

John J. Karnes

University of California, Santa Cruz

Department of Chemistry and Biochemistry

1156 High Street

Santa Cruz, CA 95064

Phone: (949) 735-9305

Email: jkarnes@ucsc.edu

Education

Ph.D. Candidate in Chemistry, University of California, Santa Cruz, *pres.*

- Thesis title: “Theoretical Studies of Molecular Structure, Dynamics, and Reactivity at Liquid Interfaces.”
- Expected completion date: June 2018.
- Chancellor’s Dissertation-Year Fellowship, 2017
- American Chemical Society’s Chemical Computing Group Excellence Award for Graduate Students, 2017

M.S. Chemistry, University of California, Irvine, 2006.

- Graduate Assistance in Areas of National Need (GAANN) Fellowship, 2004

B.S. Chemical Engineering, University of Kentucky, 1999.

- University of Kentucky National Merit Scholarship, 1994
- Dean James Hiram Graham Memorial Scholarship, 1997

Publications

12. [Karnes, J. J.; Benjamin, I. Miscibility at the Immiscible Liquid/Liquid Interface: A Molecular Dynamics Study of Thermodynamics and Mechanism. *J. Chem. Phys.* **2018**, *148*, 034707.](#)
11. [Karnes, J. J.; Benjamin, I. On the Local Intermolecular Ordering and Dynamics of Liquid Chloroform. *J. Mol. Liq.* **2017**, *248*, 121-126.](#)
10. [Karnes, J. J.; Benjamin, I. \$S_N2\$ Reaction Rate Enhancement by \$\beta\$ -cyclodextrin at the Liquid/Liquid Interface. *J. Phys. Chem. C* **2017**, *121*, 19209-19217.](#)
9. [Karnes, J. J.; Benjamin, I. Structure and Dynamics of Host/Guest Inclusion Complexes at the Liquid/Liquid Interface: Implications for Inverse Phase Transfer Catalysis. *J. Phys. Chem. C* **2017**, *121*, 4999-5011.](#)
8. [Karnes, J. J.; Benjamin, I. Geometric and Energetic Considerations of Surface Fluctuations During Ion Transfer Across the Water-Immiscible Organic Liquid Interface. *J. Chem. Phys.* **2016**, *145*, 014701. *Journal cover image.*](#)
7. [Karnes, J. J.; Gobrogge, E. A.; Walker, R. A.; Benjamin, I. Unusual Structure and Dynamics at Silica/Methanol and Silica/Ethanol Interfaces: A Molecular Dynamics and Nonlinear Optical Study. *J. Phys. Chem. B* **2016**, *120*, 1569-1578.](#)
6. [Karnes, J. J.; Benjamin, I. Mechanism and Dynamics of Molecular Exchange at the Silica/Binary Solvent Mixtures Interface. *J. Phys. Chem. A* **2015**, *119*, 12073-12081.](#)
5. [Sethian, J. D.; *et. al.* The Science and Technologies for Fusion Energy with Lasers and Direct-Drive Targets. *IEEE Trans. Plasma Sci.* **2010**, *38*, 690-703.](#)

4. Karnes, J. J.*; Petta, N. M.; Streit, J. E. Optimization of Phase Transfer Catalysis for in Situ Coating of Resorcinol Formaldehyde Targets. *Fusion Sci. Technol.* **2009**, *55*, 472-476.
3. Rearden, P.; Harrington, P. B.; Karnes, J. J.; Bunker, C. E. Fuzzy Rule-Building Expert System Classification of Fuel Using Solid-Phase Microextraction Two-Way Gas Chromatography Differential Mobility Spectrometric Data. *Anal. Chem.* **2007**, *79*, 1485-1491.
2. Wang, G.; Karnes, J. J.; Bunker, C. E.; Lei Geng, M. Two-Dimensional Correlation Coefficient Mapping in Gas Chromatography: Jet Fuel Classification for Environmental Analysis. *J. Mol. Struct.* **2006**, *799*, 247-252.
1. Bunker, C. E.; Karnes, J. J. Low-Temperature Stability and High-Temperature Reactivity of Iron-Based Core-Shell Nanoparticles. *J. Am. Chem. Soc.* **2004**, *126*, 10852-10853.

* as corresponding author

Presentations

17. Karnes, J. J.; Benjamin, I. "Mixing oil and water: The thermodynamics and mechanism of water transferring into oil." Poster, Berkeley Statistical Mechanics Meeting, University of California, Berkeley, CA, 12 January 2018.
16. Karnes, J. J.; Benjamin, I. "Deconstructing inverse phase transfer catalysis with computer simulations." Oral, University of California, Santa Cruz Department of Chemistry and Biochemistry Conference, Santa Cruz, CA, 19 September 2017.
15. Karnes, J. J.; Benjamin, I. "Quantifying the catalyst's role in inverse phase transfer catalysis with computer simulations." Oral, 253rd American Chemical Society National Meeting and Exposition, San Francisco, CA, 4 April 2017.
14. Karnes, J. J.; Benjamin, I. "Water Transfer at the Water/Oil Interface." Oral, 2nd University of California Chemical Symposium, Lake Arrowhead, CA, 28 March 2017.
13. Karnes, J. J.; Benjamin, I. "Local Ordering in Chloroform and Carbon Tetrachloride." Poster, University of California, Berkeley Mini Statistical Mechanics Meeting, 14 January 2017.
12. Karnes, J. J.; Benjamin, I. "Simulating a Host/Guest System at the Liquid/Liquid Interface." Poster, University of California, Santa Cruz Department of Chemistry and Biochemistry Conference, 13 September 2016.
11. Karnes, J. J.; Benjamin, I. "Deconstructing the 'water finger': A re-examination of water-organic ion transfer." Poster, University of California Symposium for the Chemical Sciences, Lake Arrowhead, CA, 22 March 2016.
10. Karnes, J. J.; Benjamin, I. "Deconstructing the 'water finger': A re-examination of water-organic ion transfer." Poster, 251st ACS National Meeting & Exposition, San Diego, California, 14-16 March 2016.
9. Karnes, J. J.; Benjamin, I. "Ion transfer across a water-nitrobenzene interface." Poster, University of California, Santa Cruz Department of Chemistry and Biochemistry Conference, 9 September 2015.
8. Karnes, J. J.; Benjamin, I. "Investigating a Binary Solvent Mixture at the Liquid-Solid Interface via Molecular Dynamics." Oral, Tohoku University Chemistry Summer School, Sendai, Japan, 27 August 2015.

7. Karnes, J. J.; Benjamin, I. "Binary solvents at liquid-solid interfaces: hydrogen bond competition." Poster, University of California, Santa Cruz Department of Chemistry and Biochemistry Conference, 16 September 2014.
6. Karnes, J. J.; *et. al.* "Progress toward an air-dried HAPL target capsule" 51st Annual Meeting of the American Physical Society Division of Plasma Physics, Atlanta, GA, 2-6 November 2009.
5. Karnes, J. J.; *et. al.* "Progress on Air Dried RF foam shells and In-situ Coatings" 19th High Average Power Laser Program Workshop, University of Wisconsin, Madison, 22-23 October 2008.
4. Karnes, J. J. *et. al.* "In Situ Resorcinol Formaldehyde Coatings" 18th Target Fabrication Meeting, Lake Tahoe, CA, 11-15 May 2008.
3. Karnes, J. J.; *et. al.* "In Situ Resorcinol Formaldehyde Coatings" 17th High Average Power Laser Program Workshop, Naval Research Laboratory, Washington, DC, 30-31 October 2007.
2. Karnes, J. J.; Sanders, N. L.; Guliants, E. A.; Bunker, C. E. "Preparation, Characterization, and Reactivity of Iron Core-Shell Nanoparticles," 2nd Annual Nano-Materials for Defense Applications Symposium, Maui, HI, February 2004.
1. Karnes, J. J.; *et. al.* "Predicting the Physical Properties of Aviation Fuels through Advanced Chemometric Analysis of Analytical Data" 28th Dayton-Cincinnati Aerospace Sciences Symposium, Dayton, OH, 4 March 2003.

Service

Committee member for the 2017 and 2018 University of California Chemical Symposiums. Serving on the Grant Writing, Fundraising, and Oral & Poster Session Planning subcommittees. *Secured NSF grant 1707956, February 2017. Secured Army Research Office grant W911NF-18-1-0039, November 2017.*

Volunteer as an "expert" with *Science Buddies*, a nonprofit organization that helps students, parents, and teachers with the design and implementation of K-12 science fair experiments.

Teaching Experience

Teaching Assistant: General Chemistry Lecture, General Chemistry Laboratory, Scientific Computing Skills (with Mathcad)

Substitute Lecturer: General Chemistry

Employment

Schafer Corporation, *Senior Scientist*, Livermore, CA. 2006-2011.

- Analyzed and interpreted nuclear test ban treaty verification data for Department of Defense
- Design, synthesis, and fabrication of laser targets in support of high energy density / inertial confinement fusion experiments
- Developed new materials (e.g. aerogels, thin films) from concept to delivery to meet customer's needs
- Published and presented research both internally and externally

Innovative Scientific Solutions, Inc., *Research Engineer*, Wright Patterson Air Force Base, Dayton, OH. 2002-2004.

- Developed software that used machine learning and chemometric approaches to characterize aviation fuel from analytical data

- Synthesized and characterized core-shell nanoparticles for intended use as aviation fuel additives
- Published and presented research at national and international meetings

AK Steel, *Maintenance Area Manager*, Middletown OH. 1996-2002.

- Engineer in a blast furnace, made quick, quantitative decisions on-the-fly to improve old methods
- Led and coordinated crews of pipefitters, millwrights, machinists, etc. toward common tasks
- Jack-of-all-trades: from material and energy balances to valve repair to scheduling overtime

Additional information and training

“Stanford/PULSE Electronic Structure Summer School,” short course, Stanford/SLAC National Accelerator Laboratory, Menlo Park, CA, June 2017.

Previously held US Department of Defense ‘Top Secret’ and US Department of Energy ‘Q’ security clearances.

“Nuclear Forensic Science,” short course, Radiochemistry Society, Richland, WA, January 2011.

“Environmental Radiochemistry,” short course, Nevada Technical Associates, Inc., Roswell, GA, April 2010.

“Polymer Chemistry: Principles and Practice,” short course, American Chemical Society, Blacksburg, VA, April 2007.

“ISO 9001:2000 - Fundamentals,” short course, QMI Management Systems Registration, Edmonton, AB, June 2006.

Programming experience

C (primary language used during Ph.D. work)

C# (instrument control, GUI, data handling)

C++ (Computer Science majors’ programming series, Wright State university)

MATLAB (chemometric data analysis: partial least squares, principal component analysis, etc.)