

Scott Crittenden

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Education

2004 Ph.D. Physics, Purdue University
Thesis: *Scanning Force Microscopy as a Tool for Bioelectronics*
Major professor: Ron Reifenberger

1997 B.S. Mathematics, University of Nevada, Reno

Professional Experience

08/2007— Assistant Professor, Department of Physics, University of South Carolina, Columbia, SC. Electrogenic bacteria, Microbial Fuel Cells, Scanning Force Microscopy.

2004—08/2007 Postdoctoral Fellow at the U.S. Army Research Laboratory. Studying the electrogenic properties of various anaerobic bacteria for use as microbial fuel cells. And investigating the extraction of complete tip-sample interaction potentials from amplitude-feedback Scanning Force Microscopy (SFM).

2000—2004 Research Assistant, Physics Department, Purdue University. Investigation of the properties of bacteriorhodopsin, in the form of purple membranes, with the SFM.

1997—2000 Teaching Assistant, Physics Department, Purdue University. Taught various recitation/laboratory sessions for Freshman and Sophomore level physics courses.

1992—1997 Co-founder, co-owner and co-operator, InterComm Internet Services, Inc., a local Internet Service Provider in Reno, NV. Primarily responsible for system and network administration (maintenance of all servers, networking routers, extensive configuration and programming, etc.). Shared responsibility for day-to-day business operations (management, accounting, sales, etc.).

Technical Skills

Scanning Probe Microscopy: Extensive SFM experience including Contact, Contact I(V), Lateral Force, Adhesion, Noncontact, Higher Mode, and Electrostatic Force imaging modes on a variety of samples (organic SAMs, nanotubes, lipid bilayers, viruses, proteins, and others), in a variety of environments (air, liquid, UHV, controlled humidity, pure Nitrogen/Helium/etc.), using multiple SPMs (Nanotec, Inc. SFM, Molecular Instruments PicoSPM, Omicron SFM/STM, and a custom built SFM with a controllable environment). Some STM experience.

Design/Fabrication: Designed and constructed multiple pieces of equipment including a large UHV STM/SFM (built around an Omicron, Inc. commercial SPM head) and an HV multi-source thermal evaporator. Substantial experience with mills, lathes, etc.. Experience designing and building electronic circuits.

Sample Preparation: Familiar with PDMS micro-contact stamps (stamping molecules onto surfaces, flowing through channels, etc.), deposition and manufacture of metal microelectrodes to multiwalled

carbon nanotubes, extensive experience with bacteriorhodopsin/purple membrane. Culturing facultative bacteria (*Shewanella putrefaciens*, *Rhodospirillum rubrum*).

Computer Interfacing: Wrote high-level software for IEEE-488.2 GPIB-enabled instruments and high speed DAQ cards for flexible, automated, data acquisition.

General Computer Skills: Professional-level coding experience in multiple languages (Perl, Visual Basic) and platforms (MS Windows, Linux, Solaris, Cisco IOS); familiarity with others (C/C++, Mathematica, x86 assembler, Ocaml, Labview). Familiar with various applications (MS Office, LaTeX, Origin, SigmaPlot, Mechanical Desktop, Photoshop, Gimp, MySQL, various web servers).

Publications

9. *Effect of Electron Mediators on Current Generation and Cellulose Fermentation in a Microbial Fuel Cell*, C. Sund, S. McMasters, S. Crittenden, L. Harrell, J. Sumner, Applied Microbiology and Biotechnology, in press
8. *Mediating Electron Transfer from Bacteria to a Gold Electrode via a Self-Assembled Monolayer*, S. Crittenden, C. Sund, J. Sumner, Langmuir **22** (2006), 9473
7. *Probing Attractive Forces at the Nanoscale Using Higher Harmonic Dynamic Force Microscopy*, S. Crittenden, A. Raman, and R. Reifenger. Phys. Rev. B **72**, (2005), 235422
6. *Soft Lithography Based Micron-scale Electrophoretic Patterning of Purple Membrane*, S. Crittenden, J. Hillebrecht, D. Inerowicz, F. Regnier, R. Birge, and R. Reifenger. J. Micromech. Microeng. **15** (2005), 1494-1497
5. *Scanning Force Microscopy as a Tool for Bioelectronics*, S. Crittenden, Ph.D. Thesis 2004
4. *Enhanced Mass Sensing Using Torsional and Lateral Resonances in Microcantilevers*, L. B. Sharos, A. Raman, S. Crittenden, and R. Reifenger. Applied Physics Letters **84** (2004), 4638-4640.
3. *Force Constancy and its Role on Haptic Perception of Virtual Surfaces*, ACM Transactions on Applied Perception, S. Choi, L. Walker, H. Tan, S. Crittenden, and R. Reifenger. Applied Perception **2** (2005) 89-105.
2. *Humidity Dependent Open-Circuit Photovoltage from a BR/ITO Bioelectronic Heterostructure*, S. Crittenden, S. Howell, R. Reifenger, J. Hillebrecht, and R. Birge. Nanotechnology **14** (2003), 562-565.
1. *Correlating the Location of Structural Defects with the Electrical Failure of Multiwalled Carbon Nanotubes*, P. J. de Pablo, S. Howell, S. Crittenden, B. Walsh, E. Graugnard, and R. Reifenger. Applied Physics Letters **75** (1999), 3941.

Presentations, Proceedings, & Posters

18. *Optical System Harmonic Distortion in Scanning Force Microscopes* (poster), Frontiers in Scanning Probe Microscopy Workshop, Purdue University, October 2006, **S. Crittenden**.
17. *Rapid Screening of Microbial Fuel Cell Components*, 42nd Power Sources Conference, June 2006, **S. Crittenden**, J. Sumner, C. Sund.
16. *Rapid Screening of Microbial Fuel Cell Components*, Electrochemical Society Annual Conference, May 2006, **S. Crittenden**, J. Sumner, C. Sund.

15. *Biomaterials & Scanning Force Microscopy*, Materials Science Department, University of North Texas, May 2006, **S. Crittenden**. (Invited talk)
14. *Intrinsic Harmonic Distortion of Atomic Force Microscopy Cantilever Position Detection Methods*, ASME International Mechanical Engineering Congress and Exposition, November 2005, **S. Crittenden**. (Invited talk and proceedings paper)
13. *Microbial Fuel Cells: A Biotechnological Approach to Power Generation*, American Chemical Society National Meeting, December 2005, **J. Sumner**, S. Crittenden.
12. *Van der Waals and Electrostatic Force Imaging with Higher Harmonic Noncontact Scanning Force Microscopy*, MRS Fall Meeting, November, 2004, **S. Crittenden**, A. Raman, and R. Reifenberger.
11. *Van der Waals and Electrostatic Force Imaging with Higher Harmonic Noncontact Scanning Force Microscopy*, Workshop on Advanced Dynamic AFM Methods, October, 2004, Tres Cantos, Spain, **R. Reifenberger**, S. Crittenden, A. Raman.
10. *Imaging at Higher Harmonics & Bending Modes with a Scanning Force Microscope*, Purdue University, February 16, 2004, **S. Crittenden**, S. Hu, A. Raman, R. Reifenberger.
9. *Investigating Issues in Biomolecular/Semiconductor Device Applications*, Army Research Laboratory, November 2003, **S. Crittenden**, R. Reifenberger.
8. *Investigating Issues in Biomolecular/Semiconductor Device Applications* (Poster), International Symposium on Clusters and Nano-Assemblies, November 2003, **S. Crittenden**, J. Hillebrecht, S. Hu, A. Raman, R. Birge, R. Reifenberger.
7. *Protein-Based Bioelectronic Heterostructures*, Wake Forest University, October 2003, **S. Crittenden**, R. Reifenberger.
6. *Protein-Based Bioelectronic Heterostructures*, University of Ohio, Akron, October 2003, **S. Crittenden**, R. Reifenberger.
5. *Protein-Based Bioelectronic Heterostructures* (Poster), Trends in Nanotechnology 2003, November 2003, **S. Crittenden**, S. Hu, A. Raman, R. Reifenberger.
4. *Effects of Internal Resonance on the Nonlinear Dynamics of Tapping Mode AFM Microcantilevers*, American Control Conference, June 2003, **S. Hu**, A. Raman, S. Crittenden, R. Reifenberger.
3. *Patterned Electrophoretic Deposition of Purple Membrane*, American Physical Society, March 2003, **S. Crittenden**, S. Howell, J. Hillebrecht, R. Birge, R. Reifenberger.
2. *Bacteriorhodopsin for Hybrid Biological-Semiconductor Devices* (Poster), Nanotech 2003, **S. Crittenden**, S. Howell, J. Hillebrecht, R. Reifenberger, R. Birge.
1. *Bacteriorhodopsin as an Active Component in Hybrid Biomolecular-Semiconductor Electronics* (Poster), Nanobiology 2001, **S. Crittenden**, S. Budy, K. Wise, R. Reifenberger, R. Birge.

Awards

ORAU Postdoctoral Fellowship

ASEE Postdoctoral Fellowship
Outstanding Poster, Trends in Nanotechnology
2003

Professional Societies

American Association for the Advancement of
Science

American Chemical Society

American Physical Society

American Society of Microbiology

Biophysical Society

Electrochemical Society

Materials Research Society

References

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