

Marc Foster

Cambridge, MA | fosterm@mit.edu | he/him/his

Education

Massachusetts Institute of Technology/Woods Hole Oceanographic Institution

Doctor of Philosophy in Environmental Chemistry

Advisor: Dr. Desiree Plata

Cambridge, MA
In Progress, GPA: 4.9/5.0

University of Oregon

Master of Science in Physical Chemistry

Advisor: Dr. Geraldine Richmond

Eugene, OR
2021, GPA: 3.95/4.00

Whitman College

Bachelor of Arts in Biophysics, Biochemistry, and Molecular Biology (BBMB)

Advisor: Dr. Dalia Biswas

Walla Walla, WA
2018, Cum Laude

Research Experience

Graduate Student Research Assistant - MIT/WHOI

Research Advisor: Dr. Desiree Plata

- Investigating mechanisms of bacterial cooperation towards the degradation of polymers.
- Evaluating chemical biotransformations of polymers using mass spectrometry.

Cambridge, MA
Sept. 2021 – Current

Graduate Student Research Assistant - University of Oregon

Research Advisor: Dr. Geraldine Richmond

- Investigated the surface chemistry of nanoscale oil droplets using vibrational sum frequency scattering spectroscopy.

Eugene, OR
Sept. 2018 – August 2021

Research Assistant - Whitman College

Research Advisor: Dr. Dalia Biswas

- Investigated the design and synthesis of a functional catalyst for carbon monoxide conversion and remediation based on a bacterial carbon monoxide dehydrogenase enzyme.

Walla Walla, WA
June 2016 – May 2018

Awards and Fellowships

- Ocean Ventures Fund (*Degradation of plastics through bacterial produced reactive oxygen species*), WHOI July 2024
- 3rd Place Presentation Award, Northeast Open Research Alliance, BASF March 2024
- National Science Foundation Graduate Research Fellowship June 2020 - June 2023
- American Chemical Society Award for Outstanding Senior Student in Physical Chemistry 2018
- Whitman College Academic Distinction 2016 – 2018

Teaching Experience

Environmental Microbial Biogeochemistry, 1.089 – MIT

Teaching Assistant (TA)

- Responsibilities included: guiding paper discussions, office hours, feedback (written and oral) on proposal writing, and grading.
- The course covered material in microbial interactions dictating global nutrient cycles and related current research topics.

Cambridge, MA
Spring 2024

Student Teacher – MIT

Education theory and practice practicum experience

- Student teacher at Acton-Boxborough Regional High School in introductory chemistry as part of the practicum for the class Education Theory and Practice at MIT.
- Taught 3 core chemistry classes with 30 students each for 3 weeks.
- Responsibilities included: Lesson preparation, classroom teaching, grading, one-on-one's.

Cambridge, MA
Sept. 2023 – Dec. 2023

Marine Chemistry, 12.742 – MIT/WHOI

Cambridge/Woods Hole, MA

<i>Co-Teaching Assistant (TA)</i>	Fall 2022
<ul style="list-style-type: none"> Co-TA for the foundational course in the MIT-WHOI Chemical Oceanography PhD program, Marine Chemistry. The course covered material in marine biogeochemistry and related current research topics. 	
Kaufman Teaching Certificate Series – MIT	Cambridge, MA
<ul style="list-style-type: none"> Subject Design, Lesson Planning, Microteaching, and Inclusive Teaching Tracks 2022-2023 	
Presidential Undergraduate Research Scholar Program – University of Oregon	Eugene, OR
<i>Teaching Assistant/Lecturer</i>	Sept. 2020 – June 2021
<ul style="list-style-type: none"> Led weekly lectures to a group of six undergraduate students about graduate school and graduate research. Topics included literature searches, how to apply to graduate school, writing scientific articles. 	
General Chemistry Lab – University of Oregon	Eugene, OR
<i>Teaching Assistant</i>	Sept. 2018 – June 2019
<ul style="list-style-type: none"> Led weekly labs of 20 students in the general chemistry sequence. 	
Teaching Assistant for Organic Chemistry Lab (Whitman College)	Spring 2018
Tutor for Calculus, Organic Chemistry, and Intro Biology (Whitman College)	Jan. 2016 – May 2018

Outreach

Sustainable Polymer Roundtable – MIT	Cambridge, MA
<i>Co-creator</i>	September 2024 – Current
LGBT Employee Research Group – WHOI	Woods Hole, MA
<i>Graduate Student Representative</i>	June 2024 – Current
Joint Program Chemistry Student Representative – MIT/WHOI	Cambridge/Woods Hole, MA
<i>Elected Representative</i>	Oct. 2022 – Oct. 2023
CEE Department K-12 Outreach/DEI Efforts – MIT	Cambridge, MA
<i>Module Creator and Leader</i>	Fall 2022 – Current
Through the Porthole Newsletter – WHOI	Woods Hole, MA
<i>Writer</i>	Feb. 2022 – Dec. 2022
Mad Duck Science Friday – University of Oregon	Eugene, OR
<i>Co-director</i>	Sept. 2021 – August 2021
Summer Academy to Inspire Learning (SAIL) – University of Oregon	Eugene, OR
<i>Module Creator and Leader</i>	Summer 2019
Whitman Institute for Scholastic Enrichment Module Leader	Summer 2017
Whitman College Science Outreach Volunteer	March 2017 – May 2018

Mentorship

MIT Summer Research Program (MSRP) Mentor – MIT	Cambridge, MA
Deborah Madden (Junior undergraduate)	Summer 2024
Summer Student Mentor – WHOI	Woods Hole, MA
Hannah Goldberg (Senior undergraduate)	Summer 2022
Rotation Student Mentor – University of Oregon	Eugene, OR
Allan Solis (First year graduate student)	Fall 2019
Kayd Meldrum (First year graduate student)	Fall 2020
Liza Briody-Pavlik (First year graduate student)	Winter 2021

Resident Assistant (Whitman College)

Jan. 2017 – December 2017

Publications

- (1) "Dynamic Duo: Vibrational Sum Frequency Scattering Investigation of Carboxylic Acid/carboxylate Surfactants on Nanodroplet Surfaces" **M. J. Foster**, A. P. Carpenter, G. L. Richmond, *Journal of Physical Chemistry B*, 2021
- (2) "Effects of Salt-Induced Charge Screening on Surfactant Adsorption to the Planar and Nanoemulsion Oil-Water Interfaces", A. P. Carpenter, **M. J. Foster**, G. L. Richmond, *Langmuir*, 2021
- (3) "Accelerating Water Dissociation in Bipolar Membranes and for Electrocatalysis", S. Z. Oener, **M. J. Foster**, S. W. Boettcher, *Science*, 369 (1099-1103) 2020.

Patents

- (1) "Bipolar Membranes" S. Z. Oener, S. W. Boettcher, and **M. J. Foster**, U.S. Patent Application 16/817,502, filed November 26, 2020.

Presentations

- (1) *Invited Speaker*: "Cooperative metabolisms enable a marine bacterial community to mobilize and mineralize synthetic biodegradable polyesters", MIT Climate and Sustainability Consortium, August 2024
- (2) *Invited Panelist*: Reflections on Spring 2024 ACS National Meeting, ENY-ACS Local Chapter, March 2024
- (3) "Community dynamics within a microbial consortia that can degrade and mineralize an aromatic, aliphatic co-polyester" ACS Spring National Meeting, Sustainable Polymers Design: Advancing Understanding, Quantification and Collaboration, March 2024
- (4) "Engineering of Microbial Consortia to Investigate Degradation Pathways and Recycling of Plastics" ACS Spring National Meeting, AIChE/ACS Frontiers of Chemistry, Materials Science and Chemical Engineering for Circular Economy, March 2023
- (5) "Molecular details and adsorption behavior of pH-switchable carboxylate surfactants on nanoemulsion surfaces" ACS Spring National Meeting, LGBTQ+ Student/Postdoc Symposium, April 2021

Posters

- (1) "Synthesis of functional catalysts for CO conversion based on Mo-containing CO dehydrogenase" ACS Spring National Meeting, 2018, New Orleans, LA
- (2) "Synthesis of Functional Catalysts for CO Conversion Based on Mo-Containing CO Dehydrogenase" Molecular Engineering and Sciences Undergraduate Research Symposium at University of Washington, 2017, Seattle, WA
- (3) "Synthesis of Functional Catalysts for CO Conversion Based on Mo-Containing CO Dehydrogenase" Volcano Conference in Chemical Biology, 2017, Eatonville, WA
- (4) "Designing Functional Catalysts for Toxic Carbon Monoxide Conversion Using a Novel Dimetallic Complex" Murdock College Science Research Conference, 2016, Spokane, WA