

Ariel L. Furst, Ph.D.

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EDUCATION

California Institute of Technology Ph.D. Chemistry Thesis: DNA-mediated charge transport devices for protein detection Advisor: Prof. Jacqueline K. Barton	2010 - 15
University of Chicago, Chicago, IL B.S. Chemistry with Honors, GPA 3.92 Honors Thesis: Study of the solution state properties of the Snow Flea Antifreeze Protein	2008 - 10
Wesleyan University, Middletown, CT	2007 - 08

RESEARCH

Associate Professor of Chemical Engineering - Massachusetts Institute of Technology (MIT)	2025 - present
Paul M. Cook Career Development Professorship - MIT	2022 - 25
Raymond (1921) & Helen St. Laurent Assistant Professor of Chemical Engineering - MIT	2019 - 22
Assistant Professor of Chemical Engineering - MIT	2019 - present
Arnold O. Beckman Postdoctoral Fellow with Prof. Matthew B. Francis - UC Berkeley	2015 - 19
Graduate Researcher with Prof. Jacqueline K. Barton - California Institute of Technology	2010 - 15
Undergraduate Researcher with Prof. Stephen B. H. Kent - University of Chicago	2008 - 10
Research Assistant with Prof. Shelley Minteer, Saint Louis University	2005, 2008

ACADEMIC & PROFESSIONAL HONORS

Sigma Xi	2026	Phi Beta Kappa	2010
C&EN Talented 12	2025	Graduated with Honors, University of Chicago	2010
Sloan Research Fellow	2025	Dean's List, U. Chicago & Wesleyan University	2008-10
Jonathan Sessler Fellowship for Emerging Leaders in Bioinorganic and Medicinal Inorganic Chemistry	2025		

NSF CAREER Award

MIT Chemical Engineering DEI Award	2024
SciLog Negative Emissions Awardee	2024
MIT 100K Competition, 1st Place	2023
NIH DP2 New Innovator Award	2023
Eastern Analytical Society Young Investigator Award	2023
AIChE Women in Chemical Engineering Rising Star	2023
Dreyfus Teacher Scholar Award	2023
SciLog Negative Emissions Fellow	2023
3M Non-Tenured Faculty Award	2022-23
MIT CESIF Fellow	2023
MIT Climate and Energy Prize, 1st Place	2023, 24
Empower Competition, 2nd Place	2023
MIT 100K Competition, 2nd Place	2023

AAAS 2023 Marion Milligan Mason Awardee

Frontiers in Engineering EU-US Participant	2022
ARO Early Career Research Award	2022
STS Forum Young Leader	2022
Paul M. Cook Career Development Professorship	2022
Female Founders Competition, 1st Place	2022
MIT UROP (Undergraduate Research) Mentor Award	2022
Finalist, Beckman Young Investigators	2022
CIFAR Azrieli Global Scholar	2022
Future Founders Prize, Finalist	2022
Electrochemical Society Early Career Travel Grant	2021
ECS Dennis Peters Retrospective Symposium Speaker	2021
ACS Sensors Young Investigator Symposium Speaker	2020
Raymond (1921) & Helen St. Laurent Professorship	2019
Remsen Bird Lecturer	2018
Travel Award to ACS P2F workshop	2017
Arnold O. Beckman Postdoctoral Fellowship	2016-19
Gray-Hill Lecturer	2014

APPOINTMENTS & ELECTED POSITIONS

JOURNALS

Associate Editor, <i>Journal of the Electrochemical Society</i> (2025-present)
Associate Editor, <i>Sensors+ (2023-2025)</i>
Editorial Board: <i>ACS Sensors, iScience, ACS Measurement Science Au, ACS Chem & Bio Engineering, J. Applied Electrochemistry</i>
Guest Editor: <i>RSC Chemical Biology Themed Collection (2024-25), J. Electrochemical Soc. Special Issue (2024-25)</i>

PROFESSIONAL ORGANIZATIONS

American Institute of Chemical Engineers (AIChE)

- Women in Chemical Engineering (WIC)
- Communications Chair (*Elected Position, 2020-22*)
- Member-at-Large (*Elected Position, 2022-23*)
- Area 1E (Electrochemistry Fundamentals)
- Secretary (*Elected Position, 2023-24*)
- Vice Chair (*Elected Position, 2024-25*)
- Co-Chair of Awards Committee (*Elected Position, 2022-present*)
- Sensors Topical Chair (*Elected Position, 2022-present*)

Electrochemical Society (ECS)

- Organic and Biological Electrochemistry
- Member-at-Large (*Elected Position, 2022-23*)
- Secretary/Treasurer (*Elected Position, 2022-24*)
- Chair (*Elected Position, 2024-present*)

Bioanalytical Gordon Research Conference

- Vice Chair for 2026 Meeting (*Elected Position*)

American Chemical Society (ACS)

- Symposium organizer, ENFL 015

Conference Organization

- CIFAR Accelerated Decarbonization Conference (Organizer, Fall 2024, Sao Paulo, Brazil)

- NSF-sponsored Convergence Accelerator Workshop, Session Moderator
- BMM4CMM Workshop Panel 3 Lead

CENTERS

CASFER NSF ERC

- Deputy Director (2025-present)
- PI for MIT (2024-present)

NIEHS Superfund Program

- RETCC Core Co-Lead (2024-present)

GRANT REVIEWER

- NSF, NIH, DOE, ARO, ACS PRF, NSERC, EU ERC, Novo Nordisk, Israel Science Foundation
- Member of NIH Maximizing Investigators' Research Award Study Section (2026-present)

MIT COMMITTEES & APPOINTMENTS

Bioeconomy Working Group

MIT Program in Polymers and Soft Matter (PPSM) Seminar Organizer (2022-present)

Martin Trust Center Delta V Board Member (2023)

Solve MIT Competition Judge (2024-present)

MIT Energy Hackathon Judge (2023, 24)

Internal Grant Reviewer: J-WAFS Fellowship, J-WAFS Grant, MISTI Grant

Martin Trust Center Advisory Board

UROP Strategic Planning Committee

MITEI Eni Steering Committee

TATA Strategic Planning Committee

TATA Fellowship Committee

Future of ESI Committee

Center for Environmental Health Sciences Member

Microbiology Graduate Program & Admissions Committee

MIT Department of Chemical Engineering:

- Diversity, Equity, and Inclusion Committee (2021-23)
- Graduate Committee (2021-24)
- Graduate Admissions Committee (2019-present)
- Seminar Organizer (2022-24)
- Undergraduate Advisor (2021-present)
- Mentor, Rising Stars Program & ACCESS Program
- Organizer, Incoming Graduate Student Book Club (2020-23); Undergraduate Book Club (2020-24)
- ACCESS Application review (2024-present)

PUBLICATIONS

Corresponding and Co-Corresponding

2026

76. Yeon S, Tezak C, Dey S, Michaluk S, Kuo CC, Furst A. Redox-Active Ligand Control of Cu-Centered Hydrogen Peroxide Electrooxidation in Metal-Phenolic Networks. *Submitted*.
75. Zaragoza N, Huynh H, Onoda M, Fan G, Macfarlane R, Furst AL. Tunable mucus-inspired bottlebrush polymer platform for microbial studies. *Submitted*.
74. Dotan T, Go YK, Lopez Baltazar JM, Anderson GI, Furst AL. Microbial Pyrolysis for the Sustainable Synthesis of Nanoparticle-Embedded Carbon Electrocatalysts. *Submitted*.
73. Go YK, Dhulipala A, Furst AL. Self-assembled coating materials boost microbial crack healing of concrete. *Submitted*.
72. Go YK, Dotan T, Kuo CC, Gut M, Furst AL. Understanding interface-driven dynamics of microbial carbonate precipitation through DNA-driven tethering. *Submitted*.
71. Agee A, Armstrong M, Bazakas E, Furst AL. Mechanisms behind unexpected gene circuit performance in a non-model microbe. *Submitted*.
70. Kuo CC, Zheng Y, Furst AL. Metal-phenolic networks support electrocatalytic hydrogen evolution at nanoparticle surfaces. *J Mater Chem A*. ASAP.
69. Jeon S, Qin X, Zamani M, Furst A, Callmann C. Multivalent glycopolymer design unlocks antimicrobial activity of 2-deoxyglucose. *Angew Chem Int Ed*. 2026; 65(20): e202400127.
68. Rowe A, Furst A. ACS In Focus electrochemically active microorganisms. *ACS In Focus*. 2026.
67. Vercelli GT, Zhou X, Moreno-Gómez S, et al. A universal surface functionalization technique to chemically enhance live microbial cells. *Mol Syst Biol*. 2026; 22(6): 962–978.
66. Dey S, Laws ME, Yeon S, et al. Metal-phenolic networks improve interfacial electron transfer in bio-electrochemical systems. *npj Biosensing*. 2026; 3: 32.

2025

65. Faria LCI, Nascimento SQ, Lima FCDA, et al. Bioelectrochemical systems: prioritizing energy density, long term stability and validation. *ACS Energy Lett*. 2025; 10(9): 4470–4490.
64. Sedenho GC, Pacheco JC, Gut M, et al. Genetic surfaceome E. coli reprogramming enables selective water oxidation. *Adv Mater*. 2025; 37(47): e202408100.
Featured as journal frontispiece
63. Zamani M, Monir K, Furst AL. Self-assembled nanomaterials enable extended lithium release. *J Mater Chem B*. 2025; 13(33): 10170–10176.
Highly cited paper
62. Yeon S, Zamani M, Zhou X, Furst AL. Fast, simple electrochromic biosensors for point-of-use infectious disease diagnosis. *Anal Chem*. 2025; 97(31): 17184–17190.
61. Ferreira-Garcia D, Haque S, Burke B, Furst AL, Botte GG. Electrochemical organic waste conversion: a route toward food security and a circular economy. *Curr Opin Chem Eng*. 2025; 49: 101156.
60. Zhou X, Slaughter J, Riki S, Kuo CC, Furst AL. Polymer coating for the long-term storage of immobilized DNA. *ACS Sensors*. 2025; 10(7): 5019–5026.
Featured in MIT News

59. Gut M, Wilhelm T, Benson O, et al. Lanmodulin-decorated microbes for efficient lanthanide recovery. *Adv Mater.* 2025; 37(10): 2412607.

Featured as journal frontispiece

58. Monaco M, Zamani M, Sarram A, et al. Complementary cost-effective electrochemical platforms for point-of-use biosensing. *Adv Sensor Res.* 2025; 4(2): 2400058.

Featured on journal cover

2024

57. Botte GG, Donneys-Victoria D, Alvarez-Pugliese CE, et al. Innovative approach to sustainable fertilizer production: leveraging electrically assisted conversion of sewage sludge for nutrient recovery. *ACS Omega.* 2024; 9(50): 49692–49706.

56. Spormann A, Lee J, Dassbjerg K, et al. Dream reactions of CO₂ capture, conversion, and beyond. *Cell Rep Phys Sci Voices.* 2024; 5(12): 102302.

55. Anderson G, Agee A, Furst AL. Imidazolium-based ionic liquids support biosimilar flavin electron transfer. *Mater Adv.* 2024; 5: 6813–6819.

Featured on journal cover

54. Agee A, Pace G, Yang V, Segalman R, Furst AL. Mixed conducting polymers alter electron transfer thermodynamics to boost current generation from electroactive microbes. *J Am Chem Soc.* 2024; 146(29): 19728–19736.

53. Sedenho GC, Nascimento SQ, Zamani M, Crespilho FN, Furst AL. Secondary structure in enzyme-inspired polymer catalysts impacts water oxidation efficiency. *Adv Sci.* 2024; 11(25): 2402234.

52. Zaragoza N, Widder S, Huynh H, Zamani M, Furst AL. Electrocatalytic properties of electrochemically-polymerized metal-phenolic networks. *ChemElectroChem.* 2024; 11(10): e202400093.

51. Fan G, Corbin N, Chung M, et al. Highly efficient carbon dioxide electroreduction via DNA-directed catalyst immobilization. *J Am Chem Soc Au.* 2024; 4(4): 1413–1421.

Featured in MIT News and on journal cover

50. Zaragoza N, Anderson GI, Allison-Logan S, Monir K, Furst AL. Novel delivery systems for controlled release of bacterial therapeutics. *Trends Biotechnol.* 2024; 42(7): 929–937.

49. Zhou X, Zamani M, Austin K, et al. Improving electrochemical hybridization assays with restriction enzymes. *Chem Commun.* 2024; 60(14): 1948–1951.

48. Cottet J, Oshodi JO, Yebouet J, et al. Zeta potential characterization using commercial microfluidic chips. *Lab Chip.* 2024(2); 24: 234–243.

2023

47. Burke B, Fan G, Wasuwanich P, Furst AL. Self-assembled nanocoatings protect microbial fertilizers for climate-resilient agriculture. *J Am Chem Soc Au.* 2023; 3(11): 2973–2980.

Outstanding Paper of the Year; featured in MIT News

46. Allen M, et al. 35+1 challenges in materials science being tackled by PIs under 35(ish) in 2023. *Matter.* 2023; 6(8): 2480–2487.

45. Weiss TA, Fan G, Neyhouse BJ, Moore EB, Furst AL, Brushett FR. Characterizing the impact of oligomerization on redox flow cell performance. *Batteries Supercaps.* 2023; 6(8): e202300034.

44. Baskaran B, Gill T, Furst AL. An improved spectrophotometric method for toluene-4-monooxygenase activity. *Chem Eur J.* 2023; 29(19): e202203322.

43. Agee A, Gill T, Pace G, Segalman R, Furst AL. Electrochemical characterization of biomolecular electron transfer at conductive polymer interfaces. *J Electrochem Soc.* 2023; 170: 016509.

42. Zamani M, Klapperich CM, Furst AL. Recent advances in gold electrode fabrication for low-resource setting biosensing. *Lab Chip.* 2023; 23(5): 1410–1419.

Featured on journal cover

41. Karbelkar A, Ahlmark R, Zhou X, et al. Carbon electrode-based biosensing enabled by biocompatible surface modification with DNA and proteins. *Bioconjug Chem.* 2023; 34(2): 358–365.

Featured on journal cover

2022

40. Wasuwanich P, Fan G, Burke B, Furst AL. Metal-phenolic networks as tuneable spore coat mimetics. *J Mater Chem B.* 2022; 10(37): 7600–7606.

39. Gill TM, Furst AL. Interfacial electrolyte effects on aqueous CO₂ reduction: learning from enzymes to develop inorganic approaches. *Curr Opin Electrochem.* 2022; 35: 101061.

38. Zhou X, Schuh D, Castle LM, Furst AL. Recent advances in signal amplification to improve electrochemical biosensing for infectious diseases. *Front Chem.* 2022; 10: 2296.

Part of Rising Stars in Electrochemistry collection

37. Fan G, Cottet J, Rodriguez-Otero MR, Wasuwanich P, Furst AL. Metal-phenolic networks as versatile coating materials for biomedical applications. *ACS Appl Bio Mater.* 2022; 5(10): 4687–4695.

36. Zamani M, Wilhelm TG, Furst AL. Electrochemical sensors for neurotransmitters and psychiatrics: steps towards physiological mental health monitoring. *J Electrochem Soc.* 2022; 169(4): 047513.

35. Zamani M, Yang VY, Maziashvili L, et al. Surface requirements for optimal biosensing with disposable gold electrodes. *ACS*

Meas Sci Au. 2022; 2(2): 91-95.

34. Fan G, Wasuwanich P, Rodriguez-Otero MR, Furst AL. Protection of anaerobic microbes from processing stressors using metal-phenolic networks. *J Am Chem Soc.* 2022; 144(6): 2438-2443.

Featured on journal cover

2021

33. Zamani M, Furst AL, Klapperich CM. Strategies for engineering affordable technologies for point-of-care diagnostics of infectious diseases. *Acc Chem Res.* 2021; 54(20): 3772-3779.
32. Karbelkar A, Reynolds EE, Ahlmark RA, Furst AL. A microbial electrochemical technology to detect and degrade organophosphate pesticides. *ACS Cent Sci.* 2021; 7(10): 1718-1727.
31. Machado MC, Zamani M, Daniel S, Furst AL. Bioelectrochemical platforms to study and detect emerging pathogens. *MRS Bull.* 2021; 46(9): 840-846.
30. Nano A, Furst AL, Hill MG, Barton JK. DNA electrochemistry: charge-transport pathways through DNA films on gold. *J Am Chem Soc.* 2021; 143(30): 11631-11640.
29. Zamani M, Robson JM, Fan A, et al. Electrochemical strategy for low-cost viral detection. *ACS Cent Sci.* 2021; 7(6): 963-972.
Featured in: CRISPR-based electrochemical sensor permits sensitive and specific viral detection in low-resource settings. *ACS Cent Sci.* 2021; 7: 926
28. Castle LM, Schuh DA, Reynolds EE, Furst AL. Electrochemical sensors to detect bacterial foodborne pathogens. *ACS Sensors.* 2021; 6(5): 1717-1730.
27. Mahoney AR, Safaee MM, Wuest WM, Furst AL. The silent pandemic: emergent antibiotic resistances following the global response to SARS-CoV-2. *iScience.* 2021; 24(4): 102304.
26. Fan G, Wasuwanich P, Furst AL. Biohybrid systems for improved bioinspired, energy-relevant catalysis. *ChemBioChem.* 2021; 22(14): 2353-2367.
25. Catania C, Karbelkar A, Furst AL. Engineering the interface between electroactive bacteria and electrodes. *Joule.* 2021; 5(4): 743-747.
24. Klass SH, Sofen LE, Hallberg ZF, et al. Covalent capture and electrochemical quantification of pathogenic *E. coli*. *Chem Commun.* 2021; 57(20): 2507-2510.
Featured on Chem Commun blog
23. Dai J, Knott GJ, Fu W, et al. Protein-embedded metalloporphyrin arrays templated by circularly permuted tobacco mosaic virus coat proteins. *ACS Nano.* 2021; 15(5): 8110-8119.

2019-2020

22. Fan G, Furst AL. How Far Can Electromicrobial Production Go? *Joule.* 2020; 4(10): 2079-2081.
21. Karbelkar A, Furst AL. Electrochemical diagnostics for bacterial infectious diseases. *ACS Infect Dis.* 2020; 6(7): 1567-1571.
20. Sofen LE, Furst AL. Electrochemical sensors to monitor endocrine disrupting pollutants. *J Electrochem Soc.* 2020; 167: 037524.
19. Dai Y, Furst AL, Liu CC. Strand displacement strategies for biosensor applications. *Trends Biotechnol.* 2019; 37(12): 1367-1382.

Featured on journal cover—December issue

Prior Publications

18. Furst AL, Muren NB, Hill MG. Toward multimarker and functional assays from crude cell lysates: controlling spacing and signal amplification in DNA-CT-based bioelectrochemical devices. *Curr Opin Electrochem.* 2019; 14: 104-112.
17. García-Cerdán JG, Furst AL, McDonald K, et al. A thylakoid-bound and redox active rubredoxin (RBD1) is essential in de novo assembly and repair of photosystem II complexes in photosynthetic eukaryotes. *Proc Natl Acad Sci USA.* 2019; 116(33): 16631-16640.
16. Furst AL, Klass SH, Francis MB. DNA hybridization to control cellular interactions. *Trends Biochem Sci.* 2019; 44(4): 342-350.
Featured on journal cover
15. Furst AL, Francis MB. Impedance-based detection of bacteria. *Chem Rev.* 2019; 119(1): 700-726.
14. Furst AL, Smith MJ, Lee MC, Francis MB. DNA hybridization to interface current-producing cells with electrode surfaces. *ACS Cent Sci.* 2018; 4(7): 880-884.
13. Furst AL, Smith MJ, Francis MB. New techniques for the generation and analysis of tailored microbial systems on surfaces. *Biochemistry.* 2018; 57(21): 3017-3026.
12. Olshansky L, Huerta-Lavorie R, Nguyen AI, et al. Artificial metalloproteins containing Co₄O₄ cubane active sites. *J Am Chem Soc.* 2017; 140(8): 2739-2742.
11. Furst AL, Smith MJ, Francis MB. Direct electrochemical bioconjugation on metal surfaces. *J Am Chem Soc.* 2017; 139(36): 12610-12616.
10. Finbloom JA, Han K, Slack C, Furst AL, Francis MB. Cucurbit[6]uril-promoted click chemistry for protein modification. *J Am Chem Soc.* 2017; 139(28): 9691-9697.
9. Furst AL, Hoepker AC, Francis MB. Quantifying hormone disruptors with an engineered bacterial biosensor. *ACS Cent Sci.* 2017; 3(2): 110-116.
Featured in: Impedance for endocrine disruption compounds. *ACS Cent Sci.* 2017; 3: 99; Sensing xenoestrogens. *ACS Chem Biol.* 2017; 12: 313.

8. Furst AL, Hill MG, Barton JK. Two-electrode platforms for protein biosensing based on charge transport through the DNA double helix. In: *Electroanalytical Chemistry*. Bard A, Zoski C, eds. Taylor & Francis; 2017. p. 105–120.
7. Furst AL, Barton JK. DNA electrochemistry shows DNMT1 methyltransferase hyperactivity in colorectal tumors. *Chem Biol*. 2015; 22(7): 938-945.
Featured in: New approach holds promise for earlier, easier detection of colorectal cancer. *ScienceDaily*. June 25, 2015; DNMT1 and cancer: an electrifying link. *Chem Biol*. 2015; 22: 810
6. Barton JK, Furst AL, Grodick MA. DNA sensors using DNA charge transport chemistry. In: *DNA in Supramolecular Chemistry and Nanotechnology*. Stultz E, Clever GH, eds. Wiley; 2015. p. 105–120.
5. Furst AL, Hill MG, Barton JK. A multiplexed, two-electrode platform for biosensing based on DNA-mediated charge transport. *Langmuir*. 2014; 31(23): 6554-6562.
4. Furst AL, Muren NB, Hill MG, Barton JK. Electrochemical detection of DNMT1 methyltransferase activity in tumors. *Proc Natl Acad Sci USA*. 2014; 22: 14985.
Featured in: Label-free electrochemical detection of methyltransferases. *SciBX*. 2014; 7
3. Furst AL, Hill MG, Barton JK. Electrocatalysis in DNA sensors. *Polyhedron*. 2014; 84: 150-159.
2. Furst AL, Landefeld S, Hill MG, Barton JK. Electrochemical patterning and detection of DNA arrays on a two-electrode platform. *J Am Chem Soc*. 2013; 135(51): 19099-19102.
1. Furst AL, Hill MG, Barton JK. DNA-modified electrodes fabricated using copper-free click chemistry for enhanced protein detection. *Langmuir*. 2013; 29(52): 16141-16149.

PATENTS & DISCLOSURES

- J. K. Barton, A. L. Furst, M. G. Hill, N. B. Muren. "Electrochemical Substrate Patterning and Analyte Detection on a Two-Electrode Platform." Patent Number 10316354, 2019.
- A. L. Furst, R. A. Ahlmark, A. Karbelkar, E. E. Reynolds. "A Microbial Electrochemical Technology to Detect and Degrade Organophosphate Pesticides." Provisional Patent Number 18/690033.
- A. L. Furst, C. Catania, G. Fan, P. Wasuwanich. "Protection of Next-Generation Probiotics During Processing." Utility Patent Filing PCT/US2025/023159.
- A. L. Furst, T. M. Gill, M. Liu, Y. Zhang, C.-C. Kuo. "Facet Control of Copper Nanoparticles." Utility Patent Filing PCT/US2025/023193.
- A. L. Furst, M. Gut. "Scaffolded Biomaterials for Efficient Lanthanide Recovery." Provisional Patent Number 63/753780.
- A. L. Furst, G. Fan, P. Wasuwanich, B. D. Burke, E. B. Moore, T. P. Mui. "Seed Compositions for Improved Germination." Utility Patent Filing PCT/US2024/053573.
- A. L. Furst, G. Fan, T. M. Gill, M. Liu, Y. Zheng. "DNA Based Immobilization for Improved Electrochemical Carbon Dioxide Reduction." Utility Patent Filing PCT/US2025/023159.
- A. L. Furst, G. Fan, B. Baskaran. "Methods of Degrading Polyesters with Lipase-Expressing E. coli." Utility Patent Filing PCT/US2025/19815.
- O. Cordero, A. L. Furst, G. T. Vercelli. "A Universal Surface Functionalization Method to Chemically Enhance Live Cells." Utility Patent Filing PCT/US2026/034879.
- A. L. Furst, M. Zamani. "Cell-Free System for Reconstitution of Functional Cytochrome P450 Enzymes." MIT Case Number 26654.
- A. L. Furst, Y. K. Go. "Self-Assembled Coating Materials Boost Microbial Crack Healing of Concrete." MIT Case Number 26964.

PRESENTATIONS

Invited Presentations in Current Role

2026

- "Harnessing Biological Redox Processes for Environmental Sensors and Diagnostics," PITCON, San Antonio, TX.
- "Tuning Metal-Ligand Dynamics to Control Biological and Bioinspired Catalysis," Frontiers and Challenges in Quantum Biology, Niels Bohr Institute, Copenhagen, DK.
- MIT Kuo Sharper Annual Conference, Cambridge, MA.
- "Commercializing Technology from the Lab," MIT IDEA Week, Cambridge, MA.
- "Tuning Metal-Ligand Dynamics to Control Biological and Bioinspired Catalysis," Metallocofactors GRC, Portland, ME.
- "A protein engineering platform for sustainable metal separations," Eni Annual Meeting, Milan, IT.
- "Surface-Displayed Bilirubin Oxidase for Efficient Electrocatalytic Water Oxidation," Baizer Award Symposium, ECS Spring, Seattle, WA.
- "A protein engineering platform for sustainable metal separations," SIMB, Austin, TX.
- "A protein engineering platform for sustainable metal separations," ECI BME Conference, Puerto Rico.
- "Beyond Single Points of Failure: Diversifying Critical Mineral Supply" Panel, Senior Congressional Staff Seminar, MIT, Cambridge, MA.
- ARO Biogeobatteries Workshop, *Virtual*.
- "Bio-Inspired electrocatalysis for sustainable conversions," ACS Spring, Atlanta, GA.
- "Harnessing Microbial Redox Processes for Sustainable Technologies," Brown University, Chemical Engineering, Providence, RI.
- "Harnessing Microbial Redox Processes for Sustainable Technologies," Cornell, Chemical Engineering, Ithaca, NY.
- "Harnessing Microbial Redox Processes for Sustainable Technologies," UVA, Chemical Engineering, Charlottesville, VA.
- "Harnessing Microbial Redox Processes for Sustainable Technologies," University of Denver, OLLI, Denver, CO.
- "Harnessing Microbial Redox Processes for Sustainable Technologies," UVA, Chemical Engineering, Charlottesville, VA.
- "Harnessing Microbial Redox Processes for Sustainable Technologies," UChicago, School of Molecular Engineering, Chicago, IL.
- "Harnessing Microbial Redox Processes for Sustainable Technologies," UVA, Chemical Engineering, Charlottesville, VA.
- "Harnessing Microbial Redox Processes for Sustainable Technologies," Wellesley College, Wellesley, MA.
- "Harnessing Biological Processes for Sustainable Technologies," MIT Club of Southern California, Los Angeles, CA.
- "Harnessing Microbial Redox Processes for Sustainable Technologies," UCLA, Dept of Chemical Engineering, Los Angeles, CA.

"Harnessing Microbial Redox Processes for Sustainable Technologies," UC Berkeley, Dept of Chemical Engineering, Berkeley, CA.
"Surface Display of Multicopper Oxidases as Microbial Platforms for Selective Electrocatalysis," Metals in Biology GRC, Ventura, CA.

2025

"Bio-electrocatalysis for carbon capture and conversion" PacifiChem, Honolulu, HI.
"Engineering biology for sustainability and clean energy," MIT Climate and Energy Hackathon, Cambridge, MA.
"Electrochemical approaches to PFAS degradation," MIT Alumni Weekend, Cambridge, MA.
"Enabling microbial electrochemical technologies through materials innovation," Materials Research Society, Boston, MA.
"Materials innovation for optimizing electron transfer in microbial electrochemical technologies," International Society of Electrochemistry, Mainz, Germany.
"Biomolecular Engineering to Harness Redox Processes for Sustainable Technologies," Bioelectrochemical Society Workshop, Hiroshima, Japan.
"Harnessing Microbial Redox Processes for Sustainable Technologies," Georgia Tech, Dept of Chemical Engineering, Atlanta, GA.
"Harnessing Microbial Redox Processes for Sustainable Technologies," Missouri S&T, Dept of Chemical Engineering, Rolla, MO.
"Harnessing Microbial Redox Processes for Sustainable Technologies," Princeton University, Dept of Chemical Engineering, Princeton, NJ.
"Harnessing Microbial Redox Processes for Sustainable Technologies," UIUC, Dept of Chemical Engineering, Urbana-Champaign, IL.
"Harnessing Microbial Redox Processes for Sustainable Technologies," UT Austin, Dept of Chemical Engineering, Austin, TX.
"Applying to Faculty Positions," Beckman Annual Symposium, Irvine, CA.
"Entrepreneurship as a Pre-Tenure Faculty Member," GLEEN, MIT, Cambridge, MA.
"Microbial Engineering for Human and Environmental Health," BeaverWorks Summer Institute, MIT, Cambridge, MA.
"Bio-Inspired Approaches to PFAS Detection and Degradation," MIT Alumni Weekend, MIT, Cambridge, MA.
"Microbial Engineering for Human and Environmental Health," University of Witwatersrand, Johannesburg, South Africa (*virtual*).
"The Importance of Data Standardization for Effective Implementation of CleanTech." HIDA CIFAR Summer School on Data Science and Climate, Berlin, Germany.
Congressional Staff Briefing on Climate, MIT, Cambridge, MA.
"Microbial Engineering to Harness Redox Processes for Sustainable Technologies," DTU Microbes Initiative Conference, Copenhagen, DK.
"Microbial Engineering to Harness Redox Processes for Sustainable Technologies," Stanford University, Dept of Chemical Engineering, Stanford, CA.
"Engineering biology for sustainability and clean energy," Oregon State University, Dept of Chemistry, Corvallis, OR.
"Enabling microbial electrochemical technologies through materials innovation," Colorado School of Mines, Dept of Chemical Engineering, Golden, CO.
"Bio-Inspired Technologies for Monitoring Human and Environmental Health," Session on Recent Advancements in Miniaturized Sensing Platforms for Biomolecular Monitoring, Pittcon, Boston, MA.
"Bio-Inspired Technologies for Monitoring Human and Environmental Health," NASEM US-Africa Frontiers Conference, Kigali, Rwanda.
Keynote seminar, "Enabling microbial electrochemical technologies through materials innovation," Africa ISMET, Cairo, Egypt.
"Engineering biology for sustainability and clean energy," Michigan State University, Dept of Chemical Engineering, East Lansing, MI.
"Engineering equitable technologies," Golden Speaker Series, MIT, Cambridge, MA.

2024

"Engineering biology for sustainability and clean energy," Melbourne Centre for Nanofabrication, Melbourne, Australia.
"Engineering biology for sustainability and clean energy," University of Queensland, Institute for Molecular Bioscience, Brisbane, Australia.
"Self-assembling "suits of armor" to enable formulation and delivery of delicate microbes," Bioformulations Symposium, SIMB 2024, Boston, MA.
"Bottom-up materials design for and from microbes," SB12: Conductive Biological Materials, MRS Annual Meeting, Boston, MA.
"Electrochemical Diagnostics to Support Equitable Healthcare," Nanomaterials in Biomedical Applications, University of Manipal, Karnataka, India.
Keynote seminar, "Bio-Inspired Technologies for Monitoring Human and Environmental Health," EAS Awards Session, Young Investigator Award Seminar, Princeton, NJ.
"Bio-inspired and bio-derived materials for sustainability," AIChE Annual Meeting 2024, Sustainable Low-Carbon Energy Solutions, San Diego, CA.
"Bottom-up materials design for and from microbes," Emory University, Dept of Chemistry, Atlanta, GA.
"Bio-inspired and bio-derived materials for sustainability," Climatech Planetary Stewardship, Boston, MA.
Keynote seminar, "Bio-inspired and bio-derived materials for sustainability," Green Chemistry Seminar, UMass Lowell, Lowell, MA.
"Bio-derived and bio-inspired approaches to CO₂ valorization," Novo Nordisk Dream Reactions of CO₂, Copenhagen, Denmark.
"Bottom-up materials design for and from microbes," Tufts University, Dept of Chemistry, Boston, MA.
"Bio-inspired and bio-derived materials for sustainability," Exxon Corporation, NJ.
"Carbon Capture and Sequestration," International School for Materials for Energy and Sustainability, CO School of Mines, Golden, CO.
"Bio-inspired and bio-derived materials for sustainability," Los Alamos National Lab, Los Alamos, NM.
"Self-Assembling Materials to Protect Microbes from Processing Stresses," NIH High Risk-High Reward Annual Meeting, Baltimore, MD.
"Bio-inspired and bio-derived materials for sustainability," Texas Tech University, Department of Chemical Engineering, Lubbock, TX.
TEDx Boston, Boston, MA.
TEDx MIT, Cambridge, MA.
"Bio-inspired and bio-derived materials for sustainability," Beckman Macromolecule Symposium, Newton, MA.
Keynote seminar, "Microbial technologies for human and environmental health," Pioneer Valley Microbe Day, Amherst, MA.

"Facet-controlled copper electrocatalysts for the selective conversion of CO₂ to ethylene," ACS 2024 Fall Annual Meeting, Denver, CO.

"Bio-Inspired Technologies for Monitoring Human and Environmental Health," TechConnect Conference, Baltimore, MD.

"Bio-inspired and bio-derived materials for sustainability," Vale Research Symposium, Belem, Brazil.

"Engineering biology for sustainability and clean energy," RAMACO Research Symposium, Sheridan, WY.

"In vitro Platforms to Study and Deploy Membrane-Associated Proteins," Transmembrane Protein Gordon Research Conference, Sunday River, ME.

"Bio-inspired systems for sustainability and environmental remediation," California Institute of Technology, Pasadena, CA.

"Bio-inspired electrochemical technologies for human and environmental health," Clarkson University, Potsdam, NY.

"Bio-inspired electrochemical technologies for human and environmental health," Sasol Chemicals, Virtual.

"Bottom-up materials design for and from microbes," University of Washington, Dept of Chemistry, Seattle, WA.

"Bio-inspired and bio-derived materials for sustainability," SLB, Cambridge, MA.

"Harnessing Biochemical Electron Transfer for Equitable Technologies," NA-ISMET meeting, Rice University, Houston, TX.

2023

"Bio-inspired electrochemical technologies for human and environmental health," Northwestern University, Chicago, IL.

"Bio-inspired and bio-derived materials for sustainability," Bucknell University, Lewisburg, PA.

"Bio-inspired and bio-derived materials for sustainability," MITEI Annual Research Conference, Cambridge, MA.

"Taking inspiration from nature for energy equity," WIC Rising Stars, AIChE Annual Meeting, Orlando, FL.

"Taking inspiration from Nature: Bio-inspired systems for human and environmental health," Biosensors for Cells, AIChE Annual Meeting, Orlando, FL.

"Multiscale Control of Copper Nanoparticle DNA Conjugates for Improved Electrochemical CO₂ Reduction," MIT Sustainability Conference, Cambridge, MA.

"Bio-Inspired Technologies for Sustainability and Clean Energy," MIT.nano Conference, Cambridge, MA.

"Multiscale Control of Copper Nanoparticle DNA Conjugates for Improved Electrochemical CO₂ Reduction," MIT Energy Conference, Cambridge, MA.

"Bio-Inspired Technologies for Sustainability and Clean Energy," MIT Congressional Staff Briefing, Cambridge, MA

"Circularizing the Plastic Economy," Plastic Omnium Symposium, Paris, FR

Keynote seminar for the Summer REU Program, "Bio-inspired materials for sustainability," Wellesley College, Wellesley, MA.

"Bio-Inspired Technologies for Sustainability and Clean Energy," BWSI Program, MIT, Cambridge, MA.

"Bio-Inspired Technologies for Sustainability and Clean Energy," Japan-US MIT ILP Conference, Cambridge, MA.

"Harnessing Biochemical Electron Transfer for Equitable Technologies," Bioelectronics Gordon Conference, Andover, NH.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," Chemical Engineering, University of New Hampshire, NH.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," Chemistry, UNAM, Mexico City, Mexico.

"Bio-Inspired Technologies for Sustainability and Clean Energy," Evonik Corporation, Cambridge, MA.

"Bio-Inspired Technologies for Sustainability and Clean Energy," ILP USGA Symposium, Cambridge, MA.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," Biophysical Society, Bioengineering, San Diego, CA.

2022

"Functional biosensors for human and environmental health," Chemistry, Lehigh University, Allentown, PA.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," Biochemistry, Michigan State University, East Lansing, MI.

"Quantifying E. coli on an electrode," Session 15C, AIChE Fall 2022 Meeting, Phoenix, AZ.

Keynote seminar, "Gold Leaf Electrodes for Improved Biosensing," Sensors Plenary Session, AIChE Fall 2022 Meeting, Phoenix, AZ.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," MIT ILP Paris Symposium, Paris, France.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," MIT ILP Canon Seminar Day, Cambridge, MA.

"By your powers combined! Interdisciplinary research for a cleaner planet," Ten Talk, MIT, Cambridge, MA.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," Chemical Engineering, University of Pittsburgh, Pittsburgh, PA.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," Chemistry, University of Massachusetts, Lowell, MA.

"Functional Biosensors for Human and Environmental Health," Bioanalytical Gordon Conference, Newport, RI.

"Bio-derived Materials for Sustainability and Environmental Remediation," Bioengineering, University of Minnesota, St. Paul, MN.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," Chemistry, University of Patras, Patras, Greece.

"Taking inspiration from Nature: Bio-inspired systems for sustainability and clean energy," Chemical Engineering, Kansas State University, Manhattan, KS.

2021

"Bioelectrochemistry for Sustainability and Environmental Remediation," Dow Chemical Company virtual.

"Cell-based Electrochemical Biosensor to Detect Environmental Pollutants," 3422627, Pacifichem virtual.

"Tuning the attachment of living cells to electroactive surfaces using DNA," 3422639, Pacifichem virtual.

"DNA 'Velcro' to Interface Electron Transfer-Competent Cells with Electrodes," ECS Fall K01 virtual.

"Capture and Electrochemical Detection of Pathogenic E. coli," ECS Fall M01 virtual.

"Reagentless bioconjugation to electroactive surfaces," AIChE Fall 2021 Boston, MA.

"DNA 'Velcro' to Interface Electron Transfer-Competent Cells with Electrodes," AIChE Fall 2021 Boston, MA.

"Electrochemical Sensors to Detect Environmental Contaminants," ILP Conference, Cambridge, MA.
 "Functional Biosensors for Human and Environmental Health," Chemical Engineering, Purdue University, West Lafayette, IN.
 "Engineered microbial cocultures to detect and degrade organophosphates," J-WAFS Seminar Day, MIT, Cambridge, MA.
 "Engineered microbial cocultures to detect and degrade organophosphates," 210b Seminar, MIT, Cambridge, MA.
 "Functional Biosensors for Human and Environmental Health," PPSM Seminar Series, MIT, Cambridge, MA
 "Functional Biosensors for Human and Environmental Health," Chemical Engineering, University of Rochester, Rochester, NY.
 "Tuning the attachment of living cells to electroactive surfaces using DNA," ACS Colloids, ACS Fall 2021 Atlanta, GA.
 "Electrochemical Sensors to Detect Environmental Contaminants," ACS Sensors, ACS Fall 2021 Atlanta, GA.
 "DNA hybridization to interface living cells with electroactive surfaces," Dennis Peters Retrospective Symposium, ECS.
 "DNA hybridization to interface living cells with electroactive surfaces," Nanoengineering, University of California, San Diego.

2020

"Electrochemistry for Sensors and Energy," Chemistry, University of Idaho.
 "Electrochemical Biosensors," DEVCOM Soldier Center Water Sensor Symposium.
 "DNA Velcro to interface cells with electrode surfaces," ISMET Virtual Meeting.
 "Electrochemistry for Sensors and Energy," Langer Seminar, MIT, Cambridge, MA.
 "Electrochemistry for Sensors and Energy," Gamry Webinar.
 "Electrochemical Sensors to Detect Environmental Contaminants," ACS Sensors Young Investigators Symposium, ACS Fall 2020 Virtual Meeting.
 "Tuning the attachment of living cells to electroactive surfaces using DNA," ACS Colloids, ACS Fall 2020 Virtual Meeting.
 "DNA 'Velcro' to Interface Electron Transfer-Competent Cells with Electrodes," Interfacial Phenomena, AIChE meeting, virtual.
 "Electrochemical Sensors to Detect Environmental Contaminants," Sensors, AIChE meeting, virtual.
 "Electrochemical Biosensors," ARO Soldier Hydration Group.
 "Engineered microbial cocultures to detect and degrade organophosphates," SRP-CEHS Seminar, MIT, Cambridge, MA.
 "Controlling Microbial Adhesion using DNA 'Velcro'," M02, Electrochemical Society Virtual Meeting.
 "DNA 'Velcro' to Interface Electron Transfer-Competent Cells with Electrodes," K02, Electrochemical Society Virtual Meeting.
 "Electrochemistry for Sensors and Energy," Ngo Group Meeting, BME, Boston University, Boston, MA.
 "Electrochemistry for Sensors and Energy," Biocomputing Group, virtual.
 "Electrochemistry for Sensors and Energy," Chemistry, University of Zurich, Zurich, CH.
 "Electrochemical Biosensors," Chemical Engineering, Sensors Guest Lecture, Durham, NH.
 "Controlling Microbial Adhesion using DNA 'Velcro'," Microbial Sciences Initiative Annual Symposium, Harvard University, Boston, MA.

2019

"Controlling Microbial Adhesion using DNA 'Velcro'," Materials Research Society meeting, Boston, MA.
 "Electrochemical Sensors to Detect Environmental Contaminants," Materials Research Society meeting, Boston, MA.
 "Electrochemistry for Sensors and Energy," Chemistry, Boston University, Boston, MA.
 "Controlling Microbial Adhesion using DNA 'Velcro'," Materials in Chemical Engineering Symposium, University of Florida, Gainesville, FL.
 "Controlling Microbial Adhesion using DNA 'Velcro'," MURI Review, MIT, Boston, MA.
 "Controlling Microbial Adhesion using DNA 'Velcro'," DIMENSIONS Meeting, Harvard University, Cambridge, MA.
 "DNA 'Velcro' to Interface Electron Transfer-Competent Cells with Electrodes," Bioelectronics Gordon Research Conference, Proctor Academy, NH.

TEACHING

Massachusetts Institute of Technology

10.569 Synthesis of Polymers, Instructor (2024-present)
 10.UAR Professional Development, Instructor (2023-present)
 5.310 Advanced General Chemistry Laboratory; Instructor, Course Developer (2019-2022)
 10.534 Bioelectrochemistry-Instructor, Course Developer (2019-present)
 15.366 Climate & Energy Ventures, Mentor (2023, 2024)
 Tech2Market, Mentor (2025)
 [Guest] 20.363 Biomaterials science and Engineering (2024)

California Institute of Technology

Head TA, Protein Thermodynamics (2012-2015)
 TA, Biophysics of Macromolecules (2011)
 TA, General Chemistry Laboratory (2010)

Saint Louis University

Teaching Assistant, General Chemistry
 Teaching Assistant, Chemistry Laboratory

MENTORING

Current Postdoctoral Researchers

- Dr. Tali Dotan
- Dr. Yoo Kyung Go

- Dr. Swathi Penumutthu
- Dr. Max Fomerod
- Dr. Cooper Tezak
- Dr. Ginevra Gangeri
- Dr. Farid Khoury
- Dr. Kaylee Tian
- Dr. Yeray Asensio
- Dr. Sungjin Jeon
- Dr. Wesley Harrison
- Dr. Isaac Ramirez Merrero
- Dr. Nicholas Matteucci

Current Graduate Researchers

- Kelly Teitel
- Eden Fleshler
- Josie Falagan, NSF GRFP
- Kylie Akiyama
- Chih-Peng Chuang
- Juliana Estradioto
- Benjamin Burke, NSF GRFP
- Chao-Chi Kuo
- Grace Anderson, NSF GRFP
- Chin-Yun Lee, Visiting Student

Current Visiting Researchers and Staff

- Prof. Nolan Flynn (Visiting Faculty from Wellesley University)
- Prof. Megan Nunez (Visiting Faculty from Wellesley University)
- Sage Widder (Research Scientist)
- Montana Montez (Research Scientist)

Prior Postdoctoral Researchers (*current role*)

- Dr. Amruta Karbelkar (Research scientist at Rice University)
- Dr. Gang Fan (Faculty at University of Rochester)
- Dr. Marjon Zamani (Senior scientist, Qiagen)
- Dr. Chelsea Catania (Translational lead, DARPA)
- Dr. Moein Safaee (Research scientist, Abbvie)
- Dr. Thomas Gill (Research scientist, Lockheed Martin)
- Dr. Stephanie Allison-Logan (Co-founder, Sustainable Polymers)
- Dr. Graziela Sedenho (Research Faculty at University of Sao Paulo)
- Dr. Melanie Gut (Senior scientist, Siegfried)
- Dr. Jesus Baltazar (Postdoctoral researcher, Wyss Institute)
- Dr. Sunanda Dey (Postdoctoral researcher, PNNL)
- Dr. Songyi Yeon (Research Scientist)

Prior Visiting Researchers and Staff

- Prof. Xue Ning (University College, Dublin)
- Prof. Chiyong Park (Daegu Gyeongbuk Institute of Science and Technology, DGIST)

Prior Graduate Researchers

- Dr. Nadia Zaragoza, MIT Ph.D. 2026
- Dr. Alec Agee, MIT Ph.D. 2026
- Dr. Xingcheng Zhou, MIT Ph.D. 2025
- Yu-Shuo Lee (visiting student), NTU
- Joaquim Decouvellaere (visiting student), EPFL
- Eduarda Baggia Paglia (visiting student), Unicamp
- Eleonora Matic (visiting student), Uni. Gratz
- Jessica Crivelaro Pacheco (visiting student), USP
- Manuel Merz (visiting student), EPFL
- Alexis Jones, MIT M.S. 2025
- Juliet Okorie, MIT M.S. 2024
- Barathkumar Baskaran, MIT M.S. 2023
- Akiva Gordon
- Erin Reynolds
- Suhail Haque

Undergraduate and High School Researchers Mentored

- 75 MIT undergraduates
- 1 Caltech undergraduate
- 8 REU undergraduates (CASFER ERC)
- 1 RET teacher (CASFER ERC)
- 8 Wellesley undergraduates
- 3 Imperial College undergraduates
- 9 MIT MSRP undergraduates
- 30 Malden Catholic High School students
- 15 Boston-area high school students
- 6 AEOP apprentices