Allison G. Roessler

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EDUCATION

Ph.D. Chemistry and Scientific Computing, 2020
Department of Chemistry, University of Michigan, Ann Arbor, MI
Graduate Certificate on Teaching
Diversity, Equity, and Inclusion Graduate Certificate

B.S. Chemistry, 2015
Department of Chemistry and Physics, Franciscan University of Steubenville, Steubenville, OH
Spanish Minor
Semester Abroad – Gaming, Austria

PUBLICATIONS

Peer-Reviewed Journal Articles

2020 Yang, X.; † Gitter, S. R.; † Roessler, A. G.; † Zimmerman, P. M.; and Boydston, A. J. Stereocontrol in photoredox mediated metal-free ring-opening metathesis polymerization. *In prep.* †These authors contributed equally to this work.

2020 Lipinski, B. M.; Walker, K. L.; Clayman, N. E.; Morris, L. S.; Jugovic, T. M.E.; Roessler, A. G.; Getzler, Y. D; Macmillan, S. N.; Zare, R. N.; Zimmerman, P. M.; Waymouth, R. M.; Coates, G. W. Mechanistic study of isotactic poly(propylene oxide) synthesis using a tethered bimetallic chromium salen catalyst. *ACS Catal*, 2020, 10 (15), 8960-8967. DOI: 10.1021/acscatal.0c02135

2018 Roessler, A. G. and Zimmerman, P. M. Examining the ways to bend and break reaction pathways using mechanochemistry. *J. Phys. Chem. C*, 2018, *122* (12), 6996-7004. DOI: 10.1021/acs.jpcc.8b00467

TEACHING EXPERIENCE

General Chemistry, Oglethorpe University. Fall 2020
Remote team-based learning classroom. Implemented synchronous problem-solving sessions utilizing Zoom breakout rooms and remote polling software.

General Chemistry, University of Michigan. Fall 2015, Spring 2016
Accelerated course combining all general chemistry concepts into a one-semester course. Engaged students in cooperative learning by using think-pair-shares on conceptual questions as well as assigning small problem sets for students to work on in small groups.

General Chemistry Lab, University of Michigan. Fall 2016
Engaged students in inquiry-based learning by allowing some aspects of each lab to be more open-ended. Students were encouraged to ask questions and explore the material by designing mini-experiments in order to develop problem-solving skills. Additionally, reciprocal peer teaching was utilized by having pairs of students take turns teaching laboratory techniques and calculations necessary for the upcoming laboratory period.

Chemical Principles, University of Michigan. Fall 2018, Spring 2019, Fall 2019
Physical chemistry course covers quantum, chemical thermodynamics, and chemical kinetics. Used cooperative learning techniques to practice and reinforce concepts learned in lecture such as students working together on an assigned problem or teaching a concept to a partner. Additionally, collaborative learning was utilized by working with students as a class to reason through new concepts. Taught students metacognitive learning strategies to use their study time more effectively.

Physical Chemistry Principles and Applications, University of Michigan. Spring 2020
Experience working in a flipped classroom environment. Facilitated group work during lecture periods and ran several separate recitation sections for additional practice.

AWARDS AND HONORS

2019-20 Michigan Institute for Computational Discovery and Engineering Fellowship, University of Michigan, Ann Arbor, MI.

2019 Women Make COMP, American Chemical Society National Meeting, San Diego, CA.

2019 Karle Symposium Outstanding Poster Award, University of Michigan, Ann Arbor, MI.

2019 Robert and Carolyn Buzzard Graduate Chemistry Student Leadership Award, University of Michigan, Ann Arbor, MI.

2018 Materials Research Symposium Silver Poster Award, University of Michigan, Ann Arbor, MI.

2018 Karle Symposium Oral Presentation Award, University of Michigan, Ann Arbor, MI.

2018 Rackham Conference Travel Grant, University of Michigan, Ann Arbor, MI.

2015-18 American Chemical Society Science Coaches Grant, St. Thomas School, Ann Arbor, MI.
Initiated collaboration with a local middle school science educator. Jointly secured funding, identified holes in the curriculum, and implemented laboratory and classroom coursework to round out science education.

2014 National Science Foundation REU, Duquesne University, Pittsburgh, PA.

2011-15 Center for Leadership, Franciscan University of Steubenville, Steubenville, OH.
Selected to participate in the inaugural class of Franciscan University's premier leadership program based on academic achievements and proven leadership abilities. This four-year co-curricular program cultivated practical skills essential for effective, lifelong leadership.

2011 Father Michael Scanlan Scholarship, Franciscan University of Steubenville, Steubenville, OH.
One of two incoming students to receive a four-year full-tuition scholarship to Franciscan University based on demonstrated academic and leadership skills.

CONFERENCE ACTIVITY/PARTICIPATION

Symposia Organized

2020 Chair, Graduate Student Symposium Planning Committee, American Chemical Society National Meeting, March 24. *Remote due to Covid-19*.

Contributed Presentations

2020 Using the Growing String Method to Develop Force-Responsive Materials: Elucidating Mechanistic Details for Mechanochemical Reactions, American Chemical Society National Meeting, March 23.

2020 Utilizing Computation to Understand the Physical-Organic Parameters that Govern Mechanophore Reactivity in Force-Responsive Polymers, American Chemical Society National Meeting, March 23.

2019 Computational Probing of the Force-Biased Potential Energy Surface: Uncovering Nonintuitive Mechanochemical Reaction Pathways, American Chemical Society National Meeting, August 27.

2019 Mechanistic Study of a Bimetallic Chromium Catalyst for Isotactic Propylene Oxide Polymerization, American Chemical Society Central Regional Meeting, June 5.

2019 Developing Responsive Materials with Mechanochemistry: A Computational Approach, American Chemical Society Central Regional Meeting, June 4.

2019 Mechanistic Study of Isotactic Propylene Oxide Polymerization by a Flexible Bimetallic Cr (III) Catalyst, Michigan Chapter of the North American Catalysis Society Annual Spring Meeting, May 7.

2018 Enantioselective Propylene Oxide Polymerization with a Bimetallic Chromium (III) Catalyst, Detroit Symposium on Polymer Science, November 30.

2018 Understanding Perturbations to Mechanochemical Reaction Paths for the Engineering of Force-Responsive Materials, American Chemical Society National Meeting, March 19.

CAMPUS OR DEPARTMENTAL PRESENTATIONS

2019 Using Computation to Develop Force-Responsive Materials: Elucidating Molecular-Level Mechanisms for Mechano-Materials, Materials Research Symposium, November 22.

2019 Interrogating the Force-Biased Potential Energy Surface to Uncover Nonintuitive Mechanochemical Reaction Pathways, M|CORE, November 12.

2019 Interrogating the Force-Biased Potential Energy Surface to Uncover Nonintuitive Mechanochemical Reaction Pathways, Karle Symposium, August 2.

2019 Enantioselective Propylene Oxide Polymerization with a Bimetallic Chromium Catalyst, Michigan Institute for Computational Discovery and Engineering Annual Symposium, April 10.

2018 Developing Responsive Materials with Polymer Mechanochemistry, Student Materials Research Symposium, November 16.

2018 Computational Development of Smart Materials Using Mechanochemistry, M|CORE, November 6.

2018 Computational Development of Smart Materials Using Mechanochemistry, Karle Symposium, August 3.

2017 Using the Force-Growing String Method for Computational Development of Advanced Materials, Bicentennial Materials at Michigan Symposium, October 17.

2017 Mechanochemical Transition State Finding with the Force-Growing String Method, Michigan Institute for Computational Discovery and Engineering Annual Symposium, April 18.

2017 Mechanochemical Applications of the Growing String Method, Physical Chemistry Graduate Seminar Series, February 6.

RESEARCH EXPERIENCE

2015-20 PI: Paul Zimmerman, University of Michigan, Ann Arbor, MI

Developed a force functionality for the Growing String Method and demonstrated it to be a powerful means to identify reaction paths and transition states on force-modified potential energy surfaces. Leveraged the successful method to begin an ongoing collaboration with the Boydston group at the University of Wisconsin to provide mechanistic insight into flex-activated mechanophore initiation and design novel force-responsive scaffolds.

Investigated ligand effects on the propagation mechanism of a bimetallic Chromium catalyst for the isoselective polymerization of propylene oxide in collaboration with the Coates Lab at Cornell University. Elucidated reaction pathways to rationalize experimentally observed rates and selectivity.

Discovered mechanism for stereoselectivity of a photoredox-mediated metal-free ring-opening metathesis polymerization. Investigation led to understanding of a wide-variety of experimental conditions that can toggle cis/trans product content.

2014 PI: Jeffrey Evanseck, Duquesne University, Pittsburgh, PA.
Computationally investigated solvent interactions in asymmetric Diels-Alder reactions catalyzed by chiral Lewis acids. Used electronic structure theory calculations to determine an appropriate level of theory that could be applied to more sophisticated Diels-Alder reactions.

2013 PI: Jeffrey Rohde, AbbVie, North Chicago, IL.
Worked in Global Pharmaceutical Research and Development under the direction of Dale Kempf developing the structure-activity relationship of a screening lead on *mycobacterium tuberculosis* (TB). Designed and synthesized new molecules to target TB and optimized substituents on known actives to increase efficacy.

SERVICE AND LEADERSHIP

Graduate Student Mentor, General Chemistry Laboratory, University of Michigan, Ann Arbor, MI 2019

Provide mentoring during the term to younger graduate student instructors (GSIs). Coordinate exchange of resources among GSIs, including strategies and content-specific resources. Meet individually with GSIs to help contextualize midterm course feedback and help new GSIs improve their classroom teaching.

Chair, GSSPC, American Chemical Society National Meeting, Philadelphia, PA 2018-2020
"Graduate Student Symposium Planning Committee"
Proposal to organize the Graduate Student Symposium at the Spring 2020 ACS National Meeting in Philadelphia was selected from among schools across the nation. As chair, oversee all aspects of the planning process including topic selection, speaker recruitment, fundraising, advertising, and hosting.

Research Mentor, Zimmerman Group, University of Michigan, Ann Arbor, MI 2016-2020
Mentored several undergraduate students as well as graduate students during their semester-long rotations with the Zimmerman Lab. Helped students identify a suitable project, set up their cluster accounts and familiarize them with operating in a terminal. Trained students in use of our group's methods, provided guidance on project direction, and prepared students to give oral research presentations and posters.

Graduate Student Representative, Chemistry Department Graduate Committee, University of Michigan, Ann Arbor, MI, 2018-2020
Ensure that graduate student concerns are addressed and provide crucial feedback from the graduate student body.

Organizing Committee Member, CSIE | UM, University of Michigan, Ann Arbor, MI 2018-2020
"Chemical Science at the Interface of Education at the University of Michigan"
Develop programming for professional development events including informational presentations, research seminars, career panels, and networking events. Identify, invite, and host speakers for the various events.

President, Chemistry Graduate Student Council, University of Michigan, Ann Arbor, MI 2016 -2018
Lead an initiative to position the organization as a liaison between department faculty/staff and the graduate student body. In doing so, was able to secure graduate student representative positions on five department committees that previously only included faculty and staff. Increased attendance at annual department events, while leaving better financials behind.

Founder and President, American Chemical Society Student Affiliate Chapter, Franciscan University of Steubenville, Steubenville, OH. 2014 – 2015

Student Athlete, Swimming, NCAA, Franciscan University, Steubenville, OH 2011-2014
Elected team captain by coaches and teammates, 2014
St. Sebastian Leadership Award, 2013
Selected as representative on the NCAA Student-Athlete Advisory Committee, 2012-2014
Selected to Allegheny Mountain Collegiate Conference Scholar-Athlete First Team, 2011-2014
Second-Team all-conference in 200 yd Butterfly, 2014
Committed approximately 25 hours per week to training, meetings, travel, and competition while maintaining full course load

Inaugural Member, Center for Leadership, Franciscan University, Steubenville, OH 2011-2015
Selected to participate in Franciscan University's premier leadership program based on academic achievements and proven leadership abilities. This four-year co-curricular program cultivated practical skills essential for effective lifelong leadership.