecules in France. He is now very active in the field of extracellular vesicles. Claude Antony was among the pioneers of electron tomography in cell biology, with the complete reconstruction of a cell and he contributed to develop correlative light/electron microscopy.

For young researchers, the Pierre Favard prizes for the best PhD thesis work were awarded to Benoit Arragain (Institut de Biologie Structurale IBS, Grenoble) for Life Sciences and Florian Castioni (LETI - Grenoble) for Material Science.

Our Society was proud to learn that EMS had chosen the Laboratoire de Physique des Solides (LPS) in Paris-Saclay University, a member of our Society, for their outstanding paper entitled “Cathodoluminescence excitation spectroscopy: Nanoscale imaging of exciton pathways” in the category “Instrumentation”, this year. The group was awarded during the IMC20 conference in Busan. ■

**Suzanne Giorgio**  
President of the Sf $\mu$ , Département  
Matériaux de POLYTECH, CINAM,  
Marseille, France.



## Royal Microscopical Society (RMS) report

The Royal Microscopical Society (RMS) is looking back on another action-packed year, which saw a raft of highly successful events, outreach initiatives and exciting developments in the Society's publication activities.

Our events calendar was busy as always during the first few months of the year, with our regular meetings, conferences and courses covering the full breadth of microscopy techniques and applications.

These included: UK Light Microscopy Facility Meeting 2023; Flow Cytometry Facilities Meeting 2023; EM-UK 2023; Virtual Flow Cytometry Data Analysis Course Spring 2023; Botanical Microscopy Meeting 2023; Microscopy of Semi-Conducting Materials Conference; Spring School in Electron Microscopy 2023; EBSD 2023.

We provided organizational support for the first of a new series of virtual meetings on Expansion Microscopy – alongside our partners in both North America and Australia: Canada Bioluminescence (CBI), Bioluminescence North America (BINA) and the University of Melbourne. We also continued to host the International Microscopy Lecture Series, in partnership with the Microscopical Society of Canada, the Israel Society for Microscopy, and the Brazilian Society of Microscopy and Microanalysis. The series of online lectures is also supported by the International Federation of Societies for Microscopy (IFSM).

The first week of July marked a return to Manchester Central for the staging of mmc2023 – the biennial, RMS flagship event. The passage of four years since the last 'in person' mmc in 2019, helped to create a special atmosphere over three days of conference and exhibition, celebrating the very best in microscopy, imaging and cytometry. It was also the final mmc overseen by Allison Winton, who retired as Chief Executive following almost 40 years' service at



RMS President Dr Peter O'Toole addresses the audience at mmc2023

the RMS. During an emotional farewell, The Society paid tribute to Allison's career by announcing a new award – The Winton Prize – in her name, to be awarded in future recognition of those making outstanding, sustained contributions to community engagement and collaboration in microscopy and RMS-related activities.

During the latter months of the year, The Society's events Calendar has been particularly busy with meetings and conferences including: Light Microscopy Summer School 2023; Getting the most from your Confocal Course 2023; Virtual ESRIC Super-resolution Summer School 2023; Flow Cytometry Course 2023; Adhesion and migration in disease: Translational and therapeutic opportunities; All Things Cryo 2023; Facilities Management Course 2023; flowcytometry UK 2023; and Virtual European Flow Core Meeting 2023.

In September, we were delighted to welcome our new Chief Executive Sali Davis, who has a wealth of experience in the Charitable sector, having spent 14 years as the Chief Executive of Optometry Wales - a membership

body representing all primary care Optometrists in Wales. During her first few months at the Society, Sali has been busy immersing herself in the world of microscopy, working closely with the RMS membership and wider stakeholders to identify opportunities for closer collaboration across the international stage. The Society is in very good hands under Sali's leadership, and we wish her every success for the future.

The RMS's Outreach and Education activities have continued apace, with the Microscope Activity Kit scheme for Primary Schools in full flow once again – and demand for borrowing the kits as high as ever. Alongside this, the RMS-backed, Hitachi STEM Global Outreach project has now brought electron microscopy to more than 11,000 students at over 100 schools. The scheme's success was recognised with a Community Impact Award from the Institute of Research in Schools (IRIS), received by Dr Alex Ball of the Natural History Museum, and Dr James Perkins of Queen Elizabeth's Grammar School, Kent.

The Journal of Microscopy (JoM) has gone from strength to strength in 2023, with an increased “Impact Factor” and authors now able to publish “Open Access” for free if they are affiliated with an institution signed up to an agreement with our publisher, Wiley. Meanwhile, *infocus*, the quarterly magazine for RMS members, has been reinvented as an online-only publication, both reducing the Society’s environmental impact and opening up new opportunities to engage readers.

The RMS now supports a range of “Focused Interest Groups” covering specialised areas of microscopy or established to tackle specific projects. Throughout 2023, our staff have been working closely with these groups in support of a range of planned events and courses, and we will continue to offer administrative support to both our membership, and wider microscopy community in the future.

Looking ahead to 2024, there is much to be excited about from an RMS perspective. Among the Society’s regular calendar of meetings, courses and conferences, we are very proud to be hosting the European Light Microscopy Initiative (elmi) 2024, in the vibrant city of Liverpool, UK. This is a fantastic event for the European Light Microscopy community – both the scientists working in the field and the manufacturers of their equipment.



The exhibition hall at mmc2023, which took place at Manchester Central, UK, in July

Meanwhile planning is already getting underway for mmc2025 (30 June – 3 July, Manchester, UK), and the RMS is also planning to attend both Microscopy & Microanalysis (M&M) 2024 in the US, and emc2024 in Copenhagen, Denmark.

We hope to see you at one of these events in 2024 and beyond!

A very happy new year to all our colleagues and friends across Europe. ■

**Royal Microscopical Society**  
**Dr Peter O’Toole (President),**  
**University of York, United Kingdom**

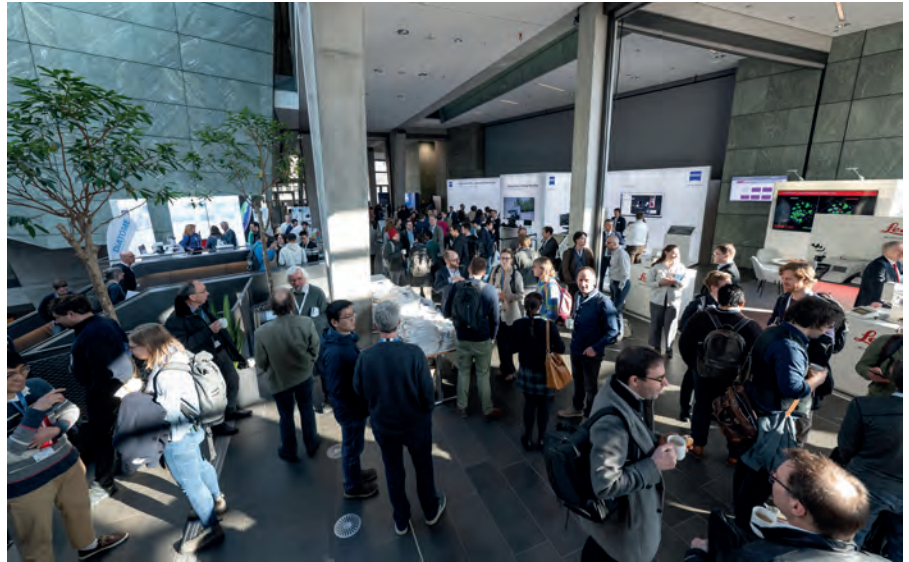


# German Society for Electron Microscopy (DGE) report

## German Society for Electron Microscopy (DGE)

### Microscopy Conference 2023:

An exhilarating five-day journey unfolded from 26<sup>th</sup> February to 2<sup>nd</sup> March 2023, as enthusiasts delved into the forefront of light and electron microscopy at the vibrant Microscopy Conference in Darmstadt. With resounding success, Prof Dr Ute Kolb and Prof Dr Hans-Joachim Kleebe, our esteemed Congress Presidents, declared, "The first MC post-pandemic was an absolute triumph!" Drawing a diverse audience of over 925 participants from 35 countries, the conference showcased a compelling program.



Seven thematic sessions explored microscopy methods and their applications in life and material sciences through 25 scientific sessions, 6 plenary lectures, award ceremonies, and over 90 oral presentations. The vibrant exchange continued with three poster sessions featuring 340 contributions and 23 engaging lunch lectures. Complementing the scientific program were well-attended workshops and a bustling industrial exhibition featuring 43 exhibitors unveiling cutting-edge developments in microscopy technology, accessories, consumables, preparation tools, and image analysis systems.



As one of Europe's premier electron microscopy events, MC 2023, hosted by the German Society for Electron Microscopy (DGE), stood as a beacon of innovation. A melting pot of insights, the Darmstadtium buzzed with discussions spanning instrumentation, methods, bio- and material sciences throughout the five days. Renowned plenary speakers from diverse disciplines graced the event, delivering stellar presentations on the latest scientific breakthroughs.

The dynamic synergy between budding researchers, seasoned scientists,

and industry leaders, coupled with riveting discussions and glimpses into the nanocosmos, sets the stage for the upcoming Microscopy Conference in Karlsruhe. Scheduled from 31<sup>st</sup> August to 4<sup>th</sup> September 2025, as an EMS extension, the event will be a collaborative effort by the German Society for Electron Microscopy (DGE), the Swiss Society for Optics and Microscopy (SSOM), and the Austrian Society for Electron Microscopy (ASEM). For more details on MC2025, visit the conference website at [www.microscopy-conference.de](http://www.microscopy-conference.de). The journey into

microscopic wonders and emerging trends continues!

### Celebrating Excellence: DGE Prizes Unveiled at the Microscopy Conference 2023

#### DGE Promotion Award for M.Sc. Anna Scheid and Dr Tolga Wagner:

The Microscopy Conference 2023 in Darmstadt marked a momentous occasion with the presentation of the DGE Promotion Award 2023 during its opening ceremony. M. Sc. Anna Scheid received well-deserved recognition for

her outstanding master thesis titled “Electron Ptychographic Phase Imaging of All-Inorganic Halide Perovskites Using 4D STEM”, earning her a coveted prize. Equally noteworthy, Dr Tolga Wagner was honored for his exceptional PhD thesis, “Interference Gating: A Novel Method for Time-Resolved Off-Axis Electron Holography”, securing the second prize. Heartfelt congratulations to both Anna Scheid and Dr Tolga Wagner on their well-earned achievements. As they embark on their future scientific journeys, we extend our warmest wishes for continued success in their promising careers. May their dedication and innovative contributions inspire others within the microscopy community.

### DGE Honors Dr. Vincenzo Grillo with the Prestigious Ernst Ruska Prize 2023:

A momentous occasion unfolded at the Microscopy Conference 2023 in Darmstadt, as the DGE bestowed the esteemed Ernst Ruska Prize 2023 upon Dr Vincenzo Grillo from the CNR Institute of Nanoscience in Modena, Italy. The ceremony took place during his captivating plenary lecture on 1<sup>st</sup> March 2023.

Dr Grillo is recognized with this prestigious award for his exceptional contributions to electron microscopy and his groundbreaking work in the realm of quantum electron optics. His pioneering efforts extend to methodological technique and instrumentation development, where he has utilized specialized nanofabrication techniques to shape electron beams and structure electron waves. A highlight of his accomplishments includes the development and experimental demonstration of an innovative device known as the electrostatic orbital angular momentum sorter for electrons. This groundbreaking technology seamlessly integrates micro-electro-mechanical systems technology with neural network control, resulting in a flexible and revolutionary system of electron optics.

The Ernst Ruska Prize, a symbol of excellence in electron microscopy, finds a worthy recipient in Dr Vincenzo



Grillo. His visionary work not only advances the boundaries of scientific understanding but also inspires the microscopy community to explore new horizons. We extend our heartfelt congratulations to Dr Grillo for this well-deserved recognition and look forward to witnessing the continued impact of his pioneering contributions.

### DGE Honors Prof Dr Philip E. Batson with the Prestigious Harald Rose Distinguished Lecture Award 2023:

The Microscopy Conference 2023 in Darmstadt witnessed a remarkable moment as the DGE presented the esteemed Harald Rose Distinguished Lecture Award 2023 to Prof Dr Philip E. Batson from Rutgers University. This distinguished accolade, awarded on 2<sup>nd</sup> March 2023, celebrates Prof Dr Batson's outstanding scientific achievements, particularly in the realm of electron optics and electron microscopy.

Internationally acclaimed, Prof Dr Batson has left an indelible mark through his groundbreaking research in electron optics, with a focus on analytical and ultra-high-resolution scanning transmission electron microscopy. His contributions extend to significant advancements in the mechanics and electronics of the high-resolution VG-STEM. Prof Dr Batson's theoretical insights into electron-object interaction

processes have been pivotal, pushing the boundaries of resolution and enhancing the detectability of weak signals in EELS (Electron Energy-Loss Spectroscopy). Notably, his innovative developments have expanded instrumental capabilities, introducing an electron monochromator and aberration correction in the STEM. This groundbreaking work achieved a remarkable 60 meV energy resolution and a sub-Angstrom beam size at 120 kV, marking a historic milestone in electron microscopy. Prof Dr Batson's research explores diverse realms, from coupled surface plasmon scattering in metal nanoparticle systems to unraveling the electronic behavior of spatially confined systems like Si/Si-Ge quantum wells. His investigations have unveiled new insights into core-exciton behavior using EELS, significantly contributing to the evolving landscape of electron microscopy.

The Harald Rose Distinguished Lecture Award is a fitting tribute to Prof Dr Philip E. Batson's exceptional contributions to the field. We extend our heartfelt congratulations to him and eagerly anticipate the continued impact of his pioneering research in shaping the future of electron microscopy.



## DGE Working Groups: A Vibrant Tapestry of Collaboration

### Working group DGE young microscopists (yDGE):

Embarking on its second term since its inception in early 2022, the DGE Young Microscopists, a working group dedicated to nurturing young scientific talent, capped off a successful first year with the Young Microscopists Symposium at the Microscopy Conference 2023 in Darmstadt. The symposium featured a dynamic program of short scientific talks by students, complemented by two expert talks on scientific writing and careers in industry. Despite the allure of parallel events, the symposium drew a substantial audience, with participants praising the interdisciplinary nature of the student presentations and actively engaging in discussions.

### Working group “Präparation und Abbildung nativer organischer Systeme” PANOS:

After the virtual format of last year's PANOS meeting, owing to pandemic constraints, the working group returned in a hybrid format in Tübingen this year on 24<sup>th</sup> March 2023. Hosted by the Max Planck Institute for Biology Tübingen and the Tübingen Structural Microscopy Core Facility, the meeting delved into the theme “Deep Learning

for EM,” attracting 110 participants for 11 talks and robust discussions.

### Working group “Elektronenmikroskopische Erregerdiagnostik” EMED:

The 20<sup>th</sup> EMED working group meeting on 8<sup>th</sup> September 2023, in Dossenheim, Germany, underscored the theme of “One Health” aligning with the WHO, WOA, and FAO principles. With contributions spanning human pathology, veterinary medicine, and phytomedicine, the meeting emphasized the crucial intersection between plant protection and global food security. Notably, the FAO estimates a 20-40% loss in worldwide crop food production due to diseases and pests.

### Working group “Interessengemeinschaft elektronenmikroskopischer Einrichtungen” IGEME:

Since 2014, the IGEME working group has been a gathering ground for electron microscopy facility operators, convening annually to share experiences and tackle challenges. The 11<sup>th</sup> IGEME meeting, hosted at the University of Rostock on 29<sup>th</sup> September 2023, took a hybrid approach, successfully blending on-site and online participation. Focusing on occupational safety and facility management, the meeting showcased the collaborative spirit that defines the IGEME community.

### Working group “Workshop SEM”:

The inaugural meeting of the Workshop SEM working group on 6<sup>th</sup> October 2023, unveiled a shared enthusiasm among participants from universities, research institutes, and companies. With nearly 30 passionate individuals, the gathering served as a forum for brainstorming ideas and defining the group's direction. The next meeting is slated for 26<sup>th</sup> September 2024, in Stuttgart, following the Annual Meeting of the IGEME working group. Anticipated discussions will encompass correlative methods, the integration of neural networks and AI, challenges of contamination, and the latest equipment and methodological developments from industry players. The Workshop SEM is poised to become a dynamic hub for advancing SEM-related expertise and collaboration. ■

### Peter A. van Aken

President of the German Society for Electron Microscopy, Head of the Stuttgart Center for Electron Microscopy bei Max-Planck Institute for Solid State Research, Stuttgart, Germany

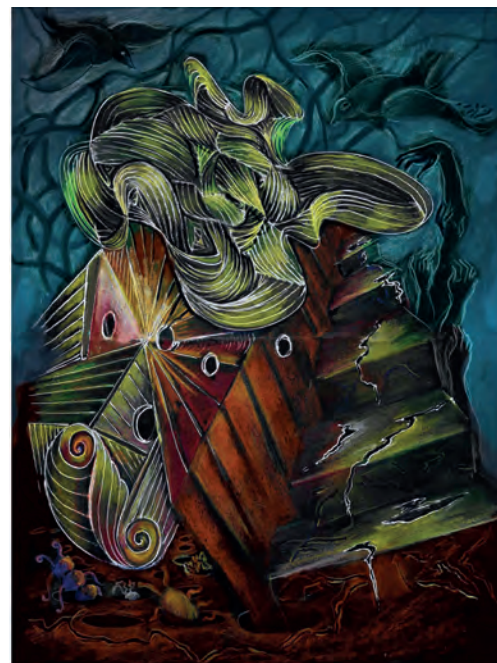
# Israel Society for Microscopy (ISM) report

“Microscopy Meets Surrealism”.

The 2023 International Art Exhibition of the Israel Society for Microscopy



Zahava Barkay / Tel-Aviv University  
Entanglement in Electron Microscopy / Painting  
Israel Society for Microscopy 2023



Helen Francis Sevitt/ Artist - Israel  
Steps / Painting  
Israel Society for Microscopy 2023

The Israel Society for Microscopy (ISM) initiated at the beginning of 2021 a virtual art exhibition (during the covid pandemic) and transformed in 2022 into a traveling real-space exhibition (<http://www.ismicroscopy.org.il/ism-art-exhibition>).

Based on local and International positive feedback from those events, ISM came up with the idea of collaborating with other institutes and societies on a larger scale. Following this idea, the 2023 international art exhibition entitled: “Microscopy meets Surrealism” was initiated.

The real-space new exhibition (<http://www.ismicroscopy.org.il/ism2023/ism-art-exhibition-2023>) was composed of 15 art pieces that were designed by researchers from the microscopy field as well as by surrealist artists from Israel and abroad. The real space exhibition was presented at the ISM 56th annual meeting, on May 23<sup>rd</sup>, 2023 at the Binyanei Hauma International Conference Center, Jerusalem.

This art exhibition was conceived and organized by Zahava Barkay (Tel-Aviv University Center for Nanoscience and Nanotechnology, ISM secretary) with

the help of Yaron Kauffmann (Technion IIT department of Materials Science and Engineering, ISM chair) and Eran Litvin (Binyanei Hauma ICC curator). ■

**Zahava Barkay**  
Tel-Aviv University Center for  
Nanoscience and Nanotechnology,  
ISM secretary



# Portuguese Microscopy Society (SPMicros) report

This year the main activity of the Portuguese Microscopy Society (SPMicros) was the organization and hosting of the 2023 Microscopy at the Frontiers of Science Meeting (MFS2023) which brought together electron microscopy scientists from the Iberian Peninsula and, to a lesser extent, across Europe. One special element of the MFS2023 meeting is the recognition of the exceptional students within the Portuguese microscopy community.

This is done by promoting many student oral-presentations and poster-presentations and awards for the top presenters in both formats. SPMicros also supports student attendance by granting registration fee waivers to the conference, and offering awards for images submitted to the image contest. A full and detailed report of the MFS2023 Meeting can be found in the meeting reports in this publication.

Beyond the excitement of the MFS2023 meeting, the SPMicros Society President, Erin Tranfield, has continued to organize the TechEM Seminars. For those that are not familiar with the TechEM seminars, they were started by Erin during the pandemic to give the biological electron microscopy community opportunities for technique sharing, networking and troubleshooting despite the travel restrictions. The seminars have continued to be a productive experience for the community with most seminars having 75 - 100 attendees from around the world. The seminars are open to anyone in the electron microscopy community. If you are interested to join, please contact Erin directly at [etranfield@igc.gulbenkian.pt](mailto:etranfield@igc.gulbenkian.pt)

As 2023 comes to a close, Erin Tranfield's 4-year double term as the SPMicros President will come to a close. Paul Ferreira from the International



Iberian Nanotechnology Laboratory and IST, University of Lisbon will become the 2024-2025 President of SPMicros. ■

**Erin Tranfield**  
SPMicros Society President, Head  
of the Electron Microscopy Facility,  
Instituto Gulbenkian de Ciência,  
Oeiras, Portugal.

**Juan de Dios Alche**  
Estación Experimental del Zaidín,  
CSIC, Granada, Spain.  
Portuguese Microscopy Society  
<https://www.spmicros.co>

# Romanian Electron Microscopy Society (REMS) report

The Romanian Electron Microscopy Society (REMS) has been established in 2014 gathering researchers, academics, students and technical personnel committed to the domain of electron microscopy within 11 research institutions located in the main academic cities across the country. With the main goal to initiate and extend the dialogue between the different research groups using electron microscopes, REMS contributes in knowledge exchange among the EM groups and the overall increase of the research quality in Romania. Within this spirit, REMS managed to organize since its creation several events, such as open seminars with invited guests from well-known EM centres in Europe,

workshops and work visits among the national EM laboratories as well as the biannual conference of the society, with international participation.

In 2023, REMS organized between October 18-21 its 5<sup>th</sup> Conference, CREMS 2023, in the university centre of Cluj-Napoca, Romania (<https://www.romicroscopy.ro/index.php/en/c-r-e-m-s/2023>). More than 70 scientists, academics, students and professionals using EM techniques for Materials and Life Sciences attended the conference. During the plenary talks, researchers from CRHEA (joint research unit CNRS - Université Côte d'Azur, France), INSA Lyon (France), Brunel University London (United Kingdom) and Sabanci



University in Istanbul (Turkey) presented top scientific results, while representatives from the manufacturing companies had the opportunity to introduce some of their latest developments in electron microscopy available on the market. ■

**Bogdan Stefan Vasile**  
President of the Romanian Electron  
Microscopy Society, National  
University of Science and Technology  
POLYTECHNIC Bucharest, Romania

<http://www.romicroscopy.ro>



# Hungarian Society for Microscopy (HSM) report

## One new lab, two schools, one prize - news from Hungary

In January 2023, a new center opened at the **Biological Research Center in Szeged**, under the leadership of **Péter Horváth**, one of the prominent members of HSM. In 2022, the group published their latest artificial intelligence (AI)-based single-cell image processing method in *Nature Biotechnology*, taking cell characterization to a new level. Their method, called **Deep Visual Proteomics (DVP)**, combines AI-based computer image analysis with laser microdissection microscopy and high-sensitivity mass spectrometry and we can get a complete picture of the extracted single cell protein pool. The **Single Cell Centre**, established with the support of the Chan Zuckerberg Foundation, the European Union's Human Cell Atlas projects and the Human Cell Atlas, helps to look for answers to biological basic research questions, from cell division to tumor development, and how they metastasize.



From Southern Hungary to the Western part of the country, Transdanubia, we visit **University of Pannonia (UP)** in Veszprém. **Nanolab** is the newly equipped electron microscopy laboratory of the university. The staff of Nanolab study the structures, compositions, and morphologies of solid materials, from atomic resolution to the micrometer scale, using a wide variety of electron microscopy techniques. In addition to pursuing their own research projects, their facility provides service to both internal (UP) and external users.

In February 2023 the **18<sup>th</sup> Winter School in Mineral Sciences** took place at the UP which was free of charge for researchers and technicians working

in mineral sciences. Most labs active in mineralogical research in Hungary were represented. The participants got also glimpses into theoretical chemistry, solid state physics, astrophysics, archaeometry and nanotechnology.



**The University of Debrecen, Debrecen** is located on the most Eastern region of the Great Hungarian Plain and Hungary. The 5-day summer school, which started on July 17<sup>th</sup> in the framework of the Erasmus+ Blended Intensive Program was organized by NeurotechEU, and was attended by 14 students from 9 countries, as well as laboratory professionals and assistants. During the **Summer School on Electron Microscopy Sample Preparation** event the participants learnt about preparations required before the electron microscopy studies of tissue samples and how to manage related technical and practical problems. After the 3-day online training program, the practical part took place in the **Electron Microscopy Laboratory of the Department of Anatomy, Histology and Embryology of the Faculty of Medicine**.



Finally, a few words about the youngest of this year's award winner HSM members.

**Susanne Prokop PhD** won the **Junior Prima Prize**, the most prestigious national award for researchers under 30.



She works in István Katona's ERC-funded research group at the HUN-REN Institute of Experimental Medicine. She was the first author of a *Nature Communications* article published in 2021, the year before her PhD. The article, which was selected as one of the top five basic research achievements of 2021 by the US government's National Institute on Drug Abuse, featured her development of *PharmacoSTORM*, a super-resolution microscopy method for measuring the binding of drugs to cell surfaces using fluorescent molecules with nanometer precision. She also called the attention to the possible psychiatric role of Calleja Islands due to its drug-binding capacity. This observation has now enabled the launch of a completely new research program with direct medical relevance. ■

**Agnes Kittel**  
HUN-REN Institute of Experimental  
Medicine, Budapest, Hungary.

# Electron Microscopy and Analysis Group (Institute of Physics) (EMAG) report

## *EMAG 2023 at the Microscience Microscopy Congress, Manchester, 4-6 July 2023*

A much-anticipated highlight of 2023 for the UK microscopy community was the biennial MMC conference (<https://www.mmc-series.org.uk/>), held in Manchester in the first week of July. The meeting is run by the Royal Microscopical Society and incorporates sessions run by the Electron Microscopy and Analysis (EMAG) group of the UK Institute of Physics. From the perspective of EMAG, an advantage of this co-sponsorship approach is that we retain the informal community feeling of a small conference within the much larger, vibrant program of the Microscience Microscopy Congress. With a substantial trade show, pre-congress workshops and themed social events, there was a lot to occupy over 1200 delegates. Despite the success of our previous online event in 2021, there was also a genuine enthusiasm for a return to in-person networking this year.

Two of MMC's six parallel sessions each day were coordinated by EMAG and dedicated to electron microscopy. These sessions regularly attracted around 100 delegates, with themes including tomography, spectroscopy and low-dose EM imaging. A clear sign

of the times was that the busiest session focused on EM data processing and analysis, showcasing recent developments in the deployment of four-dimensional STEM techniques and the use of artificial intelligence in image acquisition and analysis.

EMAG sponsored a plenary talk delivered by Amanda Petford-Long of Argonne National Laboratory (USA). She gave an engaging overview of her work, including in-situ electrical stimulation of magnetic samples, using Lorentz electron microscopy to image their spin textures. Another highlight was EMAG's nomination of Prof. Alan Craven (University of Glasgow) to become an Honorary Fellow of the RMS, in recognition of his development of electron energy loss spectroscopy (EELS) in the transmission electron microscope. In his lecture, Alan was a passionate advocate for the use of EELS, which is now a routine analytical technique in no small part because of his own developments.

EMAG meetings have always provided a supportive environment for student presenters, and often are the first opportunity for students to present



their work. It is also always a challenge for the EMAG committee to select the best presentations for prizes. This year was no exception and prizes for the best oral presentations were this year presented to Zhiquan Kho (University of Manchester), John Scott (Queen's University Belfast) and Andreas Körner (Helmholtz Institute Erlangen-Nürnberg for Renewable Energy).

Looking forward, EMAG's year will finish with a focused workshop entitled "Interfacing Biophysics and Physical Science Microscopy" (<https://iop.eventsair.com/biophys2023/>), to be held on Dec 11th at the Institute of Physics, in London. The focus is to promote synergy and further engagement across the biological and physical sciences, and delegates are warmly invited to attend and contribute. ■

**Donald MacLaren**  
School of Physics and Astronomy,  
University of Glasgow, Glasgow G12  
8QQ, U.K.





# The Nordic Microscopy Society (SCANDEM) report

**N**ext year, August 26 – 30 2024, SCANDEM will be the local regional microscopy society collaborating with EMS in hosting the 17<sup>th</sup> European Microscopy Conference (EMC-2024) in Copenhagen (<http://www.emc2024.eu/>). This is the second time EMC comes to the Nordic region – the first being the first European meeting in Stockholm in 1956. We are honoured and proud to be the host of the first physical-only EMC, post-pandemic. See separate report on EMC-2024 by Professor Klaus Qvortrup, conference chair.

This year, June 12 – 15 2023, SCANDEM had its first physical-only microscopy conference since the pandemic, the 73<sup>rd</sup> annual SCANDEM meeting, organized by Professor Klaus Leifer and his highly capable team at Uppsala University. The conference took place in the “New Ångström” premises – the largest construction project in Uppsala University’s history – involving the construction of two new buildings totalling 30,000 square metres. The departments at Ångström Laboratory

conduct research within a wide range of subjects touching all corners of the natural sciences, energy, technology, mathematics, and information technology. The SCANDEM meeting was a great success. Both materials and life sciences were covered, each comprised six sessions and four hands-on workshops. We had more than 300 attendants onsite. The trade exhibition, represented by 26 companies, was impressive. The programme of the conference included six plenary lectures, 42 contributed talks and 56 posters. Topics of the plenaries were both advanced and timely. They included: Vibrational Electron Microscopy (Xiaoqing Pan, UC Irvine); Cryo-Electron Tomography (Wolfgang Baumeister, TU München); Spatially resolved single-cell genomics (Xiaowei Zhuang, Harvard Medical School); Electron microscopy in infectious diseases (Michael Laue, Robert Koch Institute); Atomically resolved TEM (Ute Kaiser, Ulm University); and In situ TEM techniques (Frances Ross, MIT). Six students were awarded best presentation prize. The conference concluded



with SCANDEM General Assembly. Six travel grants to attend this Uppsala conference were awarded by SCANDEM to young-career researchers, PhD students and technicians. The next SCANDEM annual meeting, the 74<sup>th</sup>, will be held as a special session nested within EMC-2024 in Copenhagen.

The society’s name SCANDEM was an abbreviation for the “Scandinavian Society for Electron Microscopy”. This name was chosen since only Denmark, Norway, and Sweden were represented at the founding meeting, and for some years into the early 1950s. Today SCANDEM includes all Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden), hence the society’s name was officially changed to “Nordic Microscopy Society” in 2002. ■

**Kesara Anamthawat-Jónsson**  
SCANDEM president, University of Iceland, Faculty of Life and Environmental Sciences, Plant Genetics Research Group, School of Engineering and Natural Sciences, Reykjavik, Iceland.



## Croatian Microscopy Society (CMS) report

**O**n the occasion of the 40<sup>th</sup> Anniversary of the founding of the Section for Electronic Microscopy of the Croatian Natural History Society from which the Croatian Microscopy Society (CMS) originated, the Faculty of Science, University of Split (PMF Split) and the CMS have organized the 2nd Croatian Microscopy Symposium (2CMS). The symposium took place on 24 and 25 November 2023 at the Faculty of Science in Split and counted 61 participants. It included 2 plenary lectures, 2 invited lectures and 5 oral presentations, 15 posters and a special exhibition on the past of microscopy in Croatia. The annual CMS assembly was also held as a part of 2CMS, as was the visit to the PMF's Microscopy Laboratories.

We are very grateful to our sponsors (Golden: SCAN/JEOL, Silver: ITR Lab/ Thermo Fisher Scientific and Labena, Bronze: Mikrolux, Ansar Analitika and Mikro+Polo, Exhibitors: AnimaLab and Culmium) who made it possible for members of the CMS to attend the meeting with a free registration fee. ■

**Ivana Bočina**  
President of the 2CMS, Department  
for Biology, Faculty of Science,  
University of Split, Croatia  
Croatian Microscopy Society  
[www.mikroskopija.hr](http://www.mikroskopija.hr)



# Turkish Society For Electron Microscopy (TEMD) report

## 26<sup>th</sup> National Congress of Electron Microscopy-EMK26

26<sup>th</sup> National Congress of Electron Microscopy-EMK26 has been organized in Eskisehir Technical University in September 20-23, 2023 chaired by Prof. Servet TURAN (Faculty of Engineering, Department of Materials Science and Engineering) and cochaired by Prof. H. Mehtap KUTLU (Faculty of Sciences, Department of Biology) under the auspices of Turkish Society for Electron Microscopy. Key note lecture has been delivered by Prof. Hasan MANDAL, President of The Scientific and Technical Research Council of Turkey.



The congress aimed to establish an intensive scientific platform in the fields of both Biological and Materials Sciences by the participation of national and international experienced microscopists, as well as the young researchers. “Prof. Dr. Türkan ERBENGI Research Award”, “Prof. Dr. Necdet DEMİR Best Poster Award” and “Prof. Dr. Sevinc KAROL Best Micrograph Awards” were presented during the Congress.

The congress had an attendance of around 700 participants and consisted of 60 invited talks, 145 oral and 95 poster presentations in the field of Instrumentation and Techniques, Materials Science and Life Sciences. In addition, there were microscope demonstrations from different companies and one-day hands on schools on electron, Raman, atomic force and confocal microscopes were carried out with more than 100 students during the congress.

To celebrate Centenary of Republic of Turkey, for students, 100 scholarships to cover the registration fee of the Congress was planned, but due to high demand from young scientists, 290 scholarships were awarded to young members of the Turkish Society for Electron Microscopy.

During the EMK 26 Congress, Honorary Membership of the Turkish Society for Electron Microscopy has been presented to Prof. Pavel HOZAK, President of IFSHC. He contributed to the Congress as a Plenary Lecturer.

Prof. Serap ARBAK, Vice President of the Turkish Society for Electron Microscopy has been elected as Board Member of IFSM -International Federation of Societies for Microscopy for 2024-2032 period.

“Honorary Membership of Italian Society for Histochemistry” has been



conferred to Prof. Serap ARBAK in June, 15, 2023 during the 29<sup>th</sup> Congress of Histochemistry of the Italian Society, in recognition of her work in the field of histochemistry.

In 2023, monthly online scientific meetings of the Turkish Society for Electron Microscopy have been regularly organized. Technical workshops were also presented by microscopy companies.

### A look ahead to 2024

Besides, regular monthly webinars, we will be organizing schools in microscopy in Turkey. ■

**Servet Turan**  
Eskisehir Technical University,  
Materials Science and Engineering,  
Eskisehir, Turkey



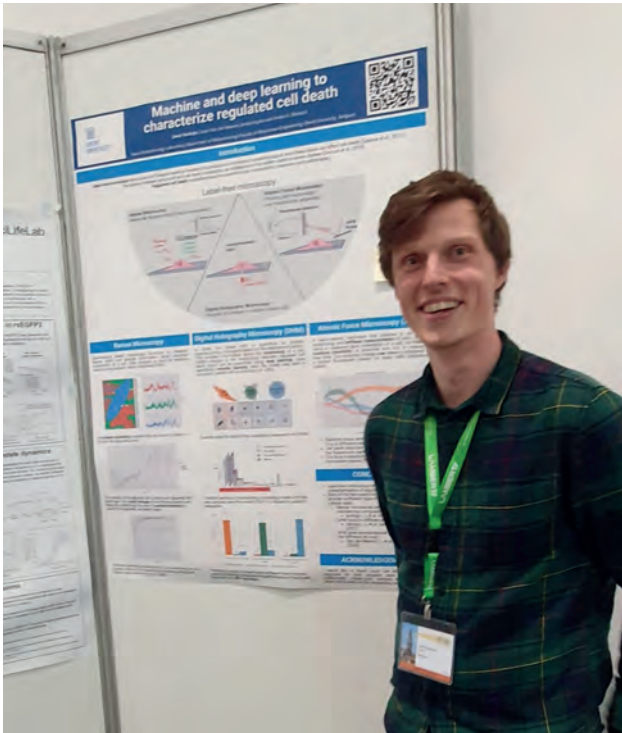


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# EMS Scholarships reports

## Joost Verduijn

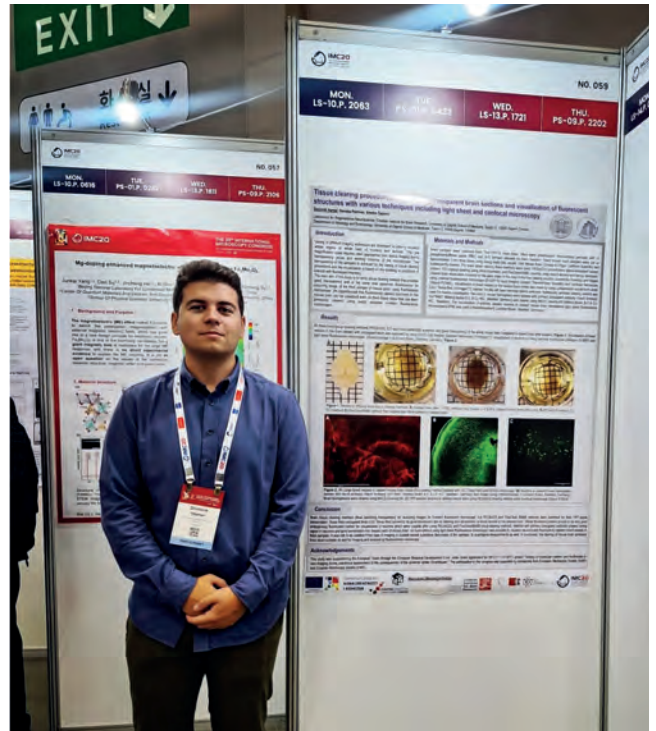
*Focus on Microscopy 2023 (FOM),  
April 2 - 5 2023, Porto, Portugal*



I went to Porto, Portugal at the beginning of April to attend my first live conference within my PhD trajectory. My background and current research focus is on label-free microscopy with amongst others: digital holographic microscopy, atomic force microscopy and Raman microscopy related to the cellular biological pathway of cell death. Thus, I was very interested in the applications of label-free in cell biology/medical applications and most specifically with Raman microscopy (current project). At all the biomedical imaging/label-free microscopy sessions, it was interesting to see the work being done within the research field. During the poster session I got the opportunity to meet people working in the field of (label-free) microscopy, like mister M.L.K. Engelhardt a PhD student at Delft university. He had an exquisite poster regarding the information obtained using quantitative phase imaging (QPI can also be obtained using DHM) on Huntington's disease and its analysis. The similarity, although very different biological pathway, of their work made a good scientific connection. In addition, the poster of miss M. Królikowska, a PhD student from Warsaw university, was of great interest to me, since she and her collaborators were able to build a multimodal microscopy setup combining holographic tomography with Raman microscopy. The integration of both platforms and the associated data analysis was remarkable. ■

## Dominik Hamer

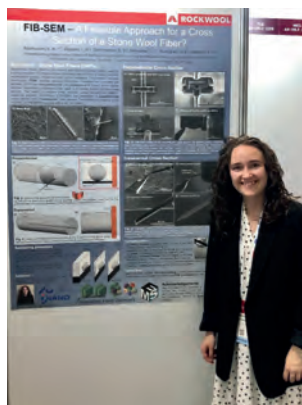
*The 20<sup>th</sup> International Microscopy  
Congress (IMC20), September  
10-15 2023, BEXCO, Busan, Korea*



From 10-15<sup>th</sup> September 2023 I participated in the 20<sup>th</sup> International Microscopy Congress in Busan, Korea. The Congress took place in Busan Exhibition and Convention Center (BEXCO). Organization of the Congress was on a high level (registration process, helpful information, materials and even the IMC20 App!) and I was surprised how well everything worked. This was a great opportunity for me as a young researcher and PhD student in the field of Neuroscience for making valuable connections with people working in science all over the world and networking. Lectures were very interesting, especially ones in the Life Science category. Also, exhibitors had a lot of promotional materials, they exposed different types of microscopes and were open for talk regarding their products or problems that we have during our everyday work in laboratory. On Thursday I had a poster presentation titled "Tissue clearing procedures for preparing transparent brain sections and visualization of fluorescent structures with various techniques including light sheet and confocal microscopy". It was my great pleasure and I am honored to be a part of such big microscopy event! I would like to thank European Microscopy Society for supporting my participation in The IMC20 in Busan, Korea through scholarship. ■

## Krestine Hofstedt Rasmussen

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



First of all, I would really like to thank the European Microscopy Society for granting me this scholarship to attend the 20<sup>th</sup> International Microscopy Congress (IMC20) in Busan, South Korea on the 9-15 of September 2023. As a researcher, it was an amazing and inspiring conference to attend and participate in!

My name is Krestine Hofstedt Rasmussen, I am an Industrial PhD student with the company ROCKWOOL A/S and Aarhus University. At IMC20, I had the honor of presenting a poster entitled “FIB-SEM – A Feasible Approach for a Cross Section of a Stone Wool Fiber?”. This work depicts the beginning of my overall PhD project that aims to characterize the atomic structure of these stone wool fibers that make up the fire resilient insulation material that we use in our houses today. The poster presented investigates two different approaches for creating a nanometer thin cross section of a single stone wool fiber as this is an important step in sample preparation for obtaining atomic scale information using TEM techniques. These two approaches include a transversal cross section and a perpendicular cross section. However, both approaches meet obstacles in either the coating procedure or the grid-attachment procedure. From presenting at IMC20, I received great input from fellow students and researchers on how to overcome these obstacles in my further work with this FIB-SEM technique.

As an Industrial PhD student, it is important always to look for opportunities to create value for the company. By attending the IMC20 conference, I was able to participate in great discussions and connect with researchers, students, and microscopy companies, and really expand my scientific horizon and obtain knowledge that will advance my PhD project and my experience in working with the FIB-SEM instrument.

At the IMC20 conference, I participated in live demonstrations of FIB-SEM instruments and acquired tips on how to improve my own technique. Overall, the conference hosted amazing talks, posters, and instrument tutorials that combined, really benefits my PhD project and my workability as a new researcher. Again, thank you EMS for granting me this scholarship. It was a one in a life-time experience. ■

## Tingting Yang

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



First, I would like to thank the European Microscopy Society (EMS) for the financial support that enabled my participation in the 20<sup>th</sup> International microscopy congress (IMC20) from 10.09.2023-15.09.2023 in Busan, Korea. With the kind support of the EMS, I had the opportunity to join the IMC20, where was with approximately 3,000 attendees. It was the first time that I attended an international conference. So that I was able to present my current research in form of talk in person.

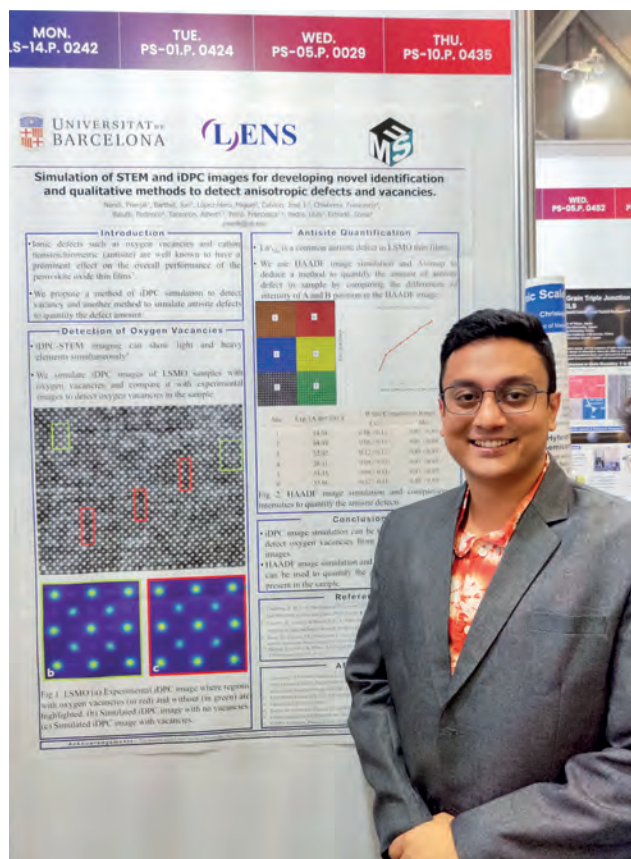
The conference began on Sunday (10<sup>th</sup> Sep.) with several pre-congress workshops before the opening ceremony. I joined one, titled “Practical Introduction to Analysis and Simulation Software in TEM and STEM”, which organized by Dr. Colin Ophus. This workshop provided an overview of open-source python tools for analysis of atomic resolution imaging, spectroscopic, and diffraction datasets. I gained a lot of experiences from this workshop.

My talk was on Tuesday afternoon, titled “Unveiling degradation mechanisms in layered Li-rich cathode materials using combined in operando neutron diffraction and 4D-STEM”, which was focused on the correlative study of the degradation mechanisms of cathode materials with 4D-STEM and operando neutron diffraction, on which I received several excellent questions and which also led to interesting discussion afterwards during coffee break. As a young scientist such an international conference is a great and vital opportunity to share own research and get critical review from experts across different fields of electron microscopy. I was able to discuss some of our findings with scientists from my field of study, and many useful ideas for further analyses were suggested to me.

This conference helped me a lot in my research field and was a great opportunity to get new motivation for my own work through fresh ideas and expert advice. I am very grateful to the EMS and IMC20 organizers for the opportunity. ■

## Pranjal Nandi

The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea



I attended the 20<sup>th</sup> International Microscopy Congress, held in Busan, Republic of Korea, on September 10-15 2023.

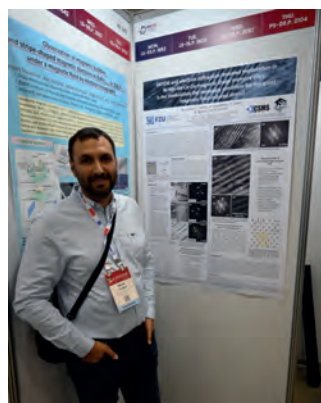
The conference allowed me to interact and learn with all the reputed scientists across the world. Watching their presentations and interacting with them motivates young scientists like me to work even harder and contribute towards the development of science and technology. It was also a great honor to listen to the speech of noble laureates and eminent speakers.

It was also a stage to meet my peers, to know their progress in the respective research and to find scopes of mutual collaboration in future. All in one I find this congress to be a podium of overall development for the microscope community. Not only in the field of science, it was also a scope to explore the beautiful city of Busan and relish the beauty it had to offer.

Lastly, I would like to mention the support I received from my institute (projects, supervisors) and the EMS scholarship, which made this trip possible. I shall forever be grateful to them. ■

## Marek Vronka

The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea



I am writing to provide a summary of my participation in the IMC20 Conference, which took place in Busan, South Korea, from September 10<sup>th</sup> to 15<sup>th</sup>, 2023. This report is intended for the European Microscopy Society (EMS) as part of my EMS 2023 scholarship grant, which supported my attendance at the IMC20 Conference.

At IMC20 I had the privilege of presenting my research poster on Thursday, September 14<sup>th</sup>. The title of my poster was "HRTEM and electron diffraction revealed modulation in Ni-Mn-Ga-Co-Cu magnetic shape memory alloy: Is the modulation the necessary condition for the giant magnetic field-induced strain?" This presentation allowed me to share my research findings with fellow attendees and receive valuable feedback.

Additionally, on Sunday, September 10<sup>th</sup>, I participated in a pre-congress workshop (Tutorial) titled "Ptychography and phase contrast STEM". This workshop provided me with valuable insights and knowledge that I can apply to my research work.

Throughout the conference, I made the most of the opportunity by attending numerous informative lectures, including all five plenary lectures. These lectures broadened my understanding of the latest developments in electron microscopy and related fields. Following the introductory workshop, I also attended the welcome reception, which provided an excellent networking opportunity.

One of the highlights of the conference was the exhibition. Here, I had the opportunity to see demonstrations of new instruments and technologies. Particularly, the demonstration of the new TEM microscope Tensor by Tescan left an impression on me.

I am grateful to EMS for their support, which allowed me to participate fully in the IMC20 Conference. The grant covered the conference registration fee, the pre-congress workshop fee, and partially contributed to my accommodation expenses. I look forward to applying the knowledge and insights gained from this conference in my future career.

Thank you once again for your support. ■



## Zhiyuan Ding

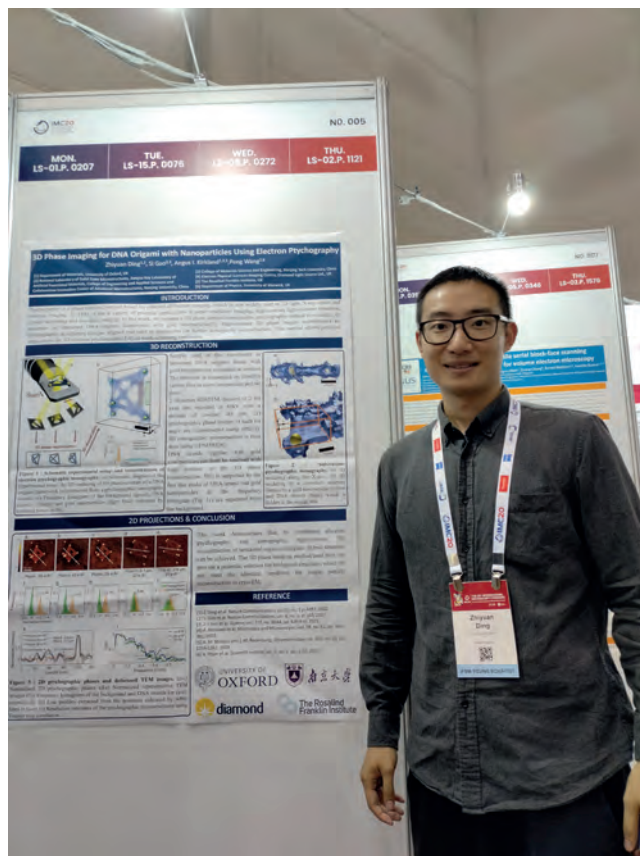
*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*

### Conference report IMC20 at Busan and satellite symposium at Fukuoka

The 20<sup>th</sup> International Microscopy Congress (IMC20) was held at Busan, South Korea. Two days before the main conference, a satellite symposium of IMC20 organized by Prof. Kenji Kaneko of Kyushu University is held at Fukuoka, Japan. I participated the satellite symposium, visited the Ultramicroscopy Research Center in Kyushu University, and gave an oral presentation. I also listened to talks from organizer Prof. Kenji Kaneko, invited speakers (including Prof. Ray Egerton and Prof. Paul Midgley) and other student participants.

After the satellite symposium, I went to Busan for the IMC20 main conference. First event I participated is IFSM young scientist assembly (YSA), where I chatted with Nobel Prize winners, Prof. Richard Henderson and Prof. Joachim Frank and many other famous scientists. It was helpful that IFSM YSA provided me a chance to listen to their career stories, since I was considering my career plan after graduation in 2024. During the main conference, I listened to many inspiring and impressive presentations, including Prof. Zhen Chen's and Prof. David Muller's presentations about TEM ptychography and Prof. Joanne Etheridge's presentation about new imaging methods for 4DSTEM. In addition, I gave an oral presentation (Picture 1) about my project, aberration-corrected iCOM algorithm, and a poster presentation about 3D ptychography and tomography reconstructions. I really enjoyed sharing our programs with researchers from all over the world. Besides, I communicated with a lot of researchers about their work, which is very inspiring and helpful.

Thanks to the scholarship from European Microscopy Society (EMS), I can travel from UK to Asia and attend IMC20. ■



Picture 1| oral presentation at IMC20



## Lucia Hughes

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



First of all, I would like to thank the European Microscopy Society (EMS) for their generous support, which enabled my participation in the highly anticipated 20<sup>th</sup> International Microscopy Congress (IMC20) held in Busan, South Korea,

from September 10<sup>th</sup> to 15<sup>th</sup>, 2023. The EMS's commitment to fostering the dissemination of scientific research, particularly among early career researchers, is truly commendable and greatly appreciated.

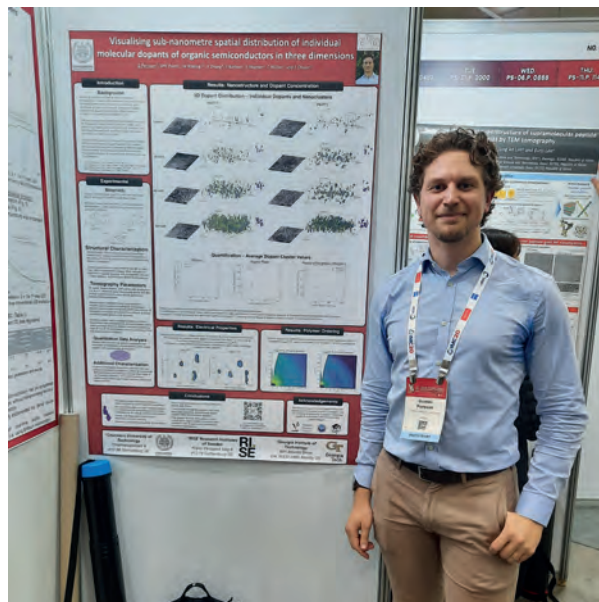
As a PhD student nearing the end of my studies, I was honoured to have been invited by the organisers of the IMC20 Energy Materials symposium to present my research. My presentation, titled "*STEM-EELS analysis and insight into the dielectric engineering of perovskite materials for Pt-nucleation and enhanced oxygen reduction activity*", delved into the intricacies of B-site ordering and dielectric engineering of perovskite materials for the formation of hybrid electrocatalysts for the oxygen reduction reaction, while also highlighting the pivotal role electron microscopy plays in advancing energy storage and conversion technologies. I was delighted with the response to my presentation, which sparked some interesting and enlightening discussions with individuals from a wide variety of disciplines.

The entire week was a treasure trove of captivating and inspirational lectures and presentations, featuring plenary talks by three distinguished Nobel Laureates. Complementing the scientific presentations, industry experts representing leading companies in the electron microscopy domain enriched the conference program by unveiling their latest innovations in instrumentation, technical applications, and software developments. Additionally, IMC20 provided abundant opportunities to connect with and learn from the leading researchers in electron microscopy, an experience that has left me inspired as I embark on future research endeavours beyond my PhD. Last but not least, I must not overlook the incredible privilege of visiting South Korea for the first time, an experience that added a cultural dimension to my academic journey.

With great anticipation, I eagerly await the next conference and the opportunity to reunite with the microscopy community once again. Thank you to the IMC20 organisers, and all those who contributed to making this conference a resounding success. ■

## Gustav Persson

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



My name is Gustav Persson, I am a PhD student at Chalmers University of Technology in Sweden and my research focus on electron microscopy studies of organic semiconductors. I would like to thank the European Microscopy Society for the financial support to attend the 20<sup>th</sup> International Microscopy Congress (IMC20) in Busan, South Korea, from 10<sup>th</sup> to 15<sup>th</sup> September 2023.

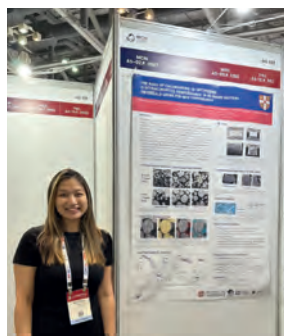
Taking part of the congress, listening to distinguished researchers from all over the world and participating in interesting discussions has been great experience. The list of high-quality talks included three Nobel Laureates: Richard Henderson, Konstantin Novoselov and Joachim Frank, all of which were (of course) incredibly inspiring to listen to. The days were filled with presentations from scientists and demonstrations from microscopy-related companies, while the evenings had social events well suited for meeting and talking to colleagues in my field. During the poster session I had the opportunity to share my work on "Visualising sub-nanometre spatial distribution of individual molecular dopants of organic semiconductors in three dimensions". Although the large number of attendees made it an intense session, I did receive valuable input about my work and ideas how to proceed in the future.

Attending IMC20 was very enjoyable and has helped me to develop as a researcher, and I would like to once again thank the European Microscopy Society for supporting my participation. ■



## May Ching Lai

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



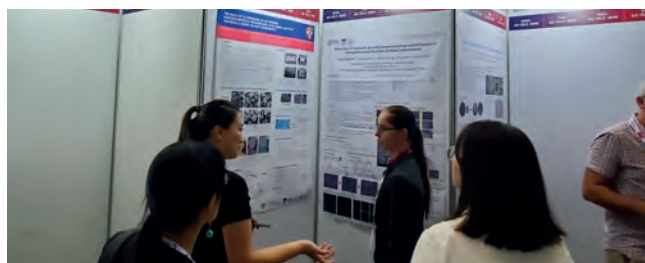
I would like to express my sincere appreciation to the European Microscopy Society for the generous EMS scholarship, which made it possible for me to participate in the 20<sup>th</sup> International Microscopy Congress held in Busan, South Korea from September 10<sup>th</sup> to 15<sup>th</sup>, 2023.

This conference proved to be an incredibly enriching and rewarding experience on both a professional and personal level.

The lectures and presentations throughout the congress were truly enriching. They provided me with a comprehensive overview of the latest developments in various microscopy techniques and their applications across diverse scientific disciplines. I was particularly excited to witness the significant advancements in the characterisation of battery materials, a topic directly aligned with my research interests. During the exhibition visit, I learnt about some new software plug-ins and codes that has the potential to enhance the depth and efficiency of my future research. These insights have already proven helpful in shaping the direction of my work.

I had the privilege of actively contributing to the conference by presenting two posters, titled "The Role of Calendar in Optimising Electrochemical Performance in Ni-based Battery Materials using FIB SEM Tomography" and "Investigating the Degradation and Structural Changes of Li(Ni<sub>0.8</sub>Mn<sub>0.1</sub>Co<sub>0.1</sub>)O<sub>2</sub> Cathodes in Lithium-ion Batteries Using Advanced TEM Techniques". The discussions and feedback I received were invaluable in refining my research and gaining fresh perspectives on my work.

The networking opportunities at the conference were beneficial, allowing me to connect with like-minded individuals in the field of microscopy and battery materials. These connections have the potential for collaborative partnerships, emphasizing the role of collaboration in accelerating scientific progress. ■



## Christoph Hell

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



The 20<sup>th</sup> International Microscopy Congress in Busan, South Korea, was one of the highlights during my PhD-time. The congress allowed

me to explore a diverse range of topics within microscopy. It provided a stage for researchers, scientists, and professionals to unveil their latest findings and discuss advancements in microscopy techniques. Thus, I could delve into the worlds of electron microscopy, super-resolution, and atom probe tomography.

Keynote speakers offered invaluable insights into the current trends and future prospects of their fields. Their presentations not only broadened my horizons but also renewed my enthusiasm for the work we do. The bustling exhibition hall was a cornucopia of microscopy equipment and services, offering a glimpse of the cutting-edge tools and techniques that drive our field forward. Workshops and live demonstrations enabled me to get my hands on cutting-edge microscopy equipment. The interactive nature of the event made it not just a gathering of like-minded but also a platform for us to deepen our skills and understanding. Networking opportunities abounded, and I rekindled old friendships and established new connections. Conversations flowed freely, ideas sparked, and future collaborations formed. Last but not least, the poster sessions allowed for in-depth, one-on-one discussions with presenters, revealing the many facets of the microscopic world.

However, in the end, it's not just about the equipment or the techniques; it's about the people, the connections we make, and the friendships we renew. In my case, the congress allowed me to meet friends from the research community, old and new. It reinforced my belief that personal meetings and discussions are key in understanding and collaborating with fellow researchers. In a world that often prioritizes virtual connections. This event was a reminder that nothing quite replaces the richness of in-person interactions. Microscopy connects. It connects us not only to the minute details of our research but also to the people who share our passion. As I depart Busan and return to my research endeavors, I carry with me the knowledge that I am part of a vibrant, interconnected community of scientists, and that through our shared enthusiasm, we will continue to illuminate the microscopic mysteries that shape our world. As the host city, Busan added a unique cultural dimension to the conference. I immersed myself in South Korean culture, sampled its cuisine, and explored its attractions. This cultural experience was a delightful complement to the scientific discourses. ■

## Fatima Taiki

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



**T**he 20<sup>th</sup> International Microscopy Congress, which took place from the 10<sup>th</sup> to the 15<sup>th</sup> of September in Busan, Korea, was my first participation in an international Congress. I was very impressed by the big venue, the BEXCO center. We could see on the front a big poster with the photos of the three Nobel laureates who would attend the Congress. The Congress started strongly with a plenary lecture by Richard Henderson. It was reassuring that the Congress started with a lecture on a topic I'm familiar with: cryo-electron microscopy (cryo-EM). He talked about the History of structural biology and how cryo-EM evolved to be the most used and efficient method to solve protein structures. Indeed, several technical developments made that possible, such as the invention of Field emission gun sources of electrons, which enabled higher brightness and lower energy spread in the beam, leading to a higher imaging resolution or even improvement of motion correction. He introduced the mitochondrial ribosome, which interestingly undergoes conformational changes as it presents a ratcheting motion during protein synthesis. This resonated with me as I'm also studying conformational changes in a protein, the nucleosome. Still, differently, as in my case, the protein is not vitrified in solutions but is looked at in the cellular environment. He then talked about the future improvements that cryo-EM could benefit from, such as colder cold stages for the microscopes, which could lead to less beam damage; faster freezing that could deal with the

problem of protein denaturation or also notably a point on sample thickness, where he said that having samples from 30 nm-thick could be critical to identify some still-unknown protein structures. The sample thickness issue interests me as it concerns cellular sample preparation for cryo-EM, for which you have two possibilities: cryo-FIB milling and cryo-sectioning. In my Ph.D., I'm working on cryo-sectioning, and one of its advantages compared to cryo-FIB-milling is that you can tune a wide range of thicknesses, starting from 30 nm. He concluded with one remarkable point: now, access time to high-end microscopes is less available than before, hence the need for low-voltage (120 keV) and, therefore, less expensive microscopes. Those low-voltage microscopes would permit data acquisition faster for single particle analysis, and it would leverage some time for cellular tomography, for example. Those microscopes are being developed by the biggest microscopy companies at the moment. I had my talk on Tuesday, 12 September, titled "Optimization of cryo-tomography of vitreous sections for tissue and cell imaging." It was a very nice experience as I was able to answer some very interesting questions. Afterward, I discussed my subject with senior scientists, who gave me some clues about what I could do next experimentally to characterize cryo-sectioning properties further. Ultimately, this Congress was very meaningful, and I thank everyone I could talk to and the EMS committee for giving me a scholarship. ■

## Aliou Sadia Traore

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



**M**y name is Aliou Sadia Traore, I am a Ph.D. candidate at the Institute of Physics and Chemistry of Materials (IPCMS) in Strasbourg, France. From 10 to 15 September 2023, I took part in the 20th International Microscopy Congress IMC20 in Busan, South Korea.

The various conferences allowed me to discover the work of experts and young scientists in different fields of microscopy. I also attended presentations on the latest developments in microscopy instrumentation. The 5 plenary lectures were fascinating, both in terms of the personalities of the speakers and the content of the discussions.

The presentations on operando correlative studies using microscopy and other characterization techniques enabled me to get answers to some of the questions I was asking myself, and I also followed with passion the themes around the application of artificial intelligence to microscopy.

Furthermore, I had an oral communication to share and discuss part of my recent work entitled "Direct insight into the activation mechanism of Fe and Sb catalysts by operando TEM and XAS techniques".

The IMC20 was a very enriching experience for me, as it was an excellent opportunity to broaden my knowledge both in terms of microscopy and on a human level.

It was a real pleasure to take part in this conference. I want to thank the conference organizers for their work, and I'd especially like to thank the EMS for the financial support they gave me to take part in IMC20. ■

## Lara Ahrens

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*

I would like to thank the European Microscopy Society (EMS) for granting me a scholarship to attend the 20<sup>th</sup> International Microscopy Congress (IMC20) held in Busan, Korea.

I am a third-year material science PhD student working on the degradation mechanisms of Ni-rich cathode material for Li-ion batteries. IMC20 was my second in-person conference after the MC23 in Darmstadt, Germany, which I enjoyed very much. Therefore, I was looking forward to the IMC20 and the opportunity to give my first oral presentation at a conference, which was definitively an exciting experience for me.

During the week, I had the chance to listen to very good and inspiring talks on the latest findings in the field of battery studies enabled by electron microscopy. The fruitful discussions after the talks which were often continued during the coffee break were very enriching. Especially, the development of in-situ electron microscopy used for various applications to study real-life phenomena is very fascinating to me. The plenary talk of Prof. Frances Ross gave an appropriated setting to the field of in-situ electron microscopy. It was very encouraging how authentically she told her story with all the challenges she had to face and the bright sides of in-situ research.

The IMC20 offered me the opportunity to reconnect with people and to make new contacts around the globe; not only during the conference day but also at the evening events. In particular, I would like to point out the Pioneers in Microscopy event that took place on Thursday evening. This event is dedicated to female scientist, where invited speakers and early-career researchers met in a small group. It was a lot of fun and a unique opportunity to get in closer contact with other female scientists from different fields of EM.

I would like to thank the EMS for their support and for giving me the opportunity to participate in the largest IMC to date. ■



## Verena Reisecker

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



First off, I'd like to express my gratitude to the **European Microscopy Society (EMS)** and the **Austrian Society for Electron Microscopy (ASEM)** for awarding me a scholarship that enabled my participation in the 20<sup>th</sup> International Microscopy Conference held in Busan from September 10<sup>th</sup> to 15<sup>th</sup>.

With over 3000 attendees this has been the biggest conference I have attended so far and also my first trip to Asia. Spanning over five days, IMC offered a plethora of captivating plenary lectures, engaging talks, and insightful posters contributed by experts and emerging scientists from around the world. I especially enjoyed the symposium on photonics where I had the privilege of presenting my latest work on Focused Electron Beam-Induced Deposition (FEBID)-grown plasmonic nanostructures, characterized by Scanning Transmission Electron based Electron Energy Loss Spectroscopy, in form of a presentation titled **"Tuning the plasmonic response of 2D and 3D metallic nanostructures via 3D nanoprinting"**.

For me, this event provided an exceptional platform for exchanging experiences and deepening my understanding of analytical transmission electron microscopy, dive into other fields of microscopy, discover novel cutting-edge microscopes showcased by numerous exhibitors but also get acquainted with the rich Korean culture and make lots of new international friends. Undoubtedly, IMC will remain a cherished memory of my PhD journey and I can't wait for the next event to meet familiar as well as new faces and follow up on research. ■

## Sara Martí-Sánchez

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



I am Sara Martí-Sánchez and I work as a researcher in the Group of Advanced Electron Nanoscopy (GAeN) of the Catalan Institute of Nanoscience and Nanotechnology (ICN2). Firstly, I would like to express my gratitude to the European Microscopy Society for supporting my attendance to the 20<sup>th</sup> International Microscopy Congress (IMC20) held in Busan, South Korea, from the 10<sup>th</sup> to 15<sup>th</sup> September 2023.

During this conference I presented two of my latest results in the field of semiconductor materials towards quantum computing applications. One of these presentations was an oral contribution entitled "Epitaxially-Assisted Sn Crystal Phase Selectivity on Hybrid Superconductor-Semiconductor Quantum Nanowires", in which the effects of epitaxial relationships between Sn and the nanowire's crystal lattice on Sn phase stability were discussed. Additionally, I presented a poster entitled "Strain Engineering in Quantum Nanowires for Doubling the Field Effect Mobility", in which we explored the role of intermediate buffer layers to trap defects far away from the conduction channels of the nanowires and the effects of these strategies for enhancing carrier mobility.



Beyond sharing my research works, this conference has been an outstanding opportunity to expand my knowledge on the most recent advances in electron microscopy, their applications to research in materials science and to discuss about new collaborative opportunities and building a professional network. All these outcomes will have, for sure, an impact on the development of my career as a researcher. ■

## Frederik Otto

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



I would like to take this opportunity to express my gratitude for receiving the scholarship to support my trip to the IMC20 in Busan. The following experiences would not have been possible without financial support from organization such as the EMS.

The IMC20 in Busan was the first international conference with focus on microscopy that I had the chance to attend, and it was more than I could have hoped for. I would consider this conference a great success mainly for 3 reasons. First, and most importantly, after having missed out on opportunities like this due to COVID, we were finally able to gather in person again and start scientific discussions. The discussions, ranging from getting explained a poster about a topic unrelated to one's own research to the late-night discourse about fundamental electron optics over a beer, are an essential part of broadening one's horizon and gaining new motivation. A personal highlight for me was discussing 4D-STEM related topics with people like Colin Ophus, whom I have only known through their papers before.

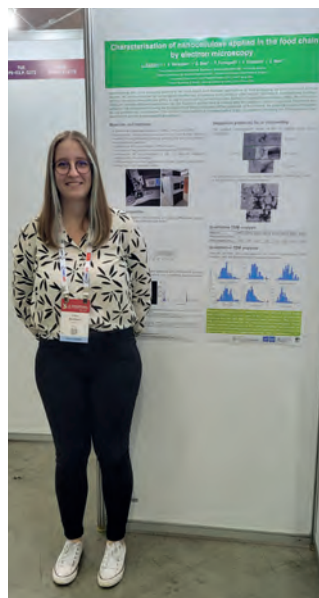
The second part is focused more on my own research. I gave a talk with the title "Long-ranging impact of TEM-Lamella Surface-Relaxation on Dynamic Diffraction in Strain Measurements" in front of a larger audience. Through the questions and discussions that arose, I gained valuable feedback for my further research endeavors and generated ideas for future projects. The general feedback to my talk was positive, again motivating me to continue pursuing my research and publishing my current results in a timely manner.

Lastly, I want to emphasize how great of an opportunity this was to visit Asia and thus, getting to know the Korean culture. Especially the K-POP performance at the gala dinner was something I think nobody expected but still puts a smile on my face to this day.

The experiences gathered at the IMC20 in Busan have therefore already contributed to my scientific journey in a positive manner. I am looking forward to similar events in the future and to meet all the new friends I made all over the world again. ■

## Lisa Siciliani

*The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*



During the IMC20 congress, I had the opportunity to present my results about the characterisation of iron oxides and hydroxides applied in the food chain by electron microscopy during 15 minutes. The Q&A following the presentation was interesting regarding the sample preparation and the quantitative analysis with STEM. At the gala dinner, I was able to discuss about my research and results in a more informal context.

During the poster session, I presented my results about the physico-chemical characterisation about nanocellulose applied in the food chain by electron microscopy in a European regulatory context. I had a few interesting discussions with fellow scientists working on cellulose, the differences between the characterisation of cellulose and nanocellulose, and the contexts in which they are applied. I was also able to detail the aim of my research on nanocellulose to people not familiar with this material, e.g. why it is of interest in Europe or why it is important in to investigate those kind of materials in a health-related context.

I also had the opportunity to discuss with fellow PhD students presenting posters about AI and automated detection of particles, and obtain more information about their methodology and workflow used to obtain single particle detection on samples of various complexity.

In the conference hall where the exhibitor booths were located, I had the chance to discuss with Thermo Fisher Scientific about one of their software (AVIZO) and how it could be used with TEM microscopes for automated detection and analysis of particles. I attended a demonstration of a Thermo Scientific Glacios 2 Cryo-TEM, and also discuss about the newly released Glacios 2 cryo-TEM.

IMC20 was the first international conference to which I attended and I overall had a very good experience discovering new topics and talk to fellow scientists and PhD from all around the world. ■

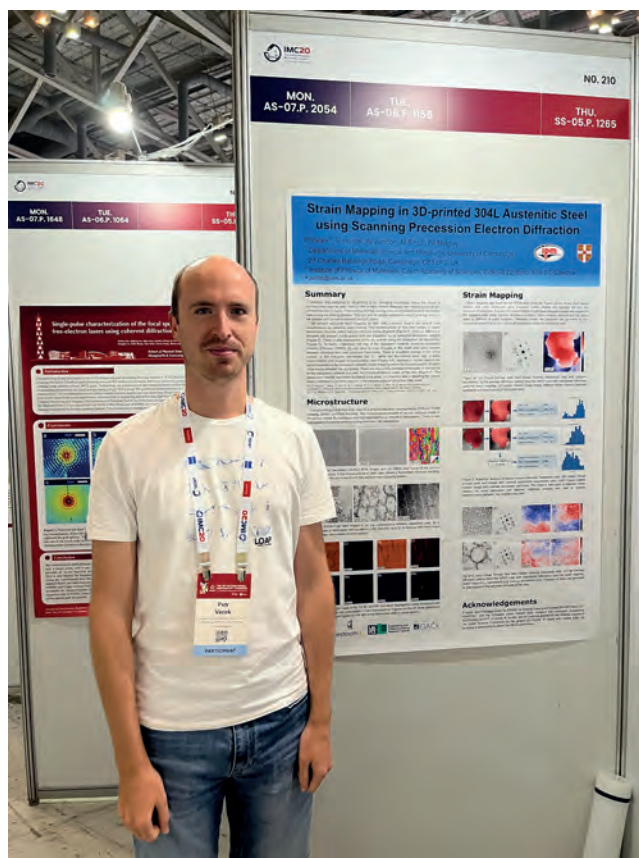
## Petr Vacek

### *The 20<sup>th</sup> International Microscopy Congress (IMC20), September 10-15 2023, BEXCO, Busan, Korea*

The 20th International Microscopy Congress (IMC20) brought together scientists and researchers from all corners of the globe to exchange knowledge and ideas in the field of microscopy. IMC20 was held in Busan, South Korea, and provided a unique platform for scientists to meet after a forced break caused by the COVID19 pandemic. The conference featured an extensive lineup of talks, seminars, and workshops delivered by leading experts in the field of microscopy. These sessions covered a broad spectrum of topics, ranging from advances in electron microscopy to emerging techniques in sample preparation and data analysis. IMC20 served as a valuable platform for identifying current hot topics and trends in electron microscopy. The presentations and discussions revealed several areas of interest, including cryo-electron microscopy, correlative microscopy, machine learning and image analysis, in-situ microscopy, and 4D-STEM techniques, including ptychography.

I was particularly interested in recent developments in strain mapping using 4D-STEM. I had the opportunity to attend several talks on this topic and engage with other scientists to discuss the various analysis methods and microscope acquisition conditions employed in different research groups. I presented my research through two posters. The first poster focused on electron microscopy of phases present in the microstructure of novel TiFeAl alloys, which exhibit interesting microstructures and a variety of phases before and after annealing. The second poster was about strain mapping in 3D-printed austenitic steel. 3D-printed austenitic steels have interesting mechanical properties and even more interesting microstructures. I utilized 4D-STEM to map changes in lattice rotation within dislocation cells present in their microstructures.

IMC20 served as a remarkable gathering of scientists and researchers from around the world. It provided a platform for knowledge exchange, insightful talks, exposure to the latest trends in electron microscopy, the opportunity to present research findings, and the chance to establish meaningful connections with fellow scientists. I thank European Microscopy Society for supporting my attendance. ■







# Outstanding Paper Awards for 2022

## Report 2022 on EMS Outstanding Paper Award: Instrumentation and Technique Development

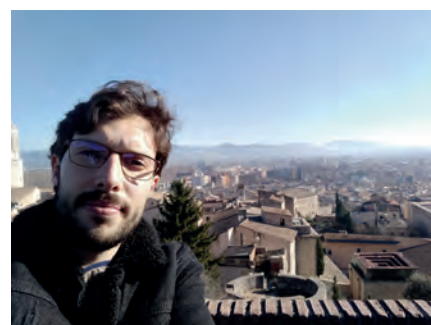
N. Varkentina\*, **Y. Auad\***, S. Y. Woo, A. Zobelli, L. Bocher, J.-D. Blazit, X. Li, M. Tencé, K. Watanabe, T. Taniguchi, O. Stéphan, M. Kociak, L. H. G. Tizei, Cathodoluminescence excitation spectroscopy: Nanoscale imaging of excitation pathways, *Science Advances* 8, eabq4947, 2022. (\*equal contribution)  
<https://www.science.org/doi/10.1126/sciadv.abq4947>

The scanning transmission electron microscope (STEM) has been profoundly transformed in the last years by the advent of a new generation of instrumental developments, such as sub-5 meV electron energy loss spectroscopy (EELS), and advancements in photon-electron spectroscopies, such as cathodoluminescence and electron energy-gain spectroscopy. Additional advances in STEM instrumentation are in progress, and, in particular, time-resolved experiments can be critical for accessing further physical information. In our work, we explore the recently-developed new acquisition scheme using the event-based Timepix3 direct electron detector (providing sub 5 ns temporal resolution) as our EELS detector. With the help of import instrumental advances,

such as readout-free hyperspectral image, we performed spatially-resolved time-correlated experiments based on temporal coincidences between inelastic electron scattering and photon emission events.

This technique, called cathodoluminescence excitation spectroscopy (CLE), as a counterpart to photoluminescence excitation spectroscopy (PLE), is capable of unveiling the excitation pathways in the sample, circumventing one of the major limits for EELS spectroscopy, i.e., the broadband nature of the energy exchange between a fast electron and matter. ■

**Yves Auad**  
 Université Paris-Saclay, CNRS,  
 Laboratoire de Physique des Solides,  
 Orsay 91405, France.



## Report 2022 on EMS Outstanding Paper Award: Materials Science

**M. Wu**, C. Harreiß, C. Ophus, M. Johnson, R. H. Fink and E. Spiecker, Seeing structural evolution of organic molecular nano-crystallites using 4D scanning confocal electron diffraction (4D-SCED) *Nature Communications* 13, 2911, 2022.  
<https://doi.org/10.1038/s41467-022-30413-5>

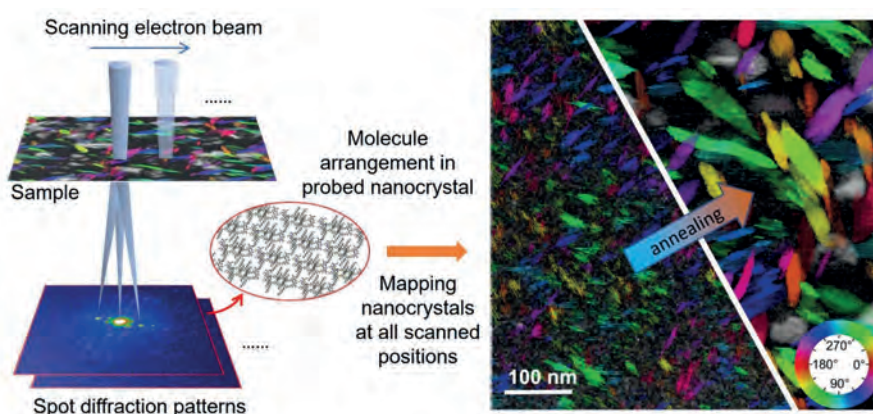
Harnessing the complex nanoscale structure in organic thin films is essential to tailor their functionality and performance. For example, the orientation of  $\pi$ -stacking domains and grain boundaries are essential to the electric transport properties in organic field-effect transistors (OFET); the donor-acceptor interface and degree of percolation of

nanoscale domains in bulk hetero-junction (BHJ) organic solar cells (OSCs) determines exciton dissociation and charge carrier pathways thus dictate performance of the cells. Directly imaging such complex nano-structures in organic thin films using transmission electron microscopy (TEM) is highly challenging due to radiation damage. This is further complicated due to





large unit cells (or distances of ordering) thus, diffraction signals appear at small angles that are buried in strong inelastic and diffuse scattering background. To overcome these challenges, we proposed a novel diffraction imaging technique 4D-scanning confocal electron diffraction (4D-SCED) which



features high dose-efficiency, high angular resolution and few-nanometer spatial resolution suitable for organic structures. 4D-SCED applies defocused pencil beam illumination on the sample and combines confocal electron optic setup with a pixelated detector to record focused spot-like diffraction patterns. The defocused illumination reduces the dose and generates a more homogeneous electron beam-specimen interaction area. At the same time, the confocal optics generates spot-like diffraction signals, boosting both signal-to-noise ratio (SNR) and signal-to-background ratio. We have successfully applied this method to visualize the layer rotation angles in bilayer  $\alpha,\omega$ -DH6T thin film and showed about an order-of-magnitude improved SNR compared to standard nano-beam 4D-STEM. The donor crystalline orientation as well as

donor-accepter interface enrichment in BHJ DRCN5T:PC<sub>71</sub>BM can be unambiguously mapped. Furthermore, we observed the nucleation and growth crystalline domains in both face-on and edge-on orientations during an in-situ annealing experiments in the TEM, providing insights to control of the nano-structures in BHJ.

This novel technique provides high potential to investigate the nano-structures of beam-sensitive organic molecular materials. ■

**Mingjian Wu**  
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## Report 2022 on EMS Outstanding Paper Award: Life Sciences

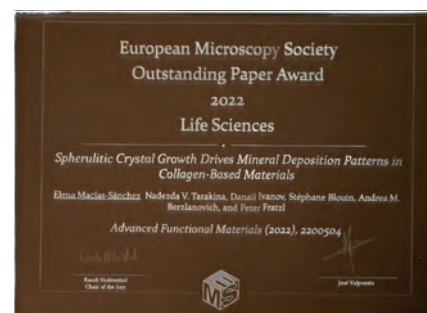
**E. Macías-Sánchez, N. V. Tarakina, D. Ivanov, S. Blouin, A. M. Berzlanovich, and P. Fratzl, Spherulitic Crystal Growth Drives Mineral Deposition Patterns in Collagen-Based Materials, *Advanced Functional Materials*, 2022, 2200504.**  
<https://doi.org/10.1002/adfm.202200504>

### Biologically controlled mineralization

Biom mineralization studies how organisms control the process of inorganic crystallization through interaction with organic molecules. Mineralization of organic matrices is a fascinating phenomenon that occurs in a variety of hard structures that we are familiar

with, such as shells, teeth or our own bones. In the case of bone, the extracellular matrix contains mainly type I collagen fibrils, and the mineral that hardens it consist of a multitude of small apatite crystals.

The biomechanical properties of bone are determined by the location, size,

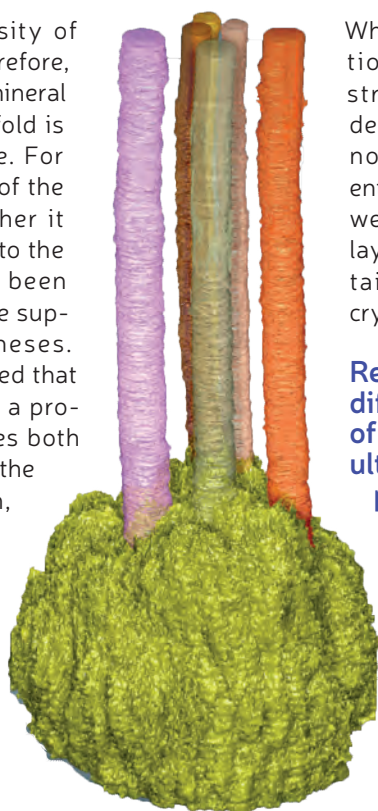


orientation and density of these crystallites. Therefore, the interaction of the mineral with the organic scaffold is of utmost importance. For decades, the location of the mineralization (whether it is internal or external to the collagen fibrils) has been debated, with evidence supporting both hypotheses. Our study demonstrated that mineralization acts in a process that encompasses both the collagen fibrils and the spaces between them, forming a *mineral network*. However, this network is not spatially continuous, but forms discrete mineral structures, called *mineral ellipsoids* or *spherulites*.

### Spherulitic crystal growth

These spherulites are ellipsoidal mineral structures that grow and interlock until the extracellular matrix is fully mineralized. This process, known as tessellation, is ultimately responsible for the mechanical properties of the tissue.

By combining a variety of advanced electron microscopy techniques in a correlative manner, we demonstrated that these mineral structures are formed through a spherulitic crystal growth process. The mineralization is initiated through disordered crystal aggregates in the spaces between the fibrils (*interfibrillar mineralization*), which constitute the center of the forming mineral spherulite. As the crystallization process spreads through the collagen fibrils (*intrafibrillar mineralization*), numerous mineral platelets crystallize inside the fibrils forming superimposed curved layers. Each of these mineral spherulites intergrows with numerous collagen fibrils, expanding longitudinally and radially until they collide.

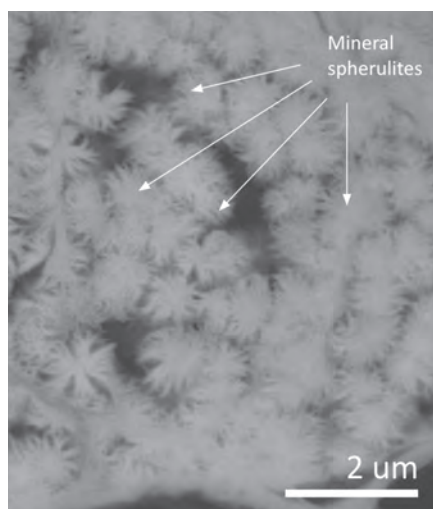


When viewed in cross-section, the final internal structure consists of a denser center formed by non-preferentially oriented crystals, from which well-packed overlapping layers radiate, each containing a multitude of crystal platelets.

### Reconciling the different projections of the mature ultrastructural pattern

The evidence presented in this paper resolves a dichotomy that has existed in the interpretation of mineralization patterns when viewed in longitudinal sections versus transverse sections. Although it is obvious

that the same processes apply, the mature mineral patterns observed in different projections are so remarkably dissimilar that they have puzzled researchers for decades! This work demonstrates that the occurrence of the spherulitic crystal growth process links both patterns, and is directly responsible for the formation of the curved crystalline structures observed in the cross-section.



### Homology in the nanostructure of different types of bones

The study compares different bone structures constituted by type I collagen. From naturally mineralizing tendons of birds (turkey tendon), to the fast-growing bone of ungulates (fibrolamellar bone) or the highly remodeled bone of humans (cortical bone) they present a similar nanostructure, indicating that it is the protein structure that guides the mineralization process and determines the final mineral pattern.

Our work provides new insights into how the protein scaffold guides the mineralization process, supporting the idea that small changes in collagen synthesis can result in dramatic deviations in the degree of bone mineralization, leading to deformity or bone fragility characteristic of pathologies such as osteoporosis or osteogenesis imperfecta. ■

**Elena Macías-Sánchez**

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Department of Biomaterials, Max Planck Institute of Colloids and Interfaces, Am Mühlenberg 1, 14476 Potsdam, Germany



# Financial report of EMS budget



# Financial report of EMS budget

To be presented at the EMS GA in Busan, September 13<sup>th</sup>, 2023. Budget 2022 final, overview budget 2023 and proposal budget 2024

## Budget 2022, 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. In summary, an amount of **€ 71 293.98** was accrued.

### Expenses

One EMS Extension meeting (MCM16 Brno), 5 Supported meetings and 13 scholarships to support registration fees for young scientists were disbursed (€ 9 940.00). Costs for two board meetings, one GA, one GC, organization of organization of virtual meetings, costs for professional secretarial support, for three Outstanding Paper Awards and further costs (banking, web hosting) added up to total expenses of **€ 69 847.24**. Thus, the annual balance for 2022 ended with a **plus of € 1 446.74**. The surplus is intended to be spent for travel scholarships to IMC in 2023 and to EMC in 2024. Together with the overflow from 2021 (€ 123 075.33) EMS had total assets of € 124 522.07 as of December 31<sup>st</sup>, 2022.

## Budget 2023, running; (as of June 16, 2023)

### Incomings

The major revenues will again be accrued by the annual contributions of EMS members via the national societies and of ECMA members. Invoices to national societies and ECMA members had already been sent out; eventual reminders to members will be sent out later this year. Further incomings will be accrued by individual member fees and job postings for non-EMS members. Together, incomings are expected to amount to **€ 48 000**.

### Expenses

No EMS Extension meeting will be supported due to IMC20 in Busan. EMS will support up to 6 Sponsored meetings (€ 4 500) and will issue 20 travel grants for attendance of young European colleagues at Busan (à € 800, in total € 16 000.00). Further expenses will include the Outstanding Paper Awards, costs for professional secretary, two board meetings and bank costs, amounting to a total of estimated **€ 54 650**.

It is thus calculated to end the year 2023 with a **minus of € 6 650**.

## Budget 2024, proposal

### Incomings

Major incomings will be accrued by the annual fees of EMS members via 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 **€ 48 000**.

### Expenses

No EMS Extension meeting will be supported due to EMC2024 in Copenhagen. EMS will support up to 6 Sponsored meetings (€ 4 500) and will sponsor the attendance of young European colleagues at the EMC with € 30 000. Further expenses will include the Outstanding Paper Awards, costs for professional secretary, two board meetings and bank costs, amounting to a total of estimated **€ 68 650**.

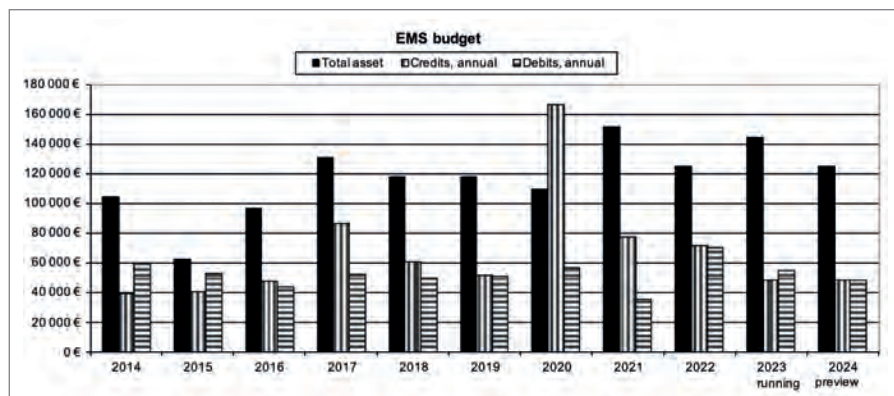
It is thus calculated to end the year 2023 with a **minus of € 20 650**. It is expected that the revenues of the EMC (usually arriving in the following year) will make up for the loss in 2023.

### Annotation:

In 2020 the savings were merged with the giro account (Credits); note that Credits and Debits depict annual budget figures without overflow; Total includes overflows and shows figures at the end of the year.

**Christian Schöfer, m.p.**  
2023 Treasurer EMS  
Vienna, June 16, 2023

Table EMS budget development/10 years





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# European Corporate Member Assembly (ECMA)

# Corporate members 2023

## PLATINUM MEMBERS

- Diatome Ltd
- JEOL Europe
- Thermo Fisher Scientific
- TESCAN

## GOLD MEMBERS

- Andor Technology
- DELONG INSTRUMENTS a.s
- Hitachi High-Technologies
- TVIPS - Tietz Video and Image Processing Systems

## SILVER MEMBERS

- AMETEK B.V.
- Bruker Nano GmbH
- Carl Zeiss Microscopy GmbH
- CEOS
- Dectris Ltd
- DENStolutions
- Electron Microscopy Sciences
- IMS Nanofabrication GmbH
- Intelligent Imaging Innovations GmbH
- Maerzhaeuser Wetzlar GmbH&Co. KG
- NanoMEGAS
- PNDetector
- Quorum technologies
- SPI Supplies

- Ted Pella, Inc.
- Wiley-VCH GmbH
- XEI Scientific Inc.

## BRONZE MEMBERS

- Advanced Microscopy Techniques
- Agar Scientific Ltd
- Deben UK Ltd
- Digital Surf
- EMSIS GmbH
- Fischione Instruments
- Gammadata Instrument AB
- ISS Group Services Ltd
- Klocke Nanotechnik
- MICROS Austria Produktions- und Handelsges.m.b.H
- Micro to Nano
- NANOVISS
- NenoVision
- Protochips
- Safematic GmbH
- Schaefer Technologie GmbH
- Science Services GmbH
- SmarAct GmbH
- SYNTEK Co
- Systron EMV GmbH
- Telight

Please find more information about the corporate membership fees:

<https://www.euremicsoc.org/en/organisation/corporate-members-ecma/concept-constitution-fees/>







# EMS Calendar 2024

# EMS Calendar 2024

Winter School 2024 - Practical course in advanced microscopy 	22 to 26 January 2024	University of Zurich Center for Microscopy and Image Analysis – Zurich – Switzerland	<a href="https://www.zmb.uzh.ch/en/News/Winter-School-2024.html">https://www.zmb.uzh.ch/en/News/Winter-School-2024.html</a>
Liquid Phase Electron Microscopy	28 January to 2 February 2024	Renaissance Tuscany Il Ciocco, Lucca – Tuscany – Italy	<a href="https://www.grc.org/liquid-phase-electron-microscopy-conference/2024/">https://www.grc.org/liquid-phase-electron-microscopy-conference/2024/</a>
European EELS & EFTEM School	13 to 16 February 2024	FELMI-ZFE, Graz University of Technology – Graz – Austria	<a href="https://felmi-zfe.at/teaching-courses/courses/courses-long-life-learning-courses/eels-eftem-school/">https://felmi-zfe.at/teaching-courses/courses/courses-long-life-learning-courses/eels-eftem-school/</a>
BIST Symposium on Microscopy, Nanoscopy and Imaging Science 2024 	16 February 2024	ICFO - Auditorium – Barcelona	<a href="https://bist.eu/events/event/2024-bist-symposium-on-microscopy-nanoscopy-and-imaging-sciences/">https://bist.eu/events/event/2024-bist-symposium-on-microscopy-nanoscopy-and-imaging-sciences/</a>
Molecular Diagnostics Training School (MDTS) & Digital Pathology and Image Analysis Training School (DP&IATS) 	25 to 28 February 2024	Vienna – Austria	<a href="https://www.meduniwien.ac.at/web/fileadmin/content/kommunikation/events/2024/02/2024_MDTS_DPIATS_Programme_for_distribution_16JAN2024.pdf">https://www.meduniwien.ac.at/web/fileadmin/content/kommunikation/events/2024/02/2024_MDTS_DPIATS_Programme_for_distribution_16JAN2024.pdf</a>
Virtual Flow Cytometry Data Analysis Course	26 to 29 February 2024	virtual course – United Kingdom	<a href="https://www.rms.org.uk/rms-event-calendar/2024-events/virtual-flow-cytometry-data-analysis-course-2024.html">https://www.rms.org.uk/rms-event-calendar/2024-events/virtual-flow-cytometry-data-analysis-course-2024.html</a>
Electron Microscopy Spring School 2024 	3 to 6 March 2024	Berlin – Germany	<a href="https://ydge.de/em-spring-school-2024/">https://ydge.de/em-spring-school-2024/</a>
AFM & SPM Meeting 2024	25 to 28 March 2024	United Kingdom	<a href="https://www.rms.org.uk/rms-event-calendar/2024-events/afm-spm-meeting-2024.html">https://www.rms.org.uk/rms-event-calendar/2024-events/afm-spm-meeting-2024.html</a>
EPMA workshop	25 to 28 March 2024	Virtual	<a href="https://sites.google.com/view/epmaathens2024">https://sites.google.com/view/epmaathens2024</a>
Huygens Virtual Workshop for Imaging Experts	16 and 17 April 2024	Virtual	<a href="https://svi.nl/Huygens-Workshop-registration">https://svi.nl/Huygens-Workshop-registration</a>
19 <sup>th</sup> European Molecular Imaging Meeting – EMIM 2024	12 to 15 May 2024	Alfândega Congress Centre – Porto – Portugal	<a href="https://e-smi.eu/meetings/emim/2024-porto/">https://e-smi.eu/meetings/emim/2024-porto/</a>
ELMI	4 to 7 June 2024	Liverpool – United Kingdom	<a href="https://www.elmi2024.org/">https://www.elmi2024.org/</a>
Light Microscopy Summer School	8 and 9 July 2024	University of York – York – United Kingdom	<a href="https://www.rms.org.uk/rms-event-calendar/2024-events/light-microscopy-summer-school-2024.html">https://www.rms.org.uk/rms-event-calendar/2024-events/light-microscopy-summer-school-2024.html</a>
Electron Microscopy Summer School	15 to 19 July 2024	University of Leeds – Leeds – United Kingdom	<a href="https://www.rms.org.uk/rms-event-calendar/2024-events/electron-microscopy-summer-school-2024.html">https://www.rms.org.uk/rms-event-calendar/2024-events/electron-microscopy-summer-school-2024.html</a>
17 <sup>th</sup> European Microscopy Congress 	25 to 30 August 2024	Bella Center – Copenhagen – Denmark	<a href="https://emc2024.eu/">https://emc2024.eu/</a>
Flow Cytometry Course	2 to 6 September 2024	University of York – York – United Kingdom	<a href="https://www.rms.org.uk/rms-event-calendar/2024-events/flow-cytometry-course-2024.html">https://www.rms.org.uk/rms-event-calendar/2024-events/flow-cytometry-course-2024.html</a>
2024 Frontiers of Electron Microscopy and Materials Science (FEMMS)	29 September to 4 October 2024	Catania – Italy	<a href="https://www.euremicsoc.org/en/meeting-calendar/calendar/www.femms2024.it">https://www.euremicsoc.org/en/meeting-calendar/calendar/www.femms2024.it</a>



# Application for membership



## Notes



## EUROPEAN MICROSCOPY SOCIETY (EMS)

### Individual Member Subscription form

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

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

Prof./Dr./Mr./Ms.: \_\_\_\_\_ Last Name: \_\_\_\_\_

First Name: \_\_\_\_\_

Institute: \_\_\_\_\_

Department: \_\_\_\_\_

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

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

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

\* please print for clarity





## EUROPEAN CORPORATE MICROSCOPY ASSEMBLY (ECMA)

### Subscription form

To subscribe to the ECMA, please complete this form\* and mail or fax to:  
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email: [sec@eurmicsoc.org](mailto:sec@eurmicsoc.org)

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

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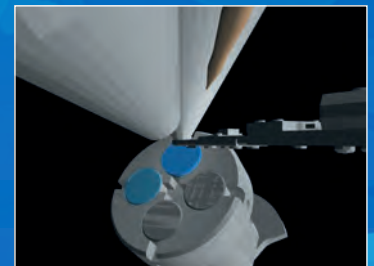
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