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Efficient Phase Contrast Imaging via Electron Ptychography

Expanding the Computational Toolbox for CryoEM

Electron Optics for CryoEM: Facts and Myths

https://doi.org/10.1017/S1431927619000722 Published online by Cambridge University Press

Biological Sciences Tutorial: Tips and Tricks for High-Pressure Freezing / Freeze Substitution

Microscopy Explorations

https://doi.org/10.1017/S1431927619000722 Published online by Cambridge University Press

Welcome from the Society Presidents

On behalf of the Microscopy Society of America, the Microanalysis Society, and the International Field Emission Society, we welcome you to Microscopy & Microanalysis 2019 at the Oregon Convention Center in Portland, Oregon. It's an excellent venue with wonderful restaurants, lots of activities for the family, and a comfortable climate.

The Program Committee, led by Alice Dohnalkova, Huolin Xin, Assel Aitkaliyeva, and Baptiste Gault, has developed an exciting group of symposia, spanning advances in instrumentation and techniques development, as well as applications in the analytical, biological, and physical sciences. A record number of paper submissions this year is sure to guarantee an exciting and robust program of cutting-edge research!

The main meeting starts with the Opening Welcome Reception on Sunday evening. The Sunday reception is a great place for all attendees to meet new colleagues and reconnect with old friends. On Monday morning, the Plenary Session kicks off the scientific program with two exciting plenary lectures from 2017 Nobel Prize in Chemistry co-winners, Professors Joachim Frank and Richard Henderson, the presentations of the M&M meeting awards, and awards from the sponsoring societies. Please join us in welcoming back these long-time MSA members and frequent M&M attendees as they discuss their groundbreaking work in cryo-electron microscopy.

In addition to the strong scientific program, what sets the M&M meeting apart is the Exhibit Hall, the world's largest annual microscopy exhibition, which showcases the latest in microscopy instrumentation and accessories. Don't miss the highly popular vendor tutorials, held Monday through Wednesday after hours in the Exhibit Hall. Other educational opportunities throughout the week include focused biological and physical science tutorials, educational outreach programs, and our Technologists' Forum special and roundtable sessions.

In short, M&M 2019 is an outstanding opportunity to stay abreast of the latest technologies, hear about new developments in applications across all areas of microscopy and microanalysis, and most importantly network with colleagues.

Welcome to Portland!

Paul Kotula
Sandia National Laboratories
President, Microscopy Society of America

Rhonda Stroud
U.S. Naval Research Laboratory
President, Microanalysis Society

David Larson
AMETEK, Inc.
President, International Field Emission Society

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WELCOME FROM THE PROGRAM CHAIRS

M&M 2019 MICROSCOPY & MICROANALYSIS August 4–8 • Portland, OR

On behalf of the Microscopy Society of America (MSA), the Microanalysis Society (MAS), and the International Field Emission Society (IFES), we are excited to welcome you to Microscopy & Microanalysis 2019 in Portland, Oregon.

As many of you who have previously visited Portland know, this city is a terrific location for our meeting: set between Mt. Hood and the Pacific coast, Portland (PDX to locals) presents a variety of attractions for everybody. Infused with the awesome Pacific Northwest culture of environmental conservation and organic local food sourcing, you will find a lot of wonderful restaurants here, plus a myriad of microbreweries, distilleries and wineries! Don't forget to visit famous PDX staples like Powell's Books and the charismatic Voodoo Donuts. Don't forget your hiking shoes or beachwear if you're planning to explore the great outdoors like the Columbia Gorge area or the Oregon Coast beaches.

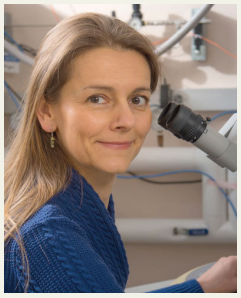
The meeting itself will be preceded by our usual array of Sunday Short Courses, two Pre-Meeting Congresses, and our Sunday evening Opening Welcome Reception. We will once again hold a Pre-Meeting Congress featuring outstanding work by students and early-career researchers.

The technical program will kick off with our annual Monday morning plenary session, featuring the major awards ceremonies for the sponsoring societies, the M&M meeting awards, and two exciting plenary talks of the 2017 Nobel Prize laureates Joachim Frank and Richard Henderson.

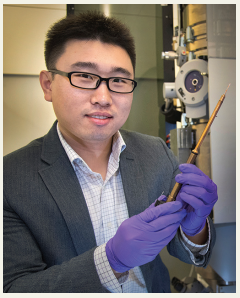
Immediately following the plenary session, the largest microscopy/ microanalysis instrument exhibition in the world opens to participants. Plan to visit the more than 100 companies displaying their latest technology and services. The social activities of the opening reception, and daily "happy hours" accompanying each day's poster and awards sessions, have become "can't-miss" events of learning and fellowship.

For a complete description of all the symposia, contributed sessions, educational opportunities and the multiple award possibilities from the three organizing societies, please visit: http://www.microscopy.org/MandM/2019/.

Be sure to download the M&M 2019 mobile app! ("M&M Annual Meeting" in App Store or Google Play.)



Alice Dohnalkova
PROGRAM CHAIR



Huolin Xin
PROGRAM CO-CHAIR

Assel Aitkaliyeva
MAS CO-CHAIR

Baptiste Gault
IFES CO-CHAIR

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Council & Appointed Officers

2019 COUNCIL – OFFICERS & DIRECTORS

President	Paul Kotula
Past President	Robert L. Price
President-Elect	Esther Bullitt
Secretary	Pamela F. Lloyd
Treasurer	Peter A. Crozier
Director	Elizabeth A. Dickey
Director (Local Affiliated Societies)	Patricia Jansma
Director	Deborah F. Kelly
Director	Lena Kourkoutis
Director	Melanie Ohi
Director	Jay Potts
Director	Yimei Zhu

APPOINTED OFFICERS

Archives	Michael Marko
Awards Committee Chair	Miaofang Chi
Certification Board Chair	Lee Cohen-Gould
Educational Outreach Committee Chair	Rengasayee (Sai) Veeraraghavan
Educational Outreach Committee Vice Chairs	Isabel Boona
Educational Resources Chair	Donovan Leonard
Fellows Chair	Esther Bullitt
Finance	Peter A. Crozier
International Committee	David C. Bell
Membership Committee Chair	James Kilcrease
Nominating Committee Chair	Robert L. Price
Placement Office	Katie Jungjohann
Sustaining Members Chair	Stephen E. Mick
Standards Committee	Nestor J. Zaluzec
Student Council President	A. Cameron Varano
Technologists' Forum	Janice Pennington

FOCUSED INTEREST GROUPS

Focused Interest Group Chair	Andrew D. Vogt
3D Electron Microscopy in the Biological Sciences	Steven Ludtke
Aberration-Corrected Electron Microscopy	Juan Carlos Idrobo
Atom Probe Field Ion Microscopy	Arun Devaraj
Cryo-preparation	Kim Rensing
Diagnostic Microscopy	Greg Ning
Electron Crystallography and Automated Mapping Techniques	Alex Eggeman
Electron Microscopy in Liquids and Gas (EMLG)	Raymond R. Unocic
Facilities Operation & Management (FOM)	Christine A. Brantner
Focused Ion Beam	Suzy Vitale
Pharmaceuticals	Jason Mantei
MicroAnalytic Standards	Anette von der Handt

2019 STUDENT COUNCIL

President	A. Cameron Varano
Past President	Janet Gbur
President-Elect	Erica Stevens
Secretary	Jackson Spurling
Treasurer	Kartik Venkatraman
Program Chair	Ethan L. Lawrence

PUBLICATIONS

***Microscopy and Microanalysis* Editor in Chief**	John F. Mansfield
Scientific Program Editor	Richard L. Martens
M&M 2019 Proceedings Editor	Gail J. Celio
***Microscopy Today* Editor-in-Chief**	Charles E. Lyman

M&M 2019 ANNUAL MEETING PROGRAM CHAIR

Alice Dohnalkova

SOCIETY & MEETING MANAGEMENT

Association Management	Virtual, Inc.
Managing Director	Ashley Carey
Meeting Management	Conference Managers
Meeting & Registration Managers	Nicole Guy, Maeve Carey, Corey Siembieda
Exhibition Management	Corcoran Expositions, Inc.
Exhibits & Sponsorship Managers	Doreen Bonnema, Mary Michalik

MSA PAST PRESIDENTS

1942	G.L. Clark	1968	John H. Luft	1994	Robert R. Cardell
1943	R. Bowling Barnes	1969	Wilbur C. Bigelow	1995	Terence E. Mitchell
1944	R. Bowling Barnes	1970	Russell Steere	1996	Margaret Ann Goldstein
1945	James Hillier	1971	Robert M. Fisher	1997	C. Barry Carter
1946	David Harker	1972	Daniel C. Pease	1998	Ralph M. Albrecht
1947	William G. Kinsinger	1973	Benjamin Siegel	1999	David C. Joy
1948	Perry C. Smith	1974	Russell J. Barrnett	2000	Kenneth H. Downing
1949	F.O. Schmitt	1975	Gareth Thomas	2001	Ronald M. Anderson
1950	Ralph W.G. Wyckoff	1976	Etienne de Harven	2002	Stanley L. Erlandsen
1951	Robley C. Williams	1977	Thomas E. Everhart	2003	J. Alwyn Eades
1952	R.D. Heidenreich	1978	Myron C. Ledbetter	2004	Sara E. Miller
1953	Cecil E. Hall	1979	John Silcox	2005	M. Grace Burke
1954	Robert G. Picard	1980	Michael Beer	2006	W. Gray (Jay) Jerome
1955	Thomas F. Anderson	1981	John J. Hren	2007	Michael A. O'Keefe
1956	William L. Grube	1982	Lee Peachey	2008	William T. Gunning
1957	John H.L. Watson	1983	David B. Wittry	2009	David J. Smith
1958	Max Swerdlow	1984	J. David Robertson	2010	David W. Piston
1959	John H. Reisner	1985	Dale E. Johnson	2011	Nestor J. Zaluzec
1960	D. Gordon Sharp	1986	Robert M. Glaeser	2012	Janet H. Woodward
1961	D. Maxwell Teague	1987	Linn W. Hobbs	2013	Ernest L. Hall
1962	Keith R. Porter	1988	Jean Paul Revel	2014	Jeanette Killius
1963	Charles Schwartz	1989	Ray W. Carpenter	2015	John F. Mansfield
1964	Sidney S. Breese	1990	Keith R. Porter	2016	Michael Marko
1965	Virgil G. Peck	1991	Charles E. Lyman	2017	Ian M. Anderson
1966	Walter Frajola	1992	Patricia Calarco	2018	Robert L. Price
1967	Joseph J. Comer	1993	Michael S. Isaacson		

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MSA Microscopy Society of America Fellows

2019

Wilbur C. Bigelow
Edward D. Boyes
Pratibha L. Gai
Ronald Gronsky
Maximilian Haider
Michael Marko
David W. McComb
Karren L. More

2018

Wen-An Chiou
Linn Hobbs
Elaine Humphrey
Kazuo Ishizuka
David Larson
Guillermo Solórzano-Naranjo
Judy Yang
Jian-Min Zuo

2017

David C. Bell
Paul E. Fischione
Christopher J. Kiely
Jeanette Killius
Laurence D. Marks
Peter Rez
Phillip E. Russell
Heide Schatten

2016

Helmut Gnaegi
Ernest L. Hall
David N. Mastronarde
Stuart McKernan
Renu Sharma
George D.W. Smith
Kenneth A. Taylor
James E. Wittig

2015

Rafal E. Dunin-Borkowski
Michael E. Davidson
E. Ann Ellis
Peter W. Hawkes
Miguel José-Yacamán
Kent L. McDonald
Stanley Frank Platek
Michael T. Postek
Susanne Stemmer
Michael M.J. Treacy

2014

Gianluigi Botton
Wah Chiu
Abhaya K. Datye
Marija Gajdardziska-Josifovska
Lucille A. Giannuzzi
Thomas F. Kelly
John F. Mansfield
Martha R. McCartney
Xiaoqing Pan
David W. Piston

2013

Timothy S. Baker
Nigel D. Browning
David J. DeRosier
Hamish L. Fraser
David A. Muller
Michael Radermacher
David J. Smith
Eric A. Stach

2012

Ulrich Dahmen
Margaret Ann Goldstein
Moon Kim
William J. Landis
Jingyue Liu
Beverly E. Maleeff
Robert L. Price
Frances M. Ross
David N. Seidman
Debra Sherman
Nan Yao

2011

Ueli Aebi
Philip E. Batson
Patricia G. Calarco-Isaacson
Peter A. Crozier
J. Alwyn Eades
Brendan J. Griffin
William T. Gunning, III
W. Gray Jerome
Richard D. Leapman
Hannes Lichte
Charles E. Lyman
Michael A. O'Keefe
George Perry
Robert B. Simmons
Janet H. Woodward

2010

Ralph M. Albrecht
Lawrence F. Allard, Jr.
Kenneth H. Downing
Joseph I. Goldstein
Michael S. Isaacson
Michael K. Miller
George Pappas
Stephen J. Pennycook
John P. Petrali
Zhong L. Wang
David B. Williams

2009 *(Inaugural Class)*

Marc Adrian
Ronald M. Anderson
James Bentley
Mary Grace Burke
Ray W. Carpenter
C. Barry Carter
Albert V. Crewe
Marc De Graef
Vinayak P. Dravid
Jacques Dubochet
Patrick Echlin
Raymond F. Egerton
Marilyn G. Farquhar
Don W. Fawcett
Joachim Frank
Robert M. Glaeser
Audrey M. Glauert
Raymond Kenneth Hart
Hatsujiro Hashimoto
Richard Henderson
Peter B. Hirsch
Archibald Howie
Hugh E. Huxley
Takeo Ichinokawa
Sumio Iijima
Shinya Inoué
David C. Joy
Morris J. Karnovsky
Aaron Klug
Ondrej L. Krivanek
Myron C. Ledbetter
Dennis McMullan
Joseph R. Michael
Sara E. Miller
Terrence E. Mitchell
Thomas Mulvey
Dale E. Newbury
Gertrude Rempfer
Jean-Paul Revel
Harald Rose
F.O. Schmitt
Caroline Schooley
Ryuichi Shimizu
John Silcox
Robert Sinclair
S.J. Singer
Fritiof Sjostrand
Kenneth C.A. Smith
Avril V. Somlyo
John C.H. Spence
Alasdair C. Steven
Peter R. Swann
Gareth Thomas
Kiyoteru Tokuyasu
Nigel Unwin
Joseph S. Wall
Oliver C. Wells
Michael J. Whelan
Nestor J. Zaluzec
Elmar Zeitler
Yimei Zhu

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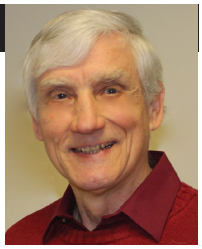
Distinguished Scientist Awards

PHYSICAL SCIENCES (2019)



Philip E. Batson

Rutgers University, Department of Physics and Astronomy

Philip E. Batson is a Distinguished Research Professor at Rutgers University, with appointments in Physics, and Materials Science, since his retirement from the IBM Thomas J. Watson Research Center in 2009. After receiving a Ph.D. in Applied Physics in 1976 at Cornell University, he did post-doctoral work at the Cavendish Laboratory in Cambridge England, and then moved to IBM in 1978. During the 1980's he built high resolution EELS equipment there and used it to explore spatially resolved EELS in the STEM, with studies of surface plasmon scattering in metal nanoparticle systems. In 2002, he was the first to demonstrate sub-Angstrom imaging using aberration correction, for which he was recognized with a 2002-2003 Scientific American 50 Award for Leadership in Imaging Sciences. Currently, he is exploring phonon behavior in nanometer sized structures Using EELS with a 10 meV energy resolution. The NSF sponsored project in collaboration with Nion to improve EELS resolution was cited by the White House in 2010 as one of "100 Recovery Act Projects that are Changing America." He has authored about 210 publications and is a Fellow of the American Physical Society and the Microscopy Society of America.

BIOLOGICAL SCIENCES (2019)

Bridget Carragher

Simons Electron Microscopy Center, New York Structural Biology Center

Bridget Carragher received her Ph.D. in Biophysics from the University of Chicago in 1987. She then worked in a variety of positions, both in industry and academia until moving to the Scripps Research Institute in 2001. Since 2002 she has served, together with Clint Potter, as the Director of the National Resource for Automated Molecular Microscopy (NRAMM), an NIH funded national biotechnology research resource. The focus of NRAMM is the development of automated imaging techniques for solving three-Dimensional structures of macromolecular complexes using cryo-transmission electron microscopy (cryoEM). The overall goal is to develop new methods to improve the entire process, from specimen preparation to the generation of the final three-Dimensional map. In 2007 Bridget co-founded a new company, NanoImaging Services, Inc., whose goal is to provide cryoEM and other microscopy services to the biopharmaceutical and biotechnology industry. She serves as Chief Technical Officer of NanoImaging Services. In 2015 Bridget and Clint moved their academic lab from The Scripps Research Institute to the New York Structural Biology Center where they serve as Co-Directors of the Simons Electron Microscopy Center. In May 2018 they were awarded a U24 grant to build the National Center for CryoEM Access and Training (NCCAT).

	BIOLOGICAL SCIENCES	PHYSICAL SCIENCES
1975	Keith R. Porter	Robert Heidenreich
1976	L.L. Marton	Albert V. Crewe
1977	Robley C. Williams	James Hillier
1978	Thomas Anderson	Vernon E. Cosslett
1979	Daniel C. Pease	John M. Cowley
1980	George E. Palade	Gareth Thomas
1981	Sanford L. Palay	Vladimir K. Zworykin
1982	Richard M. Eakin	Benjamin M. Siegel
1983	Hans Ris	Otto Scherzer
1984	Cecil E. Hall	Charles W. Oatley
1985	Gaston Dupouy	Ernst Ruska
1986	F. O. Schmitt	Peter B. Hirsch
1987	Marilyn G. Farquhar	Jan B. LePoole
1988	Morris J. Karnovsky	Hatsujiro Hashimoto
1989	Don W. Fawcett	Elmar Zeitler
1990	Audrey M. Glauert	Gertrude F. Rempfer
1991	Hugh E. Huxley	Archibald Howie
1992	Fritiof Sjöstrand	Oliver C. Wells
1993	Jean-Paul Revel	Kenneth C.A. Smith
1994	Andrew P. Somlyo	Dennis McMullan
1995	Shinya Inoué	David B. Wittry
1996	Myron C. Ledbetter	John Silcox

	BIOLOGICAL SCIENCES	PHYSICAL SCIENCES
1997	S.J. Singer	Peter R. Swann
1998	Avril V. Somlyo	Michael J. Whelan
1999	Sir Aaron Klug	Takeo Ichinokawa
2000	K. Tokuyasu	S. Amelinckx
2001	Patrick Echlin	Thomas Mulvey
2002	Marc Adrian	Ryuichi Shimizu
2003	Joachim Frank	Harald Rose
2004	Robert M. Glaeser	Raymond F. Egerton
2005	Richard Henderson	Sumio Iijima
2006	Joseph S. Wall	John C.H. Spence
2007	Nigel Unwin	Terence E. Mitchell
2008	Alasdair C. Steven	Ondrej L. Krivanek
2009	Jacques Dubochet	Robert Sinclair
2010	George Papas	Michael S. Isaacson
2011	Ueli Aebi	Hannes Lichte
2012	Timothy S. Baker	Ulrich Dahmen
2013	David J. DeRosier	C. Barry Carter
2014	Wah Chiu	David J. Smith
2015	Michael W. Davidson	Peter W. Hawkes
2016	Kenneth H. Downing	George W. Smith
2017	David W. Piston	Nestor J. Zaluzec
2018	Richard Leapman	Yimei Zhu

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Major Society Awards

BURTON MEDAL AWARD (2019)

Hari Shroff
National Institute of Health

Dr. Hari Shroff received a B.S.E. in bioengineering from the University of Washington in 2001, and under the supervision of Dr. Jan Liphardt, completed his Ph.D. in biophysics at the University of California at Berkeley in 2006 . He spent the next three years performing postdoctoral research under the mentorship of Eric Betzig at the Howard Hughes Medical Institute's Janelia Farm Research Campus where his research focused on development of photactivated localization microscopy (PALM), an optical super-resolution technique. Dr. Shroff is now chief of NIBIB's Section on High Resolution Optical Imaging laboratory, where he and his staff are developing new imaging tools for application in biological research. Current research areas include further development of super-resolution microscopy, light-sheet microscopy, inverse imaging problems, deep learning for microscopy, and the study of neurodevelopment in *C. elegans*.

MORTON D. MASER DISTINGUISHED SERVICE AWARD (2019)

No 2019 awardee.

YEAR	RECIPIENT
1975	James Lake
1976	Michael S. Isaacson
1977	Robert Sinclair
1978	David C. Joy
1979	Norton B. Gilula
1980	John C.H. Spence
1981	Barbara J. Panessa-Warren
1982	Nestor J. Zaluzec
1983	Ronald Gronsky
1984	David B. Williams
1985	Richard D. Leapman
1986	J. Murray Gibson
1987	Ron A.Milligan
1988	A.D. Romig, Jr.
1989	Laurence D. Marks
1990	W. Mason Skiff
1991	Joseph R. Michael
1992	Kannan M. Krishnan
1993	Joseph A.N. Zasadzinski
1994	Jan M. Chabala
1995	Joanna L. Batstone
1996	Vinayak P. Dravid
1997	P.M. Ajayan
1998	Ian M. Anderson
1999	Zhong Lin Wang
2000	Eva Nogales
2001	Jian Min Zuo
2002	Nigel D. Browning
2003	Frances M. Ross
2004	Z. Hong Zhou
2005	David J. Larson
2006	David A. Muller
2007	Peter D. Nellist
2008	Steven J. Ludtke
2009	Eric A. Stach
2010	Sergei V. Kalinin
2011	Radostin Danev
2012	David S. Ginger
2013	John L. Rubinstein
2014	Maria Varela
2015	Andrew M. Minor
2016	Miaofang Chi
2017	Christopher J. Russo
2018	Lena F. Kourkoutis

YEAR	RECIPIENT
1992	Ronald M. Anderson
	G. W. Bailey
	Frances L. Ball
	M. Blair Bowers
	Deborah L. Clayton
	Joseph Harb
	Kenneth R. Lawless
	Morton D. Maser
	Caroline Schooley
	John H.L. Watson
1993	E. Laurence Thurston
1994	Richard F.E. Crang
1995	Raymond K. Hart
1996	José A. Mascorro
1997	William T. Gunning III
1998	Nestor J. Zaluzec
1999	Charles E. Lyman
2000	Barbara A. Reine
	Hildegard H. Crowley
2002	Beverly E. Maleeff
2003	M. Grace Burke
2004	Ralph M. Albrecht
2005	W. Gray (Jay) Jerome
2006	Jeanette Killius
2007	Robert L. Price
2008	Stuart McKernan
2010	Pamela F. Lloyd
2011	Janet H. Woodward
2012	Gina E. Sosinsky
2013	Caroline A. Miller
2014	Michael Marko
2015	JoAn Hudson
2016	Amanda Lawrence
2017	David W. Tomlin
2018	Donovan N. Leonard

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Major Society Awards

ALBERT CREWE AWARD (2019)

B. Layla Mehdi

University of Liverpool

Dr B. Layla Mehdi is currently an Assistant Professor and Associate Director of the Imaging Centre at the University of Liverpool (ICaL), UK. She received her Master's in Analytical Chemistry from the University of Warsaw, Poland and her Ph. D. in Chemistry from Miami University, USA working in the area of electrochemical detectors coupled with gas chromatography for cancer therapy. Following her Ph.D., in 2013 she joined the Physical Sciences Directorate at the Pacific Northwest National Laboratory (PNNL) as a postdoctoral research associate and in 2016 was promoted to Staff Scientist. Her work at PNNL involved the development of an In Situ stage to study dynamic processes in next generation batteries with applications to Li-Ion and beyond Li chemistries being supported as part of the Joint Centre for Energy Storage Research (JCESR) funded by the US Department of Energy. She has received numerous international awards for this work, including the 2015 MRS postdoctoral award, the 2015 Microscopy Society of America postdoctoral award and the 2014 Microscopy & Microanalysis Presidential award. In 2016 she also received JSPS Postdoctoral Fellowship to perform Research at Nagoya University, Japan in collaboration with TOYOTA Japan. She has over 20 publications in the development and application of low-dose methods to the operando and high resolution study of beam sensitive materials and processes. She has organized 4 international In Situ liquid TEM workshops, an international In Situ TEM symposium, has given over 25 invited talks at international meetings and institutions, and is the Associate Editor covering In Situ TEM for the SpringerNature journal, Advanced Structural and Chemical Imaging. Currently, her research group focuses on developing advanced new microscopy methods to generate an in depth understanding of reaction kinetics at solid/liquid and solid/gas interfaces in batteries, electrocatalysts and pharmaceuticals.

YEAR	RECIPIENT
2012	Wu Zhou
2013	Lena Fitting-Kourkoutis
2014	Jinwoo Hwang
2015	Meng Gu
2016	Ryo Ishikawa
2017	Pinshane Y. Huang
2018	Timothy Pennycook

GEORGE PALADE AWARD (2019)

Alex Noble

New York Structural Biology Center

Alex Noble earned his BS in Physics and BA in Applied Mathematics from UC San Diego and his MS and PhD in Physics at Florida State University. He is currently an NIH Kirschstein Postdoctoral fellow in the laboratory of Bridget Carragher and Clint Potter at the Simons Electron Microscopy Center (SEMC) in the New York Structural Biology Center. He is broadly focused on developing, distributing, and applying methods that further the progress of the cryo-electron microscopy (cryoEM) field and individual cryoEM projects, along with applying those methods himself to specific biological systems. Each focus is driven by a motivation to make positive biomedical and thus humanitarian impacts. As a graduate student, he investigated a model of a coat protein complex II cage by combining cryoEM, hydrogen-deuterium exchange mass spectrometry, and molecular modelling. Beginning as a graduate student and continuing into his postdoctoral training, he develops and maintains software, Appion-Protomo, that enables researchers of all experience levels to process cryo-electron tomography (cryoET) images without the need for additional sample or imaging optimization. As a postdoctoral fellow in a highly-collaborative environment, he has illuminated and investigated a long-standing and widespread problem with single particle cryoEM sample preparation that has numerous broad implications – protein adsorption to the air-water interface. Through collaborative efforts internal and external to SEMC, he investigated solutions to this problem in the form of cryoEM grid freezing techniques (the Spotiton grid preparation robot) and sample detergent optimization. His postdoctoral fellowship, spurred by a fruitful cryoET collaboration, seeks to understand the structural behavior of type II cadherins on membranes, which are a set of cell adhesion molecules with several pathological implications if malformed. His current investigations and efforts also include several projects designed to obtain three-Dimensional cryoET structures of cellular interiors Using cryo-focused ion beam preparation, developing and overseeing deep learning applications in cryoEM/ET, assisting cryoET users at SEMC, and leading cryoET training workshops.

YEAR	RECIPIENT
2012	Gabriel C. Lander
2013	Peng Ge
2014	Ricardo C. Guerrero-Ferreira
2015	Alexey Amunts
2016	Dmitry Lyumkis
2017	Rengasayee Veeraraghavan
2018	*Not awarded*

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Major Society Awards

HILDEGARD H. CROWLEY OUTSTANDING TECHNOLOGIST AWARD FOR BIOLOGICAL SCIENCES (2019)

Matthew S. Joens
Washington University School of Medicine

Matthew is an analytical chemist by undergraduate training and has over 10 years of electron microscopy experience. His introduction into microscopy included internships at the University of California – San Diego (UCSD) with Dr. Timothy Baker, one of the founding fathers of cryo-electron microscopy, and with the National Center for Microscopy Imaging Research (NCMIR), a NIH funded lab headed by Dr. Mark Ellisman. Following these internships, he moved to the Salk Institute for Biological Studies where he worked with Dr. James Fitzpatrick to establish and grow the electron microscopy division of the Waitt Advanced Biophotonics Center. Matthew was later recruited by Dr. Fitzpatrick to help build the Center for Cellular Imaging at the Washington University School of Medicine in St. Louis. His background includes extensive experience with cryo sample preparation, immunolabeling, 3D electron microscopy, and selective staining chemistries. His main interests are in correlative sample preparation and imaging techniques, spanning light, X-Ray, ion, and electron microscopies.

YEAR	RECIPIENT
1993	Ben O. Spurlock
1994	*not awarded*
1995	Kai Chien
1996	*not awarded*
1997	John P. Benedict
1998	Hilton H. Mollenhauer
1999	John M. Basgen
2000	Nancy Crise Smith
2001	*not awarded*
2002	José A. Mascorro
2003	*not awarded*
2004	*not awarded*
2005	John J. Bozzola
2008	Thomas Deerinck
2009	Mary Morphew
2010	E. Ann Ellis
2011	Robert Grassucci
2012	Kunio Nagashima
2013	Robyn Roth
2014	Hong Yi
2015	Norman Olson
2016	Frank Macaluso
2017	Patricia S. Connelly
2018	Anchi Cheng

CHUCK FIORI OUTSTANDING TECHNOLOGIST AWARD FOR PHYSICAL SCIENCES (2019)

Dmitri Zakharov
Brookhaven National Laboratory

Dmitri N. Zakharov received his M.S. degree in Solid State Physics from Moscow State Engineering Physical Institute, Department of Theoretical and Experimental Physics in 1995, his Ph.D. in Solid State Physics from the Institute of Crystallography of the Russian Academy of Sciences in 2001, and postdoctoral trainings at Max Planck Institute of Microstructure Physics and Lawrence Berkeley National Laboratory. After spending 6 years as a Staff Scientist at Birck Nanotechnology Center at Purdue University, Dr. Zakharov joined the Center for Functional Nanomaterials at Brookhaven National Laboratory in 2012 in a Staff Scientist role. Dr. Zakharov's research interests include environmental scanning/transmission electron microscopy (ETEM) technique; automated low dose image acquisition of electron beam sensitive materials; Machine Learning algorithms and Big Data analysis for Real-Time image streams processing to extract quantitative information; operando experimental setup utilizing ETEM and the National Synchrotron Light Source II as two complimentary techniques; carbon nanotube nucleation, growth, termination and chirality control; 2D and III-Nitride materials and devices. Dr. Zakharov has over 150 journal and conference publications, which have been cited more then 3,200 times (h-index 33), and he has presented over 30 invited talks in the US and abroad. Dmitri was recipient of 2014 Spotlight Award by Brookhaven National Laboratory and Mikhail Teplov Scholarship in 2000. He also served as Graduate Faculty at the School of Materials Engineering at Purdue University.

YEAR	RECIPIENT
1993	*not awarded*
1994	Bernard J. Kestel
1995	*not awarded*
1996	David W. Ackland
1997	Stanley J. Klepeis
1998	Charles J. Echer
1999	John C. Wheatley
2000	*not awarded*
2001	Conrad G. Bremer
2002	*not awarded*
2003	Edward A. Ryan
2004	Mark C. Reuter
2005	Chris Nelson
2008	*not awarded*
2009	Lynne Gignac
2010	*not awarded*
2011	*not awarded*
2012	*not awarded*
2013	K. Shawn Reeves
2014	Eddy Garcia-Meitin
2015	Masahiro Kawasaki
2016	*not awarded*
2017	Richard L. Martens
2018	Chengyu Song

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MAS 2019 COUNCIL – OFFICERS

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Social Media	Daniel M. Ruscitto
Strategic Planning	Vincent S. (Vin) Smentkowski
Sustaining Membership	Pat Camus
Topical Conferences	Paul K. Carpenter

PAST PRESIDENTS

1968	L.S. Birks
1969	K.F.J. Heinrich
1970	R.E. Ogilvie
1971	A.A. Chodos
1972	K. Keil
1973	D.R. Beaman
1974	P. Lublin
1975	J.E. Colby
1976	E. Lifshin
1977	J.I. Goldstein
1978	J.D. Brown
1979	D.F. Kyser
1980	O.C. Wells
1981	J.R. Coleman
1982	R.L. Myklebust
1983	R. Bolon
1984	D.C. Joy
1985	D.E. Newbury
1986	C.G. Cleaver
1987	C.E. Fiori
1988	W.F. Chambers
1989	D.B. Wittry
1990	A.D. Romig, Jr
1991	J.T. Armstrong
1992	D.B. Williams
1993	T.G. Huber
1994	J.A. Small
1995	J.J. McCarthy
1996	D.E. Johnson
1997	J.R. Michael
1998	R.B. Marinenko
1999	J.J. Friel
2000	C.E. Lyman
2001	R.W. Linton
2002	G.P. Meeker
2003	E.S. Etz
2004	P.K. Carpenter
2005	I.H. Musselman
2006	R. Gauvin
2007	P.G. Kotula
2008	I.M. Anderson
2009	C. Johnson
2010	E.P. Vicenzi
2011	J.H.J. Scott
2012	J.F. Mansfield
2013-14	K.L. Bunker
2015-16	T.F. Kelly
2017-18	M. Watanabe

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Major Society Awards

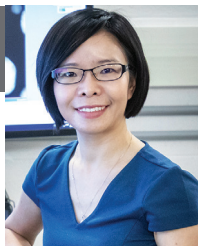
PETER DUNCUMB AWARD FOR EXCELLENCE IN MICROANALYSIS (2019)

David N. Seideman

Department of Materials Science & Engineering, Northwestern University

David Seidman is a Walter P. Murphy professor of materials science and engineering at Northwestern University, since 1996. He is a pioneer in the development and application of field-ion microscopy (FIM), atom-probe FIM and atom-probe tomography to a wide range of scientific and technological problems, which require spatial resolution at the subnanometer scale and chemical information at the same length scale. He received his Ph.D. degree from the University of Illinois at Urbana-Champaign, where he studied the kinetics of formation of vacancies in up-quenched gold: his advisor was Robert W. Balluffi. His current research interests are in atomistic mechanisms of phase-separation in multicomponent Ni-Based superalloys, development of high-temperature (greater than 723 K) Al-Based alloys, development of high-temperature Co-Based alloys, high-strength tough-steels with good blast and projectile resistance, and the use of silicon nanowires for sensors. Seidman is a member of the National Academy of Engineering, a fellow of the American Academy of Arts & Sciences, American Association for the Advancement of Science, American Physical Society, ASM International, John Simon Guggenheim Memorial Foundation, Materials Research Society, TMS (Minerals•Metals•Materials). Gold Medal Award and Albert Sauveur Achievement Award of ASM International, David Turnbull Lecturer Award of the Materials Research Society, Alexander von Humboldt Stiftung Prize, Max Planck Research Prize.

KURT F.J. HEINRICH AWARD (2019)



Miaofang Chi

Oak Ridge National Laboratory

Miaofang Chi is a senior staff scientist at the Center for Nanophase Materials Sciences (CNMS) at Oak Ridge National Laboratory (ORNL). She received her Ph.D. in Materials Science and Engineering from University of California, Davis in 2008. Her primary research interest lies in the advancements and applications of novel electron microscopy techniques in energy and nanotechnology research, especially in the understanding of interfacial charge transfer behavior in energy storage and nanoelectronics systems. She was awarded the Burton Metal by the Microscopy Society of America (2016). She received the ORNL Director's Award for Outstanding Individual Accomplishment in Science and Technology (2015) and the ORNL's Early Career Research Award (2015). Miaofang is the author and co-author of more than 150 peer-reviewed journal articles. She was named to the Clarivate's 2018 list of Highly Cited Researchers.

PREVIOUS AWARDEES

2007	D.B. Williams
2008	J.I. Goldstein
2009	D.E. Newbury
2010	D.C. Joy
2011	J.R. Michael
2012	J. Bentley
2013	E. Lifshin
2014	O.L. Krivanek
2015	P.J. Statham
2016	D. Muller
2017	T.F. Kelly
2018	R.D. Leapman

PREVIOUS AWARDEES

1986	P.J. Statham
1987	J.T. Armstrong
1988	D.B. Williams
1989	R.D. Leapman
1990	R.W. Linton
1991	A.D. Romig, Jr.
1992	S.J. Pennycook
1993	P.E. Russell
1994	J.R. Michael
1995	E.N. Lewis
1997	R. Gauvin
1998	V.P. Dravid
1999	J. Bruley
2000	H. Ade
2001	C. Jacobsen
2002	D.A. Wollman
2005	M. Watanabe
2006	M. Toth
2007	G. Kothleitner
2008	P.G. Kotula
2009	D. Drouin
2010	H. Demers
2011	L.N. Brewer
2012	E.A. Marquis
2013	J.M. LeBeau
2014	B.P. Gorman
2015	P. Pinard
2016	J. Allaz
2017	A. Herzing
2018	Y.N. Picard

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Major Society Awards

PRESIDENTIAL SCIENCE AWARD (2019)

Lawrence Allard

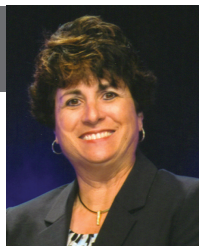
Oak Ridge National Laboratory

Dr. Larry Allard obtained all three of his degrees at the University of Michigan in (what is now the) Materials Science and Engineering Dept. He started his electron microscopy career in 1963 as a sophomore, learning theory and practice under Prof. Wilbur Bigelow. He is currently a Distinguished Research Staff Member in the Materials Science & Technology Division at Oak Ridge National Laboratory. His research involves ultra-high-resolution imaging and microanalysis in studies of precipitation processes in aluminum alloys and superalloys, catalytic materials (e.g. single-atom catalysts) for automotive exhaust after-treatment and other chemical processes, and instrumental developments involving in situ heating and operando gas-reactions electron microscopy used in those studies. He is the chief scientist in charge of the Aberration-Corrected Electron Microscope (ACEM) project at the High Temperature Materials Lab at ORNL; his JEOL 2200FS instrument is one of the first of the new generation of STEM/TEM instruments with sub-Ångström resolution to be installed in the US (2004). He is also the principal technical designer of ORNL's new Advanced Microscopy Laboratory, a facility currently housing 7 Aberration-Corrected microscopes. Dr. Allard has more than 300 cited scientific publications; he has been a co-organizer of more than a dozen workshops and symposia on advanced microscopy topics, and has co-edited several conference proceedings and books, including "Introduction to Electron Holography," the first definitive textbook on electron holography, published by Kluwer/Plenum in 1999. Dr. Allard was elected Fellow of the Microscopy Society of America in 2010. He is still collaborating closely with Prof. Bigelow, who at age 96 continues to contribute to the scientific capabilities provided by the microscopy group at ORNL and other institutions.

PREVIOUS AWARDEES

1977	R. Castaing
1978	K.F.J. Heinrich
1979	P. Duncumb
1980	D.B. Wittry
1981	S.J.B. Reed
1982	R. Shimizu
1983	J. Philibert
1984	L.S. Birks
1985	E. Lifshin
1986	R.L. Myklebust
1987	O.C. Wells
1988	J.D. Brown
1989	J. Hillier
1990	T.E. Everhart
1997	D.B. Williams
1998	F.H. Schamber
1999	R.A. Sareen
2000	R.F. Egerton
2001	P.E. Batson
2002	K. Keil
2003	P.E. Russell
2004	J.T. Armstrong
2005	G. Slodzian
2006	B.J. Griffin
2007	R.D. Leapman
2008	T.F. Kelly
2009	J.R. Michael
2010	J.J. Donovan
2011	P.J. Statham
2012	N.J. Zaluzec
2013	P. Echlin
2014	H.L. Fraser
2015	M.R. Keenan
2016	M. Jercinovic
2017	M.K. Miller
2018	M.G. Burke

PRESIDENTIAL SERVICE AWARD (2019)



Lucille Giannuzzi

EXpressLO LLC

Dr. Lucille Giannuzzi holds a B.E. in Engineering Science and M.S. in Materials Science and Engineering from Stony Brook University. She received her Ph.D. from Penn State in Metals Science and Engineering and was a Post-Doc at the PSU Center for Advanced Materials. Prof. Giannuzzi was at the University of Central Florida for 10 years where she was a recipient of an NSF CAREER award. She joined FEI Company as a product marketing engineer for 7 years before founding her own consulting and product companies. She recently joined TESCAN USA. Dr. Giannuzzi has applied focused ion beam and electron microscopy techniques to study the structure/property relationships in metals, alloys, ceramics, composites, polymers, minerals, bone/dental implants, irradiated, inorganic, and biological materials. She maintains professional affiliations in several societies and is a Fellow of AVS, MSA, and MAS. Dr. Giannuzzi has over 125 (co)authored publications; several FIB-related patents, contributed to several invited book chapters, and is co-editor of a book entitled "Introduction to Focused Ion Beams."

PREVIOUS AWARDEES

1977	P. Lublin
1978	D.R. Beaman
1979	M.A. Giles
1980	A.A. Chodos
1981	R.L. Myklebust
1982	J. Doyle
1983	D.E. Newbury
1984	J.I. Goldstein
1985	M.C. Finn
1986	V. Shull
1987	D.C. Joy
1988	C.G. Cleaver
1989	W.F. Chambers
1990	C.E. Fiori
1991	T.G. Huber
1992	E.S. Etz
1993	H.A. Freeman
1994	J.L. Worrall
1995	R.W. Linton
1996	P.F. Hlava
1997	J.A. Small
1998	J.J. McCarthy
1999	T.G. Huber
2000	R.B. Marinenko
2001	C.E. Lyman
2002	J.F. Mansfield
2003	I.H. Musselman
2004	J.R. Michael
2005	G.P. Meeker
2006	H.A. Freeman
2007	P.K. Carpenter
2008	L.M. Ross
2009	V. Woodward
2010	S.A. Wight
2011	D.T. Kremser
2012	C. Johnson
2013	J.J. McGee
2014	I.M. Anderson
2015	S. McKernan
2016	H. Lowers
2017	D. Kremser
2018	V. Robertson

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MAS Outstanding Paper Awards for 2018

MAS OUTSTANDING PAPER AWARDS (2019)

These awards are presented annually to the authors of outstanding papers from the previous annual meeting in each of four categories.

RAYMOND CASTAING – BEST STUDENT PAPER AWARD:

Analysis of Redox Changes in Silicate Glasses Using EPMA and Raman Spectroscopy

Ery Hughes, University of Bristol, United Kingdom

V.G. MACRES – BEST INSTRUMENTATION/SOFTWARE PAPER AWARD:

The MTF and DQE of Annular Dark Field STEM: Implications for Low-dose Imaging and Compressed Sensing

Lewys Jones, Trinity College Dublin, Ireland

L.S. BIRKS – BEST CONTRIBUTED PAPER AWARD:

Low Energy STEM-EELS Characterization of Primitive Organic Matter and Silicates in the Meteorite LAP 02342

Bradley De Gregorio, U.S. Naval Research Laboratory

V.E. COSSLETT – BEST INVITED PAPER AWARD:

Novel EELS Experiments in the Newly Opened Monochromatic Regime

Jordan Hachtel, Oak Ridge National Laboratory

2019 MAS FELLOWS (INAUGURAL CLASS):

Ian Anderson
Phil Batson
Paul Carpenter
Bill Chambers
John Donovan
Vinayak Dravid
Ray Egerton
John Fournelle
Hamish Fraser
Raynald Gauvin
Paul Hlava
Thomas Huber
Michael Jercinovic
Cathy Johnson
Thomas Kelly
Paul Kotula
Charles Lyman
John Mansfield
Joseph Michael
Inga Musselman
Nicholas Ritchie
John Henry Scott
John Small
Ed Vicenzi
Masashi Watanabe
Valerie Woodward

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Society Information

The International Field Emission Society (IFES) is centred around the physics and application of high-field nanoscience, and in particular its application to Nano-Scale materials characterisation by atom probe microscopy. A major focus of the society is the promotion and development of atom probe microscopy methods and research.

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Mattias Thuvander	
Arun Deveraj	
Gang Sha	
David Saxey	
Baptiste Gault	

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2014 -present	D.J. Larson
2008 - 2014	N. Kruse
2006 – 2008	T.F. Kelly
2002 – 2006	R.G. Forbes
2000 – 2001	D.N Seidman
1996 – 2000	R.G. Forbes
1993 – 1996	M.K. Miller
1990 – 1993	G.D.W. Smith
1987 – 1990	J.H. Block

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Didier Blavette
Alfred Cerezo
Paul Cutler
Frédéric Danoix
Richard Forbes
Georgiy Fursey
Robert Gomer
Kazuhiro Hono
Gary Kellogg
Thomas Kelly
Hans Juergen Kreuzer
Norbert Kruse
Allan Melmed
Michael Miller
Marwan Mousa
Osamu Nishikawa
John Panitz
Simon Ringer
Guido Schmitz
David Seidman
George Smith
Krystyna Stiller
Lyn Swanson
Tien Tzou Tsong
Nelia Wanderka

E.W. Müller Young Scientist Award

(1978)	A.R. Waugh
(1979)	H.-W. Fink
(1980)	Y. Kuk
(1981)	S.J. Banard
(1982)	J.M. Derochette
(1983)	D.R. Kingham
(1984)	M.G. Hetherington
(1985)	M. Ahmad
(1986)	L. Karlsson
(1987)	P.P. Camus
(1988)	A. Cerezo
(1989)	J. Dirks
(1990)	J.E. Brown
(1991)	F. Danoix
(1992)	H. Schmid
(1993)	M.C. Reckzügel
(1994)	R.C. Thomson
(1995)	C. Voss
(1996)	L. Li
(1997)	C. Schmuck-Pareige
(1998)	K. Nagaoka
(2001)	Ch. Lang
(2002)	E.A. Marquis
(2004)	B. Cho
(2006)	W.M. Tsang
(2008)	M. Moors
(2010)	P. Stender
(2012)	M. Roussel
(2014)	C. Oberdorfer
(2016)	M. Dagan
(2018)	S. Lambeets

2019 IFES Travel Scholarship Awards

Olivia G. Licata
University at Buffalo
Multiplicity vs. Composition Study to Understand the Field Evaporation of Polar AlxGa1-xN Heterostructures: A New Approach

Yi-Sheng (Eason) Chen
The University of Sydney, Australia
Atomic-Scale Observation of Hydroxyapatite Nanoparticle

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Meeting Awards

M&M STUDENT SCHOLAR AWARDS—SPONSORED BY MSA

Fatemeh Abbasi Yeganeh, Florida State University

Wah Chiu, Stanford University (Miller Award)

Paul Cueva, Cornell University

Ha Dang, University of Washington

Julia Doh, Oregon Health & Science University

Amanda Erwin, University of Michigan

Alice Greenberg, University of Oregon

Catherine Groschner, University of California-Berkeley

Shen Han, Max Planck Institute for Polymer Research, Germany

Daniel Kelly, Manchester University, United Kingdom

Abinash Kumar, North Carolina State University

Ethan Lawrence, Arizona State University

Brandon McKeon, Arizona State University

Arthur Moya, University of Oxford, United Kingdom

Akshay Murthy, Northwestern University

Colum O'Leary, University of Oxford, United Kingdom

Will Parker, University of Oregon

Timothy Pegg, Miami University

Graham Rykiel, Oregon Health & Science University

Jonathan Schwartz, University of Michigan

Alexandra Sheader, University of Oxford, United Kingdom

Michelle Smeaton, Cornell University

Louisa Mezache, The Ohio State University

Janis Wirth, Friedrich-Alexander University, Germany

Yao Long Xing, Sung Kyun Kwan University, Korea

Reed Yalisove, University of Michigan

Hwanhui Yun, University of Minnesota

Ruopeng Zhang, University of California-Berkeley

M&M STUDENT SCHOLAR AWARDS—SPONSORED BY MAS

Kousuke Ooe, University of Tokyo, Japan

Kevin Schweinar, Max Planck Institute for Iron Research, Germany

Berit Goodge, Cornell University

Brian Zutter, University of California-Los Angeles

Charles Fletcher, The University of Oxford, United Kingdom

Meredith Sharps, University of Oregon

Heena Inani, University of Vienna, Austria

Yichao Zhang, University of Minnesota

Parivash Moradifar, Pennsylvania State University

Yitian Zeng, Stanford University

Komal Syed, University of Califormia-Irvine

M&M POSTDOCTORAL SCHOLAR AWARDS

Benjamin Apeleo Zubiri, Friedrich-Alexander University, Germany (APKARIAN AWARD–BIOLOGICAL SCIENCES)

Axel Brilot, University of California-San Francisco (APKARIAN AWARD–PHYSICAL SCIENCES)

Hamish Brown, Lawrence Berkeley Laboratory

Michael Buch, National Institutes of Health

Johannes Elferich, Oregon Health & Science University

Wenpei Gao, University of California-Irvine

Vivian Merk , Northwestern University

Aubrey Penn, North Carolina State University (ERIC SAMUELS SCHOLARSHIP)

Paul Smeets, Northwestern University

Wei-Chang Yang, National Institute of Standards and Technology

Andrew Yankovich, Chalmers University of Technology, Sweden

M&M PROFESSIONAL TECHNICAL STAFF AWARDS

Leslie Cummins, Albert Einstein College of Medicine

Pauline Mochama, University of Minnesota

Sara Dickens, Sandia National Laboratories

Ann Johnson, The Dow Chemical Company

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