

TRICIA D. SHEPHERD

Curriculum Vitae

2355 Sherbrook St. Apt 2
Pittsburg, PA, 15217

Phone: (737) 300-7009
Email: tds53@pitt.edu

Education

- 2002 Ph.D. Physical Chemistry, Georgia Institute of Technology
 Advisor: Dr. Rigoberto Hernandez
 Thesis: *Models of Chemical Processes: Activated Dynamics across Stochastic Potentials*
- 1995 M.S. Analytical Chemistry, University of Idaho
 Advisor: Dr. Chein M. Wai
 Thesis: *The Removal of ^{137}Cs from Acidic Nuclear Waste*
- 1994 B.S. Professional Chemistry, University of Idaho

Employment History

- 2020-2021 Adjunct Professor
 Tuskegee University, Tuskegee, AL
 Courses Taught: Physical Chemistry I & II, Experimental Physical Chemistry I & II
- 2019-2020 Visiting Associate Professor
 Franklin & Marshall College, Lancaster, PA
 Courses Taught: General Chemistry I, Structure & Bonding
- 2018-2019 Teaching Fellow
 Moravian College, Bethlehem, PA
 Courses Taught: Physical Chemistry I, Physical Chemistry II, General Chemistry
- 2014-2018 Professor of Chemistry & Department Chair
 St. Edward's University, Austin, TX
 Courses Taught: General Chemistry, Analytical Chemistry, Quantum Mechanics and Spectroscopy, Thermodynamics and Kinetics, Molecular Modeling, Capstone w/embedded Ecuador study abroad
- 2013-2014 Professor of Chemistry/Physics
 Westminster College, Salt Lake City, UT
 Courses Taught: Principles of Chemistry I & II, Physical Chemistry I & II, Principles of Physics I & II, Scientific Computing, Molecular Modeling
- 2007-2013 Associate Professor of Chemistry/Physics
 Westminster College, Salt Lake City, UT
- 2002-2007 Assistant Professor of Chemistry/Physics
 Westminster College, Salt Lake City, UT
- 1996-1997 Visiting Instructor
 Georgia Southern University, Statesboro, GA
 Courses Taught: Introduction to Chemistry, Organic & Biochemistry, and Principles of Chemistry I & II

Research Experience

- Fall 2010 Sabbatical at the University of Utah, Salt Lake City, with Valeria Molinero
Course grained Molecular Dynamics simulations were used to investigate the structure of water at various interfaces including a vacuum, hexagonal ice, a hydrophobic substrate like methane, and in the presence of clathrate hydrates, solid water cages that contain small, hydrophobic guest molecules.
- Summer 2003 Visiting Research Associate at the University of Kansas, Lawrence, with Ward Thompson
Investigated vibrational relaxation of a diatomic solute in a solvent confined within nanoscale frameworks using molecular dynamics simulations
- 1998-2002 Doctoral Research Assistant
Georgia Institute of Technology, Atlanta, GA
A stochastic equation of motion (Langevin Type) with a time-dependent potential of mean force was used to model chemical reactions or dynamical events in complex environments. Various extensions of this stochastic potential model were developed in order to investigate underdamped activated dynamics and diffusion over multiple potential barriers.
- 1994-1995 Undergraduate/Graduate Research Assistant
University of Idaho, Moscow, ID
Copper ferrocyanide was immobilized on a chelating resin for selective removal of cesium from neutral to acidic solutions. Radioactive ^{137}Cs was used as a tracer for this study. Analytical measurements were made using a gamma spectrometer, flame atomic absorption spectrometer, FTIR spectrometer, and UV-Vis spectrophotometer.

Other Activities

- 2019 Project Mentor – IntroCS POGIL Project (NSF DUE 1626765)
Meet biweekly with new IntroCS POGIL instructors to provide feedback and advice regarding the initial implementation of POGIL in and introductory CS course
- 2017-present POGIL Workshop Facilitator Trainer
Training potential POGIL workshop facilitators
- 2008-present POGIL Workshop Facilitator
Facilitated workshop sessions including: Introduction to POGIL, Writing POGIL Activities, Assessing POGIL Activities, Classroom Facilitation, Scholarship of Teaching and Learning
- 2009-2014 K-12 Workshop Instructor
Developed a workshop exploring the molecular basis for water and fat solubility using molecular modeling software (Spartan by Wavefunction, Inc.). This workshop is offered every summer as part of a 3-day science and math camp for 8th grade girls and a Diversity Summer Camp hosted at Westminster College.
- 2009-2012 Regional Coordinator for POGIL Project
Organized and facilitated POGIL workshops for Southwest/Rocky Mountain Region (NM, CO, UT, WY, CA, NV, AZ, HI). Events hosted at Westminster College, MiraCosta College, and University of Redlands
- 2008-2014 Faculty Advisor for Mastering Chemistry (Pearson)
Sharing best practices and tips for successfully integrating the online homework system Mastering Chemistry into the General Chemistry curriculum. Lead advanced training sessions at Mastering Chemistry workshops hosted at BYU and Salt Lake Community College

- 2002-2014 CWCS Theoretical and Computational Chemistry Workshop Instructor
This one-week NSF-CCLI sponsored workshop is designed for faculty from 2- and 4-year colleges and universities across the U.S. It provides a background and modern perspective on theoretical and computational chemistry along with methods to introduce these topics into the undergraduate curriculum.
- 2001-2002 Education Research (STEP) Fellow
Georgia Institute of Technology & North Springs High School, Atlanta, GA
Participated in summer training workshops on inquiry-based learning pedagogy, classroom management, effective teaching skills, and appropriate uses of educational technologies. Classroom and one-on-one instruction at the high school; Designed and implemented classroom websites.

Awards and Honors

- 2017-2018 Lucian Professor
2016 Inaugural POGIL Early Achievement Award
2013 The Myriad Excellence in Learning Leadership Award
2001-2002 NSF-sponsored Student Teacher Enhancement Partnership (STEP) Fellowship
1997 Dean's Professional Development Fellowship, Georgia Institute of Technology
1994 NSF-Idaho EPSCoR Research Experience for Undergraduates (REU) program
1994 Honors Certificate from the University of Idaho Honors Program

Publications (*Undergraduate)

1. D. J. Schmucker, S. R. Dunbar, T. D. Shepherd, M. A. Bertucci "n \rightarrow π^* interactions in n-acyl homoserine lactone derivatives and their effects on hydrolysis rates" *J. Phys. Chem. C*, **2019** *123*, 6088.
2. R. Cole, T. D. Shepherd "Making Sense of Mathematical Relationships in Physical Chemistry" **2019** ACS Symposium Series, *1316*, 173.
3. A. Kumar, A. H. Nguyen, R. Okumu*, T. D. Shepherd, V. Molinero "Could Mesophases Play a Role in the Nucleation and Polymorph Selection of Zeolites?" *J. Am. Chem. Soc.*, **2018**, *140*, 16071.
4. A. H. Nguyen, M. A. Koc*, T. D. Shepherd, V. Molinero "Structure of the Ice-Clathrate Interface" *J. Phys. Chem. C*, **2015** *119*, 4104.
5. R. C. Fortenberry, A.R. McDonald, T. D. Shepherd, M. Kennedy, C. D. Sherrill "PSI4Education: Computational Chemistry Labs Using Free Software" **2015** ACS Symposium Series, *1193*, 85.
6. H. Hu, T. D. Shepherd "Teaching CS 1 with POGIL Activities and Roles" *Proceedings of the 45th ACM Technical Symposium on Computer Science Education*. Atlanta, GA March **2014**
7. T. D. Shepherd and A. Grushow "Quantum Chemistry & Spectroscopy: A Guided Inquiry" John Wiley & Sons, Inc. **2013**
8. H. Hu, T. D. Shepherd "Using POGIL to help students learn to program" *ACM Transactions on Computing Education*, **2013**, Vol. *13*, No. 3, Article 13
9. T. D. Shepherd, M. A. Koc*, V. Molinero "The Quasi-Liquid Layer of Ice under Conditions of Methane Clathrate Formation" *J. Phys. Chem. C*, **2012**, *116*, 12172.
10. T. D. Shepherd "Book & Media Reviews: Mastering Chemistry" *J. Chem. Ed.* **2009**, *86*, 694.
11. J. A. Gomez, A. K. Tucker*, T. D. Shepherd, and W. H. Thompson "Conformational Free Energies of 1,2-Dichloroethane in Nanoconfined Methanol" *J. Phys. Chem. B* **2005**, *109*, 17479.
12. J. M. Moix, T. D. Shepherd, and R. Hernandez "A phenomenological model for surface diffusion: diffusive dynamics across incoherent stochastic potentials" *J. Phys. Chem. B* **2004**, *108*, 19476.
13. S. Li, T. D. Shepherd, and W. H. Thompson "Simulations of the vibrational relaxation of a model diatomic molecule in a nanoconfined polar solvent" *J. Phys. Chem. A* **2004**, *108*, 7347.
14. T. D. Shepherd and R. Hernandez "An optimized mean-first-passage time approach for obtaining rates in activated processes" *J. Chem. Phys.* **2002**, *117*, 9227.
15. T. D. Shepherd and R. Hernandez "Activated dynamics across aperiodic stochastic potentials" *J. Phys. Chem. B* **2002**, *106*, 8176.
16. T. D. Shepherd and R. Hernandez "Chemical reaction dynamics with stochastic potentials below the high-friction limit" *J. Chem. Phys.* **2001**, *115*, 2430.
17. T. D. Clarke and C. M. Wai "Selective removal of cesium from acid solutions with immobilized copper ferrocyanide" *Anal. Chem.*, **1998**, *70*, 3708-3711.

Posters and Presentations

1. Educause Learning Initiative (ELI) Annual Meeting, New Orleans, LA, *Sometimes all it takes is some tables and chairs: Reports from Steelcase Active Learning Center Grant*, Invited Presentation (January 2018)
2. Steelcase Education Active Learning Symposium, Grand Rapids, MI, *Research Story: St. Edward's University*, Invited Presentation (November 2017)
3. National ACS meeting, San Francisco, CA, *Implementing POGIL at a Minority-Serving Institution*, Presentation (April 2017)
4. SWRM ACS regional meeting, Galveston TX, *Using POGIL to teach chemistry majors to program in the context of applications involving data analysis and simulation*, Presentation (November 2016)
5. 43rd Annual NOBCCChE Conference, Raleigh NC, *POGIL: The fundamentals*, Presentation & Workshop (November 2016)
6. AACU 2016 Transforming Undergraduate STEM Education: Implications for 21st-Century Society, Boston MA, *Creating a More Inclusive and Engaging STEM Classroom*, Workshop (November 2016)
7. 47th SIGCSE Technical Symposium, Memphis TN, *Facilitating POGIL Activities to Support All Students*, Workshop (March 2016)
8. 13th National POGIL meeting, St. Louis, MO, *Reflections on the impact of institutional context on POGIL implementation*, Poster (June 2015)
9. National ACS meeting, Denver, CO, *Rethinking homework – the impact of content, format & process on physical chemistry learning outcomes*, Presentation (March 2015)
10. SWRM ACS meeting, Fort Worth, TX, *Effectiveness of online student-centered assessment to evaluate content and process learning outcomes*, Presentation (November 2014)
11. SERMACS ACS regional meeting, Atlanta, GA, *Using Marzano's Taxonomy to assess and improve learning outcomes*, Presentation (November 2013)
12. SERMACS ACS regional meeting, Atlanta, GA, *Characterization of a stripe liquid crystal phase in simple binary water solutions*, Presentation (November 2013)
13. 11th National POGIL meeting, St. Louis, MO, *Development of Learning Cycle activities for an introductory programming course*, Poster (June 2013)
14. 22th Biennial Conference on Chemical Education, University Park, PA, *Incorporating computational chemistry in undergraduate research and education*, Presentation (July 2012)
15. 10th National POGIL meeting, St. Louis, MO, *Using student authored POGIL activities as assessment*, Poster (June 2012)
16. Invited Talk, Canadian Chemistry Conference, Calgary, AB, *From atoms to nanoparticles – the development and implementation of Process Oriented Guided Inquiry Learning (POGIL) in physical chemistry* (May 2012)
17. National ACS meeting, Anaheim, CA, *Revisiting POGIL methodology in the teaching of quantum mechanics*, Presentation (March 2011)
18. Mastering Chemistry Leadership Conference, New Orleans, LA, *Advanced Authoring Tools* (March 2011)
19. 8th National POGIL meeting, St. Louis, MO, *Using student authored POGIL activities as assessment*, Poster (May 2010)
20. Invited Talk, Utah State University, Logan UT, *Using POGIL throughout the chemistry curriculum* (April 2010)
21. Invited Talk, Utah Valley University, Orem UT, *Molecular Dynamics Simulations of Nucleic Acid Systems* (April 2010)
22. National ACS meeting, San Francisco, CA, *Incorporating computational chemistry in undergraduate research and education*, Presentation (March 2010)
23. Invited Talk, Brigham Young University, Provo UT, *Incorporating computational chemistry in undergraduate education* (October 2009)
24. 7th National POGIL meeting, St. Paul, MN, *Student reflections on learning in a POGIL classroom*, Poster (May 2009)
25. National ACS meeting, Salt Lake City, Utah, *Exposing students to the successes and challenges of molecular modeling and simulation*, Presentation (March 2009)
26. National ACS meeting, Salt Lake City, Utah, *Integrating the use of technology to enhance the implementation of POGIL*, Presentation (March 2009)
27. 20th Biennial Conference on Chemical Education, Bloomington, IN, *Emphasizing the P in POGIL!* Presentation (July 2008)
28. 20th Biennial Conference on Chemical Education, Bloomington, IN, *Illustrating the statistical bridge between the*

- microscopic and macroscopic worlds with MD simulations*. Presentation (July 2008)
29. Regional ACS meeting, Park City, Utah, *Using computational studies to promote interdisciplinary learning*, Presentation (June 2008)
 30. American Conference on Theoretical Chemistry, Champion, Pennsylvania, *Chemical reaction dynamics with stochastic potentials*, Poster (July 2002)
 31. 9th Georgia Conference on College and University Teaching, Atlanta, Georgia, *The Georgia Tech Student and Teacher Enhancement Partnership (STEP) Program*, Presentation (February 2002)
 32. Emory University International Conference: Nanobiology, Atlanta, Georgia, *Chemical reaction dynamics with stochastic potentials below the high-friction limit*, Poster (October 2001)
 33. Gordon Research Conference: Chemistry & Physics of Liquids, Plymouth, New Hampshire, *Chemical reaction dynamics with stochastic potentials*, Poster, (August 2001)
 34. Gordon Research Conference: Chemical Physics Summer School (Analytical Approaches to Rate Processes and Time-Resolved Spectroscopy in Condensed Phases), Bristol, Rhode Island, *Stochastic dynamics in the presence of a fluctuating barrier*, Poster (June 2000)

External Funding

Steelcase Active Learning Center Grant (2016-2018), \$60,000

Welch Foundation Departmental Grant (2016-2019), \$105,000

National Science Foundation – Major Research Instrumentation (2016-2019), \$225,000
“Addition of High Performance Computers for the Molecular Education and Research Consortium in Undergraduate computational chemistry (MERCURY)” Award Number: CHE-1662030.

National Science Foundation – Improving Undergraduate STEM Education (2015-2020), \$1,608,224
“SEU Living Learning Community/Active Learning (LLCAL) Project Award Number: 1525490.

National Science Foundation – Major Research Instrumentation (2012-2015), \$200,000
“Acquisition of a High Performance Computer for the Molecular Education and Research Consortium in Undergraduate computational chemistry (MERCURY)” Award Number: CHE-1229354.

National Science Foundation – Major Research Instrumentation (2008-2011), \$229,000
“Acquisition of a High Performance Computer for the Molecular Education and Research Consortium in Undergraduate computational chemistry (MERCURY)” Award Number: CHE-0849677.

National Science Foundation – Major Research Instrumentation (2005-2008), \$100,000
“Acquisition of a Linux Cluster for the Molecular Education and Research Consortium in Undergraduate computational chemistry (MERCURY)” Award Number: CHE-0521063.

Other Professional Activities

Supervision of 40+ undergraduate students including three McNair Scholars, eighteen female students, three African-American and four Hispanic. Student work has been presented locally, regionally, and nationally (NCUR, National American Chemical Society meetings, and the MERCURY conference in computational chemistry). Four former female undergraduate research students have received a PhD at Georgia Institute of Technology (physical chemistry), University of Notre Dame (physical chemistry), University of Utah (analytical chemistry), and Dartmouth (Biomedical Engineering). Two female (one African American) and three male research students are currently working toward a PhD at U.C. Santa Cruz (Physical Chemistry), University of Minnesota (Physical Chemistry), U.C. Berkeley (Physical Chemistry), University of Utah (Material Science) and Boston University (Bioinformatics).

Advisory Board member, NSF IUSE Grant: IntroCS POGIL in Introductory Computer Science
 Consultant, AAC&U Teaching to Increase Diversity and Equity in STEM (TIDES)
 AAC&U/PKAL Summer Leadership Institute for STEM Faculty, Crestone, CO, 2015
 Panelist, NSF Chemical Theory, Models and Computational Methods
 Referee for National Science Foundation and ACS Petroleum Research Fund
 Reviewer Journal of Chemical Education

Weber State program review (2013)

Review abstract submissions for NCUR (National Conference on Undergraduate Research)

External Promotion Review for chemistry faculty at University of Minnesota, Morris (2009) and Georgia Southern University (2011), Wheaton College (2013), Hamilton College (2014)

Invited symposium for the ACS National meeting, “*Computational Chemistry Investigations for Undergraduates*” San Francisco (September 10-14, 2006). Symposium co-organized by T. D. Shepherd and Daniela Kohen.

Committees and Service

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| 2016-2018 | NSCI Strategic Planning Committee |
| 2015-2017 | NSCI Travel Committee |
| Spring 2015 | Curriculum Models Group for General Education Reform Committee (GERC) |
| 2004-2014 | Instituted and organized summer undergraduate research meetings |
| 2012-2014 | Undergraduate research committee |
| 2011-2013 | Westminster Teagle working group |
| 2010-2013 | Faculty Senate (2012-2013 Chair) |
| 2010-2012 | A&S Travel Committee |
| 2007-2011 | Web Content Committee |
| 2006-2010 | Meldrum Science Center Building Shepherd |
| 2008-2010 | Chair of Teaching and Learning Resources Committee |
| 2007-2009 | Facilitator for LE workshop on Leadership, Collaboration and Teamwork |
| 2007-2009 | Undergraduate Research Faculty Group |
| 2005-2007 | Liberal Education Committee |
| 2006-2007 | Academic computing Task Force |
| 2006-2007 | President’s Advisory Council |
| 2005-2006 | Arts and Science Curriculum Committee |
| 2003-2005 | Teaching and Learning Resources Committee |

Professional Memberships

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| 2002-present | Council of Undergraduate Research |
| 2002-present | American Chemical Society |