

Thomas A. Knotts IV

Residence

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Education

University of Wisconsin-Madison

Madison, WI

- Ph.D., Chemical Engineering (GPA 3.89), Expected May 2006
Advisor: Juan J. de Pablo

Brigham Young University

Provo, UT

- B.S., Chemical Engineering (GPA 3.91), 2001
Graduated *Magna cum laude*

Research and Employment History

Research Assistant

August 2001 to Present

- Department of Chemical and Biological Engineering
University of Wisconsin-Madison

Madison, WI

- employed advanced simulation methods to investigate the thermodynamics of protein folding, DNA hybridization, and biomolecule/surface interactions
- developed computer code to implement novel algorithms for calculation of free energies, entropies, and the reversible work involved in thermal and mechanical deformation of biological molecules

Teaching Assistant

September 2002 to April 2003

- Department of Chemical and Biological Engineering
University of Wisconsin-Madison

Madison, WI

- assisted in teaching lectures, led discussions, and graded exams for Thermodynamics of Mixtures class dealing with multi-phase, multi-component equilibria, non-ideal vapors and liquids, complex chemical reaction equilibria, surface thermodynamics, and solid phase thermodynamics (ChE 311)
- taught the theory and procedures behind experimental techniques to determine transport properties, thermodynamic properties, and transfer coefficients for Transport Phenomena Lab (ChE 324)

Physics Instructor

May 2001 to July 2001

- Upward Bound Program
Arizona State University

Tempe, AZ

- developed six week course in introductory college physics

- taught course to low-income, minority high-school students

- **Teaching Assistant** September 2000 to April 2001
Brigham Young University Provo, UT

- assisted in Chemical Reaction Engineering (ChE 478) and Semiconductor Processing (ChE 381) classes in Department of Chemical Engineering
- augmented student understanding of lecture material with personal tutoring during scheduled office hours

- **Process Engineer Intern** April 2000 to August 2000
Motorola MOS 5 Mesa, AZ

- completed reclaim wafer project saving MOS 5 \$206,000/yr
- qualified Model Based Temperature Control system for horizontal polysilicon deposition furnaces, reducing the time for this process 17%
- characterized the stacked gate microstructure to decrease cycle time through fab

Technical Skills

- **Computer**

- molecular dynamics and Monte Carlo simulation code writing
- C Programming Language, Message Passing Interface (MPI)
- Linux/Unix, Windows, and Mac operating systems
- CHARMM, Matlab, and Mathcad software packages

- **Laboratory and Instrumentation**

- molecular biology techniques such as denaturing gel electrophoresis, library screening, cloning, enzymatic assays, spectrophotometry, and liquid chromatography
- physical properties measurement instruments such as pressure transducers, thermocouples, and gas chromatography
- unit operations equipment such as heat exchangers, pumps, and valves

Publications

1. T. A. Knotts, N. Rathore, and J. J. de Pablo. Structure and Stability of a Model Three-Helix-Bundle Protein on Tailored Surfaces. *Proteins* (Submitted).
2. N. Rathore, T. A. Knotts, and J. J. de Pablo. Configurational Temperature Density of States Simulations of Proteins. *Biophys. J.*, **85**(6), 3963-3968 (2003).

3. N. Rathore, T. A. Knotts, and J. J. de Pablo. Density-of-States Based Monte Carlo Techniques for Simulation of Proteins and Polymers. *AIP Conference Proceedings*, **690**(Monte Carlo Method in the Physical Sciences), 289-298 (2003).
4. N. Rathore, T. A. Knotts, and J. J. de Pablo. Density of States Simulations of Proteins. *J. Chem. Phys.*, **118**(9), 4285-4290 (2003).
5. T. A. Knotts, W. V. Wilding, J. L. Oscarson, and R. L. Rowley. Use of the DIPPR Database for Development of QSPR Correlations: Surface Tension. *J. Chem. Eng. Data*, **46**(5), 1007-1012 (2001).

Presentations

1. **Proteins, Nucleic Acids, and Surfaces: Understanding Interactions at Interfaces**
Presented at the *University of Wisconsin-Madison* for Genomic Science Program Seminar Series, Madison, WI. February 2005 (Invited Speaker)
2. **Advanced Simulation of Biological Molecules in Inhomogeneous Systems**
Presented at *AIChE National Meeting*, Austin, TX. November 2004
3. **Molecular Simulation of Biological Molecules—An Entropic Perspective**
Presented at *SC Johnson Company* as a Samuel C. Johnson Distinguished Student Fellow, Racine, WI. October 2004. (Invited Speaker)
4. **Advanced Simulation for Complex Biological Systems**
Presented at *Purdue University* for the Theoretical Physical Chemistry Group, West Lafayette, IN. May 2004 (Invited Speaker)
5. **Advanced Methods for Simulation of Biomolecules**
Presented at the *AIChE National Meeting*, San Francisco, CA. November 2003
6. **Density of States Simulations of Proteins, Liquid Crystals, and DNA** (Poster)
Presented at *The Monte Carlo Method in Physical Sciences: Celebrating the 50th Anniversary of the Metropolis Algorithm*, Los Alamos, NM. June 2003
7. **Modeling DNA: Microarrays**
Presented at the *University of Wisconsin-Madison* for the Advances in Transport Phenomena Seminar Series, Madison, WI. April 2002 (Invited Speaker)

Awards and Honors

- **GSTP Trainee** 2003-2006
Genomic Science Training Program, University of Wisconsin-Madison
- **Samuel C. Johnson Distinguished Student Fellow** 2002-2005
S. C. Johnson & Son, Inc., Racine WI

- **Outstanding Teaching Assistant Award** 2002/2003
College of Engineering, University of Wisconsin-Madison
- **Roland A. Ragatz Teaching Assistant Award**(2-time recipient) 2003
Department of Chemical Engineering, University of Wisconsin-Madison
- **Most Outstanding Instructor Award** July 2001
Upward Bound Program, Arizona State University
- **Outstanding Senior Award** April 2001
Department of Chemical Engineering, Brigham Young University
- **Dean's List** April 1999 to April 2001
College of Engineering, Brigham Young University