

# Marc Foster

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## Education

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### 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 (*italics*) and Fellowships (**bold**)

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

## Publications

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\* = 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

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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

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2025	"Environmental insights into the biodegradation of polyesters by marine bacteria", BASF Northeast Open Research Alliance, Wyandotte, MI
2025	<i>Invited Speaker</i> : "Biodegradation of polyesters: environmental implications and bioreactor considerations", MIT Climate and Sustainability Consortium
2024	<i>Invited Speaker</i> : "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	<i>Invited Panelist</i> : 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

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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

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2024	<b>Teaching Assistant</b> , Environmental Microbial Biogeochemistry (1.089), MIT
2023	<b>Student Teacher</b> , Education Theory and Practice Practicum, MIT <ul style="list-style-type: none"><li><i>Taught 3 core high school chemistry classes with 30 students each for 3 weeks.</i></li></ul>
2022	<b>Co-Teaching Assistant</b> , Marine Chemistry (12.742), MIT/WHOI
2022–2023	<b>Kaufman Teaching Certificate Series</b> , MIT <ul style="list-style-type: none"><li><i>Subject Design, Lesson Planning, Microteaching, and Inclusive Teaching Tracks (more info <a href="#">here</a>).</i></li></ul>
2020–2021	<b>Lecturer</b> , Presidential Undergraduate Research Scholar (PURS) Program, University of Oregon <ul style="list-style-type: none"><li><i>Led weekly lectures on graduate school and graduate-level research to six undergraduate students awarded the PURS fellowship (more info <a href="#">here</a>).</i></li></ul>
2018–2019	<b>Teaching Assistant</b> , General Chemistry Lab, University of Oregon
2018	<b>Teaching Assistant</b> , Organic Chemistry, Whitman College
2016–2018	<b>Tutor</b> , Calculus, Organic Chemistry, and Intro Biology, Whitman College

## Outreach

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2025–present	<b>Organizer</b> , Graduate Climate Conference, MIT
2025–present	<b>Organizer</b> , Interdepartmental Book Club, MIT
2025–present	<b>Leader</b> , Joint Program Community Garden, MIT/WHOI
2024–2025	<b>Graduate Student Representative</b> , LGBT Employee Resource Group, WHOI <ul style="list-style-type: none"><li><i>Promoting LGBT community on WHOI's campus.</i></li></ul>
2024	<b>Co-creator</b> , Sustainable Polymer Roundtable, MIT <ul style="list-style-type: none"><li><i>Monthly meeting connecting 5 research groups at MIT to discuss current topics in sustainable polymer innovation.</i></li></ul>
2022–2023	<b>Elected Representative</b> , Joint Program Chemistry Student Representative, MIT/WHOI <ul style="list-style-type: none"><li><i>Advocated for graduate student well-being.</i></li></ul>
2022–2023	<b>Module Creator and Leader</b> , CEE Department K-12 Outreach/DEI Efforts, MIT
2022	<b>Writer</b> , Through the Porthole Newsletter, WHOI
2021	<b>Co-director</b> , Mad Duck Science Friday, University of Oregon
2019	<b>Module Creator and Leader</b> , Summer Academy to Inspire Learning (SAIL), University of Oregon
2017	<b>Module Leader</b> , Whitman Institute for Scholastic Enrichment
2017–2018	<b>Volunteer</b> , Whitman College Science Outreach

## Mentorship

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\* = currently pursuing post-graduate studies

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

## Skills

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### 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  
X-ray diffraction  
Nonlinear vibrational spectroscopy  
IR spectroscopy

### Programming

Python  
MATLAB  
L<sup>A</sup>T<sub>E</sub>X