

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

Expected Aug. 2026, 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

Cambridge, MA

Sept. 2021 – Current

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

Graduate Student Research Assistant - University of Oregon

Research Advisor: Dr. Geraldine Richmond

Eugene, OR

Sept. 2018 – August 2021

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

Research Assistant - Whitman College

Research Advisor: Dr. Dalia Biswas

Walla Walla, WA

June 2016 – May 2018

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

Awards and Fellowships

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| • Martin Family Society of Fellows for Sustainability Fellowship | 2025 - 2026 |
| • Ocean Ventures Fund (<i>Degradation of plastics through bacterial produced reactive oxygen species</i>), WHOI | July 2024 |
| • 3 rd Place Presentation Award, Northeast Open Research Alliance, BASF | March 2024 |
| • National Science Foundation Graduate Research Fellowship | 2020 - 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)

Cambridge, MA

Spring 2024

- 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.

Student Teacher – MIT

Education theory and practice practicum experience

Cambridge, MA

Sept. 2023 – Dec. 2023

- 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.

Marine Chemistry, 12.742 – MIT/WHOI <i>Co-Teaching Assistant (TA)</i>	Cambridge/Woods Hole, MA 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 <i>Teaching Assistant/Lecturer</i>	Eugene, OR 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 <i>Teaching Assistant</i>	Eugene, OR 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

LGBT Employee Resource Group – WHOI <i>Graduate Student Representative</i>	Woods Hole, MA June 2024 – Current
Sustainable Polymer Roundtable – MIT <i>Co-creator</i>	Cambridge, MA 2024 – 2025
Joint Program Chemistry Student Representative – MIT/WHOI <i>Elected Representative</i>	Cambridge/Woods Hole, MA Oct. 2022 – Oct. 2023
CEE Department K-12 Outreach/DEI Efforts – MIT <i>Module Creator and Leader</i>	Cambridge, MA Fall 2022 – Current
Through the Porthole Newsletter – WHOI <i>Writer</i>	Woods Hole, MA Feb. 2022 – Dec. 2022
Mad Duck Science Friday – University of Oregon <i>Co-director</i>	Eugene, OR Sept. 2021 – August 2021
Summer Academy to Inspire Learning (SAIL) – University of Oregon <i>Module Creator and Leader</i>	Eugene, OR Summer 2019
Whitman Institute for Scholastic Enrichment Module Leader Whitman College Science Outreach Volunteer	Summer 2017 March 2017 – May 2018

Mentorship

Anna Wardle (Junior undergraduate, MIT summer visiting student)	Summer 2025
Parker McClain (Freshman MIT undergraduate, Undergraduate Research Opportunity (UROP))	June 2025 - current
Deborah Madden (Junior undergraduate, MIT Summer Research Program (MSRP))	Summer 2024
Hannah Goldberg (Senior undergraduate, Visiting summer student)	Summer 2022
Liza Briody-Pavlik (First year graduate student, Rotation student)	Winter 2021
Kayd Meldrum (First year graduate student, Rotation student)	Fall 2020
Katelyn Alley (Senior Undergraduate, Research Experience for Undergraduates (REU) at UO)	Summer 2020
Allan Solis (First year graduate student, Rotation student)	Fall 2019
Resident Assistant (Whitman College)	Jan. 2017 – December 2017

Publications

* = Mentored Undergraduates

- (1) "Metabolic Interactions Enhance Mineralization of Polyesters by Marine Bacteria" **M. J. Foster**, C. Becker, D. J. Madden*, P. A. Wasson, A. Sichert, M. G. Hayden, A. V. Subhas, S. Gross, D. L. McRose, O. X. Cordero, D. L. Plata, *Under Review*, 2025
- (2) "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
- (3) "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
- (4) "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*: "Biodegradation of polyesters: environmental implications and bioreactor considerations", MIT Climate and Sustainability Consortium, May 2025
- (2) *Invited Speaker*: "Cooperative metabolisms enable a marine bacterial community to mobilize and mineralize synthetic biodegradable polyesters", MIT Climate and Sustainability Consortium, August 2024
- (3) *Invited Panelist*: Reflections on Spring 2024 ACS National Meeting, ENY-ACS Local Chapter, March 2024
- (4) "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
- (5) "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
- (6) "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