

MicroscopyAwards

Microscopy Society of America Awards: 2022 Award Winners



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Each year, the Microscopy Society of America (MSA) provides several major awards for outstanding contributions to the fields of microscopy and microanalysis and service to the Society. While recipients of these awards are listed under the tab Awards & Scholarships – Society Awards | Microscopy Society of America on the MSA homepage, little information as to why awards were bestowed is provided. This article highlights the contributions of the winners of the 2022 MSA major Society awards and the MSA Fellows. The information presented here represents a short summary of information provided in the awardees' nomination packages. Guidelines, including deadlines for nominating individuals for these and other MSA awards, can be found at <https://www.microscopy.org/awards/society.cfm>.

Distinguished Scientist Awards

Distinguished Scientist Awards annually recognize a pre-eminent senior scientist, from both the biological and physical sciences, who has a long-standing record of achievement during his or her career in the field of microscopy or microanalysis.

Biological Sciences Distinguished Scientist: Kenneth A. Taylor



Ken Taylor, Professor, Florida State University

Ken Taylor began his career as a PhD student with Bob Glaeser at Berkeley where, in 1974, he published the first electron diffraction patterns from frozen, hydrated protein (catalase) crystals. This was the first paper to use electron cryo-microscopy on proteins and contributed to the early appreciation of its long-term potential. Ken is one of the principal founders of the field of electron microscopy of unstained (frozen-hydrated) biological specimens, a field known colloquially as “cryo-EM.” Ken’s seminal work helped to launch this field. Ken is an international leader in two areas of cryo-EM. The first of these involves structural studies of the actin-myosin system, and the second is the application of electron tomography in cell and molecular biology. His highly cited 2006 *Nature* paper (<https://doi.org/10.1038/nature04817>) reported the first 3D tomographic determination of the structure of the HIV *env* spike protein trimers.

As a postdoctoral fellow in 1980, Ken determined the first 3D structure of a bacterial cell wall (from *Sulfolobus* sp.) using electron crystallography images of 2D arrays of the cell wall, tilted at angles up to 85°. The greatest impact of Ken’s research has been his extensive work on actin and myosin, the proteins involved in muscle contraction. His work on insect flight muscle in rigor and various trapped states has produced an enormous depth of understanding of the location, motion, and occupancy of the cross-bridges in their cycle of attachment, power stroke, and release from the thin filaments.

Ken has been an active participant in MSA and international meetings. He has served on both the MSA Program Committee and the Nominations Committee. He also served as Chairman of the 2003 Gordon Research Conference on 3-D Electron Microscopy. He has a strong record of service to the scientific community as a long-standing editor of the *Journal of Structural Biology*, a participant in over 70 NIH study sections, and a member of two NIGMS council advisory panels.

Physical Sciences Distinguished Scientist: Ruud Tromp



Ruud Tromp, Professor, Leiden University

Ruud Tromp received his PhD in Physics and Mathematics from Utrecht in 1982 under the guidance of Drs. F.W. Saris and M.J. Sparnaay. In 1983, he began work as a Research Staff Member at IBM in the T.J. Watson Research Center, where he became Manager of the Interface Science and Analytical Science groups. Since 2006, he has been affiliated with the Materials group at Leiden University, the Netherlands.

Ruud pursued development of ion and electron scattering at IBM with low-energy electron microscopes (LEEMs). His signature contribution involves modifications to the LEEM system, including aberration correction, that have transformed its performance. These modifications include a reduction in footprint of Bauer’s original concept of a horizontally extended instrument, to one with a mainly vertical electron beam column. This improved access to the specimen area allowed modularization of optical components with greater mechanical stability. It also simplified the addition of a commercially available field emission source that significantly improved electron beam brightness.

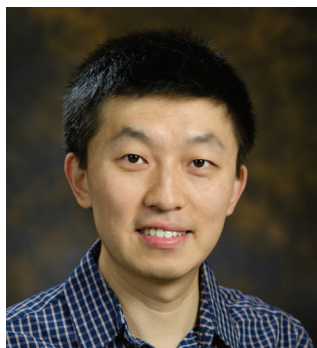
Ruud's recent work has involved addition of *in situ* high-temperature environmental equipment for TEMs to allow observation of material growth and behavior under semiconductor processing conditions. This has included work with an environmental cell for both wet and dry gaseous chemistry to explore *in situ* nanoparticle and island growth and coarsening. This technology has made significant contributions to *in situ* electron microscopy over a 20- to 30-year period.

Ruud's contributions to instrumentation stand out as he has also utilized the new capabilities to create a lasting body of scholarship. Citations of his over 260 publications have been consistent, with more than 500 citations per year for most of his career, culminating in his current h-index of 81 (Google Scholar) and 70 (Web of Science). He has numerous honors and in 2020 was elected to the US National Academy of Engineering. He is the holder of 47 patents and has given over 100 presentations since 2006.

Burton Medal

The Burton Medal honors annually the distinguished contributions to the field of microscopy and microanalysis by a scientist who is less than 40 years of age on January 1st of the award year (that is, the awardee to be honored at M&M 2022 cannot have been born earlier than 1982).

Burton Medal in Biological Sciences: Yuan "Kai" He



Yuan "Kai" He, Associate Professor, Northwestern University

Yuan He received his PhD with Ishwar Radhakrishnan at Northwestern University while working on the structure-function analysis of the mammalian Sin3 corepressor complex. He then moved to the University of California at Berkeley to work as a postdoctoral fellow with Dr. Eva Nogales, where he reported the human transcription pre-initiation complex structure (*Nature* 2013, and subsequent papers). Yuan is a well-trained structural biologist with an international reputation. He is now an Associate Professor at Northwestern University and an international leader in the field of the cryo-electron microscopy analysis of chromatin and transcription complexes.

Yuan's contributions have significantly advanced our knowledge of human Pol II transcription preinitiation complex (PIC) assembly and architecture. He has also made exceptional contributions to our understanding of the Pol I and Pol II PICs and to the field of large chromatin remodeling complexes and DNA repair. Because his initial work was carried out before the resolution revolution afforded by new detector technology, Yuan devised a visualization and image analysis pipeline that used stepwise redundancy of information to build a rock-solid set of structures of different stages in the PIC assembly process. The systematic nature of Yuan's approach and the quality of his EM work resulted in a robust work with great mechanistic insight that was published as a *Nature* article in 2013 (<https://doi.org/10.1038/nature11991>).

He then extended those results to higher resolution (using direct electron detectors) to obtain the structure of the PIC in four different functional states through the transcription initiation process. Published in *Nature* in 2016 (<https://doi.org/10.1038/nature17970>), this work is essential material that has set the standard for complex studies in transcription and beyond. Yuan's design and implementation of an *in vitro* reconstitution system for the assembly of human transcription preinitiation complexes for cryo-EM structure determination has been generalized for the purification and cryo-EM studies of other supramolecular complexes. Dr. He is well-published in top tier journals and is well-funded through various national and private foundation mechanisms.

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Burton Medal in Physical Sciences: Colin Ophus



Colin Ophus, Staff Scientist, Lawrence Berkeley National Laboratory

Colin Ophus received his PhD in Materials Engineering from the University of Alberta while working on nanoscale resonators fabricated from metallic alloys, and modeling and simulation of polycrystalline thin film growth. His postdoctoral work was as a Materials Fellow at the National Center for Electron Microscopy, Lawrence Berkeley National Laboratory (LBNL), where he worked his way through the ranks and is today a Staff Scientist in Molecular Foundry at LBNL.

Colin's major contributions are the development of simulation methods for scanning transmission electron microscopy (STEM) and major advances in atomic electron tomography (AET) and 4D-STEM techniques and analyses. As a winner of the DOE Early Career Award, he will lead a new effort in quantum electron microscopy (QEM) that has the potential to revolutionize electron microscopy. His expertise in image simulation and overall understanding of electron scattering has led him to develop new methods of phase-contrast and diffraction imaging, and he has proposed advanced techniques such as QEM.

Colin's publication record is among the strongest in the field, with over 114 peer-reviewed manuscripts in high-level journals such as *Physical Review Letters*, *Nature Materials*, and *Nature*, as well as technical journals important to the field of electron microscopy such as *Microscopy and Microanalysis* and *Ultramicroscopy*. Colin has a long list of invited talks at conferences, universities, and national labs. His most recent talks at the annual Microscopy & Microanalysis meetings have become "must see" for many attendees, with standing audience members lining up outside the room.

Albert Crewe Award

The Albert Crewe Award was initiated to recognize annually the distinguished contributions to the field of microscopy and microanalysis in the physical sciences of an early career scientist, of not more than 6 years' standing since doctoral graduation, for research performed during this period.

Albert Crewe Award: Jordan A. Hachtel

Jordan Hachtel, Center for Nanophase Material Sciences, Oak Ridge National Laboratory

Jordan Hachtel received his PhD in Physics from Vanderbilt University, working with Professor Sokrates Pantelides on optical properties of complex nanostructures. He then did his postdoctoral training at Oak Ridge National Laboratory (ORNL), specializing in monochromated EELS and aberration-corrected STEM to perform precision nanoscale characterization of organic

molecules, plasmonic nanostructures, and 2D materials. Dr. Hachtel has published 56 papers and played the leading role in 29 of them. Four of his papers have been featured on journal covers, and he received the Microanalysis Society Cosslett Award for the best invited paper at the 2018 M&M Meeting.

Dr. Hachtel is currently an R&D Associate at ORNL and has expertise in cathodoluminescence (CL), differential phase contrast (DPC) imaging, monochromated EELS, atomic resolution imaging quantification, and the development of open-source scripting analytical tools for on-the-fly and post-processing 4D STEM imaging. He has done truly pioneering work on monochromated EELS, being the first to observe and measure isotopic shifts with EELS in deuterated water and amino acids. The work, published in *Advanced Materials* (<https://doi.org/10.1002/adma.201802702>) and *Science* (<https://doi.org/10.1126/science.aav5845>), was recognized in 2019 by the UT-Battelle Director's Team Award for Research Accomplishment and the UT-Battelle Outstanding Team Research Accomplishment Award. Additional work on DPC imaging allowed him to acquire data and develop his own Python script to analyze 4D data sets and extract the E-field and potential images that revealed the electric field of atomic columns (including those of weak electron scatters, such as oxygen) at the sub-angstrom resolution (<https://doi.org/10.1186/s40679-018-0059-4>).

George Palade Award

The George Palade Award was initiated to recognize annually the distinguished contributions to the field of microscopy and microanalysis in the life sciences of an early career scientist, of not more than 6 years' standing since doctoral graduation, for research performed during this period.

George Palade Award: Melody Campbell

Melody Campbell received her PhD in Biophysics from the Scripps Research Institute in Florida with Bridget Cargher. During her post-doc in the lab of Yifan Cheng at UCSF, Melody made use of her expertise in cryo-EM image processing to study integrins, a group of proteins considered by many to be too flexible and too small for meaningful cryo-EM studies. At UCSF she expanded her toolset to



Melody Campbell, Assistant Professor, Fred Hutchings Cancer Research Center

include the development and fabrication of new grid substrates for sample preparation, as well as her biochemical skills to include mammalian cell expression and purification of heavily glycosylated proteins.

Melody began her independent career in July 2020 and is currently an Assistant Professor in the Basic Sciences Division at Fred Hutchings Cancer Research Center. She is also the Scientific Director of the Cryo-EM Core and an Affiliate Assistant Professor in the Department of Biochemistry at the University of Washington School of Medicine.

Melody has continued her research on integrin complex interactions and has redefined our understanding of integrin mediated TGF- β activation. She determined the structures of integrins in complex with their ligand TGF- β with high affinity antibody fragments engineered to "trap" integrins in intermediate states.

She was an invited speaker at the last two 3DEM Gordon Research Conference (GRC) meetings. Melody has also spoken at several cryo-EM international conferences, including the 3D-EM GRC (2018, 2019), the Microscopy Society of Japan Meeting (2019), the Microscopy & Microanalysis Meeting (2019), and the West Coast Structural Biology Workshop (2019). Her publications are in stellar journals such as *Science*, *Cell*, and *Nature Communications*.

Chuck Fiori Award for Outstanding Technologist in the Physical Sciences

This award annually honors a technologist from the physical sciences who has made significant contributions, such as the development of new techniques, that have contributed to the advancement of microscopy and microanalysis. A technologist is defined as an individual whose primary role is in microscopy and microanalysis tool development or service. Established principal investigators/project managers are not eligible for this award.

Fiori Award: Hendrik O. Colijn

Hendrik O. Colijn is currently the Assistant Director for Operations at the Ohio State University Center for Microscopy and Analysis (CEMAS), where he has played a leading role in development of the world-class facility and assisted researchers and students in the areas of TEM, SEM, Auger, FIB, XRD, and microCT since 1982. He maintains the suite of equipment involving many electron optical columns, has provided world-class service and tutoring to many generations of materials scientists, and given years of service to the Microscopy Society of the Ohio River Valley (MSORV). Henk is a technologist who understands the physics involved in a technique and is able to dig into problems involving the mechanical and electrical systems of equipment. Henk



Hendrik O. Colijn, Assistant Director for Operations, Ohio State University Center of Microscopy & Analysis

also understands microscopes and has been able to act as a service engineer and to troubleshoot problems with the microscopes. This has been an enduring and essential contribution by Henk. In addition to keeping the microscopes well-maintained, it is very important that students and postdoctoral fellows are well-trained in use of the equipment. In many ways, it is sometimes more important for a user to know what not to do, rather than what to do,

and this has been Henk's method of instruction: first, what one should not do, and then what one should do to achieve an interpretable result. He is an expert in electron optical imaging, diffraction, and analytical techniques—a veritable microscopy guru. With this broad expertise he creates a huge advantage for users, the vast majority of whom go on to be employed in academia, industry, and national laboratories, having benefitted from Henk's training.

Hildegard H. Crowley Award for Outstanding Technologist in the Biological Sciences

This award annually honors a technologist from the biological sciences who has made significant contributions, such as the development of new techniques, that have contributed to the advancement of microscopy and microanalysis. A technologist is defined as an individual whose primary role is in microscopy and microanalysis tool development or service. Established principal investigators/project managers are not eligible for this award.

Crowley Award: Janice Green Pennington



Janice Green Pennington, Manager, 3D Cell Microscopy Facility, University of Wisconsin, Madison

Janice has 40 years of experience as an electron microscopist and has a bachelor's degree in Biology and a master's degree in Botany from Oklahoma State University (OSU). She spent her first eleven years as a microscopist in the core EM Facility at OSU and the last three years as the core manager and instructor of the laboratory portion of an electron microscopy course. She has held positions as a research electron microscopist at the University of Kentucky,

IU School of Medicine in Indianapolis, and Purdue University. While working at the Purdue Cryo-EM Facility, she learned approaches for single-particle analysis for the study of virus particles and prepared high-pressure frozen samples in resin to study the replication complexes of Dengue virus

in S2 cells. Over the past nine years she has worked with Dr. Paul Ahlquist at the Institute for Molecular Virology at the University of Wisconsin and was instrumental in resolving the crown structure in the mitochondrial replication complex of a Nodavirus using cryo-electron tomography. During this time, she also worked with Dr. Marisa Otegui using high-pressure freezing, immunolabeling, and electron tomography to study endomembrane trafficking in plants. Janice was the Chair of the MSA Technologists' Forum between 2018 and 2020 and has been a member of various Local Affiliated Societies. She is currently the Manager of the 3D Cell Microscopy Facility in the Center for Quantitative Cell Imaging at the University of Wisconsin, Madison.

Morton D. Maser Distinguished Service Award

This award recognizes outstanding volunteer service to the Microscopy Society of America as exemplified by Mort Maser, who served the Society for many years with great dedication. This award is made annually to honor an MSA member who has provided significant volunteer service to the Society over a sustained period of time.

Morton D. Maser Award: Edward P. Calomeni



Ed Calomeni, Director - Electron Microscopy Core, Department of Pathology, The Ohio State University Medical Center

Ed Calomeni is currently the Director of the Electron Microscopy Lab in the Department of Pathology at The Ohio State University Medical Center. Ed has been a member of MSA for 36 years and has served on the Certification Board for 25 of those years as a committee member and as President. He has always helped to set up the Certification Board and Technologists' Forum sections of the MSA MegaBooth at Microscopy & Microanalysis meetings and assists with unpacking and

repacking of the Education Committee library. Ed spends many hours sitting at the Certification Board section of the MegaBooth to answer questions about the EM Technologist certification process and other MSA-related events, including "talking up" MSA, the Certification program, and the Technologists' Forum while recruiting new members. Ed was on the Local Arrangements Committee for the 1997 M&M in Cleveland, OH, where he was tasked with the placement and maintenance of the daily meeting boards (outside the meeting rooms). He stepped in to chair an M&M session when the assigned chair was unable to attend, and he has also presented at a Technologists' Forum symposium. Ed was a member of the Texas Society of EM, has held office in the Northwest Ohio Microscopy Society, served as President of the Microscopy Society of the Ohio River Valley and the Great Lakes EM consortium, and has been a member of the Technologists' Forum since 1997 and of the Diagnostic & Biomedical Microscopy Focused Interest Group since 2015.

MSA Fellows

The designation MSA Fellow is intended to recognize those who have been conferred the Society's Distinguished Scientist Awards, as well as senior distinguished members of the Society who have been a member of the Society for at least 10 years and have made significant contributions to the advancement of the field of microscopy and microanalysis through a combination of scientific achievement, service to the scientific community, and the Society itself. Election to MSA Fellow is highly selective and represents a broad cross section of the MSA membership. The number of MSA members elected to Fellowship each year is restricted to no more than 0.5% of the total MSA membership. For each Fellow, the nominating statement supporting their award is italicized, followed by a short summary of their service to the MSA or microscopy research community.

2021 MSA Fellows with Nominating Statement



Miaofang Chi, Senior Staff Scientist, Oak Ridge National Laboratory

Miaofang Chi: *For her sustained and outstanding contributions to advancing microscopy for the study of a broad range of energy materials. Miaofang's research has put her at the forefront of applying advanced microscopy to materials science investigations by performing cutting-edge studies that have gained her recognition and standing across several disciplines and made her a much sought-after investigator. Dr Chi has more than*

260 high-impact publications in diverse journals, including 6 publications in *Science*, 14 publications in *Nature*, and 37 publications in the ACS family of journals, with more than 22,000 citations and an h-index of 74. Dr. Chi has provided significant service to MSA as an invited speaker and regular contributor to the Diagnostic & Biomedical Microscopy Focused Interest Group symposia.



Stig Helveg, Professor, Technical University of Denmark

Stig Helveg: *For pioneering electron microscopy of materials under reactive gas environments and at atomic resolution, leading to groundbreaking insights into gas-surface interactions in catalysis and nanomaterials. Dr. Helveg is one of the most exciting and inspirational voices in electron microscopy and catalysis science for *in situ*/operando studies of surface reactivity related to catalysis and other materials science fields such as crystal*

growth and corrosion. Dr. Helveg's achievements are documented in 97 peer-reviewed publications, including numerous papers in *Nature* and *Science*, with 13,935 citations and an h-index of 50. He has been awarded the Danish Ministry of Higher Education and Science Elite Research Prize (2018) and the Materials Research Society (MRS) Innovation in Materials Characterization Award (2019).



Cynthia Goldsmith, Electron Microscopist, Centers for Disease Control and Prevention

Cynthia Goldsmith: *For her long-term commitment to improve public health and safety through her viral diagnosis and pathology electron microscopy research and her services to the microscopy community through teaching and training peers both locally and nationally. Dr. Goldsmith has been an electron microscopist at the Centers for Disease Control and Prevention (CDC) for 38 years. She is the author or co-author of 105 publications and 5 book chapters. Her research has focused*

on conducting diagnostic and research electron microscopy for infectious diseases. Cynthia has worked on many viruses including Ebola, HIV, influenza H1N1, West Nile Virus, and others, but perhaps her most significant contribution was the identification of the 2003 outbreak of SARS-CoV as being caused by a coronavirus. Dr. Goldsmith has been an invited speaker at M&M meetings and a regular contributor to the Diagnostic & Biomedical Microscopy Focused Interest Group symposia.

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Microscopy TODAY

Innovation and Micrograph Competitions Award Presentation

Wednesday, August 3 at 4:00 p.m.
Poster Session Stage in the M&M 2022 Exhibit Hall



Innovation Awards:

Developments in equipment and methods in all areas of microscopy and microanalysis

Micrograph Awards:

Stunning scientific images from all types of biological and materials microscopy

**Please stop by to help us
congratulate the award winners!**