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John Mansfield, Editor in Chief, 4304 Spring Lake Blvd., Ann Arbor, MI, 48108-9657, USA; Tel: (734) 936-3352; Fax: (734) 763-2282; E-mail: thejfmjfm@me.com

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- 948 *Characterizing Dzyaloshinskii Domain Walls in Asymmetric [Pt/Co/Ni/Ir]_N Multi-Layers using Lorentz TEM*; MP Li, M De Graef, V Sokalski
- 950 *Visualized Effects of Oxidation and Temperature on Vortex-State Fe₃O₄ Particles Examined by Environmental TEM and Off-Axis Electron Holography*; TP Almeida, AR Muxworthy, W Williams, T Kasama, T Hansen, P Brown, A Kovács, R Dunin-Borkowski
- 952 *Study of Vortex State in Permalloy Plates Using Optimized Electron Holography*; E Ortega, B Mora, C Monton, C Redondo, J Arellano, R Morales, E Voelkl, A Ponce
- 954 *Revealing the Magnetic Interactions of DP in Cu-Co alloys by Electron Holography*; NM Suguhiro, MR Mc Martney, DJ Smith, AM Costa, IG Solórzano
- 956 *Direct Laser Deposition and Homogenization of Ni-Co-Mn-Sn Magnetocaloric Material*; E Stevens, K Kimes, V Chernenko, P Lazpita, A Wojcik, W Maziarz, M Chmielus
- 958 *Microstructural Development in Melt-spun Nd₂Fe₁₄B Under High Magnetic Field Annealing*; L Zhou, T Kim, B Brandt Jensen, K Sun, O Palasyuk, K Dennis, I Nlebedim, M McGuire

Strain Analysis from Nano- to Micro-length Scales

- 960 *Strain Mapping Using EBSD Cross Correlation and Raman Methods*; MD Vaudin, AJ Gayle, LH Friedman, RF Cook
- 962 *High Angular Resolution Electron Backscatter Diffraction Studies of Tetragonality in Fe-C Martensitic Steels*; T Tanaka, AJ Wilkinson
- 964 *Local Strain Analysis using Scanning Nanobeam Electron Diffraction during in situ TEM Nanomechanical Testing*; AM Minor
- 966 *Developing High Resolution and High Precision Strain Mapping Methodologies for Materials Research and Semiconductor Technology*; J-M Zuo, R Yuan
- 968 *Residual Stress Characterization on the Mesoscale in Additive Manufacturing*; KA Small, Z Clayburn, J Almer, J Tischler, D Fullwood, M Taheri
- 970 *Nano-scale Elastic Strain Maps of Twins in Magnesium Alloys*; L Ma, PF Rottmann, K Xie, KJ Hemker
- 972 *Probing Nanoscale Local Lattice Strains in Semiconductor Nanostructures and Devices by Transmission Electron Microscopy*; J Wang, G Lian, MJ Kim

- 974 *Strain Characterization of Advanced CMOS Transistors: An Industry Perspective*; J Zhang, X Weng, R Yuan, L Pan, H Li, M Kuhn, K Johnson, J-M Zuo
- 976 *Dynamical Effects on the Geometric Phase*; L Meißner, T Niermann, D Berger, M Lehmann
- 978 *Strain Analysis of FinFET Device utilizing Moiré Fringes in Scanning Transmission Electron Microscopy*; Y Kondo, N Endo, Y Aoyama, K Asayama, K-I Fukunaga, CC Lin, H Kim
- 980 *Strain Analysis in Polycrystalline Diamond under Extreme Conditions*; S Kaboli, P Burnley
- 982 *Coherency and Thermal Evolution of Metastable and Stable β Phase Precipitates in Aluminum Alloy AA5456*; D Foley, A Lang, A Leff

Sterling Newberry Memorial Symposium on X-ray Imaging

- 984 *The Munich Compact Light Source: Biomedical Research at a Laboratory-Scale Inverse-Compton Synchrotron X-ray Source*; B Günther, M Dierolf, R Gradl, E Eggl, C Jud, L Hehn, S Kulpe, B Gleich
- 986 *Micro-focused Five-dimensional X-ray Imaging with the Color X-ray Camera*; JM Davis, J Schmidt, M Huth, R Hartmann, H Soltau, L Strüder
- 988 *A New Method for Characterizing 3D Microstructures Using Lab-based Diffraction Contrast Tomography*; H Bale, W Harris, S Kelly, N Guenincault, J Sun, E Lauridsen
- 990 *X-ray Detectors – in Heaven and on Earth*; L Strueder, H Soltau, P Holl, R Hartmann, D Schlosser, A Niculae, M Huth, J Davis
- 992 *Combining 3D X-ray Techniques; Computed Tomography and Fluorescence*; BM Patterson, NL Cordes, GJ Havrilla, K Henderson
- 994 *Blob-based Algebraic Reconstruction Technique for Computed Laminography*; P Trampert, T Dahmen, P Slusallek
- 996 *Next Generation of Instruments Required - Not just X-Ray Imaging but Combined EDS, CL, GSR, XRM, XRD and Raman Systems*; R Wuhler, K Mason, K Moran
- 998 *In situ Dynamic X-ray Tomography in the Laboratory*; A Merkle, M Boone, D Van Loo
- 1000 *Soft X-ray Microscopy: History, Status, and Future*; H Ade
- 1002 *In situ Imaging of Materials using X-Ray Tomography*; BM Patterson, NL Cordes, K Henderson, X Xiao, N Chawla
- 1004 *Using Micro-Computed Tomography to Investigate Powder Distribution Trends Within 3D Binder-Jet Printed SS316 Parts*; E Stevens, J Barnes, M Chmielus
- 1006 *High-Efficiency Fast X-Ray Imaging Detector Development at SSRF*; H Xie, C Zhao, G Du, H Luo, W Xu, T Xiao

- 1008 *Novel Sub-eV High Throughput Laboratory Micro-XAS (X-ray Absorption Spectrometer) for Chemical State Analysis Through XANES and EXAFS*; W Yun, S Seshadri, S Lewis, J Gelb, S Lau, J Kirz
- 1010 *4D and In Situ X-ray Microscopy for Studying Damage Evolution in Materials Across Multiple Length Scales*; W Harris, H Bale, S Kelly, B Hornberger
- 1012 *Full-Field X-Ray Nanoscopy Developed at SSRF*; B Deng, Y Ren

Surface and Subsurface Microscopy and Microanalysis

- 1014 *What do Cells and Photovoltaic Materials Have in Common? TOF-SIMS Tandem MS Imaging and the Identification of Chemistry at < 100 nm Resolving Power*; GL Fisher
- 1016 *Secondary Ion Mass Spectrometry on the Helium Ion Microscope: Methodologies for Analysis of Nanomaterials*; J-N Audinot, F Vollnhals, P Gratia, S Eswara, P Philipp, T Wirtz
- 1018 *Surface Characterization of Biologically-Related Systems with Imaging TOF-SIMS and Complementary Techniques*; L Gamble, T Angerer, D Graham, E Chudler
- 1020 *Ablation and Microstructure Imaging of Dentin-Enamel Junction Using Focused Electron Beam in an Environmental Scanning Electron Microscope*; D Zhao, R Seyedmahmoud, JD McGuire, Y Wang, MP Walker, JP Gorski
- 1022 *Imaging the Endoplasmic Reticulum within Individual Mammalian Cells with Secondary Ion Mass Spectrometry*; ML Kraft, CE Chini, GL Fisher, MM Tamkun
- 1024 *Improving the Understanding of Catalytic Processes using Field Emission Techniques: The Case of NO+H₂ on Pd-Au*; C Barroo, TV de Bocarmé
- 1026 *TOF-SIMS Analysis with High Lateral and High Mass Resolution in Parallel*; F Kollmer, N Havercroft, A Henss, W Paul, H Arlinghaus, R Möllers, E Niehuis
- 1028 *Understanding Conditions Affecting Background in Atom Probe Tomography with Implications for Analysis of Hydrogen*; TJ Prosa
- 1030 *Auger Electron Spectroscopy – History and Applications in Materials Characterization with Emphasis on Medical Devices*; S Raman, L LaVanier, J Moskito, D Madamba
- 1032 *Spherical Particles in Al₆₅Cu₂₀Fe₁₅ Alloy Prepared by Arc Melting*; C Li, C Carey, D Li, M Caputo, H Hampikian
- 1034 *Recent Developments in XPS – Microspectroscopy, Spectromicroscopy, Lateral and Depth Information towards Cutting-Edge Solid Electrolytes and Biomaterials*; JDP Counsell, DJ Surman, C Moffitt
- 1036 *Observation of Lithium Fluorescence X-ray Utilizing Superconducting Tunnel Junction Array X-ray Detector Toward in situ Mapping Analyses of Precipitated Metal Lithium in Solid Electrolytes of Li-ion Batteries*; M Ukibe, G Fujii, S Shiki, M Ohkubo
- 1038 *Multidimensional Imaging of Surfaces with Ringing Mode of Atomic Force Microscopy*; I Sokolov, ME Dokukin

- 1040 *Nanoscale Hyperspectral Characterization of Source Rock in Unconventional Reservoirs using Photo-Induced Force Microscopy*; SL Eichmann, D Nowak, D Jacobi, NA Burnham
- 1042 *Multimodal Chemical and Functional Imaging of Nanoscale Transformations Away from Equilibrium*; AV Ievlev, P Maksymovych, SV Kalinin, OS Ovchinnikova
- 1044 *Nanoelectrochemistry and Nanoelectrics at Electrode/Electrolyte Interface*; Z Huang, P De Wolf, B Pittenger
- 1046 *Utilizing Correlative, Multi-Technique Surface Analysis to Complement Microscopy Studies*; TS Nunney, C Deeks, P Mack, R Simpson, C Stephens
- 1048 *Continuous Wavelet Transforms for Measuring Roughness of Nanoscale Interfaces*; DLN Homeniuk, M Malac, M Hayashida
- 1050 *Surface Analysis of Fine Art Paintings: Studying Degradation Mechanisms with a Systematic Approach*; TP Beebe Jr, Z Voras, K de Gheraldi, J Mass
- 1054 *Microstructural and Material Properties of Individual Zirconium Hydride Domains Formed Under Simulated Conditions*; S Riechers, B Johnson
- 1056 *Correlative Defect Characterization in Semiconductors via Electron Channeling Contrast Imaging and Scanning Deep Level Transient Spectroscopy*; TJ Grassman, K Galiano, JI Deitz, SD Carnevale, DA Gleason, PK Paul, Z Zhang, SA Ringel
- 1058 *Mapping Subsurface Composition with Attogram Sensitivity using Micro-XRF*; J Gelb, B Stripe, X Yang, S Lewis, S Lau, W Yun
- 1060 *In-situ Low Energy Argon Ion Source for the Improvement of EBSD Pattern Acquisition*; R Isaacs, A Prokhotseva, T Vystavel
- 1062 *Characterization of Si Surface by SEM-SXES using Low Incident Voltage*; Y Yamamoto, H Takahashi, T Murano, N Kikuchi, N Erdman
- 1064 *The Powder-Pack Boriding Process: A Microstructure Comparison of Boride Layers Formed on AISI 4150 and M2 Steels*; J Zuno-Silva, M Ortiz-Domínguez, I Simón-Marmolejo, LE Martínez-Martínez, MA Flores-Rentería, A Arenas-Flores, A Cruz-Avilés
- 1066 *Additive Manufacturing Methods for Soft Magnetic Composites (SMCs)*; N Benack, T Wang, K Matthews, M Taheri
- 1068 *Exploring the Differences in Spatial Resolution between Auger and EDS Elemental Mapping*; CR Thurber
- 1070 *Characterization of PM10 Particles by SEM-EDS*; R Ramirez-Leal, M Cruz-Campas, H Estuardo-Moreno
- 1072 *Morphology and Elemental Composition of Fine Particulate Matters PM10 by SEM-EDS*; R Ramirez-Leal, M Cruz-Campas, H Estuardo-Moreno
- 1074 *Metals Characterization by Principal Component EDS Analysis and EBSD*; J Morrow, K Thompson

- 1076 *Analysis of Nitride Layers on ARMCO Pure Iron: The Powder-Pack Nitriding Process*; M Ortiz-Domínguez, OA Gómez-Vargas, I Simón-Marmolejo, MÁ Flores-Rentería, LE Martínez-Martínez, A Cruz-Avilés, MÁ Paredes-Rueda
- 1078 *Resolving Multilayer Structure of Pressure Sensitive Adhesive by Atomic Force Microscopy (AFM)*; H Duan, S Qin
- 1080 *Microscopic Characterization of IBM Star Polymers at High-Temperature for Water Membrane Applications*; J-Y Cho, J Le, Y-H Na, M Sadrzadeh, A Myles
- 1082 *Microanalysis of Carbon and Glass Fiber Obtained by Resin Transfer Molding Process to Manufacture Blades for Wind Turbines*; EE Vera Cardenas, AI Martinez Perez, C Rubio Gonzalez, S Ledesma Ledesma, JA Banderas Hernandez, G Luis Raya
- 1084 *A Multiple Hits Correction Factor for Atom Probe Tomography*; DJ Larson, TJ Prosa, E Oltman, DA Reinhard, B Geiser, RM Ulfig, A Merkulov
- 1086 *XPS Study of Corrosion Deposit in Stainless Steel Hardfacing*; E Huape, M Sánchez, A Medina, H Guillermo-Carreón, S Eduardo-Borjas, R Huirache, L Béjar
- 1088 *Visualization of Impurities on the Surface of Frozen Samples by Environmental Scanning Electron Microscopy*; L Vetráková, V Neděla, J Runštuk
- 1090 *Study of Molecular Composition and Chemical Group Presents in Plants Extracts By Using Mass Spectrometry and FTIR*; EE Rizo Tafolla, DK Tiwari, D Tripathi, SE Borjas Garcia
- 1092 *Analysis of Raman Spectroscopy and SEM of Carbon Nanotubes Obtained by CVD*; L Bejar, A Alberto-Mejia, C Parra, C Aguilar, A Medina, SE Borjas, JL Bernal
- 1094 *Characterization of Carbon Nanotubes with TiO₂ by the (CVD) Chemical Vapor Deposition Method*; AA Mejia, L Bejar, C Parra, C Aguilar, A Medina, E Huape-Padilla, SE Borjas, JL Bernal
- 1096 *Preparation of a Model Platinum/Gamma-Alumina Catalyst for in situ Environmental TEM Experiments*; M McCann, H Ayoola, JC Yang
- 1098 *Synthesis and Characterization of Silica Nanoparticles Obtained by Additions of Amino Acids into the Stöber Reaction*; FJ Carrillo-Pesqueira, RC Carrillo-Torres, ME Alvarez-Ramos, J Hernández-Paredes
- 1100 *The Benefits of Consistently Orientated Samples for Coincident Data Collection*; A Halfpenny, C Mattinson, W Bohrson, K Merigot
- 1102 *Comparative Study of TiN/SiC and CrN/SiC Multilayer Systems Produced by PVD*; JL Bernal, AI Martínez, EE Vera, A Garcia
- 1104 *Modification of Microstructure of Pure Al using Shot Peening Treatment*; L Xu, K Shin
- 1106 *Microstructural Study of Internal Oxidation of Dilute Ni-Al Alloys*; O Hernandez-Negrete, A Martinez-Villafañe

- 1108 *Effect of Ultrasonic Shot Peening on Microstructural Evolution of Duplex Stainless Steel S32750*; S Liu, K Shin
- 1110 *Synthesis and Characterization of HfC/SiC Ceramic Nanoparticles*; LG Ceballos-Mendivil, JC Tánori-Córdova, JA Baldenebro-López, RA Soto-Rojo, FJ Baldenebro-Lopez
- 1112 *Effect on Microstructure and Nanoindentation of a AlCoFeMoNi High Entropy Alloy*; FJ Baldenebro-Lopez, CD Gomez-Esparza, H Camacho-Montes, R Martínez-Sánchez
- 1114 *Synthesis and Characterization of TiO₂/C Composite for Photocatalytic Degradation of Dyes*; LG Ceballos-Mendivil, JC Tánori-Córdova, D Vargas-Hernández, HI Villafán-Vidales, A Cruz-Enriquez, JA Baldenebro-López, RA Soto-Rojo, FJ Baldenebro-López

Vendor Symposium

- 1116 *S9000X – Next Generation of Ultra-High Resolution SEM for Enhanced Analysis and Xe Plasma FIB for Ultra-Fast and Gentle Sputtering*; M Havelka, J Jiruše, T Hrnčíř, J Polster, R Váňa, S Záchej
- 1118 *Removal of Ga Implantation on FIB-prepared Atom Probe Specimens Using Small Beam and Low Energy Ar⁺ Milling*; CS Bonifacio, KP Rice, TJ Prosa, ML Ray, TF Kelly, PE Fischione
- 1120 *Influence of SEM Deposited Protection Layers on FIB Induced Amorphous Damage of TEM Lamella Prepared by ExSolve WTP*; MR Najarian, M Gordillo, G Dutrow
- 1122 *A Versatile All-in-One Automated Processor for Electron Microscopy*; TE Strader, NR Stewart, BK August, SL Goodman
- 1124 *Cryo-EM Workflow Optimization*; M Kuijper, M de Jonge, J Mitchels, S Konings, O Shanel, R vd Ploeg
- 1126 *Tilt-free EBSD*; T Vystavěl, P Stejskal, C Stephens, M Unčovský
- 1128 *The Benefits and Applications of a CMOS-based EBSD Detector*; J Goulden, P Trimby, A Bewick
- 1130 *Introducing Lumis -A Novel EBSD detector*; CJ Stephens, Z Pesic
- 1132 *Optimizing the Nion STEM for In situ Experiments*; MT Hotz, G Corbin, N Dellby, TC Lovejoy, GS Skone, J-D Blazit, M Kociak, O Stephan
- 1134 *Sub-Å STEM Resolution from 30-300kV*; M Bischoff, M Niestadt, V Altin, A Henstra, P Tiemeijer, B Freitag, C Maunders, P Hartel
- 1136 *Latest Developments in Environmental SEM Systems*; EJR Vesseur
- 1138 *Aquiring High-Quality Microscopic Images Through Silicon Without Damaging the Finished Product*; R Bellinger
- 1140 *Laser Scanning Confocal Microscopy 3D Surface Metrology Applications*; M Hong, G Meng
- 1142 *Chromatic Line Confocal Sensor Technology in High-Speed 3D and Deep Depth of Focus 2D Imaging Applications*; J Saily

- 1144 *Insights on Sample Topography in EDX Spectroscopy with Annular SDD Detectors*; A Schöning, R Lackner, A Bechteler, A Liebel, JM Davis, A Niculae, H Soltau
- 1146 *An Evaluation of Beam-Damage Zone in Si Wafer Machined by Gatan MicroPREP™ Laser-Ablation*; WW Zhao, Y Wang, C Bennett, PS Pichumani, G Walker, K Eaton, MH Shearer, L Dumas
- 1148 *High Throughput Automatic Elemental Analysis System Using Conventional SEM-EDS*; S Suzuki, M Morita, Y Ohta
- 1150 *High Performance Silicon Drift Detectors for Energy Dispersive Spectroscopy*; A Pahlke, F Dams, R Fojt, M Fraczek, L Höllt, J Knobloch, N Miyakawa
- 1152 *Using a Residual Gas Analyzer to Monitor Plasma Cleaning of SEM Chambers and Specimens*; RA Vane, M Cable
- 1154 *The Power of Electron Diffraction Phase Analysis and Pattern Simulations Using the ICDD® Powder Diffraction File™ (PDF-4+)*; A Gindhart, T Blanton, J Blanton, S Gates-Rector
- 1156 *A 120 kV Transmission Electron Microscope Series for Both Life Science and Material Science Fields*; K Tamura, T Kubo, I Nagaoki, H Mise, A Wakui, M Wayama, H Matsumoto, T Yaguchi
- 1158 *Development of an Easy-to-Use Cryo-Electron Microscope for Simultaneous Observation of SEM and Transmission Images*; Y Ose, T Sunaoshi, Y Tamba, Y Nagakubo, J Azuma, R Tamochi, A Narita, T Matsumoto
- 1160 *Single Particle Analysis with Highly Coherent Electron Source from Cold Field Emission Gun*; N Hosogi, T Fukumura, Y Shimizu, H Iijima

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Microscopy and Analysis in Forensic Science

- 1162 *The FBI Laboratory Toolmark Topography Analysis Research for Objectively Qualifying the Degree of Similarity between Toolmarks*; HJ Seubert, ED Smith
- 1164 *Evaluation of Lateral and Depth Resolutions of Light Field Cameras*; S Yoon, P Bajcsy, M Litorja, JJ Filliben
- 1166 *Root Cause Failure Analysis of Polyethylene Tubing Utilizing Microscopy*; EI Garcia-Meitin, M Jablonka
- 1168 *Classification Strategies for Fusing UV/visible Absorbance and Fluorescence Microspectrophotometry Spectra from Textile Fibers*; SL Morgan, N Fuenffinger, JV Goodpaster, EG Bartick
- 1170 *Microscopy to Support Trace Screening of Contraband, Including Explosives and Illicit Drugs*; J Verkouteren, E Sisco
- 1172 *Optimization of Forensic Analyses with Latest Generation EDS and EBSD on Multi-Function SEMs*; M Hiscock

- 1174 *Detection and Characterization of Heavy-Metal-Free (HMF) Gunshot Residues using CL, EDS and Raman together with XRD*; K Mason, R Wuhrer
- 1176 *Advantages of Micro-XRF in Forensic Science: From Large Areas to Minute Amounts*; M Buegler, F Reinhardt, S Scheller, R Tagle, T Wolff
- 1178 *The Necessity of Standards in an ISO 17025 Accredited Bioforensic Electron Microscopy Laboratory*; BM Leroux, RK Pope
- 1180 *Rapid Neutron Activation Analysis of Fissile Material Traces at the High Flux Isotope Reactor*; DC Glasgow, J Knowles
- 1182 *Forensic Soil Analysis Using the Electron Microprobe: The Markice-Bowling Case*; S Singletary, H Hanna
- 1184 *TEM Quantification of Amphibole in Asbestos Containing Materials: A Summary of Data 20 Years in the Making*; S Compton
- 1186 *Forensic Palynology in the United States: The Search for Geolocation*; AR Laurence
- 1188 *TEM and EDX of Metallic Nanoparticles in e-Cigarette Aerosol*; HO Colijn, VB Mikheev
- 1190 *How to Improve Soil Anti-adhesion by Studying the Micro-topography of a Beetle Cuticle*; EA Favret, O Tesouro, L Venturelli, M Roba, A Romito, LM Setten
- 1192 *Capability of Electron Microscopy in Forensic Science*; M Kotrly
- 1194 *Localization and Quantification of Total UV Absorbing Compounds in Chinese Elm (*Ulmus parvifolia*)*; V Ferchaud, Y Qi, L Chin

Microscopy in Food Science: Bridging Biology and Materials Science

- 1196 *The Application of Microscopy in Dairy Science: A Comprehensive Review of Existing and Emerging Techniques*; MA Auty
- 1198 *Mechanisms of Autocatalytic Multistage Structure Formation Reactions in Dairy-based Systems in Relation to Processing and Compositional Factors*; U Kulozik, S Lenze, S Sedlmeier
- 1200 *Non-Thermal Effects of Microwaves Enhancing Fixation of Biological Samples*; RI Webb
- 1202 *Optimization of Rapid Microwave Processing of Botanical Samples for Transmission Electron Microscopy*; J Mowery, GR Bauchan
- 1204 *Resolving the Calcium and Phosphorus Distribution in Casein Micelles in Bovine Milk: an in situ STEM/EDX Study as Applied to Hydrated Materials in Food Science*; BR Van Devener, AH Vollmer, NN Youssef
- 1206 *Confocal Raman Microscopy Study of Food Microstructures*; J Dong
- 1208 *Survey of Image Analysis Methods Applied to Consumer Foods*; N Piché, E Jabason, M Marsh, AH Vollmer

3D Structures of Macromolecular Assemblies, Cellular Organelles, and Whole Cells

- 1210 *Cryo-EM: A New Tool for Drug Development*; P da Fonseca
- 1212 *Integrative Structure and Functional Anatomy of a Nuclear Pore Complex*; I Nudelman, SJ Kim, J Fernandez-Martinez, Y Shi, W Zhang, SJ Ludtke, CW Akey, BT Chait
- 1214 *Structural Characterization of Emerging Pathogenic Human Parvoviruses*; M Mietzsch, M Luo, JC Yu, S Kailasan, M Ilyas, P Chipman, D Sousa, M Söderlund-Venermo
- 1216 *Using Reconstruction Statistics to Predict the Number of Images Required for Single Particle Analysis*; B Heymann
- 1218 *Structural Snapshots of a Dynamic Process in the Regulation of P-Rex, a Metastatic Factor*; JN Cash, S Ravala, JJ Tesmer, MA Cianfrocco
- 1220 *Cryo-EM Reveals a Unique BRCA1 Complex in Metastasis*; AC Varano, N Alden, W Dearnaley, DF Kelly
- 1222 *Correlative Light and 3D Electron Microscopy of Subnuclear Structures*; CS Lopez, J Riesterer, K Loftis, S Kwon, G Thibault, M Williams, B Johnson, JW Gray
- 1224 *High Pressure Freezing Airway Smooth Muscle Tissue at Physiological Length for Analysis of Contractile Filaments*; TL Lavoie, ML Dowell, JR Austin, J Solway
- 1226 *Electron Tomography of Hydroxyapatite Platelets in *Atractosteus spatula* Boney Scales*; KJ Livi, T Lancon, C Bouchet-Marquis
- 1228 *Breaking Barriers of FIB-SEM for Large Volume Connectomics and Cell Biology*; CS Xu, KJ Hayworth, S Pang, Z Lu, HF Hess
- 1230 *The National Cryo-EM Facility*; U Baxa, TJ Edwards, H Wang, M Hutchison, S Subramaniam
- 1232 *Molecular Clustering of Skeletal and Cardiac Ryanodine Receptor*; J Lobo, S Dhindwal, M Samsó
- 1234 *Eukaryotic Hibernating Ribosome Dimers are Maintained by a Kissing Loop Formed by Ribosomal RNA*; W Huang, D Krokowski, M Hatzoglou, D Taylor
- 1236 *High Resolution Atomic Force Microscopy Visualization of Fibrinogen Unfolding on Modified Graphite*; EV Dubrovin, NA Barinov, DV Klinov
- 1238 *The ASM Study of Elastic Properties of Rat Fibroblasts, Lacking Vimentin*; A Vakhrusheva, V Zhuikov, S Endzhievskaya, A Minin, OS Sokolova
- 1240 *Projection Structures of DNA-DPS Co-Crystals are Determined by the Length of the Incorporated DNA*; A Moiseenko, K Tereskina, N Loiko, Y Danilova, Y Krupyansky, OS Sokolova
- 1242 *Multiple Conformations of the Compact Dinucleosomes: Analysis by Electron Microscopy*; M Valieva, O Chertkov, M Karlova, M Kirpichnikov, A Feofanov, OS Sokolova, V Studitsky

- 1244 *Cryo-EM Structure of the Single-Ring Chaperonin from Bacteriophage OBP P. fluorescence*; TB Stanishneva-Konovalova, P Semenuyk, Y Pechnikova, LP Kurochkona, OS Sokolova
- 1246 *Observed Structural Heterogeneity of Human Hepatitis B Virus Surface Antigen Particles by Cryo-electron Microscopy*; JR Gallagher, AK Harris
- 1248 *Three Dimensional Structure Analysis of Cell Nuclei in Mice Cerebellar Cortex using Array Tomography*; M Suga, H Nisioka, M Nakamura, K Suzuki, K Konishi, T Nonaka, S Kume, M Maeda

Utilizing Microscopy for Research and Diagnosis of Diseases in Humans, Plants and Animals

- 1250 *Ultrastructural Analysis of Platelets During Storage in Different Buffers*; R-C Hsia, R Kaur, R Schuh, A Saladino, J Klinedinst, G Fiskum
- 1252 *Characterization of Calcium Phosphosilicate (Hydrate) Nanoparticles: A Novel Organic-Inorganic Composite Nanomaterial for Drug and Diagnostic Delivery*; JH Adair
- 1254 *Zap-and-Freeze Electron Microscopy Captures Synaptic Vesicle Exocytosis with Unprecedented Temporal Precision*; GF Kusick, M Chin, S Watanabe
- 1256 *Revealing Mechanisms of Microvesicle Biogenesis in Breast Cancer Cells via in situ Microscopy*; JM Noble, N Vidavsky, LM Roberts, A Chiou, MJ Paszek, C Fischbach, LA Estroff, LF Kourkoutis
- 1258 *A Multi-Microscopy Approach to Discover the Feeding Site and Host Tissue Consumed by Varroa destructor on Host Honey Bees*; S Ramsey, C Gulbranson, J Mowery, R Ochoa, D vanEnglesdorp, GR Bauchan
- 1260 *Studying Manometric Anatomy to Understand Structural Heart Disease at the Organ Scale*; AF Liang, VR Mezzano, A Leo-Macias, EA Pascual, C Petzold, K Dancel-Manning, G Morley, M Delmar
- 1262 *Correlated Wide Scale Imaging of Tissue Sections on Glass Slides for Histology and Ultrastructural Pathology by Backscatter Electron Scanning Microscopy*; M Reichelt, M Sagolla, C Austin, P Caplazi, J Webster
- 1264 *Retinal Ultrastructural and Microvascular Defects in Decorin Deficient (*Dcn*^{-/-}) Mice*; RR Lim, S Gupta, DG Grant, PR Sinha, RR Mohan, SS Chaurasia
- 1266 *Atomic Resolution STEM Imaging of Human Enamel Crystallites and Characterization of its Localized Impurities*; PJ Smeets, K DeRocher, MJ Zachman, BH Goodge, LF Kourkoutis, D Joester
- 1268 *Structural Changes in Sodium Channel-Rich Nanodomains Contribute to the Progression of Atrial Fibrillation*; A Greer-Short, T Hund, R Veeraraghavan
- 1270 *Application of Microscopy Technologies for Nanomaterial Characterization and Biological Quantification*; G Cheng, Y Xia, W Li, M Nisic, S Hao, S-Y Zheng
- 1272 *Volume EM of Pathological Deposits – Array Tomography and FIBSEM Nanotomography on Weakly Metalized Routine Samples*; I Wacker, C Dittmayer, J Schroeder, RR Schröder

- 1274 *Compositional and Engineering Adaptations in Dentine Explored by Analytical STEM*; V Srot, B Bussmann, B Pokorny, M Watanabe, PA van Aken
- 1276 *Directional Growth of Optic Nerve Axons and Processive Gliogenesis*; SL Bernstein, Y Guo, Z Mehrabian
- 1278 *Acceleration of Neuroscience Research Discovery by Incorporation of Large Area/Volume Microscopic Data Workflows*; A Popratiloff, C Clarkson, Z Motahari, C Brantner
- 1280 *Antibiotics-induced Mitochondrial Toxicity: A Neglected Factor Possibly Contributing to Tumorigenesis and Neurodegeneration*; RL Elliott, X Jiang
- 1282 *Quantifying Chromatin Fractal Dimension through ChromEM Staining*; Y Li, A Eshien, R Bleher, VP Dravid, V Backman
- 1284 *Automated Rapid Preparation of Tissue Specimens for TEM Pathology*; TE Strader, NR Stewart, BK August, SL Goodman
- 1286 *Analysis of Ultrastructural Properties of Lung and Pancreatic Injury after Severe Acute Pancreatitis in Wild-type and Surfactant Protein D Knockout Mice*; H Chen, J Yu, G Wang
- 1288 *Cell Viability of Hydrothermally Synthesized $Mn_{0.75}Zn_{0.25}Fe_2O_4$ Coated with Tetraethyl Orthosilicate (TEOS)*; SE Almanza-Morales, AV Coria-Tellez, DK Tiwari, SE Borjas-Garcia
- 1290 *Identification of Premature Senescence Cells in the Brain of the HIV-1 Transgenic Rat (HIV-TG Rat)*; F Denaro, F Benedetti, S Davinelli, G Scapagnini, D Zella, O Latinovic
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- 1478 *The Importance of Combined Spatio-Temporal Characterization: From in situ to operando Diffraction Measurements of $\text{Li/Li}_{1.1}\text{V}_3\text{O}_8$ Batteries*; E Takeuchi, Q Zhang, A Bruck, D Bock, K Takeuchi, A Marschilok
- 1480 *Insights into Structural Evolution of a Solid Electrolyte Interphase Using Thin Window Si Membrane Negative Electrodes*; VP Oleshko, S Takeuchi, WR McGehee, E Strelcov, D Gundlach, N Zhitenev, CL Soles, JJ McClelland
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- 1508 *TEM Studies of Hole-selective Molybdenum Oxide Contacts in Silicon Heterojunction Solar Cells*; H Ali, G Gregory, M Bivour, M Schneider, M Hermle, KO Davis
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- 1522 *Observation of Solid-Liquid Interfacial Reactions Controlled Bulk Phase Transition of Ni-rich Layered Cathode*; L Zou, Z Liu, W Zhao, J Zheng, Y Yang, G Wang, J Zhang, C Wang
- 1524 *Correlative SPM/TEM Investigation of the Electrochemical Deposition of Lithium Metal*; C Campbell, C Phatak, B Lee, YM Lee, KY Cho, Y-G Lee, S Hong
- 1526 *Amorphous Structure Analysis of Si Anode for Li Ion Battery*; Y Shimo, A Hirata, H Yamasaki, H Yamaguchi, K Sato

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- 1536 *Aberration-Corrected Scanning Transmission Electron Microscopy of Single Crystals and Chemically-Gradient NMC Cathodes*; S Sharifi-Asl, G Chen, J Croy, M Balasubramanian, R Shahbazian-Yassar
- 1538 *Developing Model Cathodes to Study Interfacial Ion Diffusion*; K Bilash, JR Jokisaari, RF Klie
- 1540 *Oxygen Ion Conductivity and Composition at the Grain Boundaries of Ca Doped CeO_2* ; BM Hauke, BDA Levin, PA Crozier
- 1542 *Atomic Observation on Alternating Heteroepitaxial Nanostructures in Na-ion Layered Oxide Cathodes*; S Xu, H Qun, J Liu, W Wei, P Wang
- 1544 *Structural Modifications of Nanostructured Cubic CdS Thin-Films due Cu^{2+} Doping*; A Flores-Pacheco, J-I Contreras-Rascón, R-C Carrillo-Torres, P Del Angel-Vicente, R-A Rosas-Burgos, R Sánchez-Zeferino, M-E Álvarez-Ramos
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- 1562 *Site Selective Growth of Noble Metal Atoms on Two-dimensional MoS₂ Nanosheets*; J Xu, X Li, J Liu
- 1564 *Low and Ultra-Low Energy Scanning Electron Microscopy of 2D Transition Metal Dichalcogenides: Experiments and Simulations*; E Mikmeková, A Paták, I Müllerová, L Frank, B Daniel, I Konvalina, T Řiháček, M Zouhar
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- 1594 *Automated Atom-by-Atom Assembly of Structures in Graphene: The Rise of STEM for Atomic Scale Control*; O Dyck, S Kim, AR Lupini, SV Kalinin, S Jesse

- 1596 *Study of Helium-Ion-Beam-Generated Defects in a Monolayer WS₂ Using Aberration-Corrected Scanning Transmission Electron Microscopy*; TR Kim, C Cress, J Fonseca Vega, T Brintlinger, J Robinson, R Stroud
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Welcome from the Society Presidents

On behalf of the Microscopy Society of America, the Microanalysis Society, and the Microscopical Society of Canada (Société de Microscopie du Canada) we welcome you to Baltimore, Maryland for Microscopy & Microanalysis 2018. Baltimore and its famous Inner Harbor promise to be an exciting venue with ample opportunity to visit old friends and to meet new colleagues with a common interest in microscope development and applications. The Inner Harbor features many attractions for families, including the National Aquarium and Maryland Science Center, the historic tall ships and U.S. Navy and Coast Guard museum vessels, and great dining opportunities, both on land and sea (harbor dinner cruises). We hope that you enjoy all that Charm City and its region have to offer.

The Program Committee, led by Yoosuf Picard, Alice Dohnalkova, James LeBeau and Nabil Bassim, has developed a comprehensive and exciting group of Symposia led by leaders in their respective fields of microscopy and analysis. As a group, the Symposia capture our members' diverse fields of research, including Advances in Instrumentation and Techniques Development, and Applications in the Biological and Physical Sciences. We encourage you to scan through this Call for Papers for a complete list of Symposia, and contribute to the program by submitting one or more scientific papers to the meeting. Presentations will include a range of platform and posters. New to our meeting this year will be provision of a small table for each poster presentation, which will allow presenters to use a laptop or other digital media format to present animations and movies of their data to enhance their presentations. The leadership of our Societies and the Program Committee feel that with the advancement of three-dimensional reconstruction and other techniques that are best illustrated by these modern dynamic styles, this will provide a unique opportunity for many poster presenters to fully illustrate their data.

The meeting itself will be preceded by our usual array of Sunday Short Courses, three Pre-Meeting Congresses, and our Sunday evening Opening Reception that provides an opportunity to network with colleagues and friends. Following the success of the Inaugural Pre-Meeting Congress in St. Louis led by our Early-career Professionals and Student Council, we will again have a Pre-Meeting Congress featuring the outstanding work done by students and post-doctoral Fellows attending the meeting. If you are an early-career scientist, please consider contributing to this Pre-Meeting Congress. 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. One plenary talk will be by Manu Prakash, inventor of the foldscope that has brought imaging to remote regions of the world for imaging of parasites and a range of diseases. The second plenary will be by Jon Larsen, author of *"In Search of Stardust: Amazing Micrometeorites and Their Terrestrial Imposters"* that provides amazing microscopy of micrometeorites found in common locations such as rooftops.

The M&M meeting also showcases the largest annual exhibition in microscopy and features the latest state-of-the-art instrumentation and accessories in microscopy and microanalysis. Educational opportunities throughout the week include tutorials covering select topics in physical and biological sciences, educational outreach sessions for students and teachers, our Technologists' Forum, and our ever-popular vendor tutorials, held Monday through Wednesday after the Exhibit Hall closes.

M&M 2018 is an opportunity to stay abreast of the latest technologies, hear about new developments in the techniques and applications of all areas of microscopy and microanalysis, and most importantly network with colleagues. We're pleased to spend this time together in Baltimore!

Robert Price

President,
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of America



Masashi Watanabe

President,
Microanalysis Society



Joaquin Ortega

President, Microscopical
Society of Canada / Société
de Microscopie du Canada



WELCOME FROM THE PROGRAM CHAIRS

Welcome to Microscopy and Microanalysis 2018 in Baltimore, Maryland!

The Microscopy Society of America (MSA), the Microanalysis Society (MAS), and the Microscopical Society of Canada/Société de Microscopie du Canada (MSC/SMC) welcome you to Microscopy and Microanalysis 2018 (M&M 2018) in Baltimore, Maryland.

As you have come to expect, M&M 2018 features the latest innovative applications and instrumentation developments in microscopy and microanalysis across the biological and physical sciences.

The M&M 2018 meeting features nearly 40 technical symposia, and numerous educational opportunities for students, technologists, and scientists in the form of courses, tutorials, Tech Forum and special panels on "Entrepreneurship in the Microscopy Community" and "Procuring Government Funding for Microscopy Instrumentation and Research." Pre-meeting events include Sunday short courses as well as pre-meeting congresses on microanalytical standards and electron microscopy in liquids/gases. MSA Student Council is organizing its second annual pre-meeting congress designed specifically for early career scientists.

We are pleased to feature Professor Manu Prakash, Assistant Professor in Bioengineering at Stanford University, who will speak on the very real possibility of how and why "Every Child in the World Should Carry a Microscope in Their Pocket." Our second plenary speaker is Jon Larsen, author of "In Search of Stardust," the first comprehensive popular science book on micrometeorites. His presentation will show how anyone can find micrometeorites in populated areas using simple tools and a microscope.

The Executive Program Committee and the dozens of symposia organizers have worked tirelessly to produce the technical program for M&M 2018. On behalf of the Executive Program Committee, MSA, MAS, MSC/SMC, and the numerous volunteers that organize this event, welcome to Baltimore and M&M 2018! Hope you have a great week!



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Using Microscopy to Find Stardust Anywhere

Jon Larsen¹, Matthew Genge² and Jan Braly Kihle³

¹Project Stardust, Oslo, Norway

²Department of Earth Science and Engineering, Imperial College London, London, UK

³Institute for Energy Technology, Kjeller, Norway

Micrometeorites (MMs) are alien stones that are everywhere around us [1]. MMs (~200-400 μm in size) contain stardust older than our Sun and have travelled farther than anything else on Earth. They include matter derived from asteroids and comets, and they hold a wealth of information on the early formation of our solar system. Various example cosmic “spherules” found on Earth are shown in Figure 1(a).

In 2009 a MM literally landed on my table, catching both my attention and intrigue. I became further fascinated by MMs due to an interesting paradox: MMs are the dominant extra-terrestrial material that falls to Earth, yet they cannot be easily found. Historically, MMs could only be found in areas free of any anthropogenic influence, like remote deserts, glaciers and even the Antarctic. MMs fall to Earth at a rate of ~1 particle per square meter per year. Meteorite hunters have tried to build MM traps, but an ideal trap would need to be the size of a football field and have captured particles over decades.

As it turns out, such ideal traps already exist in populated areas: vinyl-covered flat roofs of decades old buildings with low security walls (Figure 1(b)). In 2010, I began collecting dust samples from roofs, roads and parking lots. Over 6 years, I conducted 1000 field searches in populated areas across 50 countries. Using a Zeiss binocular microscope and a custom-built photo rack, I exhaustively examined and classified thousands of particles by color, size and morphology. Recognizing common shapes for anthropogenic and naturally occurring terrestrial particles, I was able to isolate the best MM prospects. In 2015, working with meteorite researchers, scanning electron microscopy and electron microprobe analysis verified the first MM found in a populated area: a 270 μm barred olivine (similar example in Figure 2(a)). Verification and classification of MMs [2] requires careful consideration of particle morphology, composition (chondritic composition [3] example in Figure 2(a)) and microstructure (like magnetite dendritic formation shown in Figure 2(b)). Eventually, 500 MMs were classified [4]. In 2017, I authored and published the book, “In Search of Stardust: Amazing Micrometeorites and Their Terrestrial Imposters.” This book is a collection of hundreds of example particles, including both urban MMs as well as various example anthropogenic and terrestrial particles [1]. My extensive travels and interactions with fellow meteorite enthusiasts propelled me to start Project Stardust [5], where amateur MM hunters can document their field search and the use of optical/electron microscopy to identify and analyse MMs. With a broom, a bag, a magnet and a microscope, you can truly find stardust anywhere!

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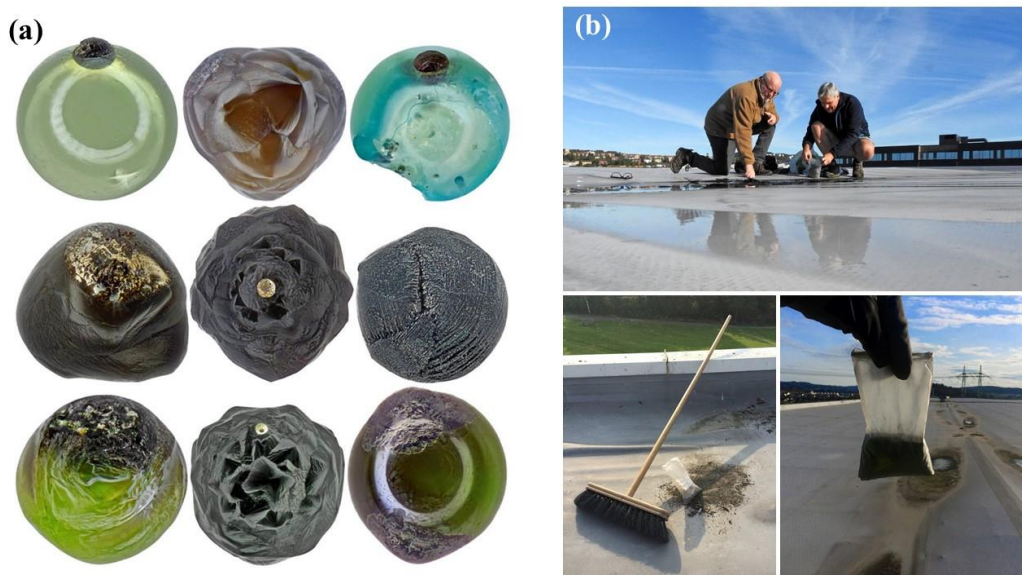


Figure 1. (a) Optical micrographs (OMs) of nine example micrometeorites (MMs): Upper-left - glass / Upper-middle - cryptocrystalline / Upper-right - glass / Middle-left - cryptocrystalline and glass / Middle-middle - cryptocrystalline / Middle-right - barred olivine / Lower-left – porphyritic / Lower-middle - cryptocrystalline / Lower-right- glass. (b) Photographs of Jon Larsen (right) with Morten Bilet conducting a MM search on the roof of BAMA, Oslo, Norway, with additional photographs of the tools.

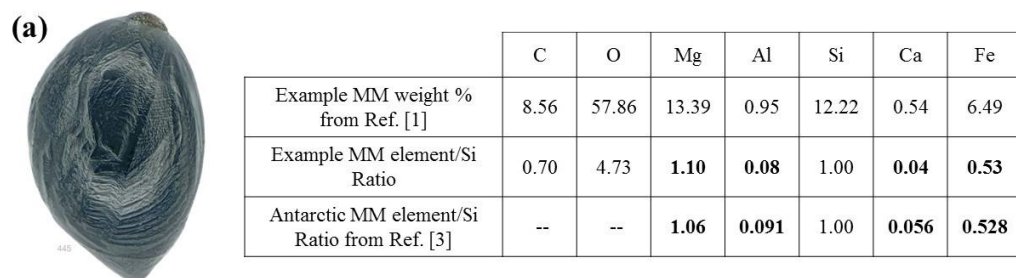


Figure 2. (a) OM of a typical barred olivine MM with a table of EDS-measured elemental composition by weight % [1] that indicates chondritic composition when compared by element/Si ratios to MMs obtained from the Antarctic [3]. (b) OM of a ~700 μm porphyritic olivine MM found at Nesodden, Akershus, Norway, with BSE micrographs indicating dendritic magnetite formation (bright features).

Every Child in the World Should Carry a Microscope in Their Pocket

Manu Prakash¹

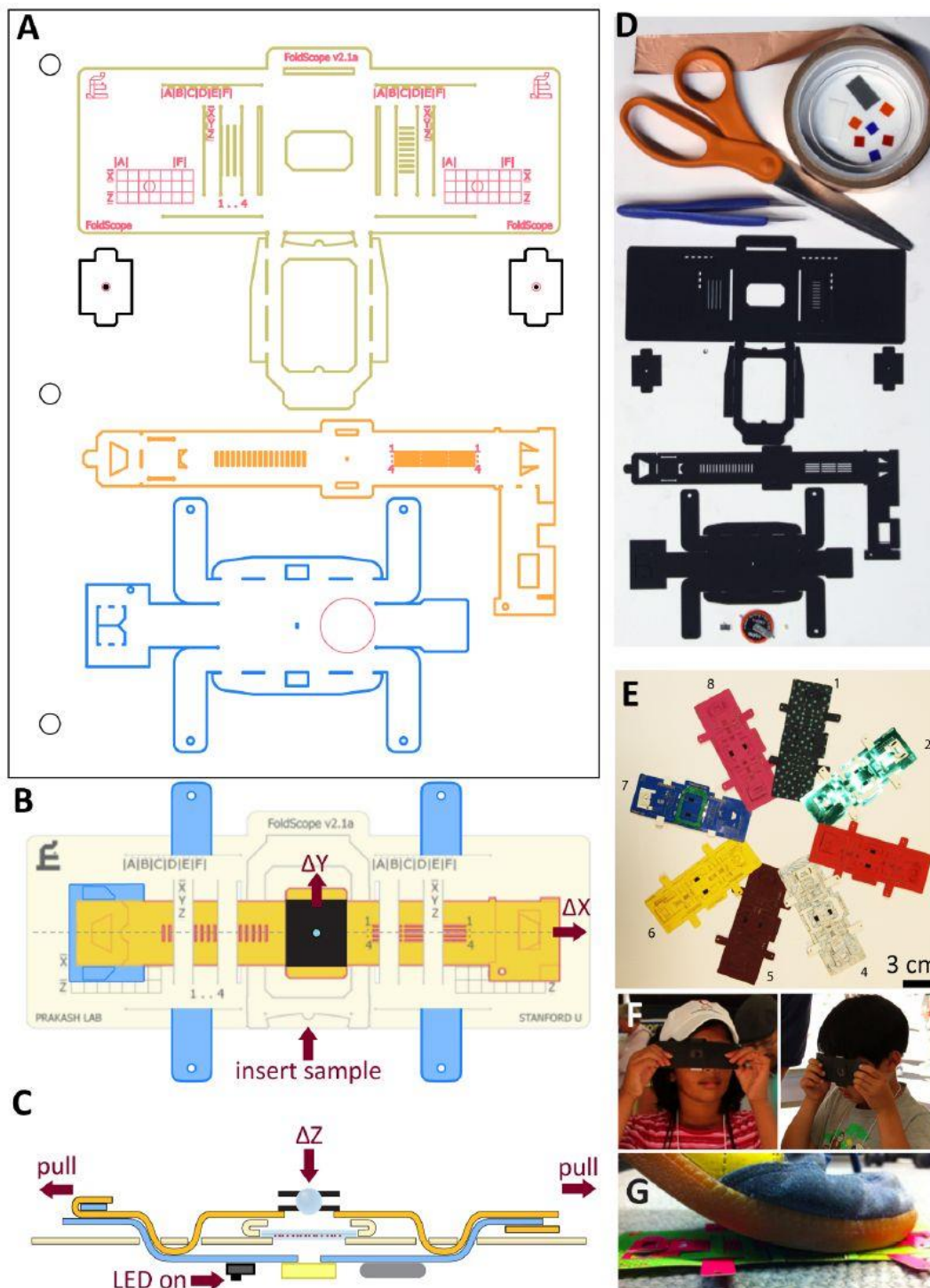
¹Department of Bioengineering, Stanford University, Stanford, CA 94305, USA

In 2010, I was visiting a health clinic in India and I saw a photo of Mahatma Gandhi looking through a microscope to observe the bacteria that causes leprosy. Gandhi was wearing a dhoti and sitting on the ground, using an expensive European microscope that was impractical for rural India. But Gandhi knew this instrument was needed to help fight disease in his country. This image inspired me to discover new ways to develop low-cost scientific instruments that could be available for everyone, everywhere. Later, while in Thailand, I saw fluorescence microscopes laying on the floor unused because the researchers there were afraid of damaging such expensive equipment.

I decided to build a microscope at a cost of one dollar, yet still have the range of performance necessary to collect useful data. Working on the initial schematics during my flight from Thailand, the first prototype of such an instrument, the Foldscope, became a reality in 2014 [1]. The Foldscope can be assembled in seven minutes from pre-designed, punched cardstock (Figure 1). Folded together using Origami principles, the manually controlled stage has micron-scale positioning control and nanometer scale focusing precision, both by using your thumbs while the instrument is held to your eye. The optical microscope uses a cheap, spherical glass lens and a light emitting diode powered by a watch battery. These microscopes are the size of a bookmark, weigh 8 grams, and can provide magnifications from 140X up to 2,000X.

Jim Cybulski, my former graduate student and Foldscope co-inventor, founded Foldscope Instruments with me in December 2015. The vision for our company is to widely distribute scientific tools like Foldscope while developing online social platforms like “Microcosmos” [2] to allow information sharing and networking for any curious person interested in scientific exploration. Global distribution of Foldscopes across over 135 countries has allowed many activities, including: identification of microscopic eggs for agricultural pests in India, cataloguing the biodiversity of soil arthropods in the Amazon, detection of fake currency and medicine, and mapping pollen diversity in a city landscape. My hope is to extend “frugal science” in a variety of diagnostic tools, including paper-based centrifuges [3] and even realizing a \$100 electron microscope.

For children, everything they touch, experience and hold has a microscopic component. Every living thing is made living cells, so just like with astronomy, when you look through a microscope lens, there are galaxies of things crawling around. Growing up in a small town in India, I deeply understand what access to simple but powerful scientific instruments could mean for any kid out there in the world. So, I passionately believe the very real possibility that every child in the world could and should carry a microscope in his/her pocket.



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Figure 1. Foldscope design, components and usage. (A) CAD layout of Foldscope paper components on an A4 sheet. (B) Schematic of an assembled Foldscope illustrating panning, and (C) cross-sectional view illustrating flexure-based focusing. (D) Foldscope components and tools used in the assembly, including Foldscope paper components, ball lens, button-cell battery, surface-mounted LED, switch, copper tape and polymeric filters. (E) Different modalities assembled from colored paper stock. (F) Novice users demonstrating the technique for using the Foldscope. (G) Demonstration of the field-rugged design, such as stomping under foot. Reproduced from [1].

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

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

2009 (Inaugural Class)

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

2010

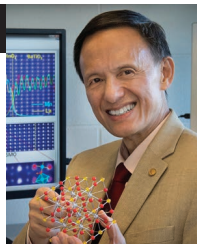
Ralph M. Albrecht
Lawrence F. Allard, Jr.
Kenneth H. Downing
Joseph I. Goldstein
Michael S. Isaacson
Michael K. Miller
George Pappas
Stephen J. Pennycook
John P. Petrali
Zhong L. Wang
David B. Williams

PHYSICAL SCIENCES (2018)

Yimei Zhu

Brookhaven National Laboratory

Prof. Yimei Zhu is Senior Physicist at Brookhaven National Laboratory (BNL) and Adjunct Professor at Columbia University and Stony Brook University. He received his BS from Shanghai Jiaotong University and PhD from Nagoya University. He joined BNL as Assistant Scientist in 1988, rising through the rank to become Tenured Senior Physicist in 2002. He is the founding director of the Institute for Advanced Electron Microscopy at BNL. His research interests include condensed matter physics of correlated electron systems and advanced electron microscopy including ultrafast microscopy instrumentation. He is an Inaugural Fellow and currently the Director for Physical Science of Microscopy Society of America, a Fellow of American Physical Society and a Fellow of American Association for the Advancement of Science. Zhu has published more than 500 peer-reviewed journal articles and delivered more than 300 invited talks at international conferences.



BIOLOGICAL SCIENCES (2018)

Richard D. Leapman

National Institutes of Health

Richard Leapman obtained his B.A. and M.A. degrees in Natural Sciences, and his Ph.D. in physics from the University of Cambridge. He trained as a postdoctoral fellow in the Department of Materials at the University of Oxford, and then under the mentorship of Prof. John Silcox in the Department of Applied and Engineering Physics at Cornell University, where he contributed to the development of electron spectroscopy for the nanoscale characterization of materials. Dr. Leapman subsequently moved to NIH to develop methods based on scanning transmission electron microscopy and electron spectroscopy to determine the structure and chemical composition of cells and supramolecular assemblies. More recently, his group has developed techniques based on STEM tomography for determining 3D ultrastructure in thick sections of cells, as well as serial block face SEM approaches for determining nanoscale tissue architecture. Dr. Leapman received the Burton Medal from the Microscopy Society of America, the Samuel Wesley Stratton Award from the National Institute of Standards and Technology, and the Presidential Science Award from the Microbeam Analysis Society. He was elected a Fellow of the Microscopy Society of America in 2011. He is currently Editor of the Journal of Microscopy (Oxford), a member of the editorial boards of other microscopy and nanotechnology journals, and has served on national scientific advisory committees, including the one for the Advanced Photon Source at Argonne National Laboratory. Dr. Leapman has served as the Scientific Director of the intramural program of the National Institute of Biomedical Imaging and Bioengineering since 2006, and also heads NIBIB's Laboratory of Cellular Imaging and Macromolecular Biophysics.



	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

BURTON MEDAL AWARD (2018)

Lena F. Kourkoutis
Cornell University



Lena F. Kourkoutis is an Assistant Professor of Applied and Engineering Physics and James C. and Rebecca Q. Morgan Sesquicentennial Faculty Fellow at Cornell University. Her electron microscopy group focuses on understanding and controlling nanostructured materials, from complex oxides to materials for energy storage to biomaterials. They use advanced electron microscopes to study these systems atom-by-atom and develop new cryogenic techniques to gain access to low temperature electronic states as well as to study processes at liquid/solid interfaces. Kourkoutis received her undergraduate degree in Physics from the University of Rostock, Germany in 2003, and then moved to Ithaca where she was awarded a Ph.D. in 2009. As a Humboldt Research Fellow, she spent 2011-2012 in the Molecular Structural Biology Group at the Max Planck Institute of Biochemistry in Martinsried, Germany. She returned to Cornell University in 2012 and joined the Cornell Faculty in 2013. Kourkoutis is recipient of the 2013 Albert Crewe Award, a 2014 Packard Fellowship for Science and Engineering, a 2016 Presidential Early Career Award for Scientists and Engineers, and a 2017 NSF CAREER award. She is also a Kavli Fellow of the National Academy of Sciences.

MORTON D. MASER DISTINGUISHED SERVICE AWARD (2018)

Donovan N. Leonard
Oak Ridge National Laboratory



Donovan N. Leonard has been a member of MSA since 1998. He is looking forward to his new role as Vice-Chair of the MSA Educational Resources (2018-2020) and is pleased to currently be the organizer of the MSA Physical Sciences Tutorials (2017-2019) and X90: Microscopy in the Classroom symposia (2018, 2010-2011). He has served on the MSA Executive Program Committee (2015, MAS Co-Chair), MSA Fellows Committee (2012-2015) and MSA Education Committee (2011-2014). Additionally, he has been an instructor for MSA In-Meeting workshop titled Nanomaterial Microscopy & Microanalysis (2008-2012) and will be instructor for a MSA Sunday Short Course titled Sample Preparation for High-Resolution EM of Materials (2018). He has been an active member of his local affiliated society, the Appalachian Region Microscopy Society (AReMS), since 1998 and served as President (2012-2014) and webmaster (2008-2014). Donovan is currently a Senior Technical Staff Member in the Materials Science & Technology Division at Oak Ridge National Laboratory. He received his Ph.D. in Materials Science & Engineering from North Carolina State University in 2002 and joined ORNL in 2007. Before ORNL he was tenure track faculty in the Physics & Astronomy Dept. of Appalachian State University and had worked for IBM in microelectronics packaging applications. His research now involves daily application of advanced microscopy and microanalysis methods to energy related materials at length scales from the atomic level to the macro scale. More specifically, aberration corrected scanning transmission electron microscopy (STEM) and electron energy loss spectroscopy (EELS) of quantum materials in addition to EPMA/WDS, EBSD and EDS analysis of materials critical for vehicle lightweighting, fossil, fusion and solar applications.

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. David

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

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

ALBERT CREWE AWARD (2018)

Timothy Pennycook

Max Planck Institute for Solid State Research, Germany



Timothy J. Pennycook is a research scientist at the Max Planck Institute for Solid State Research in Stuttgart, Germany, working to develop new techniques in aberration corrected scanning transmission electron microscopy (STEM). He received his PhD in Physics from Vanderbilt University in 2012, combining density functional theory with STEM to investigate materials, uncovering the origin of colossal ionic conductivity in yttria-stabilized zirconia and, using dynamic STEM imaging, revealing the origin of white light emission from ultrasmall CdSe nanoclusters. As a Research Fellow with the University of Oxford, based at the SuperSTEM laboratory in Daresbury, he developed 3D spectroscopic imaging with optical sectioning, quantification of the atomic scale dynamics involved in solid state phase changes, and a new method of high efficiency ptychography for phase contrast imaging. In 2014 Pennycook joined the Faculty of Physics, University of Vienna, using STEM to study 2D materials, and in 2015 was awarded a Marie-Sklodowska-Curie Individual Fellowship to continue his research into ptychography. He has shown that electron ptychography offers not only the highest efficiency imaging in STEM, but also gives double resolution and much greater robustness to temporal incoherence than high resolution transmission electron microscopy, revealing a new route to low dose imaging of beam sensitive materials. In 2017 he moved to Stuttgart to further develop these techniques.

GEORGE PALADE AWARD (2018)

No 2018 awardee.

YEAR RECIPIENT

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

YEAR RECIPIENT

2012	Gabriel C. Lander
2013	Peng Ge
2014	Ricardo C. Guerrero-Ferreira
2015	Alexey Amunts
2016	Dmitry Lyumkis
2017	Rengasayee Veeraraghavan

HILDEGARD H. CROWLEY OUTSTANDING TECHNOLOGIST AWARD FOR BIOLOGICAL SCIENCES (2018)



Anchi Cheng

New York Structural Biology Center

EDUCATION: B.S. Chemistry – National Taiwan University, Taipei, Taiwan, R.O.C. (1988) Ph.D. Chemistry – The Ohio State University (1995).

Anchi Cheng spent most of her undergraduate senior year in an X-ray crystallography lab that studies the bonding property of sulfur with hydrocarbon. She has a strong background in instrument and processing automation gained by the study of lipid phase transition at synchrotron radiation source facilities during her graduate study. As a postdoctoral research associate, she used electron crystallography to determine the structure of aquaporin 1 and connexin 43, where she became an expert user of TEM. In addition, she developed methods for evaluating the data distribution and an error analysis method based on bootstrap resampling. As her interests turned to technology development for cryo-TEM, she has become a key developer of software for automated molecular microscopy (Leginon) and building an integrated pipeline for data processing (Appion) in single-particle averaging, tomography, and two-dimensional crystal screening. Each of these developments was driven by different biological projects that she executed or oversaw. As a user-turned developer, she understands the importance of providing both robust automation as well as flexibility of user redirection.

CHUCK FIORI OUTSTANDING TECHNOLOGIST AWARD FOR PHYSICAL SCIENCES (2018)



Chengyu Song

Lawrence Berkeley National Laboratory

Chengyu Song obtained his B.S. in Materials Science from Zhejiang University, China in 1989, and M.S. from Shanghai Institute of Ceramics, Chinese Academy of Sciences, where he first received trainings in electron microscopy. After finishing two-year visiting scholarship in Argonne National Laboratory, he joined National Center for Electron Microscopy (NCEM) at Lawrence Berkeley National Laboratory as a Research Associate in 1997, and had been a Senior Scientific Engineering Associate since 2005. NCEM is one of the world's foremost centers for electron microscopy. Having merged with the Molecular Foundry in 2014, it continues to provide user community with cutting-edge instrumentation and expertise. Chengyu has been a key operator of NCEM's state-of-art electron microscopes, such as 1 MeV Atomic Resolution Microscope, One Angstrom Microscope, and Transmission Electron Aberration-corrected Microscopes (TEAMs). Over the past two decades, he collaborated with hundreds of scientists and visitors from many part of the world, and trained over a thousand graduate students and post doctors from universities nationwide.

YEAR RECIPIENT

1993	Ben O. Spurlock
1994	<i>not awarded</i>
1995	Kai Chien
1996	<i>not awarded</i>
1997	John P. Benedict
1998	Hilton H. Mollenhauer
1999	John M. Basgen
2000	Nancy Crise Smith
2001	<i>not awarded</i>
2002	José A. Mascorro
2003	<i>not awarded</i>
2004	<i>not awarded</i>
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

YEAR RECIPIENT

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

MAS 2018 COUNCIL – OFFICERS

EXECUTIVE COUNCIL

President	Masashi Watanabe
President-Elect	Rhonda Stroud
Secretary	Chad Parish
Treasurer	Elaine Schumacher

DIRECTORS

Andrew Herzing
 Anette von der Handt
 Julie Chouinard
 Vincent (Vin) Smentkowski
 Emma Bullock
 Roseann Csencsits
 Patrick Camus (Commercial Director)

COMMITTEE CHAIRS

Archivist	John H. Fournelle
Affiliated Regional Societies & Tour Speakers	Kerry Siebein
Awards Committee	Andrew Herzing
Computer Activities	Nicholas W.M. Ritchie
Education	Inga Holl Musselman
Fellows Committee	Thomas F. Kelly
Finance	James McGee
International Liaison	Heather Lowers
M&M 2018 Co-Chair	James M. LeBeau
M&M 2019 Co-Chair	Assel Aitkaliyeva
Membership Services	Mike Nagorka
MicroNews Editor	Assel Aitkaliyeva
Microscopy and Microanalysis Editorial Board	Donovan Leonard
Nominations	Rhonda Stroud
Social Media	Katherine L. Crispin
Strategic Planning	Keana Scott
Sustaining Membership	Lucille Giannuzzi
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

DUNCUMB AWARD FOR EXCELLENCE IN MICROANALYSIS (2018)

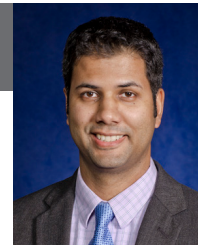
Richard D. Leapman
National Institutes of Health



Richard Leapman received his education at Peterhouse, Cambridge University, UK, where he obtained a B.A. in Natural Sciences, followed by a Ph.D. in physics from the Cavendish Laboratory under the supervision of Prof. Vernon Ellis Cosslett. He then trained as a postdoctoral fellow in the Department of Materials at the University of Oxford, and also under the mentorship of Prof. John Silcox in the Department of Applied and Engineering Physics at Cornell University, where he contributed to the development of electron energy loss spectroscopy (EELS) for the nanoscale characterization of materials. Dr. Leapman subsequently moved to the National Institutes of Health to develop methods that combined scanning transmission electron microscopy (STEM) and EELS for analyzing the organization and composition of cells and supramolecular assemblies. More recently, his group has developed techniques based on STEM tomography for imaging the 3D ultrastructure of cells, as well as serial block face SEM approaches for determining nanoscale tissue architecture. Dr. Leapman received the Presidential Science Award from the Microbeam Analysis Society and was elected a Fellow of the Microscopy Society of America in 2011. He is currently an Editor of the *Journal of Microscopy*, a member of the editorial boards of other microscopy and nanotechnology journals, and has participated on national scientific advisory committees, including the one for the Advanced Photon Source at Argonne National Laboratory. Since 2006, Dr. Leapman has served as the Scientific Director of the intramural program of the National Institute of Biomedical Imaging and Bioengineering, NIH, where he also heads the Laboratory of Cellular Imaging and Macromolecular Biophysics.

KURT F.J. HEINRICH AWARD (2018)

Yoosuf N. Picard
Carnegie Mellon University



Professor Picard obtained a B.S. in Mechanical Engineering from Louisiana Tech University in 2001 and a Ph.D. in Materials Science and Engineering from the University of Michigan-Ann Arbor in 2006. During his graduate career, he was a Microsystems Engineering and Science Applications Fellow at Sandia National Laboratories where he researched focused ion beam applications as well as pulsed laser ignition phenomenon in energetic thin films. Following his doctoral research on materials modifications by femtosecond lasers, he was a National Research Council postdoctoral research associate at the U.S. Naval Research Lab (NRL), where he conducted electron microscopy studies of GaN devices, SiC thin films, and metal-oxide nanowires. He joined the faculty at Carnegie Mellon University (CMU) in 2009 as an assistant research professor in the Materials Science and Engineering Department and was later promoted to associate research professor in 2014. His research group develops and applies advanced electron microscopy methods for quantitative microstructural characterization and *in situ* analysis of defect behavior in nanoscale devices, ceramic surfaces and new metal alloys. Yoosuf continues to progress electron channeling contrast imaging (ECCI) for non-destructive defect identification, with interests in developing defect engineering strategies for bulk crystalline surfaces. He is an active member of the Minerals, Metals and Materials Society (TMS), Microscopy Society of America (MSA) and Microanalysis Society (MAS). He served as MAS Director (2015-2018) as well as a co-organizer for the MAS Topical Conferences on EBSD 2012, 2014 and 2016. He has also served as leader of the MSA "Electron Crystallography and Automated Mapping Techniques" focused interest group. He is the Program Chair for Microscopy and Microanalysis 2018. Yoosuf is editor for the journal *Microscopy and Microanalysis*. At Carnegie Mellon University, he advises the MSE Graduate Student Advisory Council and serves on the steering committee for the Energy Science Technology & Policy Master's degree program. Yoosuf teaches courses on materials characterization and electron microscopy for both undergraduate and graduate students. He has co-authored over 70 peer-reviewed publications and was a recipient of the Birks Award for best contributed paper at Microscopy and Microanalysis 2009.

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	David Muller
2017	Thomas F. Kelly

PREVIOUS AWARDEES

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

PRESIDENTIAL SCIENCE AWARD (2018)

M. Grace Burke

University of Manchester,
United Kingdom



Prof. M. Grace Burke is the Director of the Materials Performance Centre at the University of Manchester, where she leads investigations of materials' behavior in nuclear power systems, with particular emphasis on the role of microstructure. In addition to her MPC role, she was also Director of the Electron Microscopy Centre at the University of Manchester from 2012 through 2016. Prior to joining the University in late 2011, she acquired extensive experience in materials for power generation during a her career in the US nuclear industry with research positions at the Westinghouse Science and Technology Center, and the Bettis Atomic Power Laboratory in Pittsburgh, where she was the Consultant Scientist in Materials Technology. Including prior research experience at the US Steel Research Laboratory, she has over 35 years of expertise in steels, materials of construction for nuclear power plants, irradiation damage, SCC, and hydrogen embrittlement of structural alloys. She is particularly known for her application of advanced microscopy/microanalysis techniques to nuclear materials research, and to the microstructural characterisation of complex materials. Her research into irradiation damage using AP-FIM provided the first evidence of the complex solute-enriched clusters responsible for the irradiation-induced hardening/degradation of welds in PWRs. Her current research continues to involve the application of advanced analytical TEM and in situ ATEM in liquids and gases to study the nanoscale phenomena leading to environment-sensitive degradation of structural alloys. Grace is a recognized expert in numerous international nuclear science and technology organisations including NUGENIA, ICG-EAC, and IGRDM. Grace is a Fellow of ASM International, the Institute of Materials, Minerals and Mining (UK), the Microscopy Society of America, and the Royal Microscopical Society.

PREVIOUS AWARDEES

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

PRESIDENTIAL SERVICE AWARD (2018)

Vernon Robertson, JEOL



Vernon Robertson has been with JEOL USA for over 32 years and was appointed EPMA/Surface Analysis Product Manager in early 2016 and will continue as SEM Technical Sales Manager, providing in-house and in the field, technical product support and customer applications support. Vern served as the senior SEM Applications Specialist at JEOL beginning in 1986. He was appointed National Laboratory Manager in 2004, and FEG SEM Product Manager in 2005. Vern received his B.Sc. in Geology with honors from the University of New Hampshire. His prior industrial experience included eight years of consulting in an independent testing lab specializing in industrial and environmental problem solving, with responsibilities including polarized light optical microscopy, and atomic emission and absorption spectroscopy SEM with EDS/WDS and x-Ray diffraction. Vern was a recent member of the MAS (Microanalysis Society) Council serving as the Corporate Liaison.

PREVIOUS AWARDEES

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

MAS OUTSTANDING PAPER AWARDS (2017)

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:

Characterizing the Effectiveness of Atomic Layer Deposited Coatings for the Prevention of Glass Disease

Miriam Hiebert, University of Maryland

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

Using Scanning Transmission X-ray Microscopy to Reveal the Origin of Lithium Compositional Spatiodynamics in Battery Materials

Daan Hein Alsem, Hummingbird Scientific, Inc.

L.S. BIRKS – BEST CONTRIBUTED PAPER AWARD:

Numerical Modeling of Specimen Geometry for Quantitative Multiple Detector EDS

Weizong Xu, North Carolina State University

V.E. COSSLETT – BEST INVITED PAPER AWARD:

Recent Advances of the Open Source MULTEM Program to Provide Accurate and Fast Electron Microscopy Simulations

Ivan Pedro Lobato Hoyos, EMAT, University of Antwerp, Belgium



Microscopical Society of Canada/ Societe' de Microscopie du Canada Society Information

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Randy Mikula (2013)
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Canadian Foundation for the Development of Microscopy – Bursary Winners:

1. **Sara Makaremi**, McMaster University, adviser prof. Jose Moran-Mirabal
2. **Quentin Stoyel**, McGill University, adviser prof. Raynald Gauvin
3. **Christopher Schankula**, McMaster University, adviser prof. Nabil Bassim
4. **Hesham El-Sherif**, McMaster University, adviser prof. Nabil Bassim

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M&M 2018 MEETING AWARDS



M&M STUDENT SCHOLAR AWARDS – SPONSORED BY MSA

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Materials Research Dresden, Germany
Josh Vincent, Arizona State University
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Anna Weiss, Carnegie Mellon University
Daniel Du, University of Minnesota
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Spencer Reisbick, University of Minnesota
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Yu Yuan, McGill University, Canada
Lucile Brunel-Duverger, Centre de Recherche et de
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Paul Smeets, Northwestern University
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