

# Alexa R. Barres

## Curriculum Vitae

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## EDUCATION

### UNIVERSITY OF WISCONSIN-MADISON | Madison, WI | August 2014 – Present

Ph.D. in Organic Chemistry

Graduate Advisor: Dr. Sandro Mecozzi

GPA: 3.54/4.00

Dissertation: Synthesis of semifluorinated triphilic block copolymers and their formulation into super stable theranostic nanoemulsions for solid hydrophobic drug and MRI contrast agent delivery

### UNIVERSITY OF MICHIGAN-FLINT | Flint, MI | May 2014

B.S. in Honors Chemistry, ACS Certified Degree

Undergraduate Advisor: Dr. Jessica Tischler

GPA: 3.72/4.00

Undergraduate Thesis: A study of the decomposition of the anti-diabetic drug Metformin as a function of pH, time, temperature, and the presence of vanadium

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## RESEARCH EXPERIENCE

### UNIVERSITY OF WISCONSIN-MADISON | Madison, WI | November 2014 - Present

Graduate Research Fellow for Dr. Sandro Mecozzi

- Designed and synthesized new semifluorinated block copolymers
- Performed polymer purification and characterization including NMR, HPLC, MALDI-MS, and CMC
- Formulated polymeric nanoemulsions to serve as drug delivery vehicles for hydrophobic drugs and imaging agents
- Monitored nanoparticle stability, size, and drug release rate
- Investigated cellular viability as well as *in vitro* and *in vivo* <sup>19</sup>F-MRI
- Performed *in vivo* husbandry and toxicity studies with a zebrafish model

### UNIVERSITY OF MICHIGAN-FLINT | Flint, MI | May 2011 - July 2014

Undergraduate Researcher for Dr. Jessica Tischler

- Synthesized tertiary amines *via* green reductive amination reactions that utilized subcritical water in a high-pressure Parr reactor
- Characterized product identity and purity as well as reaction efficiency using GC, NMR, and IR

### AMYRIS BIOTECHNOLOGIES | Emeryville, CA | June 2013 – August 2013

Analytical Operations Intern for Manager Brian van Deren

- Analyzed company products from many departments in a high throughput setting *via* HPLC, GC, LC, and physical tests
- Performed extensive data analysis and instrument maintenance

### COLORADO STATE UNIVERSITY | Fort Collins, CO | June 2012 - August 2012

Undergraduate Researcher for Prof. Debbie Crans

- Determined the decomposition products of the anti-diabetic drug Metformin under various stresses
- Developed NMR parameters to successfully analyze drug decomposition products by extending T<sub>1</sub> relaxation

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## TEACHING EXPERIENCE

### UNIVERSITY OF WISCONSIN-MADISON | Madison, WI

Teaching Assistant | Introductory Organic Chemistry (CHM 343) | Dr. Brian Esselman | *Summer 2018*

- Taught two weekly 75-minute discussion sections
- Wrote and graded assessments
- Monitored and answered student questions using online platform
- Provided feedback on course assessments, material, and clicker questions
- Participated in flipped classroom structure

Research Mentor | Mecozzi Lab | *Fall 2015- Fall 2017*

- Mentored one undergraduate chemistry student and one graduate pharmacy student in a research lab setting
- Monitored safety and proper PPE
- Provided weekly guidance, accountability, and feedback
- Planned experiments and communicated about results
- Assisted with student poster and oral presentation preparation and delivery

Teaching Assistant | Introductory Organic Chemistry Lab (CHM 344) | Dr. Nick Hill | *Fall 2014, Spring 2015*

- Taught two weekly 50-minute pre-lab lectures
- Taught two weekly 3-hour labs
- Monitored lab safety
- Prepared two weekly lesson plans
- Wrote and graded all quizzes
- Graded all lab reports
- Held weekly office hours and communicated with students

### UNIVERSITY OF MICHIGAN-FLINT | Flint, MI

Teaching Assistant | Organic Chemistry I and II (CHM 330, 332) | Dr. Jessica Tischler | *Fall 2012 – Spring 2014*

- Taught two weekly 75-minute discussion sections
- Prepared weekly lesson plans and practice problems
- Graded assessments

Teaching Assistant | Organic Chemistry I and II Lab (CHM 331, 333) | Dr. Douglas Herzog | *Spring 2012 – Fall 2013*

- Attended weekly 3-hour lab
- Assisted with lab setup, cleanup, and student questions
- Monitored student safety
- Explained proper use of instrumentation to students and monitored their use
- Proctored exams and quizzes

Tutor | Organic Chemistry I and II (CHM 330, 332) | Dr. Jessica Tischler | *Fall 2011 – Fall 2012*

Teaching Assistant | General Chemistry I and II Lab (CHM 261, 263) | Dr. Michael Gebler | *Fall 2010 – Fall 2011*

- Attended weekly 3-hour lab
- Assisted with lab setup, cleanup, and student questions
- Monitored student safety
- Administered lab practical exams

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## PUBLICATIONS and PATENTS

Mecozzi, S. and **Barres, A.R.**, Stable theranostic and therapeutic nanoemulsions using triphilic semifluorinated amphiphiles. US P170292US01, Filed April 2, 2018.

**Barres, A.R.**; Wimmer, M.R.; and Mecozzi, S., Multicompartment theranostic nanoemulsions stabilized by a triphilic semifluorinated block copolymer. *Mol. Pharmaceutics* 2017, 14, 3916-3926.

Chatkon, A.; **Barres, A.**; Samart, N.; Boyle, S. E.; Haller, K. J.; Crans, D. C., Guanylyurea metformium double salt of decavanadate,  $(\text{HGU}^+)_4(\text{HMet}^+)_2(\text{V}_{10}\text{O}_{28}^{6-}) \cdot 2\text{H}_2\text{O}$ . *Inorg. Chim. Acta* 2014, 420, 85-91.

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## PROFESSIONAL AFFILIATIONS

**AMERICAN CHEMICAL SOCIETY** | Member | 2011 - present

Division of Organic Chemistry | Member | 2014- Present

Division of Polymer Chemistry | Member | 2018 - present

Student Chapter, University of Michigan-Flint Chemistry Club | President, VP, PR Officer | 2010-2014

**AMERICAN ASSOCIATION OF PHARMACEUTICAL SCIENTISTS** | Member | 2018 - present

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## HONORS and AWARDS

### University of Wisconsin-Madison

- Pharmaceutical Sciences Poster Session 2<sup>nd</sup> Place Winner | *February 2018*
- Graduate Student-Faculty Liaison Committee Poster Session 1<sup>st</sup> Place Winner | *April 2017*
- Graduate Student-Faculty Liaison Committee Travel Award | *January 2017*

### American Chemical Society

- Division of Organic Chemistry Graduate Research Symposium Selection | *July 2018*
- Women Chemist Committee/ Eli Lilly Travel Award: \$1,000 | *November 2016*
- Organic Division Undergraduate Award | *March 2014*

### National Science Foundation

- Graduate Research Fellowship Program Fellow | *April 2015*

### University of Michigan-Flint

- Chemistry and Biochemistry Department Graduating Senior Award | *April 2014*
- Lillian B. Wright Citizenship Award | *March 2014*
- Virgil Cope Outstanding Analytical Chemistry Student Award | *April 2013*
- Harry Blecker Sr. Chemistry Scholarship | *2012-2014*
- Geniesse Scholarship | *2012-2014*
- Freeman Chemistry Scholarship | *2010-2014*
- Fran Frazier Travel Award | *2011-2014*
- Honors Scholarship Competition Scholarship: \$4,000 yearly for 4 years | *2009*

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## NATIONAL PRESENTATIONS

**Barres, A.R.** and Mecozzi, S., Development of highly stable, semifluorinated nanoemulsions to deliver therapeutics and imaging agents. Presented at the American Chemical Society Division of Organic Chemistry Graduate Research Symposium, Bloomington, IN, July 26-29, 2018; Poster Presentation.

**Barres, A.R.** and Mecozzi, S., Formulation and study of highly stable, semifluorinated nanoemulsions with theranostic applications. Presented at the 253rd National Meeting of the American Chemical Society, San Francisco, CA, April 2-6, 2017; Oral Presentation.

**Barres, A.R.;** Crans, D.C.; Chatkon, A.; and Haller, K.J., Decomposition of the anti-diabetic drug Metformin as a function of pH, temperature, and the presence of Decavanadate. Presented at the 245th National Meeting of the American Chemical Society, New Orleans, LA, April 7-11, 2013; Oral Presentation.

Hnatyk, C.; **Barres, A.R.;** and Tischler, J.L., Continued investigations into the green synthesis of tertiary amines using a formate-mediated reductive amination in subcritical water. Presented at the 243rd National Meeting of the American Chemical Society, San Diego, CA, March 25-29, 2012; Poster Presentation.

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## LOCAL and REGIONAL PRESENTATIONS

Mecozzi Lab, Development of semifluorinated amphiphilic polymers for delivery of hydrophobic pharmaceuticals. Presented at the University of Wisconsin-Madison Department of Chemistry CHOPs Poster Session, Madison, WI, Fall 2016, Fall 2017, Fall 2018; Poster Presentation.

**Barres, A.R.** and Mecozzi, S., Formulation and study of highly stable, semifluorinated nanoemulsions with theranostic applications. Presented at the University of Wisconsin-Madison Pharmaceutical Sciences Recruiting Poster Session, Madison, WI, February 2018; Poster Presentation.

Mecozzi Lab, Development of semifluorinated amphiphilic polymers for delivery of hydrophobic pharmaceuticals. Presented at the University of Wisconsin-Madison Department of Chemistry Recruiting Poster Session, Madison, WI, Spring 2016, Spring 2017, Spring 2018; Poster Presentation.

**Barres, A.R.** and Mecozzi, S., Formulation and study of highly stable, semifluorinated nanoemulsions with theranostic applications. Presented at the Graduate Student-Faculty Liaison Committee Poster Session, Madison, WI, April 2017; Poster Presentation.

**Barres, A.R.;** Esson, M.M.; and Mecozzi, S., Semifluorous nanoemulsions with theranostic applications. Presented at the University of Wisconsin-Madison Pharmaceutical Sciences Poster Session, Madison, WI, August 2016; Poster Presentation.

Hnatyk, C.; **Barres, A.R.;** and Tischler, J.L., Continued investigations into the green synthesis of tertiary amines using a formate-mediated reductive amination in subcritical water. Presented at the XXI Meeting of the Minds Student Research Conference, Dearborn, MI, May 2012; Poster Presentation.

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## SERVICE

### **Secretary and Representative | Graduate Student-Faculty Liaison Committee | August 2016 - August 2018**

- Served the University of Wisconsin-Madison Department of Chemistry as an Organic Path Representative and Secretary
- Planned professional development events
- Advocated for graduate student needs by being their voice
- Recorded accurate and detailed meeting minutes
- Planned and executed annual organic path picnic
- Facilitated committee votes

### **Mentor | Catalyst Program | August 2017 - May 2018**

- Provided support network to first year graduate students
- Met with mentee to allow time for questions and feedback
- Attended professional development and social events with mentee

### **Scientific Judge | Wisconsin Middle School Regional Science Bowl | January 2017, January 2018**

- Served as scientific judge for competition rounds
- Kept score for competition rounds
- Proofread competition questions and answers prior to the start of the competition

### **Volunteer | Precollege Enrichment Opportunity Program for Learning Excellence (PEOPLE) | Summer 2016, Summer 2017**

- Helped with a 4-day science module on Polymer Chemistry
- Assisted with lab setup and cleanup each day
- Answered student questions
- Encouraged student participation
- Provided students assistance with lab experiments

### **Volunteer | Wisconsin Science Olympiad- Middle School Level | January 2017**

- Facilitated two hands-on practical lab exams
- Graded student exams following competition

### **Mentor | Adult Role Models in Science (ARMS) | December 2014 - March 2015**

- Mentored three middle school girls as they performed a science project of their choosing
- Discussed science project ideas
- Modeled science project after the scientific method
- Guided analysis and presentation of results
- Participated in the Madison Middle School Science Symposium

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## PROFESSIONAL DEVELOPMENT in TEACHING & LEARNING

### **Delta Teaching and Learning Certificate Program** | *Summer 2016 – Spring 2019 EXPECTED*

- Completed coursework in teaching and learning best practices
- Attended workshops to develop skills and expand knowledge
- Brown bag and round table events to promote community
- Performed teaching internship at Madison Area Technical College
- Participated in internship seminar course
- Prepared teaching portfolio
- Defended teaching portfolio in front of teaching committee

### **Teaching and Learning Coursework**

- Delta: Research Mentor Training | *Summer 2016*
- Delta: Teaching in Science and Engineering, The College Classroom | *Fall 2017*
- CIRTLL: Diversity in the College Classroom | *Spring 2018*

### **Teaching and Learning Workshops, Panels, and Trainings**

- Internal Review Board Human Research Subjects Training | *Summer 2018*
- Delta: Writing Effect Learning Outcomes | *Summer 2018*
- Delta: Incorporating Learning-through-Diversity and Learning Communities | *Summer 2018*
- Delta: Women Faculty in STEM Panel | *Spring 2018*
- WISCIENCE: Graduate Student and Post-Doc Book Club, Make it Stick: The Science of Successful Learning by Brown et. al | *Fall 2017*
- Delta: Teaching at a PUI Seminar | *Fall 2017*