Marc Foster

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Education

Massachusetts Institute of Technology / Woods Hole Oceanographic Institution — Cambridge, MA
Doctor of Philosophy in Environmental Chemistry — Expected Aug. 2026, GPA: 4.9/5.0
Advisor: Dr. Desiree Plata
Anticipated thesis: Environmental insights into the biodegradation of polyesters by marine bacteria

University of Oregon — Eugene, OR
Master of Science in Physical Chemistry — 2021, GPA: 3.95/4.00
Advisor: Dr. Geraldine Richmond
Project: Vibrational sum-frequency investigation of carboxylic acid surfactants on nanodroplet surfaces

Whitman College — Walla Walla, WA
Bachelor of Arts in Biophysics, Biochemistry, and Molecular Biology (BBMB) — 2018, Cum Laude
Advisor: Dr. Dalia Biswas
Thesis: Synthesis of functional catalysts for the conversion of toxic carbon monoxide based on a bacterial protein

Awards *(italics)* and Fellowships (bold)

MIT Martin Family Society of Fellows for Sustainability	2025 – 2026
WHOI Ocean Ventures Fund Graduate Student Award	2024 – 2025
BASF Northeast Open Research Alliance Presentation Award	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

Publications

$*$ = Mentored Undergraduates

(1) **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; Metabolic Interactions Enhance Mineralization of Polyesters by Marine Bacteria. *Under Review at Proceedings of the National Academy of Sciences*, 2025

(2) **M. J. Foster**, A. P. Carpenter, G. L. Richmond; Dynamic Duo: Vibrational Sum Frequency Scattering Investigation of Carboxylic Acid/carboxylate Surfactants on Nanodroplet Surfaces. *Journal of Physical Chemistry B*, 2021

(3) A. P. Carpenter, **M. J. Foster**, G. L. Richmond; Effects of Salt-Induced Charge Screening on Surfactant Adsorption to the Planar and Nanoemulsion Oil-Water Interfaces. *Langmuir*, 2021

(4) S. Z. Oener, **M. J. Foster**, S. W. Boettcher; Accelerating Water Dissociation in Bipolar Membranes and for Electrocatalysis. *Science* 369 (1099–1103), 2020

Patents

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

Presentations

(1) "Environmental insights into the biodegradation of polyesters by marine bacteria", BASF Northeast Open Research Alliance, Wyandotte, MI, July 2025

(2) *Invited Speaker*: "Biodegradation of polyesters: environmental implications and bioreactor considerations",

MIT Climate and Sustainability Consortium, May 2025

(3) *Invited Speaker*: "Cooperative metabolisms enable a marine bacterial community to mobilize and mineralize synthetic biodegradable polyesters", MIT Climate and Sustainability Consortium, August 2024

(4) "Community dynamics within a marine microbial consortia that can degrade and mineralize aromatic aliphatic co-polyesters", BASF Northeast Open Research Alliance, Research Triangle Park, NC, March 2024, *3rd*

(5) *Invited Panelist*: Reflections on Spring 2024 ACS National Meeting, ENY-ACS Local Chapter, March 2024

(6) "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

(7) "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

(8) "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

Teaching Experience

Teaching Assistant, Environmental Microbial Biogeochemistry, 1.089 – MIT 2024

Student Teacher, Education theory and practice practicum experience – MIT 2023

- *Taught 3 core high school chemistry classes with 30 students each for 3 weeks.*

Co-Teaching Assistant, Marine Chemistry, 12.742 – MIT/WHOI 2022

Kaufman Teaching Certificate Series – MIT 2022 – 2023

- *Subject Design, Lesson Planning, Microteaching, and Inclusive Teaching Tracks*

Lecturer, Presidential Undergraduate Research Scholar (PURS) Program – University of Oregon 2020 – 2021

- *Led weekly lectures on graduate school and graduate-level research to six undergraduate students awarded the PURS fellowship.*

Teaching Assistant, General Chemistry Lab – University of Oregon 2018 – 2019

Teaching Assistant, Organic Chemistry – Whitman College 2018

Tutor for Calculus, Organic Chemistry, and Intro Biology – Whitman College 2016 – 2018

Outreach

Organizer, Graduate Climate Conference – MIT 2025 – current

Organizer, Interdepartmental Book Club – MIT 2025 – current

Leader, Joint Program Community Garden – MIT/WHOI 2025 – current

Graduate Student Representative, LGBT Employee Resource Group – WHOI 2024 – 2025

- *Promoting LGBT community on WHOI's campus.*

Co-creator, Sustainable Polymer Roundtable – MIT 2024

- *Monthly meeting connecting 5 research groups at MIT to discuss current topics in sustainable polymer innovation.*

Elected Representative, Joint Program Chemistry Student Representative – MIT/WHOI 2022 – 2023

- *Interfaced with the Academic Programs office, advocating for graduate student well-being.*

Module Creator and Leader, CEE Department K-12 Outreach/DEI Efforts – MIT 2022 – 2023

Writer, Through the Porthole Newsletter – WHOI 2022

Co-director, Mad Duck Science Friday – University of Oregon 2021

Module Creator and Leader, Summer Academy to Inspire Learning (SAIL) – University of Oregon 2019

Module Leader, Whitman Institute for Scholastic Enrichment 2017

Volunteer, Whitman College Science Outreach 2017 – 2018

Mentorship

$*$ = currently pursuing post-graduate studies

Parker McClain (Freshman MIT undergraduate, Undergraduate Research Opportunity (UROP)) 2025–present

Anna Wardle (Junior undergraduate, MIT summer visiting student) Summer 2025

Deborah Madden (Junior undergraduate, MIT Summer Research Program (MSRP), co-author) 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) 2017

Skills

Instruments

LC–MS (triple quadrupole)
TOC analyzer
Cavity ring-down spectrometer
Plate reader (absorbance)
Ti:sapphire laser
Pendant drop tensiometer

Techniques

Targeted LC–MS
Non-targeted LC–MS
Isotopic tracing
16S amplicon sequencing
Protein purification
Gene deletion
Differential scanning calorimetry
X-ray diffraction
IR spectroscopy
Nonlinear vibrational spectroscopy

Programming

Python
MATLAB
LaTeX