Current Position

Clare Boothe Luce Assistant Professor
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Education and Training

University of Utah Postdoctoral Fellow 2011-2014
Mentor: Professor John C. Conboy
Measured selective estrogen receptor modulator (SERM)–membrane interactions with second harmonic generation

Johns Hopkins University Postdoctoral Fellow 2009-2011
Mentors: Professor Alan T. Stone and Professor Justine P. Roth
Characterized manganese (III) species formed with pyrophosphate, phosphonacetate, and citrate ligands using capillary electrophoresis and high performance liquid chromatography

Northwestern University Ph. D. Physical Chemistry 2009
Thesis advisor: Professor Franz M. Geiger
"Heterogeneous Ozonolysis of Tropospherically Relevant Chiral and Achiral Olefins Studied by Vibrational Sum Frequency Generation"

Stanford University B. S. Chemistry 2002

Publications from Santa Clara University (* *denotes undergraduate student)*

1. Landry, M. R.*; Rangel, J. L.*; Dao, V. P.*; MacKenzie, M. A.*; Gutierrez, F. L.*; Dowell, K. M.*; Calkins, A. L.*; Fuller, A. A.; **Stokes, G. Y.** "Length Impacts Adsorption of Water-Soluble Peptoids to Phospholipid Membranes," *J. Phys. Chem. B* 2019, 123, 5822-5831. 10.1021/acs.jpcb.9b04641 Special Issue: *Pacific Conference on Spectroscopy and Dynamics*

2. Jimenez, C. J.*; Tan, J.*; Dowell, K. M.*; Gadbois, G. E.*; Read, C. A.*; Burgess, N.*; Cervantes, J. E.*; Chan, S.*; Jandaur, A.*; Karanik, T.*; Lee, J. J.*; Ley, M. C.*; McGeehan, M.*; McMonigal, A.*; Palazzo, K. L.*; Parker, S. A.*; Payman, A.*; Soria, M.*; Verheyden, L.*; Vo, V. T.*; Yin, J.*; Calkins, A. L.*; Fuller, A. A.; **Stokes, G. Y.** "Peptoids advance multidisciplinary research and undergraduate education in parallel: Sequence effects on conformation and lipid interactions," *Biopolymers* 2019, 323256. 10.1002/bip.23256 Special issue: *Peptoids*

3. **Stokes, G. Y.**; DiCicco, E. N.*; Moore, T. J.*; Cheng, V. C.; Wheeler, K. Y.; Soghigian, J.; Barber, R. P.; Edgerly, J. S. "Structural and Wetting Properties of Nature's Finest Silks (Order Embioptera)," *Royal Soc. Open Sci.* 2018, 5: 180893. 10.1098/rsos.180893

4. Fearon, A. D.*; **Stokes, G. Y.** "Thermodynamics of Indomethacin Adsorption to Phospholipid Membranes," *J. Phys. Chem. B* 2017, 121,10508-10518. 10.1021/acs.jpcb.7b08359 Special issue: *Physical Chemistry Research at Undergraduate Institutions*

5. Calkins, A. L.*; Yin, J.*; Rangel, J. L.*; Landry, M. R.*; Fuller, A. A.; **Stokes, G. Y.** "A Thermodynamic Description of the Adsorption of Simple Water-Soluble Peptoids to Silica," *Langmuir* 2016, 32, 11690-11697. 10.1021/acs.langmuir.6b02804

6. Osborn Popp, T. M.; Addison, J. B.; Jordan, J. S.; Damle, V. G.; Rykaczewski, K.; Chang, S. L. Y.; **Stokes, G. Y.;** Edgerly, J. S.; Yarger, J. L. "Surface and Wetting Properties of Embiopteran (Webspinner) Nanofiber Silk," *Langmuir* 2016, 32, 4681-4687. 10.1021/acs.langmuir.6b00762

Publications from graduate and postdoctoral training

7. **Stokes, G. Y.**; Conboy, J. C. "Measuring Selective Estrogen Receptor Modulator (SERM)-Membrane Interactions with Second Harmonic Generation" *J. Am. Chem. Soc.* 2014, 136, 1409-1417.

8. Buchbinder, A. M.; Gibbs-Davis, J. M.; **Stokes, G. Y.**; Peterson, M. D.; Weitz, E.; Geiger, F. M. "Method for Evaluating Vibrational Mode Assignments in Surface-Bound Cyclic Hydrocarbons Using Sum-Frequency Generation," *J. Phys. Chem. C,* 2011, *115*, 18284-18294.

9. **Stokes, G. Y.**; Chen, E. H.; Buchbinder, A. M.; Paxton, W. F.; Keeley, A.; Geiger, F. M. "Atmospheric Heterogeneous Stereochemistry" *J. Am. Chem. Soc.*, 2009, *131*, 13733-13737.

10. **Stokes, G. Y.**; Chen, E. H.; Walter, S. R.; Geiger, F. M. "Two reactivity modes in the heterogeneous cyclohexene ozonolysis under tropospherically relevant ozone-rich and ozone-limited conditions," *J. Phys. Chem. A*, 2009, *113*, 8985-8993.

11. Hellar, J. A.; Lin, J-C.; Kim, J-H.; Yoder, N. L.; Bevan, K. H.; **Stokes, G. Y.**; Geiger, F. M.; Nguyen, S. T.; Bedzyk, M. J.; Hersam, M. C. "Probing Surface-Adlayer Conjugation on Organic-Modified Si(111) Surfaces with Microscopy, Scattering, Spectroscopy and Density Functional Theory," *J Phys. Chem. C.* 2009, *113*, 2919-2927.

12. **Stokes, G. Y.;** Buchbinder, A. M.; Gibbs-Davis, J. M.; Scheidt, K. A.; Geiger, F. M. "Chemically Diverse Environmental Interfaces and Their Reactions with Ozone Studied by Sum Frequency Generation," *Vib. Spectros.* 2009, *50*, 86-98.

13. **Stokes, G. Y.**; Buchbinder, A. M.; Gibbs-Davis, J. M.; Scheidt, K. A.; Geiger, F. M "Heterogeneous Ozone Oxidation Reactions of 1-Pentene, Cyclopentene, Cyclohexene, and a Menthenol Derivative Studied by Sum Frequency Generation," *J. Phys. Chem. A.* 2008, *112*, *46*, 11688-11698.
14. **Stokes, G. Y.**; Gibbs-Davis, J. M.; Boman, F. C.; Stepp, B. R.; Condie, A.; Nguyen, S. T.; Geiger, F. M. "Making 'Sense' of DNA," *J. Am. Chem. Soc.* 2007, *129*, 7492-7493.

15. Voges, A. B.; **Stokes, G. Y.**; Gibbs-Davis, J. M.; Lettan, R. B., II; Bertin, P. A.; Pike, R. C.; Nguyen, S. T.; Scheidt, K. A.; Geiger, F. M. "Insights into Heterogeneous Atmospheric Oxidation Chemistry: Development of a Tailor-Made Synthetic Model for Studying Tropospheric Surface Chemistry," *J. Phys. Chem. C.* (Feature Article), 2007, *111*, 1567-1578.

16. Konek, C. T.; Illg, K. D.; Al-Abadleh, H. A.; Voges, A. B.; **Yin, G.**; Musorrafiti, M. J.; Schmidt, C. M.; Geiger, F. M. "Nonlinear Optical Studies of the Agricultural Antibiotic Morantel Interacting with Silica/Water Interfaces," *J. Am. Chem. Soc.* 2005, *127*, 15771-15777.

Active External Grants

- "CAREER: Quantifying How Peptoids Interact with Lipid Membranes" National Science Foundation (NSF CHE-1848583) (2019-2024) $475,000
- "Thermodynamic Studies of Peptoid–Lipid Interactions" Cottrell Scholar Award, Research Corporation for Scientific Advancement (RCSA) (2018-2021) $100,000
- Jean Dreyfus Lectureship Award for Undergraduate Institutions (2017-2020) $18,500

Internal Grants

- "Thermodynamic Studies of Peptoid–Membrane Interactions" DeNardo Research Grant Supplemental Award (Awarded January 2018) $8000
- "Quantifying the thermodynamic forces which drive adsorption of water-soluble peptoids to lipid bilayers" University Research Grant (Awarded May 2017) $5000
- "High-Throughput Study of Organic Molecules Adsorbed to Peptoid Coatings" STEM Convergence Grant from SCU Provost's Office (Awarded May 2016) $15,000
- "Characterization of Peptoid Coatings on Silica Surfaces." University Research Grant (Awarded May 2016) $5000
- "Adsorption of indomethacin to lipid bilayers containing cyclooxygenase-2" Faculty-Student Research Assistant Program (FSRAP) (Awarded May 2016) $1000
- "Summer Stipend for Researching How Chiral Anesthetic Drugs Interact with Model Cell Membranes" Faculty Summer Stipend (Awarded May 2015) $6000

Honors and Awards

- Clare Booth Luce Assistant Professorship (2014-2022)
- Scialog Fellow: Chemical Machinery of the Cell, RCSA (2018-2019)
- Camille and Henry Dreyfus Environmental Chemistry Postdoctoral Fellowship (2009-2011)
- NASA Earth and Space Science Graduate Fellowship (2004-2009)

Invited seminars

- Keck Science Department, Claremont Colleges, November 2019
- University of Wisconsin Eau Claire, Department of Chemistry, November 2019
- Louisiana State University, Macromolecular Chemistry Seminar, September 2019
- University of the Pacific, Stockton, CA, Department of Chemistry, September 2019
- Cal Poly San Luis Obispo, San Luis Obispo, CA Department of Chemistry, May 2019
- UC Berkeley, Graduate Women in Engineering Speaker Series, March 2019
- Macalester College, St. Paul, MN, Department of Chemistry, November 2018
- UC Merced, Department of Chemistry and Chemical Biology, August 2018
- The Hockaday School, "The Hungry Scientist" seminar promoting women in STEM, April 2018
- Sonoma State University, Department of Chemistry and Biochemistry, April 2018
- Berkeley Science Leadership and Management (SLAM), UC Berkeley, November 2017
- Aquinas High School, AP chemistry and biology classes, La Crosse, WI, November 2017
- University of Wisconsin—La Crosse, Department of Chemistry, La Crosse, WI, November 2017
- San Francisco State University, Department of Chemistry and Biochemistry, October 2017
- San Jose State University, Department of Chemistry, October 2017
- Lawrence Livermore National Lab, Biosciences & Biotechnology Division, September 2017
- Academic career panel discussion, Stanford University School of Medicine, May 2016
- Whitman College, Department of Chemistry, Walla Walla, WA, December 2013

Selected Conference Presentations

Oral presentations

- 258th ACS National Meeting, San Diego, CA, August 2019, "Quantifying drug adsorption to lipid membranes using second harmonic generation" (COLL 484)
- 258th ACS National Meeting, San Diego, CA, August 2019, "Implementing python-based computational guided inquiry exercises in thermodynamics and quantum chemistry courses" (CHED 97)
- 257th ACS National Meeting, Orlando, CA, March 2019, "Second harmonic generation studies of water-soluble peptoids adsorbed to phospholipid membranes" (COLL 61)

- Pacific Conference on Spectroscopy and Dynamics, San Diego, CA, January 2019, "Peptoids adsorbed to phospholipid membranes reveal drug design principles" (invited talk)
- 10th Peptoid Summit, Berkeley, CA, August 2017, "Peptoids at the silica-aqueous interface"
- 253rd ACS National Meeting, San Francisco, CA, April 2017, "Second harmonic generation studies of water-soluble peptoids adsorbed to phospholipid membranes" (COLL 3)
- 251st ACS National Meeting, San Diego, CA, March 2016, "Interactions between water-soluble peptoids and silica surfaces studied by second harmonic generation" (COLL 121)
- 246th ACS National Meeting, Indianapolis, IN, September 2013, "Characterizing the interactions between planar supported lipid bilayers and selective estrogen receptor modulators (SERMs) using second harmonic generation spectroscopy" (COLL 412)
- Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESS), Brookhaven National Lab, NY, August 2009, "Heterogeneous ozonolysis of chiral and achiral olefins studied by sum frequency generation"
- 238th ACS National Meeting, Washington, DC, August 2009, "DNA hybridization studied by SHG and SFG" (ANYL 365)
- American Physical Society (APS) March Meeting, New Orleans, LA, March 2008, "Heterogeneous oxidation reactions relevant to atmospheric aerosol chemistry studied by sum frequency generation"
- 234th ACS National Meeting, Boston, MA, August 2007, "Tropospheric aerosol surface oxidation reactions studied by sum frequency generation" (ENVR 8)
- 62nd International Symposium on Molecular Spectroscopy, Ohio State University, June 2007, "DNA functionalized surfaces studied by nonlinear optical spectroscopy"
- 232nd ACS National Meeting, San Francisco, CA, September 2006, "Probing chirality of DNA at interfaces using sum frequency generation"
- 37th ACS Great Lakes Regional Meeting, Milwaukee, WI, June 2006, "Heterogeneous Organic Oxidation Reactions Relevant to Tropospheric Chemistry"

Poster Presentations

- 62nd Annual Meeting, Biophysical Society, San Francisco, CA, February 2018, "Thermodynamic Studies of Indomethacin Adsorption to Phospholipid Membranes"
- Pacific Conference on Spectroscopy and Dynamics, San Diego, CA, January 2018, "Indomethacin Interactions with Supported Phospholipid Bilayers"
- 10th Peptoid Summit, Berkeley, CA, August 2017, "Thermodynamic studies of the adsorption of water-soluble peptoids to supported lipid bilayers using second harmonic generation"
- Pacific Conference on Spectroscopy and Dynamics, Asilomar, CA, January 2017, "Thermodynamic studies of the adsorption of water-soluble peptoids to silica at the liquid-solid interface using second harmonic generation"
- Chemical Reactions at Interfaces Gordon Research Conference, Ventura, CA, February 2015, "Adsorption of capsaicin and related amphiphiles to supported lipid bilayers containing gramicidin A ion channels"
- 246th ACS National Meeting, Indianapolis, IN, September 2013, "Using nonlinear optical spectroscopies to elucidate surface adsorption and reaction in systems ranging from atmospheric aerosols to drug-membrane interactions" (AEI 11)
- Environmental Sciences: Water Gordon Research Conference, Holderness, NH, June 2010, "Understanding the chemical pathways of lignin degradation by white rot fungi"
- Metals in Biology Gordon Research Conference, Ventura, CA, February 2010, "Mechanism of tyrosine oxidation in heme oxygenase"
- Atmospheric Chemistry Gordon Research Conference, Waterville Valley, NH, August 2009, "Heterogeneous cyclohexene ozonolysis under tropospherically relevant ozone conditions"
- Chemical Reactions at Interfaces Gordon Research Conference, Ventura, CA, February 2009, "Reactions of atmospherically relevant organic surfaces with ozone characterized by sum frequency generation"

Department and University Service Activities

- Chemistry & Biochemistry department research seminar coordinator (2015-2017)
- Reviewer for internal undergraduate research awards: Goldwater Scholarship nominations, Clare Boothe Luce fellowships, Richard Bastiani summer research awards (2014-present)
- Chemistry & Biochemistry department liaison to the Coding Working Group (2018-2019)
- General chemistry curriculum revision committee member (2018-2019)
  Beckman Scholar Program, designated mentor and selection committee member (2019-2021)
- Organized tours of my research lab and gave demonstrations to support and recruit female high school students from Villanova Prep, a Clare Boothe Luce designated institution (February 5, 2018)
- Gave presentations and answered questions for prospective students and parents about chemistry and biochemistry department on SCU Preview Day (April 15, 2018)
- Participated in the STEM programming and planning meetings and Wet Lab Focus Group discussions to propose policies for the allocation and management of resources for the Sobrato Campus for Discovery and Innovation at SCU (2014-present)
- Member of Santa Clara University's delegation to the Teaching to Increase Diversity and Equity in STEM (TIDES) Institute in Los Angeles, CA (June 2019)

Professional Service

- Reviewer for ten manuscripts submitted to the following ACS journals: *Journal of the American Chemical Society*, *Journal of Physical Chemistry*, and *Environmental Science and Technology* (September 2014 through May 2019)
- Ad hoc reviewer for two American Chemical Society Petroleum Research Fund proposals (July 2016 and July 2018) and two National Science Foundation CHE proposals (April 2019)

Teaching

- General Chemistry I, lecture and laboratory
- General Chemistry II, lecture and laboratory
- Chemical Thermodynamics
- Quantum Chemistry (Spectroscopy)
- Faculty-Mentored Capstone Research Experience

Synergistic activities

Curriculum Development Team for Computational-Guided Inquiry Modules

I served on a team of physical chemistry instructors who implemented and evaluated prototype Python-based computational-guided inquiry (CGI) modules in upper-division physical chemistry courses in Winter and Spring quarters of 2018 and 2019. Participated in NSF-sponsored workshops and 2017 and 2018 to incorporate Polar Research into undergraduate curricula using CGIs combined with backward design and flipped classroom methods.

Mentor and instructor for first generation college students at Santa Clara University

In Fall 2016, 2018 and 2019, a cohort of first-generation college students (LEAD scholars) were enrolled together in my first-term general chemistry lecture section in order to better support underrepresented students through advancements in pedagogy. I used active learning practices and flipped classroom methods to engage weaker students, and helped students organize residence-based study groups. Additionally, in Fall 2018 and 2019, one week before classes begin, I taught a five-lecture elective course to a subset of LEAD scholars to help them better understand and solve word problems in college-level science courses, and to introduce them to computer-based tools for visualizing and analyzing data relevant to current chemistry research. To learn more about the Leadership Excellence Academic Development (LEAD) program at Santa Clara University, see https://www.scu.edu/lead/.