



Nina Balke

Guest Editor for this issue of *MRS Bulletin*

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Balke has been a staff member at the Center for Nanophase Materials Sciences at Oak Ridge National Laboratory since 2010. She received her Diploma (2003) and PhD (2006) degrees in materials science from the University of Technology Darmstadt, Germany, working on degradation mechanisms of ferroelectric materials.

As a Feodor-Lynen fellow of the Alexander von Humboldt foundation, she conducted postdoctoral research at the University of California, Berkeley, in the group of R. Ramesh and at Oak Ridge National Laboratory in the group of S.V. Kalinin. She specialized in nanoscale characterization of multiferroic materials using scanning probe microscopy (SPM). Balke is developing SPM-based techniques to image ionic currents in energy storage materials. In 2011, she was awarded the Department of Energy Early Career Research Award.



Dawn Bonnell

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Bonnell is a Trustee Professor of Materials Science at the University of Pennsylvania and the director of the Nano/Bio Interface Center. She received her PhD degree from the University of Michigan and was a Fulbright scholar to the Max-Planck-Institute in Stuttgart, Germany, after which she worked at the IBM Thomas

Watson Research Center. Her current research involves atomistic processes at oxide surfaces, nanometer scale electronic phenomena in materials, and assembly of complex nanostructures. She has authored or coauthored more than 180 papers and edited several books. Her work has been recognized by several awards and distinguished lectureships. Bonnell serves on several editorial boards, national and international advisory committees, is a past president of AVS, has served the governing board of the American Institute of Physics, and is a past vice president of the American Ceramic Society. She also is a fellow of the American Ceramic Society, the American Association for the Advancement of Science, and the AVS.



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Ginger is a professor and Lawton Distinguished Scholar in Chemistry at the University of Washington (UW). He received dual BS degrees in chemistry and physics from Indiana University and a PhD degree in physics from the University of Cambridge. He was a National Institutes of Health postdoctoral fellow at Northwestern University before joining the UW faculty. His

research interests include nanostructured materials for applications in low cost solar cells and novel biosensors, with an emphasis on the development and application of scanning probe microscopy.



Martijn Kemerink

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Kemerink is an associate professor of organic electronics at the Eindhoven University of Technology. His research focuses on charge and energy transport in organic materials and devices, combining electrical characterization with scanning probe microscopy and numerical modeling. Investigated devices include light-emitting electrochemical cells, ratchets, field-effect transistors, memories, and solar cells.



Thomas M. Arruda

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Arruda is currently a postdoctoral researcher in the Imaging Functionality group at Oak Ridge National Laboratory's Center for Nanophase Materials Sciences. He received his BS degree in chemistry from the University of Massachusetts, Dartmouth, in 2004, and his PhD degree in chemistry from Northeastern University in 2010, where he employed synchrotron-based methods

to study the stability and activity of electrocatalysts for PEM fuel cells. His research focuses on SPM-based approaches to study ion transport and electrochemical reactions in materials for Li-ion and Li-air batteries. Additionally, Arruda has been working on adapting strain-based SPM methods to study carbonaceous-based electrochemical capacitors.



Flemming Besenbacher

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Besenbacher is a full professor in the Department of Physics and Astronomy at the Faculty of Science, Aarhus University, Denmark. He received his doctoral degree in natural sciences from Aarhus University. He is director and founder of the Interdisciplinary Nanoscience Center and head of the graduate school. Besenbacher is a member of the board of directors of the Carlsberg

Foundation, the Carlsberg Breweries A/S, and of the Tuborg Foundation. He has received numerous honors, and he is a fellow of the Chinese Chemical Society, the American Vacuum Society, and the Materials Research Society, and received an honorary Einstein Professorship at the Chinese Academy of Sciences. He has published more than 500 papers in international journals and several in high-impact journals.



Louisa M. Brown

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Brown is a graduate student in the Marohn Laboratory at Cornell University. She received a BA degree in chemistry and fine arts from Hamilton College in 2009, where she performed undergraduate research with Professors Karen Brewer and Ian Rosenstein. In 2010, she was awarded an NSF Graduate Research Fellowship. Her current research includes scanned-probe microscopy techniques to study local electronic effects such as charge generation and charge

trapping in organic semiconductors and photovoltaics, with a particular interest in understanding degradation processes.

**Xi Chen**

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Chen is a PhD degree student in materials science and engineering at the University of Pennsylvania. He received his BS degree (2008) in physics from Peking University, China. His research interests include the impedance behaviors of a single molecule/molecular monolayer under electrical and optical fields at interfaces.

**Francesco Ciucci**

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Ciucci is an assistant professor of mechanical engineering and chemical and biomolecular engineering at the Hong Kong University of Science and Technology (HKUST). Prior to joining HKUST, he studied engineering at Ecole Centrale Paris and received his BSc degree. He received his MEng degree at Politecnico di Milano and his PhD degree from the California Institute of Technology. Ciucci also was a post-

doctoral researcher in applied mathematics at the University of Heidelberg. His research focuses on ionic materials for energy storage and conversion.

**Nikolas C. Hoepker**

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Hoepker is currently a PhD degree candidate at Cornell University, where he is using electric force microscopy to examine charge-induced fluctuations in organic solar cells and organic transistors. He received his BS degree in physics from the University of California, Davis, where he performed undergraduate research under the direction of Professor Rajiv Singh.

**Stephen Jesse**

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Jesse is a research staff member at Oak Ridge National Laboratory in the Imaging Functionality group at the Center for Nanophase Materials Sciences. He received his PhD degree from the University of Tennessee, Knoxville, in materials science and engineering in 2004. His current work involves developing novel scanning probe microscopy (SPM) techniques that utilize high-speed electronics and flexible controls to facilitate

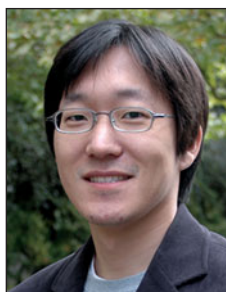
functional imaging and increase, by orders of magnitude, the useful information gathered at nanoscale systems. This includes coupling voltage, radiofrequency, and photonic excitation and detection systems to SPMs to extend microscopy to the fundamental time and energy scales of important physical phenomena related to photovoltaic, mechanical, electromechanical, and electrochemical processes. He also works to create new methodologies to analyze and interpret high-dimensional, multi-spectral SPM data.

**Sergei V. Kalinin**

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Kalinin is a senior research staff member at Oak Ridge National Laboratory (ORNL) and co-theme leader for scanning probe microscopy at the Center for Nanophase Materials Sciences at ORNL, following a Eugene P. Wigner fellow appointment at ORNL (2002–2004). He also is an adjunct faculty member at the Pennsylvania State University and a professor at the Bredesen Center for Interdisciplinary Research and Educa-

tion at the University of Tennessee, Knoxville. He received his PhD degree in materials science from the University of Pennsylvania in 2002. His research is focused on local bias-induced phase transitions and electrochemical transformation in ferroelectric, ionic, and macromolecular systems. Kalinin is the recipient of numerous prestigious awards and is the author of more than 200 scientific papers and 14 patents and patent disclosures on different aspects of SPM and ferroelectric materials applications. He also has organized a series of international workshops on piezoresponse force microscopy and SPM for energy storage materials.

**Yunseok Kim**

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Kim is a postdoctoral researcher at Oak Ridge National Laboratory (ORNL). He received his PhD degree in 2007 from the Korea Advanced Institute of Science and Technology, Daejeon, Korea. Prior to joining ORNL, he was awarded the Humboldt research fellowship from the Alexander von Humboldt Foundation, which allowed him to work as a postdoctoral researcher at Max Planck Institute of Microstructure Physics, Halle, Germany,

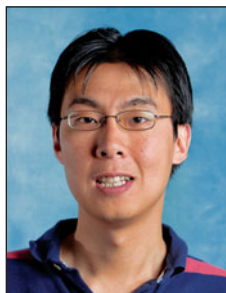
from 2008 to 2010. Kim's research interests include electromechanical phenomena, transport properties, and ferroelectricity using scanning probe microscopy.

**Amit Kumar**

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Kumar is currently a postdoc in the Imaging Functionality group at ORNL's Center for Nanophase Materials Sciences. His research focuses on SPM-based approaches to study ion transport and electrochemical reactions in fuel cell electrolytes and mixed ionic electronic conductors. Additionally, Amit has been working on developing local strain detection techniques for the

probing of surface and bulk electrochemical processes in oxide materials. Amit received a B.Tech. degree in materials science from IIT Kharagpur, India, in 2005 and his PhD degree in materials science from Pennsylvania State University in 2010, where he employed nonlinear optical and SPM techniques for the study of spin-charge-lattice coupling in multiferroic oxides and strained ferroelectrics.

**Stanley Lai**

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Lai is a postdoctoral research fellow supported by a Marie Curie fellowship at the University of Warwick (UK). He received his MSc degree in chemistry from Leiden University (The Netherlands) in 2006. He obtained his PhD degree, studying under Professor Marc Koper, on the topic of the electrocatalytic oxidation of ethanol, from Leiden University in 2010. His research interests lie in the fundamental aspects of electrocatalytic materials and reactions using a

combination of conventional electrochemical, *in situ* spectroscopic, and high resolution imaging techniques.

**Won-Young Lee**

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Lee is a postdoctoral associate in the Department of Nuclear Science and Engineering at the Massachusetts Institute of Technology. He received his BS degree in mechanical and aerospace engineering from Seoul National University in 2004, and his MS (2006) and PhD (2010) degrees in mechanical engineering from Stanford University. His research focus lies in

developing high-performance energy conversion and storage devices, including fuel cells, electrolysis cells, Li-ion batteries, and photovoltaic cells.

**Julie Macpherson**

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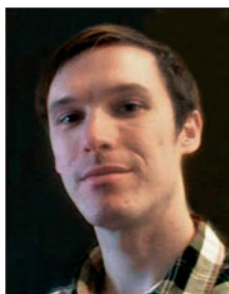
Macpherson is a full professor at the University of Warwick, where she also received her degree. She obtained a University Royal Society Fellowship in 1999 and, upon completion of her fellowship in 2007, was promoted to a full professorship. Her current research interests lie in the development and application of carbon-based materials in analysis, sensing, and imaging.

**John A. Marohn**

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Marohn is a professor of chemistry and chemical biology and member of the field of materials science and engineering at Cornell University (CU), Ithaca, NY. He received his BS degree in chemistry and his BA degree in physics from the University of Rochester, NY. He earned his PhD degree in chemistry working with Daniel P. Weitekamp at the California Institute of Technology studying the buried interface in a

GaAs/AlGaAs heterojunction using optically detected magnetic resonance and radio-frequency magnetic field gradients to improve magnetic resonance imaging of solids. Marohn carried out postdoctoral work in magnetic resonance force microscopy with Doran D. Smith during a National Research Council Associateship at the US Army Research Laboratory. He joined the faculty at CU in 1999. His research interests include scanned probe studies of nanoscale phenomena in electronic materials and nanoscale imaging by mechanically detected magnetic resonance.

**Stephen Nonnenmann**

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Nonnenmann is a postdoctoral associate with Professor Dawn Bonnell in the Department of Materials Science and Engineering at the University of Pennsylvania. He received his BSE degree in glass science and engineering from Alfred University in 2001, and his MSE degree in materials science and engineering from the University of Central Florida on a CREOL fellowship in 2003. In 2010, he finished his doctoral

studies under the guidance of Professor Jonathan Spanier at Drexel University, earning a "Best Doctoral Dissertation" honor. Nonnenmann's research includes studies of interfacial electrochemical phenomena of solid-state oxide systems using *in situ* advanced variable-environment, extreme temperature atomic force microscopy techniques.

**James R. O'Dea**

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O'Dea is a postdoctoral researcher at Cornell University in the laboratory of John A. Marohn. He received a BS degree in chemistry from the University of Puget Sound, performing undergraduate research with Kenneth W. Rousslang. He earned his PhD degree in chemistry from the University of California, Santa Barbara, where he worked with Steven K. Buratto to investigate the morphology and conductivity of

proton exchange membranes. O'Dea is studying the local electrical properties of materials for energy storage and conversion.

**Ryan O'Hayre**

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O'Hayre is an associate professor of metallurgical and materials engineering at the Colorado School of Mines (CSM). He received his BS degree (1999) in metallurgical and materials engineering from CSM, and his MS (2001) and PhD (2004) degrees in materials science and engineering from Stanford University. His research centers on energy materials, emphasizing aspects of electronic and ionic oxides,

catalysis, fuel cells, and electrochemistry. O'Hayre has received several young investigator research awards, including the Presidential Early Career Award in Science and Engineering (PECASE) from the US White House/Army Research Office. He served as an *MRS Bulletin* volume organizer (2009) and as co-chair of the 2011 MRS Spring Meeting.

**Friedrich Prinz**

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Prinz is a professor at Stanford University. The Prinz group creates, models, and prototypes nanoscale structures to understand the physics of electrical energy conversion and storage. Prinz is exploring the relation between size, composition, and the kinetics of charge transfer reactions. He also is interested in learning from nature, in particular by studying the electron transport

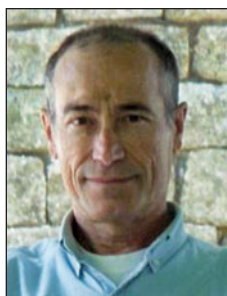
chain in plant cells. His students employ a wide range of nanofabrication technologies, including atomic layer deposition, scanning probe microscopy, and impedance spectroscopy. In addition, the group is using molecular scale modeling to gain insights into the nature of charge separation and recombination processes.

**Sascha Sadewasser**

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Sadewasser is a group leader in the Laboratory for Nanostructured Solar Cells (LaNaSC) at the International Iberian Nanotechnology Laboratory, Braga, Portugal (INL). He holds a degree in physics (1995) from the RWTH Aachen, Germany, and a PhD degree (1999) from the Washington University St. Louis, MO. From 1999 to 2011, Sadewasser worked at the

Helmholtz-Zentrum Berlin (HZB, the former Hahn-Meitner Institute), also completing a Ramón y Cajal fellowship at the Centro Nacional de Microelectrónica in Barcelona, Spain, from 2003 to 2004. He was the deputy head of the Department for Heterogeneous Material Systems at HZB from 2008 to 2011, before accepting a group leader position at INL.



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Salmeron is director of the Materials Science
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mentation, including high pressure scanning
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Vacuum Society. In 2004, Salmeron received

the Klaus Halbach Award for innovative instrumentation, and in 2008 he received the Medard Welch Award of the American Vacuum Society and the Langmuir Lectureship Award of the American Chemical Society.

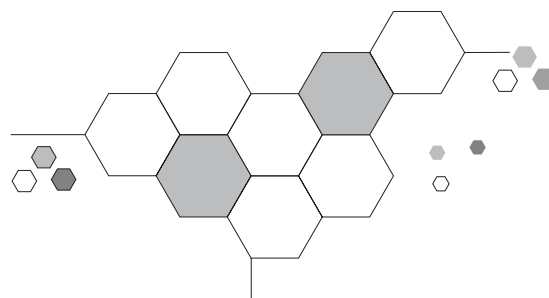


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Thstrup is the deputy director of the Inter-
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Besenbacher at Aarhus University in the area of
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in building up the iNANO organization, working
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at McGill University, Montreal, from 2006 to 2009.

He then returned to iNANO as a research associate, moving to his current position in 2012.



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Unwin has been a professor of chemistry at the
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Group in 1992. He holds a BSc degree from the
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the University of Warwick. He has particu-
lar interest in the development and application
of flux imaging techniques, especially electro-
chemical microscopy and optical methods.



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