

Arthur P. Baddorf

Senior R&D Staff
Scanning Probe Microscopy Group Leader
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[Publications](#)



Education

Wheaton College, Wheaton, IL
University of Pennsylvania, PA

Math and Physics
Physics

B.A., *Summa Cum Laude*, 1980
Ph.D., 1987

Professional Experience

2010–p Group Leader, Imaging and Nanoscale Characterization, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
2010–p Joint Institute for Advanced Materials Research Affiliate
2005–p Senior Research Staff Member, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
1990–2007 Research Staff Member, Low Dimensional Materials By Design, Materials Science and Technology Division, Oak Ridge National Laboratory
1987–1989 Research Associate, Surface Physics Group, Solid State Division, Oak Ridge National Laboratory

Professional and Synergistic Activities

2015–p Institute for Functional Imaging Advisory Board
2015–p Initiative Review Committee, ORNL Laboratory Directed Research and Development
2015–p Journal of Physics D Advisory Panel
2014–p ORNL Research Conflict of Interest Advisory Committee
2014–p Nature Scientific Reports Editorial Board
2010–p Group Leader, Imaging Functionality, Center For Nanophase Materials Sciences
2010–p Program Advisory Board, Joint Institute for Advanced Materials
2010–2013 Theme Leader, Electronic and Ionic Functionality, Center For Nanophase Materials Sciences
2008–2010 Team Leader, Scanning Probe Imaging, Center For Nanophase Materials Sciences
2008–2010 ORNL SEED Program Review Committee
2005–p Active in scientific outreach to K-12 students
1995–2004 Executive Board, Complex Materials Consortium CAT, Advanced Photon Source, Argonne, IL
1991–92, 2002–03 President, Tennessee Valley Chapter of the American Vacuum Society
2000 Lecturer, Louisiana State University Summer School
1988–p Member: Materials Research Society, AVS, and American Physical Society

Honors and Awards

2009 ORNL Significant Event Award for organization of 5th Annual Advanced PFM Workshop
2008 Cosslett Award for best invited paper at Microscopy & MicroAnalysis Conference
2006 ORNL Director's Award Outstanding Team Accomplishment in Science and Technology
2006 ORNL Award for Science and Technology

Research Synopsis

135 publications peer reviewed journals, 53 invited presentations, *h*-index 33, total citations 3870 (Google Scholar)

1. *Atomic structure of oxide surfaces and interfaces*
Understanding and control of the wide range of properties discovered in oxide thin films and interfaces depend critically on the exact atomic structure, which we explore using scanning tunneling and non-contact force microscopies.
2. *Domain Engineering: Ferroelectrics*

Extensions of Piezoresponse Force Microscopy are used to examine switching, domain growth, and domain control in thin film ferroelectrics.

3. *Transport in non-metallic oxides*

The transport of electrons in thin oxide films is mapped at nanometer length scales as a function of temperature, applied voltage, and internal polarization in ultra high vacuum as a tool to understand oxide behavior through injection, hopping, and vacancy motion.

4. *Electron Scattering and Excitations*

Experiments for an atomic level understanding of electronic properties and dynamics, including electron transport, excitations, spin correlations, and interactions.

5. *Energy flow at the nanoscale*

We seek a fundamental understanding of energy flow and dissipation at nanometer scales using band excitation techniques in atomic force microscopy (tip surface dissipation) and inelastic tunneling spectroscopy in scanning tunneling microscopy (electronic excitation).

Patents

Asymmetric Ferroelectric Tunneling Element (AFTE) and Applications for Non-Volatile Random Access Memory,

S. V. Kalinin, H. M. Christen, A. P. Baddorf, and V. Meunier, 2010.

Ultra-high Density Ferroelectronic Storage and Lithography by Second Order Ferroelectroelastic Switching,

S. V. Kalinin, A. Gruverman, Junsoo Shin, H. N. Lee, H. M. Christen, A. P. Baddorf, E. Karapetian, and M. Kachanov, 2006.

Fourier Transform for Acoustic Microscopy, S. Jesse, A. P. Baddorf, and S. V. Kalinin, patent disclosure.

Semiconductor Composition Containing Fe, Dy, and Tb, R. C. Pooser, B. J. Lawrie, A. P. Baddorf, A. Malasi,

H. Taz, A. Farah, R. Kalyanaraman, G. Duscher, M. Patel, patent disclosure 2015.

Graduate Students and Postdoctoral Scholars in the SPM Group

Past Ph.D. Students

J. Shin (2003-2007), Physics, The University of Tennessee-Knoxville with E. W. Plummer

Current Postdoctoral Scholars

Ye Cao, Marius Chyasnachyus, Liam Collins, Jeremy Come, Saban Hus, Anton Ievlev, Seokmin Jeon, Qian Li, Chuanxu Ma, Jewook Park, Suhas Somnath, Rama Vasudevan, Jun Wang, Maxim Ziatdinov, Qiang Zou

Recent Postdoctoral Scholars, Next Position

Alexei Belianinov (2012-2015), Research Staff, Oak Ridge National Laboratory

Jennifer Black (2012-2015), Senior R&D Scientist, Nantero Corporation, MA

Corentin Durand (2013-2015), Assistant Professor, CEMES, Toulouse, France

Evgehni Strelcov (2011-2015), Postdoctoral Associate, CNST, NIST, MD

Baris Okatan (2013-2015), Turkey

Whenzi Lin (2012-2014), Postdoctoral Assoc., Los Alamos National Laboratory

Thomas Arruda (2010-2013), Assoc. Professor, Salve Regina University, RI

Simon Kelly (2012-2013), American Magnetics, Oak Ridge, TN

Geoffrey Rojas (2011-2013), Postdoc Univ. Minnesota

Amit Kumar (2010-2013), lecturer, Queens University, Belfast UK

Qing Li (2010-2013), Assoc. Professor, Inst. of Functional Nano & Soft Materials, Soochow University

Yunseok Kim (2011-2012), Asst. Professor, Sungkyunkwan University, Korea

Shengyong Qin (2011-2012), RHK, Inc.

Kendal Clark (2010-2012), Asst. Professor, Central Methodist University, MO

Senli Guo (2009-2011), Bruker Nano, Inc.

Nina Balke (2009-2010), Research Staff, Oak Ridge National Laboratory

Maxim Nikiforov (2008-2010), HGST, Argonne National Laboratory

Stephen Jesse (2005-2007), Research Staff, Oak Ridge National Laboratory

Brian Rodriguez (2005-2007), Humboldt Fellow, Germany

Jing Zhou (2004-2006), University of Wyoming