

Zachary J. Donhauser

152 Davey Lab, Box 15
Department of Chemistry
The Pennsylvania State University
University Park, PA 16802

phone: (814) 863-8220
fax: (814) 863-5516
email: zjd101@psu.edu
www: <http://stm1.chem.psu.edu>

PROFESSIONAL EXPERIENCE

Research Assistant, The Pennsylvania State University, 1998 to present

Advisor: Dr. Paul S. Weiss

- Utilized scanning tunneling microscopy to study nanometer-scale electronic structures
- Examined molecular electronic devices and screened potential candidates for functionality
- Investigated mechanistic details and determined relevant parameters for mediating conductance switching of single molecules
- Designed annealing procedures for self-assembled monolayers of alkanethiolates on gold to control the nature of monolayer defects
- Developed new instrumentation to quantify and to characterize dopant species spatially at the nanometer scale
- Operated, repaired and maintained microwave frequency alternating current scanning tunneling microscope

Research Assistant, Providence College, 1997 to 1998

Advisor: Dr. James Belliveau

- Examined cell-death mechanism implicated in multiple sclerosis
- Analyzed cerebrospinal fluid of multiple sclerosis patients for gliotoxic activity using gel electrophoresis

Research Assistant, University of Southern California, NSF-REU, 1997

Advisor: Dr. Chi Mak

- Studied solution-phase chemical physics using molecular dynamics simulations
- Examined the effects of restricted polyelectrolyte geometries on counterion condensation

Teaching Assistant, The Pennsylvania State University, 1998 to 1999

- Supervised and instructed analytical spectroscopy and introductory chemistry laboratories consisting of approximately 20 students each

Teaching Assistant, Providence College, 1995 to 1998

- Supervised and assisted students in laboratory sections of physical chemistry, analytical chemistry, and general chemistry

HONORS AND AWARDS

Semiconductor Research Corporation Graduate Fellowship, 2001 to present

Department of Chemistry Geiger Graduate Fellowship, 2001

Department of Chemistry Roberts Graduate Fellowship, 1998 to 2000

Department of Chemistry Travel Award, 2001

Phi Lambda Upsilon Chemistry Honor Society, 1998

Father Hickey Award (individual and academic excellence in chemistry), 1998

ACS Award for Analytical Chemistry, 1997

J. Joseph Hanley Award (excellence in organic chemistry), 1996

EDUCATION

Ph.D. Candidate in Chemistry, The Pennsylvania State University

Advisor: Paul S. Weiss

Thesis: *Scanning Tunneling Microscopy Experiments in Nanoscale Electronics*

Expected graduation date: December 2002, GPA: 3.90/4.00

B.S. Chemistry (Honors, *Magna Cum Laude*), Providence College, May 1998

GPA: 3.74/4.00 Cumulative, 3.94/4.00 Chemistry

PUBLICATIONS

1. "High Resolution Dopant Profiling Using a Tunable AC Scanning Tunneling Microscope", Z. J. Donhauser, G. S. McCarty, L. A. Bumm, and P. S. Weiss, *Characterization and Metrology for ULSI Technology: 2000 International Conference*, D. G. Seiler, A. C. Diebold, T. J. Shaffner, R. McDonald, W. M. Bullis, P. J. Smith, and E. M. Secula, editors (American Institute of Physics, New York, 2001), 641.
2. "Difference Frequency Imaging and Spectroscopy to Profile Dopants Using the Alternating Current Scanning Tunneling Microscope", Z. J. Donhauser, G. S. McCarty, R. Y. Wang, L. A. Bumm, and P. S. Weiss, *Proceedings of the 2001 International Conference on Ultrashallow Junctions* (American Institute of Physics, New York, 2001).
3. "Control and Placement of Molecules via Self-Assembly", P. A. Lewis, Z. J. Donhauser, B. A. Mantooth, R. K. Smith, L. A. Bumm, K. F. Kelly, P. S. Weiss, *Nanotechnology* **12**, 231 (2001).
4. "Conductance Switching in Single Molecules through Conformational Changes", Z. J. Donhauser, B. A. Mantooth, K. F. Kelly, L. A. Bumm, J. D. Monnell, J. J. Stapleton, D. W. Price, Jr., D. L. Allara, J. M. Tour, and P. S. Weiss, *Science* **292**, 2303 (2001).
5. "Cross Correlation Image Tracking for Adsorbate Analysis and Drift Correction", B. A. Mantooth, Z. J. Donhauser, K. F. Kelly, and P. S. Weiss, *Review of Scientific Instruments* **73**, 313 (2002).
6. "Matrix-Mediated Control of Stochastic Single Molecule Conductance Switching", Z. J. Donhauser, B. A. Mantooth, T. P. Pearl, K. F. Kelly, S. U. Nanayakkara, and P. S. Weiss, *Japanese Journal of Applied Physics* **41**, 4871 (2002).
7. "Control of Alkanethiolate Monolayer Structure Using Vapor-Phase Annealing", Z. J. Donhauser, D. W. Price, Jr., J. M. Tour, and P. S. Weiss, submitted to *Journal of the American Chemical Society*.
8. "Switching of Single Molecules Between Multiple Conductance States", Z. J. Donhauser and P. S. Weiss, manuscript in preparation.

PRESENTATIONS

1. "Atomic Scale Investigation of Single Molecule Electronics", Z. J. Donhauser and P. S. Weiss, *Materials Research Society 2003 Spring Meeting*, San Francisco, CA, April 2003, **invited paper**.
2. "Single Molecule Switches for Molecular Electronics", Z. J. Donhauser and P. S. Weiss, *Semiconductor Research Corporation Graduate Fellowship Program Conference*, Dallas, TX, September 2002, **invited paper**.
3. "Exploiting and Controlling Intermolecular Interactions for Precise Placement and Connection of Molecules", Z. J. Donhauser and P. S. Weiss, *Korea Institute of Advanced Studies Symposium on Molecular Electronics*, Seoul, Korea, July 2002, **invited paper**.
4. "Switching of Single Molecules", Z. J. Donhauser and P. S. Weiss, *62nd Physical Electronics Conference*, Atlanta, GA, June 2002, **contributed paper**.
5. "Conductance Switching in Single Molecules", Z. J. Donhauser and P. S. Weiss, *Annual APS March Meeting 2002*, Indianapolis, IN, March 2002, **contributed paper**.
6. "Controlling Switching Behavior of Single Molecules", Z. J. Donhauser and P. S. Weiss, *STM '01: 11th International Conference on Scanning Tunneling Microscopy/ Spectroscopy and Related Techniques*, Vancouver, BC, Canada, July 2001, **contributed paper**.