

mmc2023 (incorporating EMAG 2023): Review and Picture Special!

Well, that was fun, wasn't it?

With the dust now settled on mmc2023 (incorporating EMAG 2023), we take a look back at what proved to be a fantastic few days in Manchester, celebrating the very best in microscopy, imaging and flow cytometry.

Perhaps you can spot yourself in one of our official event photos!

Welcome to mmc2023

Microscience Microscopy Congress

incorporating **EMAG 2023**

www.mmc-series.org.uk





mmc2023 saw a record-breaking 1,270 attendees, plus exhibitors, descend on Manchester Central as the Congress series returned to the iconic UK venue for the first time in four years.

The Royal Microscopical Society would like to thank everyone who attended its flagship event – the exhibitors, delegates, volunteers and everyone else who helped make the Congress such a special occasion for the microscopy, imaging and flow cytometry communities.

Over three days (four, including our Monday meetings), this international event combined a heady mix of vibrant conference sessions (36 in total – including EMAG 2023 sessions) covering all the latest techniques and applications in microscopy – with a world-class exhibition showcasing the very latest products and technology from some of the leading companies in the field.

The event incorporated pre-Congress meetings and workshops – including an Early Career Symposium and the BioImaging UK meeting – as well as free-to-attend company workshops throughout the exhibition. This year's mmc also featured an expanded Learning Zone with its own lecture theatre, a dazzling exhibition of images shortlisted in our International Scientific Imaging Competition, and a series of vibrant and engaging poster sessions.

The RMS held its 2023 Annual General Meeting (as

well as AGMs for each of the Society's Scientific Section Committees) during the Congress, which featured a number of award presentations for previously announced winners – plus some new recipients (see below). There were new Honorary Fellowships, awards for Scientific Achievement, Outreach and Education, service to the RMS and many more – including our poster prize-winners.

We would like to congratulate all our award-winners and once again, thank you to everyone who attended this hugely important event for the microscopy, imaging and flow cytometry communities

We hope to see you again at mmc2025 – and in the meantime, we hope you enjoy the following pages, as we revisit some of the action from this year's Congress.

www.mmc_series.org.uk

Pre-congress meetings and workshops

Before the main Conference and Exhibition even began, mmc2023 warmed up on Monday 3 July with fully-booked Pre-Congress Workshops on image processing and analysis ('ImageJ' and 'python' programming), and two AFM & SPM-themed workshops. There was also the Bioluminescence meeting – bringing the UK Bioimaging community together to discuss priorities and strategies in national infrastructure, technology development, training, careers and ways to share knowledge across different disciplines.

The eagerly anticipated Early Career symposium also took place on the Monday afternoon. This was an interdisciplinary event aimed at students, postdocs and early career professionals working in the field of microscopy. The meeting served both as a networking opportunity ahead of the main conference, and an opportunity for attendees to showcase their research with peers.

A highlight of the meeting was the Early Career Award competition – with the best talk chosen on the day by a panel of judges. The prize went to Alex Johnson of the Institute of Science and Technology, Austria (Read Alex's report on p66).

Alex Johnson (right) receives the RMS Early Career Award from Professor Grace Burke and Dr Liam Rooney, who Chairs the RMS Early Career Committee.





Conference

With no fewer than 36 sessions taking place across six parallel 'streams' over three days, the conference delivered its usual breadth and depth of microscopy techniques and applications across the sciences. With standing room only, and a queue of delegates stretching out of the conference room entrance, the first Plenary talk delivered by Judith Klumperman gave a sure indication of attendance levels - and sizeable audiences were maintained throughout.

We would like to thank all our speakers and presenters for making mmc2023 a conference to remember – especially our brilliant cast of plenary speakers, who each brought their unique insights and expertise to the conference platform. Our

thanks go to Professor Klumperman (University Medical Center Utrecht, Netherlands), Professor Joerg Bewersdorf (Yale University, USA), Professor Amanda Petford-Long (Argonne National Laboratory, USA) and Professor Philip Withers (University of Manchester/Henry Royce Institute, UK)

We would also like to thank Dr Erin Tranfield (Instituto Gulbenkian de Ciência), who delivered mmc's first Equity, Diversity, Inclusion and Accessibility (EDIA)-themed Plenary. Titled *'Surviving a life-changing accident and relearning how to be a scientist'*, Erin's thought-provoking talk explored what it means to be a scientist with a disability, and was free and open to all attendees.



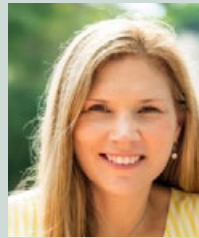
Joerg Bewersdorf



Judith Klumperman



Amanda Petford-Long



Erin Tranfield



Philip Withers



Exhibition

The mmc2023 exhibition featured more than 80 exhibitors, including many of the leading companies in the field. Beneath the grand arches of Manchester Central, they showcased the very latest products and technology, providing expert advice, product demonstrations and free workshops throughout the event. A very big thank you to all our exhibitors

We would also like to thank all our exhibitors who took part in the mmc2023 'Passport Competition' – in which visitors used the Congress App to 'collect' a 'full-house' of QR codes from participating stands. A random prize-draw was carried out after

the exhibition closed and five lucky winners each received a £100 Amazon voucher.

Our winners were as follows:

- Berardo Manuel Sanchez Tafolla
- Chloe Cooper
- Kseniia Bondarenko
- Rebecca Gascoyne
- Zeeshan Mughal

Many thanks to [Prior Scientific](#), [Thermo Fisher Scientific](#), [Nikon UK](#), [Cairn Research Ltd](#), and [Greiner Bio-One](#) for providing the prizes.

[Find out more about all our exhibitors.](#)





Learning Zone

The Learning Zone brought something a bit different to this year's Congress, with a programme of daily talks, expert advice and eye-catching, historical displays.

An ever-popular - and free - feature of mmc, the Learning Zone provided the opportunity to learn more about the many facets of modern microscopy – including a daily programme of free introductory lectures at its dedicated seminar theatre. Visitors

also had access to a range of microscopes demonstrating the fundamentals of microscopy.

For the history buffs, this year's display collection included a Cooke, Troughton and Simms (CTS) microscope from the 1950s - very similar to the one used by Rosalind Franklin, the world-famous British chemist and X-ray crystallographer. The McCormick Collection of replica antique microscopes spanning hundreds of years of microscopy, and a collection of antique slides recently donated to the RMS were also on display.



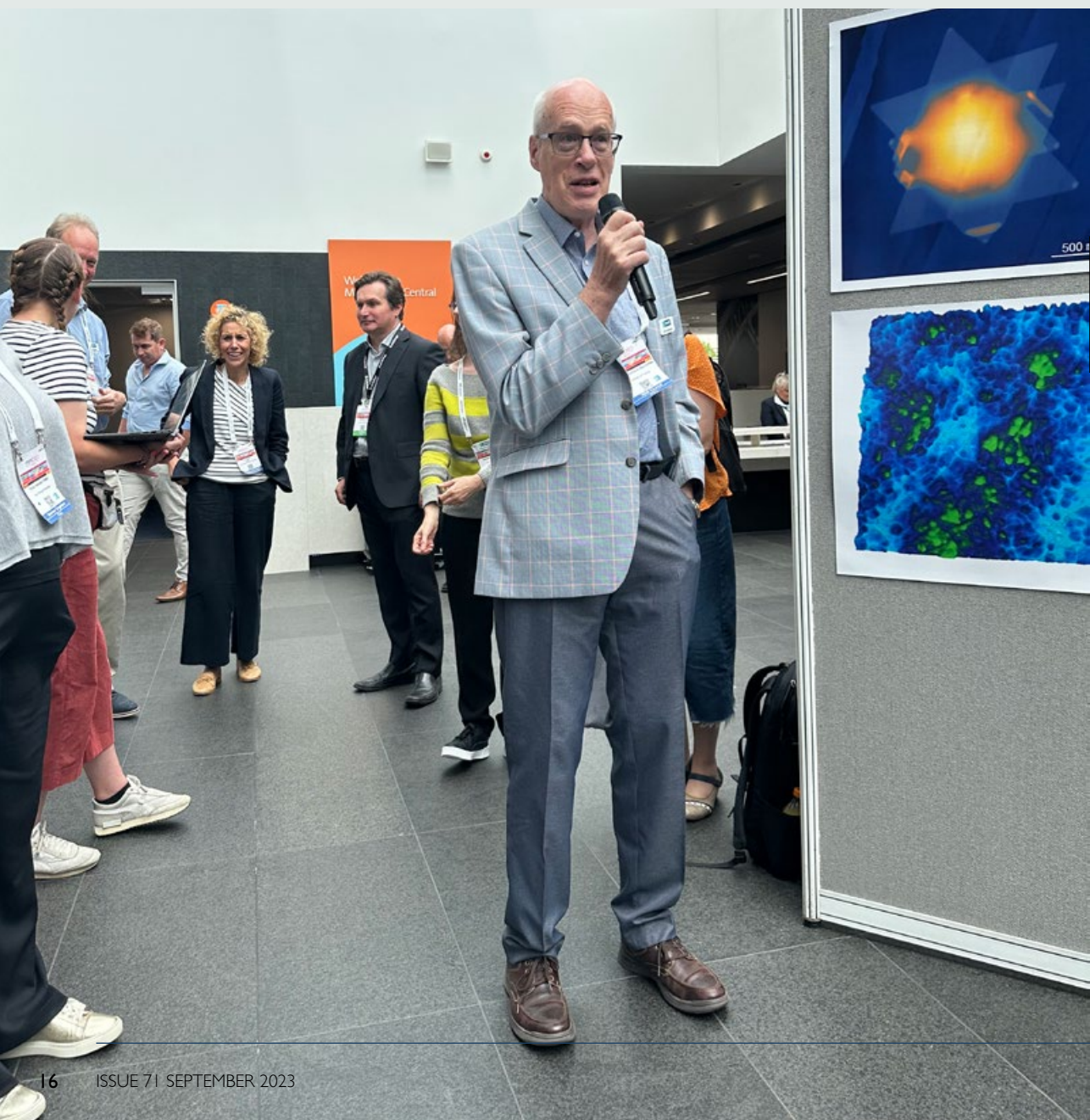


Scientific Imaging Competition

This year's Scientific Imaging Competition received more than 220 submissions from across the globe, spanning six different categories (Light Microscopy – Life Sciences; Light Microscopy – Physical Sciences; Electron Microscopy – Life Sciences; Electron Microscopy – Physical Sciences; AFM & SPM; Short Video Category). Our team of judges whittled these down to a shortlist of around 50 images,

which were displayed in the foyer at Manchester Central throughout mmc2023.

A well-attended prize-giving ceremony saw the winners revealed by RMS History Committee Chair, Dr John Hutchison Hon FRMS – who has been involved on the judging panel for many years. We were delighted that some of the winners were able to attend mmc2023 and receive their prizes in person (pictured opposite and overleaf). Read John's report on p64.



1st Prize Light Microscopy (Life Sciences)

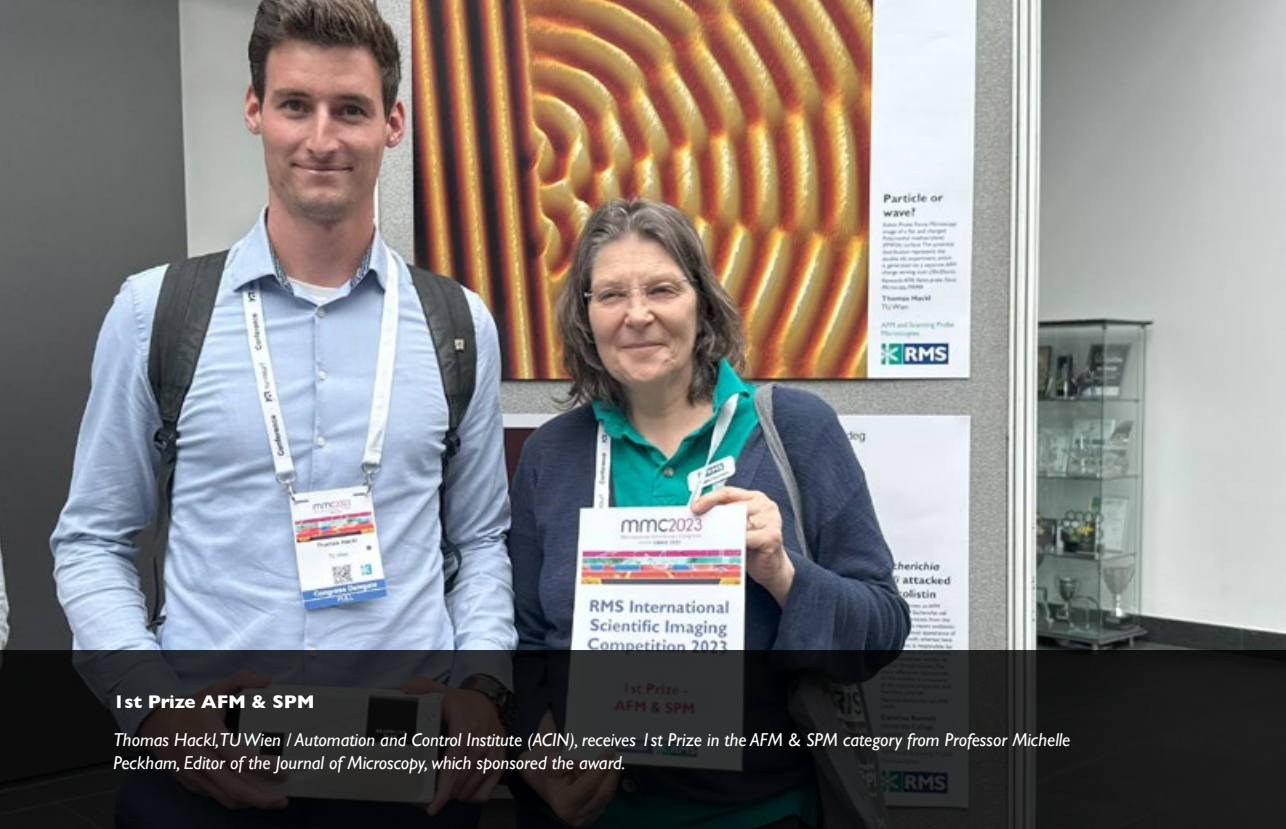
Georgina Fletcher of prize-sponsor, BiolmagingUK, accepts the First Prize in the Light Microscopy Life Sciences category, on behalf of winner Vitoria Murakami Olyntho, McMaster University, from competition judge Dr John Hutchison Hon FRMS.



2nd Prize Electron Microscopy (Physical Sciences)

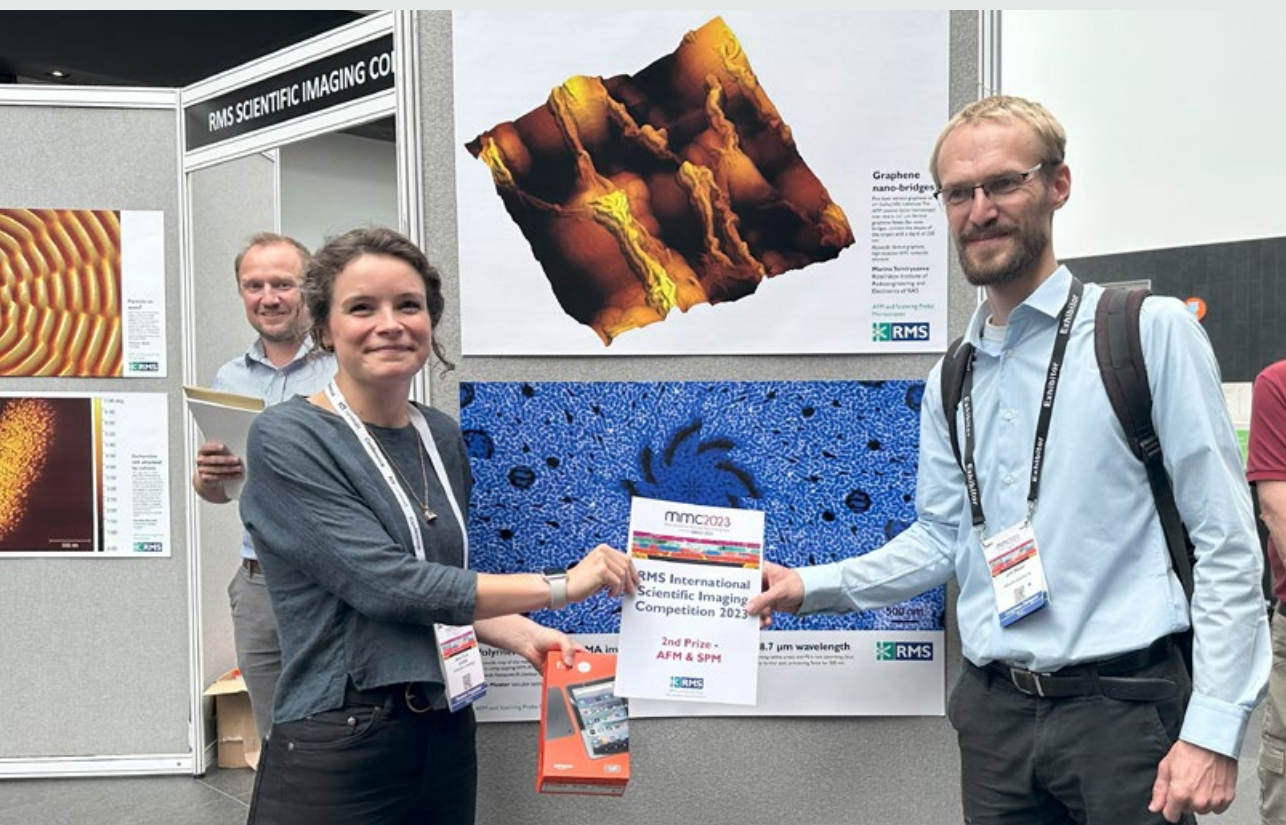
Zeeshan Mughal of The Open University accepts 2nd Prize in the Electron Microscopy Physical Sciences category from competition judge, Professor Pippa Hawes.





1st Prize AFM & SPM

Thomas Hackl, TU Wien / Automation and Control Institute (ACIN), receives 1st Prize in the AFM & SPM category from Professor Michelle Peckham, Editor of the Journal of Microscopy, which sponsored the award.



2nd Prize AFM & SPM

Lars Mester, Attocube systems AG, receives 2nd prize in the AFM & SPM category from competition judge, Dr Alice Pyne.

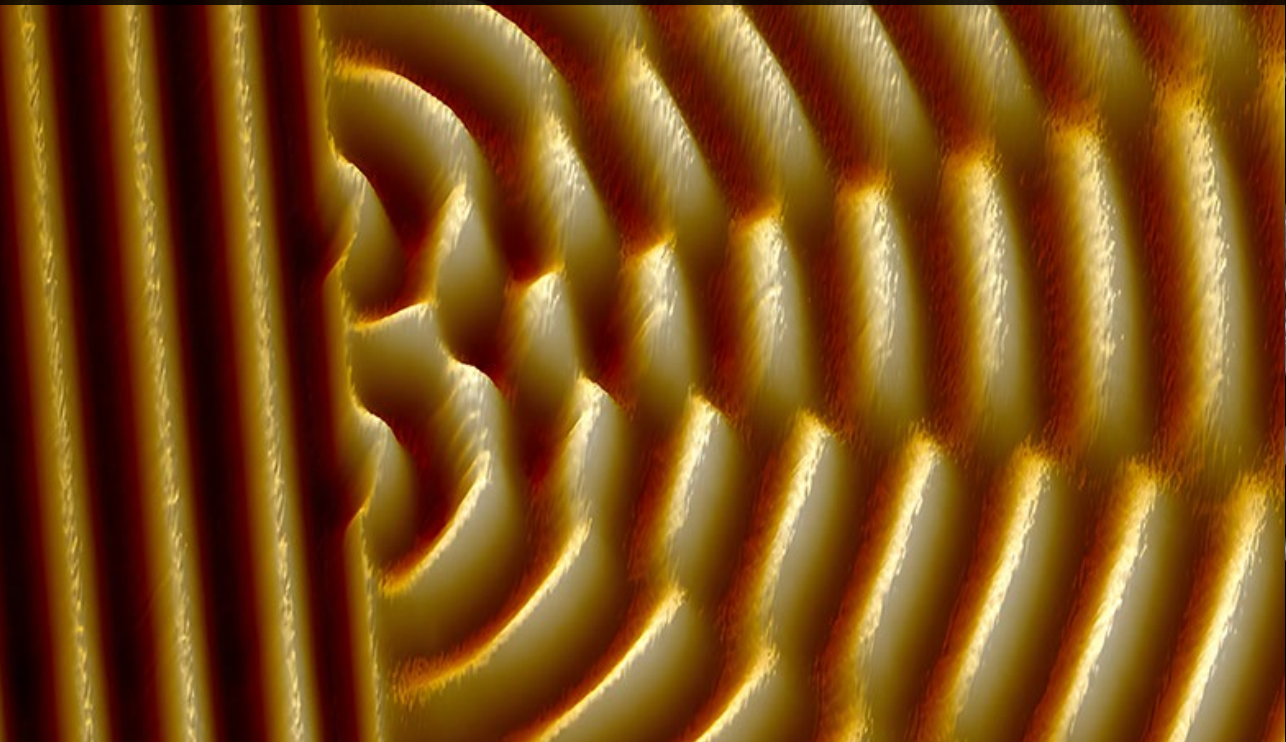
Albert D. Smith, TESCANA-UK, accepts first Prize in the Short Video (Physical Sciences) category from Dr Alice Pyne.



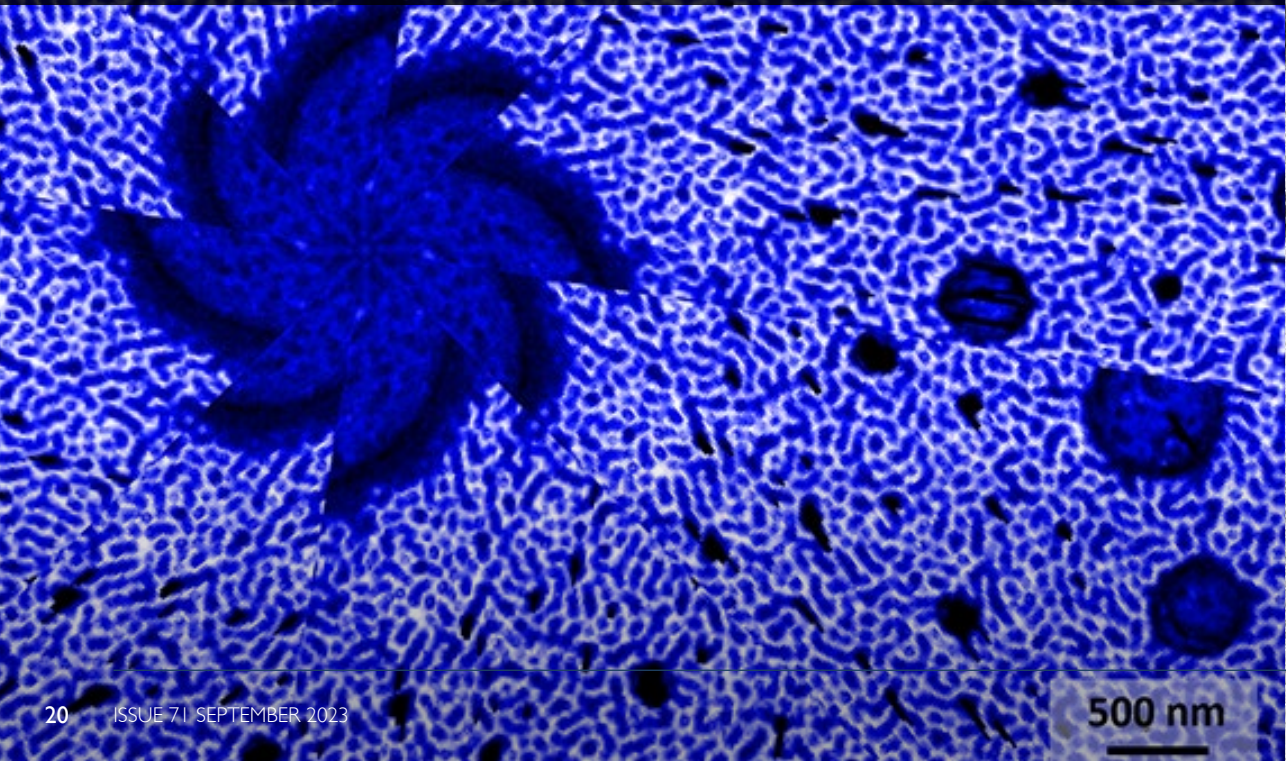
The following images were announced as the winners and runners-up:

AFM and Scanning Probe Microscopies

1st: Thomas Hackl, TU Wien / Automation and Control Institute (ACIN). Particle or Wave? Kelvin Probe Force Microscopy image of a flat and charged Poly(methyl methacrylate) (PMMA) surface. The potential distribution represents the double slit experiment, which is generated via a separate AFM charge writing scan (20x20µm).

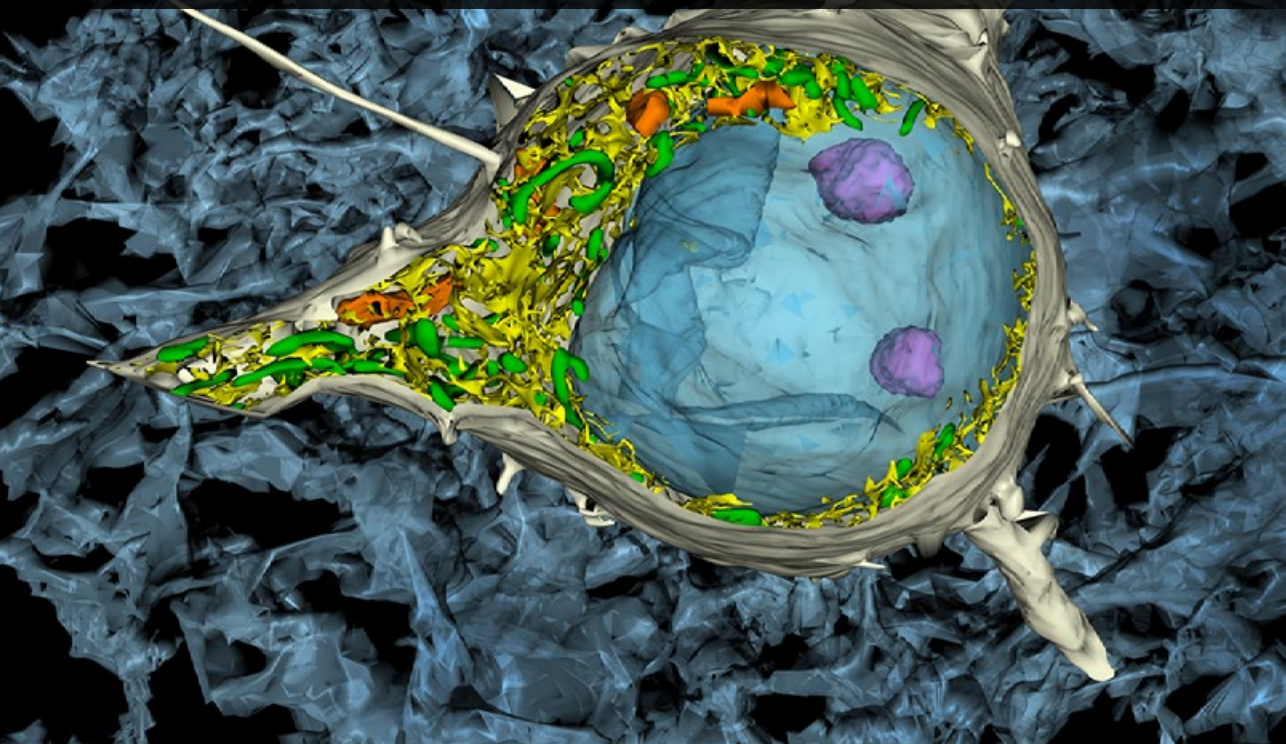


2nd: Lars Mester, attocube systems AG. Polymer brush PS-PMMA imaged with tapping AFM-IR at 8.7 µm wavelength. Nanoscale map of the material distribution in a PS-PMMA polymer brush sample.

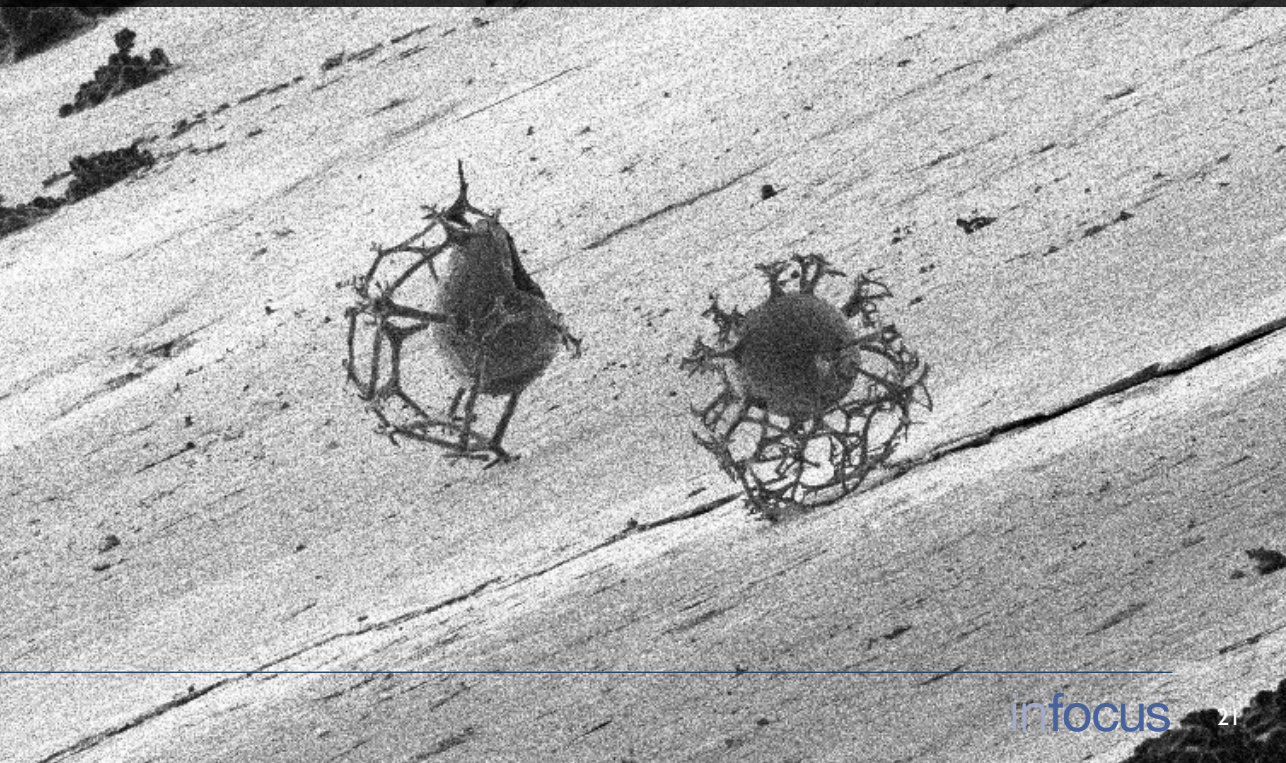


Electron Microscopy - Life Sciences

1st: Josef Spacek, Professor of Pathology, Charles University Hospital, Hradec Kralove, Czechia. A look inside the pyramidal cell of the cerebral cortex 3D reconstruction, serial electron microscopy. Orig. magn. 6000x.

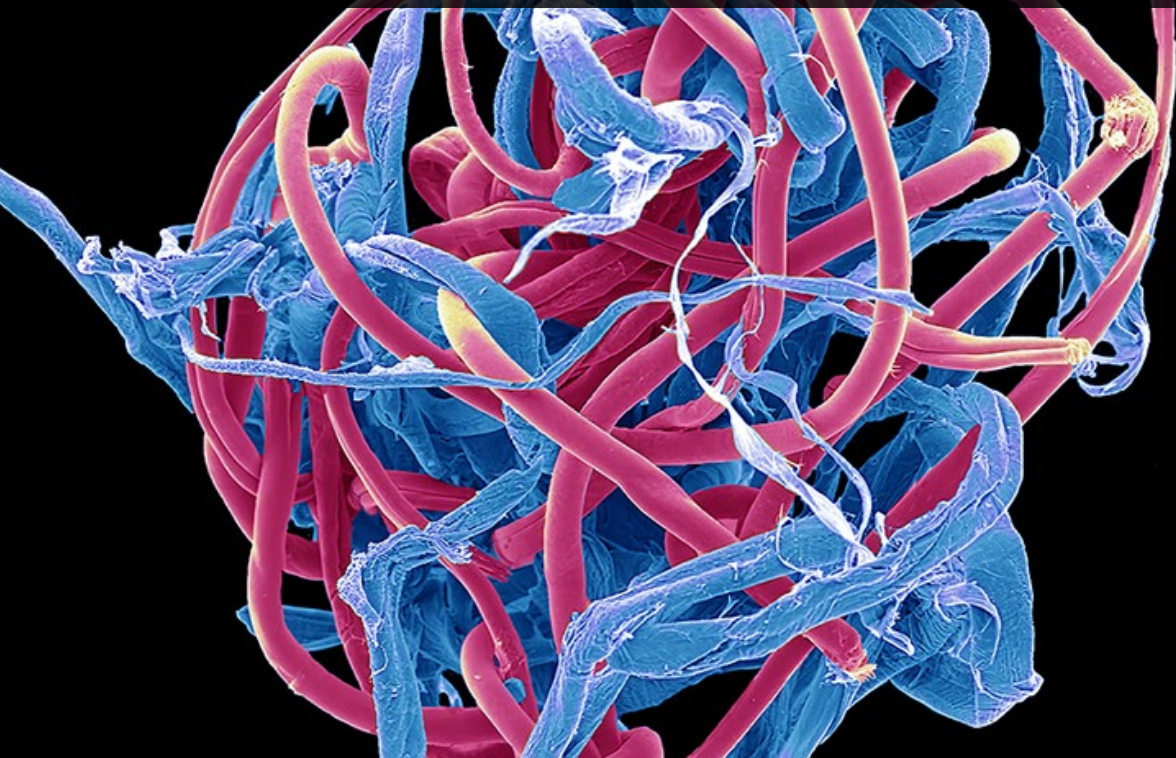


2nd: Sandy McLachlan, University of Victoria, Victoria, BC, Canada. What Goes Up Must Come Down. Two specimens of *Cannosphaeropsis franciscana*, a fossil dinoflagellate cyst, recovered from 66 million-year-old rocks on Vancouver Island, Canada.

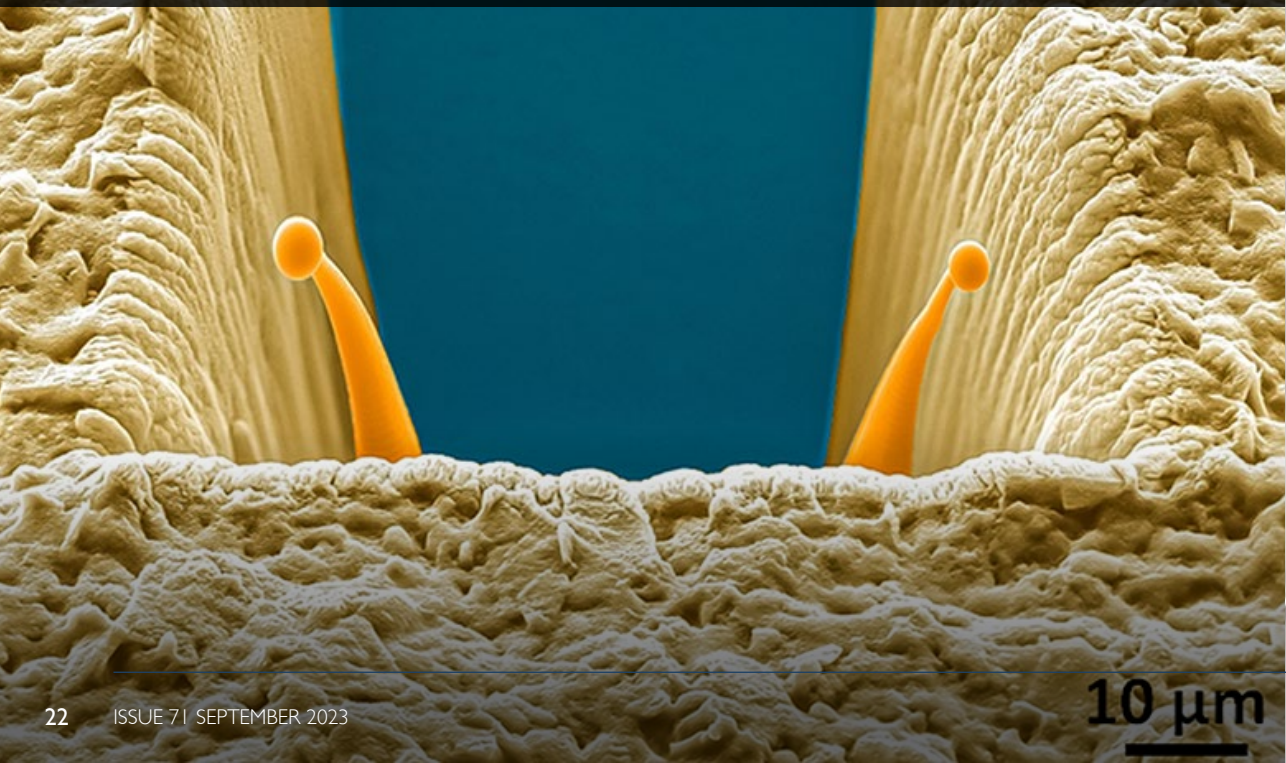


Electron Microscopy - Physical Sciences

1st: Steve Gschmeissner. Plastic pollution. Coloured scanning electron micrograph of a microplastic bobble from a poly-cotton garment.

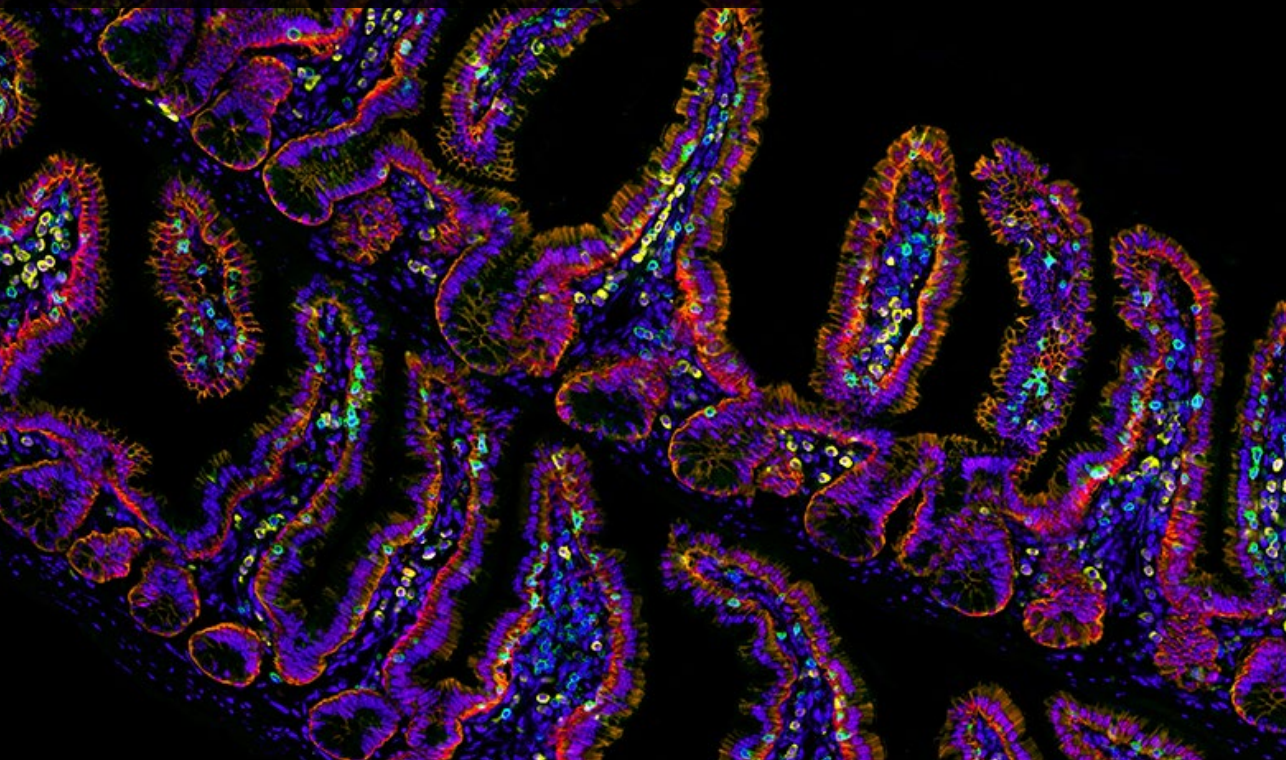


2nd: Zeeshan Mughal, The Open University. Peek-A-Boo, a snail in the nano-world. A by-product of focused ion beam milling cross-section for a $\sim 100\mu\text{m}$ graphene coating on a steel substrate.

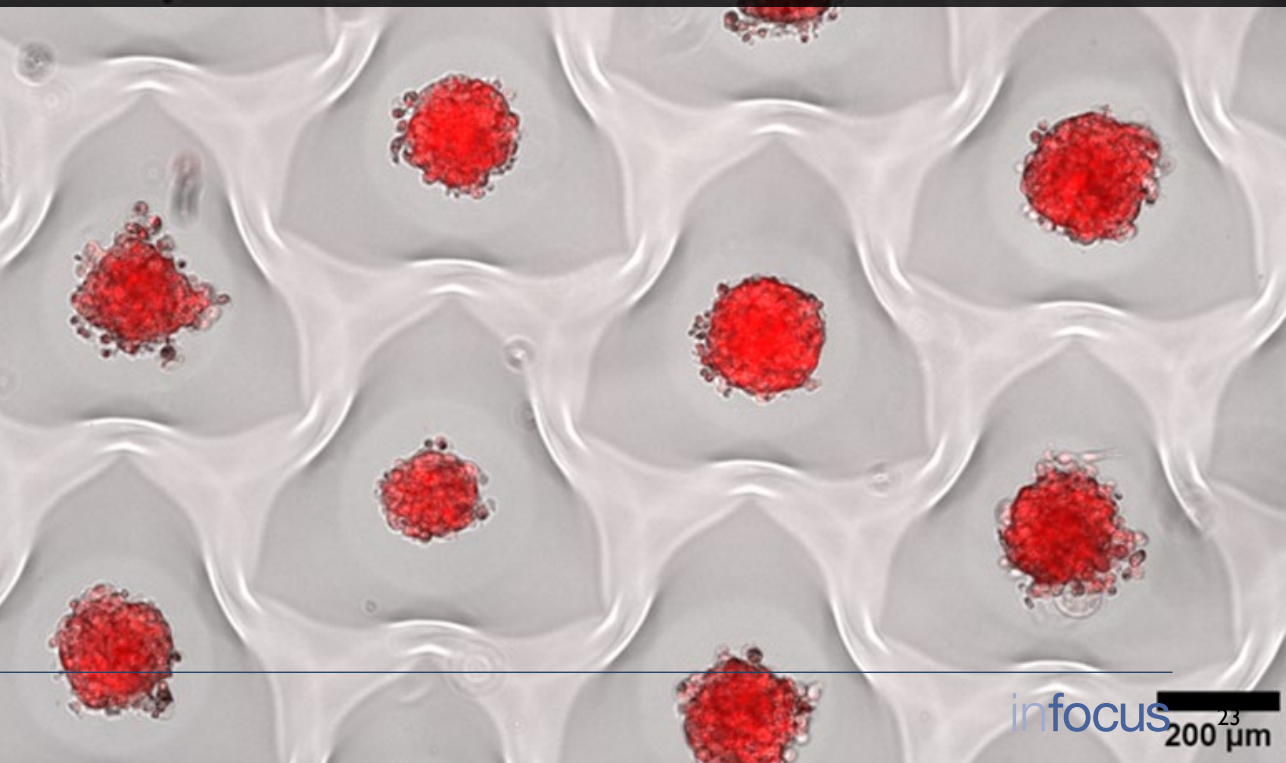


Light Microscopy - Life Sciences

1st: Vitoria Murakami Olyntho, McMaster University. Intestinal villi of a food-allergic mouse. Image depicting the intestinal villi of a mouse allergic to the egg protein, ovalbumin, upon secondary allergen exposure. The sample was stained with fluorescent-labelled antibodies.



2nd: Dan Marks, Imperial College PhD Student. Dimensionality in Ovarian Cancer. An array of spheroids grown from cells derived from a patient with ovarian high-grade serous carcinoma. The nucleus of each cell is labelled with styo-deep red.



Light Microscopy - Physical Sciences

1st: Cagri Yalcin. Crystallization Scene of Magnesium Nitrate dissolved in water and ethanol. Half teaspoon of magnesium nitrate is dissolved in 30ml of water and ethanol. Two drops are spread on a slide which is heated and then put on an icy surface to cool down.



2nd: Nathan Renfro, GIA. Aquamarine Cave. This image shows a microscopic 'cave' created in an etched crystal of the mineral beryl complete with needle-like spires.

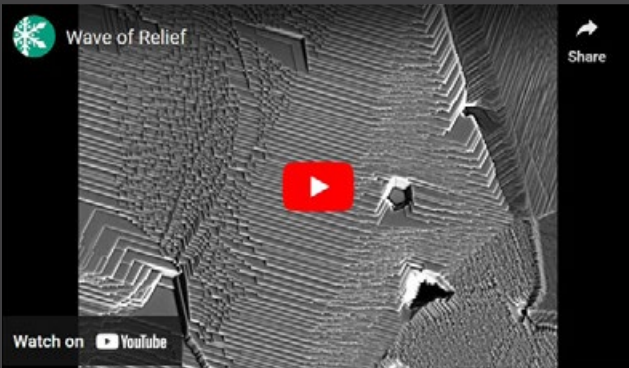


Short Video

1st Life Sciences: Annalisa Bellandi, Faulkner Laboratory, John Innes Centre, Norwich, UK. A small plant with mighty signals - plants transmit wounding information to distal leaves. There is a universe of dynamic signals inside plants - when a plant is wounded, long-distance calcium signals are transmitted quickly from the wounded leaf to the others!



1st Physical Sciences: Albert D. Smith, TESCAN-UK. Wave of Relief. Iron diffusing into titanium at 850°C over 24 hours as observed in an SEM with a 60µm view field.



Find out more about all these winning images and videos

Dr Peter O'Toole becomes RMS President at Annual General Meeting

Among the many announcements at the RMS Annual General Meeting, which took place on Tuesday 4th, was the appointment of Dr Peter O'Toole as RMS President. Professor Grace Burke was on hand to pass on the President's official medallion of office.

Pete said: "I have always been immensely proud to be a part of this wonderful Society, and it is a huge honour to serve as RMS President. I look forward to working alongside all our members, volunteers, and staff, as we look to continue to evolve and develop further to continue supporting the science of microscopy, imaging, analysis and flow cytometry communities."

Read more on page 72.

Changing of the guard: Professor Grace Burke passes on the RMS President's official medallion to Dr Peter O'Toole.



A surprise RMS Honorary Fellowship for Grace!

Fittingly, Pete's first duty as RMS President was to announce a surprise Honorary Fellowship for Grace.

Throughout her remarkable career in the US and UK, Grace has made an enormous contribution to microscopy and Materials Science, and has become

a hugely influential figure in both industry and academia. She is also the first person to have served both as President of the Microscopy Society of America (MSA) and the RMS.

You can read more about Grace's career and achievements on page 76.

...Sometimes a picture really does say it all!



Surprise! Grace hides her face in disbelief, while Pete enjoys the moment. He then hands her the Hon Fellowship certificate.



Professor Rafal Dunin-Borkowski announced as RMS Honorary Fellow

Also joining the RMS Honorary Fellowship was Professor Rafal Dunin-Borkowski – a world-leading Electron microscopist who has made major contributions to a wide range of electron

microscopy techniques and applications.

Rafal was recognised not only for his ground-breaking research, but for his vision and leadership as Co-Director of the Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons (ER-C) at Forschungszentrum Jülich.

Read more on page 78.

Professor Rafal Dunin-Borkowski signs the Honorary Fellows register.



‘Understanding Light Microscopy’ author Jeremy Sanderson receives the RMS President’s Award

Another highly popular award recipient was RMS stalwart Jeremy Sanderson, who received the President’s Award in recognition of his exceptional contributions to the work of the Society.

Jeremy has been involved with the RMS for 35 years – notably as a prominent teacher on the long-running RMS Light Microscopy courses.

He is also well known as an author on microscopy; his latest book, a comprehensive guide titled *Understanding Light Microscopy*, was published in 2019 as part of the RMS Wiley Book series.

Read more on page 79.

Jeremy Sanderson (left) receives the RMS President’s Award alongside Professor Grace Burke and Dr Peter O’Toole



Standing ovation – and surprise honour – for Chief Executive Allison Winton, as she bows out at her last mmc!

The RMS bade an emotional farewell to retiring Chief Executive Allison Winton, who has dedicated an incredible 39 years of service to the RMS as a member of staff.

It was revealed that a new RMS award has been established in Allison's name; the 'Winton Prize' will be awarded in future to those who have made outstanding, sustained contributions to community engagement and collaboration in microscopy and RMS-related activities. The announcement sparked a spontaneous and prolonged standing ovation for Allison.

You can read more about Allison's extraordinary career at the RMS on page 82.

Allison (right) becomes the inaugural recipient of the Winton Prize – established in recognition of her years of service to the RMS.



Previously announced winners receive their RMS Awards and Honours

mmc2023 provided the perfect stage for many previously-announced RMS award-winners to receive their awards in person, and gain public recognition from the microscopy, imaging and cytometry communities.

The four-year gap since the last mmc, and a reduced number of in-person RMS events since 2019 due to Covid, meant a large number of recipients had yet to receive their awards. Happily, we were able to put that right in Manchester for many of our recipients, and we would like, once again, to congratulate them on their achievements.



Dr Alice Pyne (right), receiving the RMS AFM & SPM Award.



Dr Andrea Centrone (left) receiving the RMS Scientific Achievement Award.



Dr Ardan Patwardhan (right), receiving the RMS Scientific Achievement Award.



Professor Christian Eggeling (left), receiving the RMS Award for Light Microscopy.



Craig Holliday (right), receiving the RMS Diploma from Professor Susan Brooks (centre) and Dr Kerry Thompson.



Dr Elisabeth Bik (left), receiving the RMS Chris Hawes Award for Outreach and Education.



Professor Erin Tranfield (right), receiving the RMS Alan Agar Award for Electron Microscopy.



Dr Hari Shroff (right), receiving the RMS Scientific Achievement Award.



Dr Lynne Joyce (centre left), receiving the RMS President's Award.

Professor Michael Sheetz (right), receiving the RMS Pearse Prize.



Dr Lothar Schermelleh (right), receiving the RMS Scientific Achievement Award.



Dr Marty Jopson (left), receiving the RMS Chris Hawes Award for Outreach and Education.



Dr Peter Bankhead (right), receiving the RMS Data Analysis in Imaging (DAIM) Award.



Wim Hagen (left), receiving the RMS Scientific Achievement Award.



Dr Natalie Reznikov (left), receiving the Award for Innovation in Applied Microscopy for Engineering, Physical and Material Sciences.





Dr Robert Haase (left), receiving the RMS Data Analysis in Imaging (DAIM) Award.

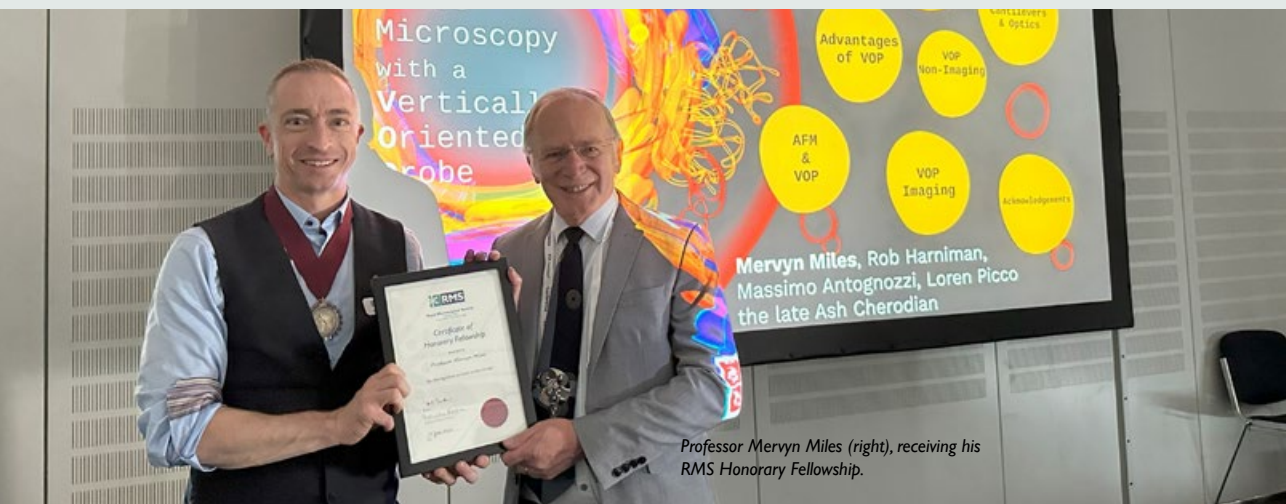


Xiangli Zhong (centre), receiving the RMS Vice President's Award.

Honorary Fellows Professor Mervyn Miles and Professor Alan Craven receive their awards

We were particularly delighted to welcome RMS Honorary Fellows, Professors Mervyn Miles and

Alan Craven to receive their awards in person. Mervyn's Hon Fellowship was announced in 2019 for his pioneering work in AFM & SPM – particularly in its development and application to biological systems. Alan was appointed an Honorary Fellow in 2021 in recognition of his seminal contributions to the development of instrumentation and techniques – including the STEM-EELS technique.



Professor Mervyn Miles (right), receiving his RMS Honorary Fellowship.



Professor Alan Craven (right), receiving his RMS Honorary Fellowship.

Poster Prizes and ‘Best Talk’ Winners

Among our many award-recipients at mmc2023 were the poster prize-winners, covering a wide range of microscopy techniques across the sciences.

Each day of the event featured vibrant poster sessions, with presenters engaging in absorbing discussions with visitors in the main exhibition hall.

After some very difficult deliberations, the judges picked their winners on the final day of mmc2023. The RMS would like to congratulate all our winners and runners-up, as follows:

Poster Prize Winners

1st Prize - Microbial Imaging Session

Helena Maier, *The Pirbright Institute*

Cross virus comparison of coronavirus proteins involved in replication organelle formation

1st Prize - Public Health Session

Patrick Phillips, *Diamond Light Source. The Pirbright Institute. Oxford University*

Correlative cryo-bioimaging to study coronavirus replication organelles

1st Prize - Frontiers in Biolmaging

Edward Ward, *University of Cambridge*

Combining machine learning with interferometric structured illumination microscopy for the imaging of dynamic process in three-dimensions

2nd Prize - Frontiers in Biolmaging

Lydia Daly, *King's College London. Queen Mary, University of London*

Studying the kinetochore corona with super-resolution and fast lattice-light sheet imaging

AFM & SPM, Physical Sciences

Pieter Keenan, *University of Bath*

Passive identification of adsorbate single benzene molecules on atomically resolved Si(111)-7×7 surface by I-z spectroscopy at room temperature

AFM & SPM, Life Sciences

William Trewby, *Durham University*

Direct, nano-rheological studies of in-plane lipid dynamics in model and native membranes

1st Prize - mmc2023

Mahesh Uttamlal, *Glasgow Caledonian University*

Microscopic analysis of new and historic cotton fibre cross-sections

Runner Up - mmc2023

Patrick Phillips, *Diamond Light Source. The Pirbright Institute. Oxford University*

Correlative cryo-bioimaging to study coronavirus replication organelles

Runner Up - mmc2023

Alex Robinson, *University of Liverpool*

Advances in Probe Subsampling for 4D-STEM

1st Prize - New & Emerging Concepts

Florian Steiner, *Ludwig-Maximilians-University Munich*
Quantum optics meets microscopy – An ultra-sensitive resonator microscope for nano- and life sciences

2nd Prize - New & Emerging Concepts

Mollie Brown, *University of Strathclyde*

Obtaining super-resolved images at the mesoscale through Super-Resolution Radial Fluctuations

EMAG - Best Student Posters

Seojin Kim, *University of St Andrews*

Microscopic characterisation of Ni nanoparticles exsolution in La_{0.4}CaxSr_{0.4-x}Ni_{0.06}Ti_{0.94}O_{3-d} perovskite oxides

Atul Atul, *University of Groningen*

Resolving phase coexistence in VO₂ thin films by real space imaging of oxygen atoms

Ella Kitching, *Cardiff University*

Investigation of the capabilities of iDPC tomography to image CeO₂ nanoparticles

EMAG Best Flash Talk

Frances Quigley, *Trinity College Dublin. Advanced*

Microscopy Laboratory, Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN), Dublin

Developments in designing a retrofittable photoelectron source for low voltage electron microscopy

EMAG Best Talks

Zhiquan Kho, *University of Manchester*

Understanding multi-phase nano-scale structural complexity of reacted SiC coating of TRISO particle using STEM and unsupervised clustering

John Scott, *Queen's University Belfast*

A Multiscale Study of Ferroelastic Domains as a Function of Aspect Ratio

Andreas Körner, *Helmholtz Institute Erlangen-Nürnberg for Renewable Energy*

What radiation does to water: the case of acidity under electron and X-ray exposure

Some of our prize-winners are pictured below





