Marc Foster

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Education

Massachusetts Institute of Technology/Woods Hole Oceanographic Institution — Cambridge, MA
Doctor of Philosophy in Environmental Chemistry — Exp. 2026, GPA: 4.9/5.0
Advisor: Dr. Desirée Plata
Anticipated thesis title: 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
Adivsor: 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 title: Synthesis of Functional Catalysts for the Conversion of Carbon Monoxide Based on a Bacterial Protein

Awards and Fellowships

2025–2026	**MIT Martin Family Society of Fellows for Sustainability**
2024–2025	*WHOI Ocean Ventures Fund Graduate Student Award (more info here)*
2024	*BASF Northeast Open Research Alliance Presentation Award*
2020–2023	**National Science Foundation Graduate Research Fellowship**
2018	*American Chemical Society Award for Outstanding Senior Student in Physical Chemistry*
2016–2018	*Whitman College Academic Distinction*

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. *Submitted*, 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

Under preparation manuscripts from thesis chapters:

1. **M. J. Foster**, P. M. McClain*, D. L. McRose, D. L. Plata; Cutinase adsorption to polyester surfaces modulates dissolved oligomer speciation during enzymatic depolymerization. *In prep.*, 2025

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

2025	"Environmental insights into the biodegradation of polyesters by marine bacteria", BASF Northeast Open Research Alliance, Wyandotte, MI
2025	*Invited Speaker*: "Biodegradation of polyesters: environmental implications and bioreactor considerations", MIT Climate and Sustainability Consortium
2024	*Invited Speaker*: "Cooperative metabolisms enable a marine bacterial community to mobilize and mineralize synthetic biodegradable polyesters", MIT Climate and Sustainability Consortium
2024	"Community dynamics within a marine microbial consortia that can degrade and mineralize aromatic aliphatic co-polyesters", BASF Northeast Open Research Alliance, RTP, NC
2024	*Invited Panelist*: Reflections on Spring 2024 ACS National Meeting, ENY-ACS Local Chapter
2024	"Community dynamics within a microbial consortia that can degrade and mineralize an aromatic, aliphatic co-polyester", ACS Spring National Meeting
2023	"Engineering of Microbial Consortia to Investigate Degradation Pathways and Recycling of Plastics", ACS Spring National Meeting, AIChE/ACS Frontiers of Chemistry
2021	"Molecular details and adsorption behavior of pH-switchable carboxylate surfactants on nanoemulsion surfaces", ACS Spring National Meeting, LGBTQ+ Student/Postdoc Symposium

Posters

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

Teaching Experience

2024	**Teaching Assistant**, Environmental Microbial Biogeochemistry (1.089), MIT
2023	**Student Teacher**, Education Theory and Practice Practicum, MIT • *Taught 3 core high school chemistry classes with 30 students each for 3 weeks.*
2022	**Co-Teaching Assistant**, Marine Chemistry (12.742), MIT/WHOI
2022–2023	**Kaufman Teaching Certificate Series**, MIT • *Subject Design, Lesson Planning, Microteaching, and Inclusive Teaching Tracks (more info here).*
2020–2021	**Lecturer**, Presidential Undergraduate Research Scholar (PURS) Program, University of Oregon • *Led weekly lectures on graduate school and graduate-level research to six undergraduate students awarded the PURS fellowship (more info here).*
2018–2019	**Teaching Assistant**, General Chemistry Lab, University of Oregon
2018	**Teaching Assistant**, Organic Chemistry, Whitman College
2016–2018	**Tutor**, Calculus, Organic Chemistry, and Intro Biology, Whitman College

Outreach

2025–present	**Organizer**, Graduate Climate Conference, MIT
2025–present	**Organizer**, Interdepartmental Book Club, MIT
2025–present	**Leader**, Joint Program Community Garden, MIT/WHOI
2024–2025	**Graduate Student Representative**, LGBT Employee Resource Group, WHOI
	• *Promoting LGBT community on WHOI's campus.*
2024	**Co-creator**, Sustainable Polymer Roundtable, MIT
	• *Monthly meeting connecting 5 research groups at MIT to discuss current topics in sustainable polymer innovation.*
2022–2023	**Elected Representative**, Joint Program Chemistry Student Representative, MIT/WHOI
	• *Advocated for graduate student well-being.*
2022–2023	**Module Creator and Leader**, CEE Department K-12 Outreach/DEI Efforts, MIT
2022	**Writer**, Through the Porthole Newsletter, WHOI
2021	**Co-director**, Mad Duck Science Friday, University of Oregon
2019	**Module Creator and Leader**, Summer Academy to Inspire Learning (SAIL), University of Oregon
2017	**Module Leader**, Whitman Institute for Scholastic Enrichment
2017–2018	**Volunteer**, Whitman College Science Outreach

Mentorship

$*$ = currently pursuing post-graduate studies

2025–present	**Parker McClain** (Freshman MIT undergraduate, UROP)
Summer 2025	**Anna Wardle** (Junior undergraduate, MIT summer visiting student)
Summer 2024	**Deborah Madden** (Junior undergraduate, MSRP, co-author)
Summer 2022	**Hannah Goldberg*** (Senior undergraduate, visiting summer student)
Winter 2021	**Liza Briody-Pavlik** (First-year graduate student, rotation student)
Fall 2020	**Kayd Meldrum*** (First-year graduate student, rotation student)
Summer 2020	**Katelyn Alley*** (Senior undergraduate, REU at UO)
Fall 2019	**Allan Solis** (First-year graduate student, rotation student)
2017	Resident Assistant, Whitman College

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
Differential scanning calorimetry
Nonlinear vibrational spectroscopy
IR spectroscopy

Programming
Python
MATLAB
LaTeX