

Marc Foster

Cambridge, MA | fosterm@mit.edu | he/him/his | <https://marcjofoster.github.io>

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

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

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

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

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| 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 <ul style="list-style-type: none"><i>Promoting LGBT community on WHOI's campus.</i> |
| 2024 | Co-creator , Sustainable Polymer Roundtable, MIT <ul style="list-style-type: none"><i>Monthly meeting connecting 5 research groups at MIT to discuss current topics in sustainable polymer innovation.</i> |
| 2022–2023 | Elected Representative , Joint Program Chemistry Student Representative, MIT/WHOI <ul style="list-style-type: none"><i>Advocated for graduate student well-being.</i> |
| 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

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| 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
X-ray diffraction
Nonlinear vibrational spectroscopy
IR spectroscopy

Programming

Python
MATLAB
L^AT_EX