

## MICHAEL BRENDAN ROSS

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University of Massachusetts Lowell  
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### PROFESSIONAL APPOINTMENTS

**Assistant Professor** 2019–present  
**University of Massachusetts, Lowell**, Lowell, MA  
Department of Chemistry

**CIFAR Bio-Inspired Solar Energy Postdoctoral Fellow** 2016–2019  
**University of California, Berkeley**, Berkeley, CA  
With Peidong Yang and Edward H. Sargent

**Visiting Researcher** 2010  
**Chulalongkorn University**, Bangkok, Thailand  
Advisor: Tirayut Vilaivan

### EDUCATION

**Ph.D.**, Chemistry 2016  
**Northwestern University**, Evanston, IL  
**NDSEG Fellow**  
Dissertation: Designing Optical Properties in DNA–Programmed Nanoparticle Superlattices  
Advisors: Chad A. Mirkin & George C. Schatz

**B.S.**, Biochemistry, *cum laude* 2011  
**Providence College**, Providence, RI  
Advisor: Jay D. Pike

### AWARDS AND HONORS

**Early Career Advisory Board**, *Materials Chemistry Frontiers* 2024  
**Faculty Excellence Award for Mentoring Honors College Students**, UMass Lowell 2024  
**Community Board Member**, *Nanoscale Horizons* 2023  
**RHED Faculty Fellow, Sustainability** 2023  
**Seldon Green Chemistry Award**, UMass Lowell 2023  
**Wong Research Award**, UMass Lowell 2023  
**Scialog Fellow**, Negative Emissions Science 2022  
**Department Teaching Excellence Award**, UMass Lowell 2022  
**Giants Kennedy College of Sciences Award for Advanced Research**, UMass Lowell 2022  
**Emerging Investigator**, *Nanoscale* 2021  
**Winner, NASA Centennial CO<sub>2</sub> Conversion Challenge**, NASA 2021

<b>Honorable Mention, Student-Preceptor Award for Undergraduate Research, ACS DIC2021</b>	
<b>125 Years of the Journal of Physical Chemistry, Invited, <i>Journal of Physical Chemistry</i></b>	2021
<b>Award of Appreciation, National Defense Science and Engineering Former Fellow</b>	2019
<b>Highlighted Oral Presentation, Bay Area Postdoctoral Symposium</b>	2017
<b>Bio-Inspired Solar Energy Postdoctoral Fellowship, Canadian Institute for Adv. Res.</b>	2016
<b>Outstanding Researcher Award, International Institute for Nanotechnology</b>	2015
<b>Graduate Researcher Award, Milliken &amp; Company</b>	2015
<b>Highlighted Poster, Noble Metal Nanoparticles: Gordon Research Conference</b>	2014
<b>National Defense Science and Engineering Graduate Fellowship (NDSEG), DoD</b>	2012
<b>Fr. Hickey Science Award for Individual and Academic Excellence, Providence Coll.</b>	2011
<b>Highest Cumulative Four-Year Average (GPA) in Biochemistry, Providence Coll.</b>	2011

## PUBLICATIONS

1. Sullivan, C.S.; Mason, N.L.; Branco, A.J.; Jeong, S.; **Ross, M.B.** "Size, Composition, and Phase Tunable Plasmonic Absorption in Au-Sn Alloy Nanoparticles" *Submitted*
2. Mason, N.L.; Liu, S.; Branco, A.J.; Trancart, M.; Jeong, S.; Sullivan, C.S.; Dawes, S.S.; Chatterjee, S.; Manukian, S.; Hayes, D.; Quan, L.; **Ross, M.B.** "Annealing-Driven Phase Control Enables Plasmonic Tunability in Alloy Nanoparticles" *Submitted*
3. Wang, C., Biswas, K., Bello, A., Bello, D., **Ross, M.B.** "Surface-Enhanced Raman Spectroscopy Detection of Per- and Poly-Fluoroalkyl Substances in Aqueous Film Forming Foams" *Submitted*
4. King, M.E.; Xu, Y.; Nagarajan, P.; Mason, N.L.; Branco, A.J.; Sullivan, C. S.; Silva, S.M.; Jeong, S.; Che, F.; **Ross, M.B.** "Leveraging Bismuth Immiscibility to Create Highly Concave Noble Metal Nanoparticles" **Chem** 2024 10, 1725-1740. *ChemRxiv doi: 10.26434/chemrxiv-2023-1644z*
5. Mason, N.L.; Dawes, S.S.; Vu, D.; Sullivan, C.S.; Chatterjee, S.; Branco, A.J.; Manukian, S.; **Ross, M.B.** "Introducing Solid State Chemistry and Nanoscience with Colloidal Au-Sn Alloying" **J. Chem. Ed.** 2024 101, 3404-3409.
6. Jeong, S.; Branco, A.J.; Bollen, S.W.; Sullivan, C.S.; **Ross, M.B.** "Universal pH electrocatalytic hydrogen evolution with Au-based high entropy alloys" **Nanoscale** 2024 16, 11530-11537.
7. Chaurasia, S.; Aravamuthan, S.R.; Sullivan, C.; **Ross, M. B.**; Agar, E. "Investigating Manganese – Vanadium Redox Flow Batteries for Energy Storage and subsequent Hydrogen Generation" **ACS Appl. Energy Mater.** 2024 7, 11429-11441.
8. Cha, J.H.; Silva, S.M.; Branco, A.J.; **Ross, M.B.** "Aqueous synthesis of plasmonic gold-tin alloy nanoparticles" **J. Vis. Exp.** 2024 205, e66628.
9. Sullivan, C.S.; Jeong, S.; King, M.E.; **Ross, M.B.** "Designing electrocatalysts for hydrogen evolution in saline electrolyte using rapid synthesis on carbon paper supports" **Mater. Chem. Front.** 2024 8, 1382-1389. *ChemRxiv doi:10.26434/chemrxiv-2023-59xhv*
10. Xu, Y; **Ross, M.B.**; Xin, H.; Che, F. "Engineering Bimetallic Interface and Revealing the Mechanism for CO<sub>2</sub> Electroreduction Reaction to C<sub>3</sub>+ Liquid Chemicals" **Cell Rep. Phys. Sci.** 2023 4, 101718.

11. Li, Z.; Wang, S.; Nattermann, U.; Bera, A.K.; Borst, A.J.; Yaman, M.Y.; Bick, M.J.; Yang, E.C.; Sheffler, W.; Lee, B.; Seifert, S.; Hura, G.L.; Nguyen, H.; Kang, A.; Dalal, R.; Lubner, J.M.; Hsia, Y.; Haddox, H.; Courbet, A.; Dowling, Q.; Miranda, M.; Favor, A.; Etemadi, A.; Edman, N.I.; Yang, W.; Weidle, C.E.; Sankaran, B.; Negahdari, B.; **Ross, M.B.**; Ginger, D.S.; Baker, D. "Accurate Computational Design of 3D Protein Crystals" **Nat. Mater.** 2023 22, 1556-1563.
12. Fonseca Guzman, M.V.; King, M. E.; Mason, N.L.; Sullivan, C.S.; Jeong, S.; **Ross, M.B.** "Plasmon manipulation by post-transition metal alloying". **Matter** 2023 6, 838-854. *ChemRxiv doi: 10.26434/chemrxiv-2022-zjdkn* **Cover Article, Featured Article.**
13. Nagarajan, P., Augustine, I. J., **Ross, M.B.** "Strategies for multi-step CO<sub>2</sub> upgrading and valorization" **Cell Rep. Phys. Sci.** 2023 4, 101472. **Editor's Choice, 2023.**
14. Branco, A.J.; Dawes, S.S; Mason, N.L; Fonseca Guzman, M.V.; King, M.E.; **Ross, M.B.** "Synthesis of gold-tin alloy nanoparticles with tunable plasmonic properties" **STAR Protocols.** 2023 4, 102410.
15. Scanga, R.; Sharokhinia, A.; Borges, J.; **Ross, M.B.**; Reuther, J.F. "Asymmetric polymerization-induced crystallization-driven self assembly of helical, rod-coil poly(aryl isocyanide) block copolymers" **J. Am. Chem. Soc.** 2023 145, 6319–6329. *ChemRxiv doi: 10.26434/chemrxiv-2022-zjdkn*
16. Cestellos-Blanco, S.; Louisia, S.; **Ross, M.B.**; Li, Y.; Detomasi, T. C.; Cestellos Spradlin, J. N.; Nomura, D. K.; Yang, P. "Toward abiotic sugar synthesis by CO<sub>2</sub> electrolysis" **Joule** 2022 6, 2304–2323. *ChemRxiv doi: 10.26434/chemrxiv-2021-9srsx*
17. King, M.E.; Wang, C.; Fonseca Guzman, M.V.; **Ross, M.B.** "Plasmonics for environmental remediation and pollutant degradation" **Chem Catalysis** 2022 2, 1-13.
18. Hammerstrom, B.; Niezrecki, C; Hellman, K; Jin, X.; **Ross, M.B.**; Mack, J. H.; Agar, E.; Trelles, J.P.; Liu, F.; Che, F.; Ryan, D.; Narasimhadevara, M.S.; Usovicz, M. "The viability of implementing hydrogen in the Commonwealth of Massachusetts" **Front. Energy Res.** 2022 10, 1005101. <https://futureofhydrogen.org>
19. King, M.E.; Fonseca Guzman, M.V.; **Ross, M.B.** "Material strategies for function enhancement in plasmonic architectures" **Nanoscale** 2022, 14, 602–611.
20. Fonseca Guzman, M.V.; **Ross, M.B.** "Radiative contributions dominate plasmon broadening in post-transition metals in the ultraviolet" **J. Phys. Chem. C** 2021, 125, 19428–19437. *ChemRxiv doi: 10.33774/chemrxiv-2021-pk3k7-v4*
21. Folgueras, M.C.; Jin, J.; Gao, M.; Quan, L.N.; Steele, J.A.; Srivastava, S.; **Ross, M.B.**; Zhang, R.; Seeler, F.; Schierle-Ardnt, K.; Asta, M.; Yang, P. "Lattice dynamics and optoelectronic properties of zero-dimensional perovskite Cs<sub>2</sub>TeX<sub>6</sub> (X= Cl, Br, I), single crystals" **J. Phys. Chem. C** 2021, 125, 25126–25139.
22. Chen, C.; Li, Y.; Yu, S.; Louisia, S.; Jin, J.; Li, M.; **Ross, M.B.**; Yang, P. "Cu-Ag tandem catalysts for high-rate CO<sub>2</sub> electrolysis towards multicarbons" **Joule** 2020, 4, 1688–1699. **ESI Highly Cited Paper.**
23. **Ross, M.B.** "Carbon dioxide recycling makes waves" **Joule** 2019, 3, 1814–1816. (Invited commentary)
24. **Ross, M. B.**; De Luna, P.; Li, Y.; Dinh, C. T.; Kim, D.; Yang, P.; Sargent, E. H. "Designing materials for electrocatalytic carbon dioxide recycling" **Nat. Catal.** 2019, 2, 648–658. **ESI Highly Cited Paper.**

25. **Ross, M. B.**; Li, Y.; De Luna, P.; Dinh, C. T.; Kim, D.; Sargent, E. H.; Yang, P. “Electrocatalytic rate alignment enhances syngas generation” **Joule** 2019, 3, 1–8.
26. Kim, H. Y.; **Ross, M. B.**; Kornienko, N.; Zhang, L.; Guo, J.; Kim, D.; Yang, P.; McCloskey, B. D. “Efficient hydrogen peroxide generation using reduced graphene oxide-based oxygen reduction electrocatalysts” **Nat. Catal.** 2018, 1, 282–289. **ESI Highly Cited Paper.**
27. De Luna, P.; Quintero–Bermudez, R.; Dinh, C. T.; **Ross, M. B.**; Bushuyev, O.; Todorovic, P.; Regier, T.; Yang, P.; Sargent, E. H. “Catalyst electro-redeposition controls morphology and oxidation state for selective carbon dioxide reduction” **Nat. Catal.** 2018, 1, 103–110. **ESI Highly Cited Paper.**
28. Ashley, M. J.; Bourgeois, M. R.; Murthy, R. R.; Laramy, C. R.; **Ross, M. B.**; Naik, R.R.; Schatz, G. C.; Mirkin, C. A. “Shape and size control of substrate–grown gold nanoparticles for surface–enhanced Raman spectroscopy detection of chemical analytes” **J. Phys. Chem. C** 2018, 122, 2307–2314.
29. Kibria, M.D.; Dinh, C. T.; Seifitokaldahni, A.; De Luna, P.; Burdyny, T.; Quintero–Bermudez, R.; **Ross, M. B.**; Bushuyev, O.S.; Garcia de Arquer, F.P.; Yang, P.; Sinton, D.; Sargent, E. H. “A Surface Reconstruction Route to High Productivity and Selectivity in CO<sub>2</sub> Reduction toward C<sub>2+</sub> Hydrocarbons” **Adv. Mater.** 2018, 30, 1804867.
30. **Ross, M. B.**; Dinh, C. T.; Li, Y.; Kim, D.; De Luna, P.; Sargent, E. H.; Yang, P. “Tunable Cu–enrichment enables designer syngas electrosynthesis from CO<sub>2</sub>” **J. Am. Chem. Soc.** 2017, 139, 9359–9363. **Highlighted by Molecular Foundry and U.S. Department of Energy; ESI Highly Cited Paper**
31. Li, Y.\*; Cui, F.\*; **Ross, M. B.**; Kim, D.; Sun, Y.; Yang, P. “Structure–sensitive CO<sub>2</sub> electroreduction to hydrocarbons on ultrathin five–fold twinned copper nanowires” **Nano Lett.** 2017, 17, 1312–1317. **ESI Highly Cited Paper.**
32. Wang, S.; McGuirk, C. M.; **Ross, M. B.**; Wang, S.; Chen, P. C.; Xing, H.; Liu, Y.; Mirkin, C. A. “General and direct method for preparing oligonucleotide–functionalized metal–organic framework nanoparticles” **J. Am. Chem. Soc.** 2017, 139, 9827–9830.
33. Bourgeois, M. R.\*; Liu, A. T.\*; **Ross, M. B.**; Berlin, J. M.; Schatz, G. C. “Self–assembled plasmonic metamolecules exhibiting tunable magnetic response at optical frequencies” **J. Phys. Chem. C** 2017, 121, 15915–15921.
34. Sun, L.\*; Lin, H.\*; Park, D. J.\*; Bourgeois, M. R.; **Ross, M. B.**; Ku, J. C.; Schatz, G. C.; Mirkin, C. A. “Polarization–dependent optical response in anisotropic nanoparticle–DNA superlattices” **Nano Lett.** 2017, 17, 2313–2318.
35. Zheng, X.\*; De Luna, P.\*; Garcia de Arquer, F. P.; Zhang, B.; Becknell, N.; **Ross, M. B.**, *et al.* “Sulfur modulated tin sites enable efficient electrochemical reduction of CO<sub>2</sub> to formate” **Joule**, 2017, 1, 794–805. **ESI Highly Cited Paper.**
36. **Ross, M. B.**; Ku, J. C.; Lee, B.; Mirkin, C. A.; Schatz, G. C., “Plasmonic metallurgy enabled by DNA” **Adv. Mater.** 2016, 28, 2790–2794.
37. **Ross, M. B.**; Mirkin, C. A.; Schatz, G. C. “Feature Article: The optical properties of one–, two–, and three–dimensional arrays of plasmonic nanostructures” **J. Phys. Chem. C** 2016, 2, 816–830. **ESI Highly Cited Paper.**
38. **Ross, M. B.\***; Bourgeois, M. R.\*; Mirkin, C. A.; Schatz, G. C. “Magneto–optical response of cobalt interacting with plasmonic nanoparticle superlattices” **J. Phys. Chem. Lett.** 2016, 7, 4732–4738.

39. **Ross, M. B.**; Ashley, M. J.; Schmucker, A. L.; Singamaneni, S.; Naik, R.; Schatz, G. C.; Mirkin, C. A. “Structure–function relationships in SERS–active plasmonic paper” **J. Phys. Chem. C** 2016, *120*, 20789–20797.
40. Barnaby, S. N.; **Ross, M. B.**; Thaner, R. V.; Lee, B.; Schatz, G. C.; Mirkin, C. A. “Enzymatically controlled vacancies in nanoparticle crystals” **Nano Lett.** 2016, *16*, 5114–5119.
41. Sharma, B.; Cardinal, M. F.; **Ross, M. B.**; Zrimsek, A.; Bykov, S.; Punihaole, D.; Asher, A.; Schatz, G. C.; Van Duyne, R. P. “Aluminum film–over–nanosphere substrates for deep–UV surface–enhanced resonance Raman spectroscopy” **Nano Lett.** 2016, *16*, 7968–7973.
42. Ashley, M. J.; O’Brien, M. N.; Hedderick, K. R.; Mason, J. A.; **Ross, M. B.**; Mirkin, C. A. “Templated synthesis of uniform perovskite nanowire arrays” **J. Am. Chem. Soc.** 2016, *138*, 10096–10099.
43. **Ross, M. B.**; Ku, J. C.; Vaccarezza, V. M.; Schatz, G. C.; Mirkin, C. A. “Nanoscale form dictates mesoscale function in plasmonic DNA nanoparticle superlattices” **Nat. Nanotechnol.** 2015, *10*, 453–458. **Highlighted by *Nanotechweb.org* and *Advanced Photon Source*.**
44. **Ross, M. B.**; Ku, J. C.; Blaber, M. G.; Mirkin, C. A.; Schatz, G.C. “Defect tolerance and the effect of structural inhomogeneity in plasmonic DNA–nanoparticle superlattices” **Proc. Natl. Acad. Sci. U.S.A.** 2015, *112*, 10292–10297.
45. **Ross, M. B.** & Schatz, G. C. “Radiative effects in plasmonic aluminum and silver nanospheres and nanorods” **J. Phys. D: Appl. Phys.** 2015, *48*, 184004.
46. Ku, J. C.; **Ross, M. B.**; Schatz, G. C.; Mirkin, C. A. “Conformable, macroscopic crystalline nanoparticle sheets assembled with DNA” **Adv. Mater.** 2015, *27*, 3159–3163.
47. Barnaby, S. N.; Thaner, R. V.; **Ross, M. B.**; Brown, K. A.; Schatz, G. C.; Mirkin C. A. “Modular and chemically responsive oligonucleotide bonds in nanoparticle superlattices” **J. Am. Chem. Soc.** 2015, *137*, 13566–13571.
48. Ozel, T.\*; Ashley, M. J.\*; Bourret, G. R.; **Ross, M. B.**; Schatz, G. C.; Mirkin, C. A. “Solution–dispersible metal nanorings with deliberately controllable compositions and architectural parameters” **Nano Lett.** 2015, *15*, 5273–5278.
49. Lin, Q. Y.\*; Li, Z.\*; Brown, K. A.; O’Brien, M. N.; **Ross, M. B.**; Zhou, Y.; Butun, S.; Chen, P. C.; Schatz, G. C.; Dravid, V. P.; Aydin, K.; Mirkin, C. A. “Strong coupling between plasmonic gap modes and photonic lattice modes in DNA–assembled gold nanocube arrays” **Nano Lett.** 2015, *15*, 4699–4703.
50. **Ross, M. B.**; Blaber, M. G.; Schatz, G. C. “Using nanoscale and mesoscale anisotropy to engineer the optical response of three–dimensional plasmonic metamaterials” **Nat. Commun.** 2014, *5*, 4090.
51. **Ross, M. B.** & Schatz, G. C. “Aluminum and indium plasmonic nanoantennas in the ultraviolet” **J. Phys. Chem. C** 2014, *118*, 12506–12514.
52. Young, K. Y.\*; **Ross, M. B.\***; Blaber, M. G.; Rycenga, M.; Jones, M. R.; Zhang, C.; Senesi, A. J.; Lee, B.; Schatz, G. C.; Mirkin, C. A. “Using DNA to design plasmonic metamaterials with tunable optical properties” **Adv. Mater.** 2014, *26*, 653–659. **Highlighted by *Nature Photonics*.**

## Patents

1. Jeong, S., **Ross, M.B.** “High-entropy alloys, methods of synthesis thereof, and electrocatalytic application thereof” PCT Filed UM200545US. May 2024.
2. Yang, P., Cestellos-Blanco, S., Li, Y., **Ross, M.B.** “Sugar Formation from CO<sub>2</sub> Electroreduction” US20230407491A1, 2023.

## Book Chapters

1. **Ross, M. B.\***; Blaber M. G.\*; Schatz, G. C. “Plasmonically–enhanced dye–sensitized solar cells” *Plasmonics: Theory and Applications*, Chapter 3, Springer: Dordrecht, 2014.

## Public Reports

1. Hammerstrom, B.; Niezrecki, C.; Hellman, K.; Jin, X.; **Ross, M. B.**; Mack, H.; Agar, E.; Trelles, J. P.; Liu, F.; Usovich, M.; Che, F.; Ryan, D.; Narasimhadevara, M. S. “The Viability of Implementing Hydrogen in Massachusetts” 2022. **Highlighted by *The Boston Globe***

## FUNDING AND SUPPORT

- PI National Institutes of Health, “Understanding and Designing pH-Responsive Peptides in Confined Nanoscale Environments”, \$455,940. 09/01/2024–08/31/2027
- PI Office of Naval Research, “Designing Robust Electrocatalysts for Fuel Generation by Integrating Structural Design with Electronic Tuning”, \$668,792. 12/01/2024–11/30/2027
- PI University of Massachusetts Lowell, “AI Mini-Grant”, \$1,000. 09/01/2024–05/31/2026
- PI National Science Foundation, “LEAPS-MPS: Manipulating Noble Metal Nanoparticles Using Post-Transition Metal Alloying”, \$250,000. 09/01/2024–08/31/2026 #2418613
- PI The Alfred P. Sloan Foundation, “ML-ROCKS: Machine Learning Reaction Optimization of Carbonation KineticS”, \$55,000. 02/01/2024–01/31/2025
- PI Research Corporation of America RCSA, “Cow Burps to Butanol: Bio-electrocatalytic Valorization of Methane to Butanol”, \$55,000. 02/01/2024–01/31/2025
- PI DEVCOM SC U.S. Army, “MN-39: Passive HOT (Heating by Optical Transduction) Textiles for Arctic Resilience”, \$254,939. Individual Award: \$114,722. 09/06/2023–09/05/2024
- PI University of Massachusetts Lowell Seed Grant, Stimuli-Responsive Textiles Using Nanoparticle-Protein Conjugates for Sweat Sensing, \$15,000. Individual Award: \$5,000. 07/01/2023–06/30/2025
- PI Seldon Green Chemistry Award, \$1,500. Individual Award: \$1,500. 06/2023–06/2024
- PI Wong Research Fund Award, Programming and Understanding Nano-Bio Interactions Using Intrinsically Disordered Proteins, \$875. Individual Award: \$875. 01/2023–05/2023
- PI Office of Naval Research, Electrocatalytic Versatility in Diverse Electrolyte Conditions, \$363,121. 09/01/22–08/31/24 Award #N00014-22-1-2654
- PI Office of Naval Research, CO<sub>2</sub> Conversion for Temporally Controlled Hydrogen Storage and Electricity Generation, \$5,500,000. Individual Award: \$510,000. 12/31/2022–12/31/2025. Award #N00014-23-1-2124

## Michael B. Ross: Curriculum Vitae

- Co-PI National Science Foundation, Major Research Instrumentation, MRI: Acquisition of Small/Wide-Angle and Non-Ambient X-Ray Diffraction Packages for Research and Education in Energy and Environmental Sustainability, \$127,699. Individual Award: \$25,539 Award # 2216240
- PI American Chemical Society Development and Engagement Grant, Day of Discovery, \$1,000. 04/13/2022
- PI National Science Foundation, Mass-NSF-I-Corps Site Grant, \$8,000. 11/01/2022–04/30/2022
- PI UMass Lowell-WPI Seed Grant, Plasmon-Enhanced Organic Photoredox Catalysts for Biomanufacturing Synthesis. \$20,000. Individual Award: \$10,000
- Co-PI University of Massachusetts Lowell Seed Grant, PFAS Firefighting Foams, \$10,000. Individual Award: \$5,000. 01/31/2022–01/31/2024
- PI Peter E. and Anna Giants Kennedy College of Sciences Endowed Fund for Advanced Research, Understanding Phase Behavior in Light Absorbing Au-Sn Nanoparticles, \$8,000. Individual Award: \$8,000. 02/01/2022–08/31/2022
- PI Office of Naval Research, Renewably-Powered CO<sub>2</sub> Recycling for Zero-Carbon On-Demand Fuel Generation, \$3,242,562. Individual Award: \$290,000. 10/23/2021–10/22/2023. Award #N00014-22-1-2001.
- Co-PI Office of Naval Research, "Dual-Layer Energy Storage: Combining Redox Flow Batteries with Renewable Hydrogen Generation on Demand, \$3,242,562. Individual Award: \$290,000. 10/23/2021–10/22/2023. Award #N00014-22-1-2001.
- Co-I Federal Emergency Management Agency, "Incentives and barriers to adopting PFAS-free firefighter foams in fire training facilities", \$906,385. 09/01/2021–08/31/2024. Award # EMW-2020-FP-00078.
- PI MassVentures Acorn Innovation Fund Grant, Nanostructured SERS Architectures for Handheld PFAS Detection in Water, \$15,000. Individual Award: \$15,000. 06/01/2021–10/31/2021
- Co-PI University of Massachusetts Lowell Seed Grant, Nondestructive Pain Detection in an In Vitro Tissue Model, \$9,963. Individual Award: \$4,980. 06/01/2021–05/31/2023
- Co-PI Associated Industries of Massachusetts (AIM), A Study on the Viability of Implementing Hydrogen in Massachusetts, \$71,500. Individual Award: \$10,214. 02/-1/2021–12/31/2021
- PI Office of Naval Research, Design of resilient materials for on-demand H<sub>2</sub> generation from potable, grey, and saline water, \$3,459,862. Individual Award: \$379,505. 09/24/2020–09/23/2022. Award # N00014-20-1-2858.

## **TRAINEE AWARDS AND FELLOWSHIPS**

- Trainee NESACS, Trainee Support for Stephanie Ceballos, Norris Richards Undergraduate Summer Research Scholarship, \$3,500, 05/01/2024–08/31/2025
- Trainee NSF NRT, Trainee Support for Isabel Augustine, NSF SWIMMER NRT Fellowship, \$34,000, 09/01/2022–08/31/2023

Trainee NESACS, Trainee Support for Noah L. Mason, Norris Richards Undergraduate Summer Research Scholarship, \$3,500, 05/01/2022–08/31/2022

Trainee Rist Institute for Sustainability and Energy, Trainee Support for Maria V. Fonseca-Guzman, RISE Fellowship, \$5,000, 09/01/2020–08/31/2021

Trainee American Association of University Women (AAUW), Trainee Support for Melissa E. King Ph.D., American Postdoctoral Fellowship, \$30,000, 07/01/2020–06/30/2021

## INVITED PRESENTATIONS

1. “Making Poor Metals Rich at the Nanoscale” Northwestern University, Evanston, IL Mar. 2025 (oral)
2. “Making Poor Metals Rich at the Nanoscale” Bridgewater State University, Bridgewater, MA, Feb. 2025 (oral)
3. “Designing Materials for Electrifying Chemistry” Northeast Catalysis Society Meeting, Lowell, MA, Jan. 2025 (oral)
4. “Making Poor Metals Rich at the Nanoscale” Boston University, Boston, MA, Oct. 2024 (oral)
5. “Making Poor Metals Rich at the Nanoscale” Northeastern University, Boston, MA Sep. 2024 (oral)
6. “Making Poor Metals Rich at the Nanoscale” University of New Hampshire, Dover, NH, Sep. 2024
7. “Making Poor Metals Rich at the Nanoscale” Gordon Research Conference, South Hadley, MA, June 2024 (oral)
8. “Making Poor Metals Rich at the Nanoscale” Brown University, Providence, RI, April 2024 (oral)
9. “Making Poor Metals Rich at the Nanoscale” Providence College, Providence, RI, April 2024 (oral)
10. “Making Poor Metals Rich at the Nanoscale” University of Connecticut, Storrs, CT, April 2024 (oral)
11. “Making Poor Metals Rich at the Nanoscale” University of Massachusetts Amherst, Amherst, MA, March 2024 (oral)
12. “Making Poor Metals Rich at the Nanoscale” Worcester Polytechnic Institute, Worcester, MA, March 2024 (oral)
13. “Making Poor Metals Rich at the Nanoscale” Boston College, Chestnut Hill, MA, Feb. 2024 (oral)
14. “Making Poor Metals Rich at the Nanoscale” Tufts University, Medford, MA, Feb. 2024 (oral)
15. “Nanoscale Design for Electrochemical Catalysis” Texas Tech University, Lubbock, TX, Oct. 2023 (oral)
16. “Designing multi-step strategies for CO<sub>2</sub> valorization” American Chemical Society Meeting, San Francisco, CA, Aug. 2023 (oral)
17. “Accessing higher energy plasmonics by phase and composition control” American Chemical Society Meeting, San Francisco, CA, Aug. 2023 (oral)
18. “Constructing Materials from the Atom Up” UMass Lowell, Multiscale Science Conversation Starter, Lowell, MA, March 2023



19. “Renewably-Powered CO<sub>2</sub> Recycling” UMass Lowell, Climate Change Initiative, Lowell, MA, February 2023
20. “Constructing Metallic Nanomaterials for Controlling Light and Energy” UMass Lowell, Biomedical Engineering, Lowell, MA, February 2023
21. “Manipulating the structure and properties of noble metals using post-transition elements” University of Rhode Island, Kingston, RI, Sept. 2022
22. “Manipulating the structure and properties of noble metals using post-transition elements” Massachusetts Institute of Technology, Cambridge, MA, Sept. 2022
23. “Manipulating the structure and properties of noble metal nanoparticles using post-transition elements” UMass Lowell, Physics, Lowell, MA, April 2022
24. “Manipulating the structure and properties of noble metal nanoparticles using post-transition elements” American Chemical Society Meeting, San Diego, CA, Mar. 2022
25. “Electrochemical CO<sub>2</sub> Recycling with Noble Metal Nanostructures” University of Massachusetts Lowell, Lowell, MA, Oct. 2021
26. “Designing Functional Nanomaterials for Photonics, Detection, and Energy” DEVCOM Soldier Center, Natick, MA, April 2021.
27. “Data-Driven Vibrational Spectroscopy as A Portable Aqueous Detection Platform” DEVCOM Solder Center Water Sensors Symposium, Natick, MA, Mar. 2021.
28. “Electrochemical CO<sub>2</sub> Recycling with Noble Metal Nanostructures” Tripathy Symposium, Lowell, MA, Dec. 2020.
29. Prime 2020 and 238<sup>th</sup> PacifiChem Meeting, Honolulu, HI. Declined due to COVID-19. Oct. 2020.
30. Electrochemical Society Biannual Meeting, Montreal, Quebec, Canada. Cancelled due to COVID-19. May 2020.
31. “Renewable-powered catalysis with noble metal nanoparticles” University of New Hampshire, Dover, NH, Mar. 2020.
32. “Renewable-powered catalysis with noble metal nanoparticles” University of Massachusetts Dartmouth, Dartmouth, MA, Mar. 2020.
33. “Designing function in electronically excited nanoscale metals” National Defense Science and Engineering Graduate Program Conference, San Diego, CA, Aug. 2019.
34. “Electrocatalytic rate alignment enables enhanced syngas generation” “CIFAR Bio-Inspired Solar Energy Program Meeting, Toronto, Canada, March 2018.
35. “Synthesizing chemicals from carbon dioxide using renewable energy” “Bay Area Postdoctoral Symposium, Buck Institute, Novato, CA, June 2017.
36. “How do we teach collaboration? Best practices for educating future researchers and innovators” American Chemical Society Meeting, San Francisco, CA, April 2017.
37. “Bio-Inspired solar energy catalysis program overview” CIFAR Bio-Inspired Solar Energy Program Meeting, Montreal, Canada, Oct. 2017.
38. “The rational and deliberate design of optical properties in DNA-nanoparticle superlattices” Academy of Sciences of the Czech Republic, Prague, Czech Republic, June 2015.
39. “The optical properties of DNA-nanoparticle superlattices” Milliken Graduate Research Symposium, Spartanburg, SC, April 2015.
40. “Using anisotropy at the nanoscale and mesoscale to engineer the optical properties of plasmonic metamaterials” Noble Metal Nanoparticles: Gordon Research Seminar, South Hadley, MA, June 2014.

## **OTHER PROFESSIONAL PRESENTATIONS AND WORKSHOPS**

41. “Enhancing plasmonics with post-transition metals” American Chemical Society Meeting, New Orleans, LA, Feb. 2024 (oral)
42. “Plasmonic nanoparticle design by post-transition metal diffusion” American Chemical Society Meeting, San Francisco, CA, Aug. 2023 (oral)
43. “Designer Plasmonic Nanoparticles with Post-Transition Metals” Northeast American Chemical Society Meeting, Boston, MA, June 2023 (oral)
44. “Plasmon Manipulation by Post-Transition Metal Alloying” American Chemical Society Meeting, Chicago, IL, Aug. 2022 (oral)
45. “Detecting and Degrading Pollutants Using Plasmonic Nanomaterials” American Chemical Society Meeting, Chicago, IL, Aug. 2022 (oral)
46. “Plasmon Manipulation by Post-Transition Metal Alloying” Noble Metal Nanoparticles, Gordon Research Conference, South Hadley, MA, June 2022. (poster)
47. “The Viability of Implementing Hydrogen in Massachusetts” Future of Hydrogen, Lowell, MA, Nov. 2021. (panelist and co-host)
48. “Designing Functional Materials with Noble Metal Nanoparticles” Tripathy Annual Symposium, Lowell, MA, Dec. 2019 (poster)
49. ACS and Cottrell Scholars New Faculty Workshop, Savannah, GA, Oct. 2019
50. “Designing nanostructured materials for electrochemically recycling carbon dioxide” Materials Research Society Meeting, Boston, MA, Dec. 2018 (oral)
51. Mission Innovation Advanced Energy Materials Workshop, Mexico City, Mexico, Sep. 2017.
52. “Tunable Cu enrichment enables designer syngas electrosynthesis from CO<sub>2</sub>” American Chemical Society Meeting, San Francisco, CA, April 2017. (oral)
53. “Magneto–optical response of cobalt interacting with plasmonic nanoparticle superlattices” American Chemical Society Meeting, San Francisco, CA, April 2017. (oral)
54. “Tunable Cu enrichment enables designer syngas electrosynthesis from CO<sub>2</sub>” Nanomaterials for Applications in Energy Technology: Gordon Research Conference, Ventura, CA, Feb. 2017. (poster)
55. “Monitoring surface species during carbon dioxide reduction using in situ Raman spectroscopy” CIFAR Bio–Inspired Solar Energy Program Meeting, Montreal, Canada, Oct. 2016. (oral)
56. Foresight Institute: Breakthrough Technologies for Energy Workshop, Palo Alto, CA, May 2016
57. “Nanoscale strategies for the efficient and selective electrochemical reduction of CO<sub>2</sub>” CIFAR Bio–Inspired Solar Energy Program Meeting, Vancouver, Canada, May 2016. (oral)
58. “Designing optical properties in DNA–programmed nanoparticle superlattices” University of Toronto, Toronto, Canada, March 2016. (oral)
59. “The deliberate design of optical properties in DNA–programmed nanoparticle superlattices” American Chemical Society Meeting, San Diego, CA, March 2016. (oral)
60. “Plasmonic metallurgy enabled by DNA” American Chemical Society Meeting, San Diego, CA, March 2016. (oral)
61. “Elucidating the transport properties of interconnected DNA networks” MURI Program Review, Evanston, IL, Oct. 2015. (On behalf of Prof. Mirkin)
62. “Using DNA to deliberately design plasmonic response across length scales” Stanford University, Palo Alto, CA, Nov. 2015. (oral)

63. “Defect tolerance and the effect of structural inhomogeneity in plasmonic DNA–nanoparticle superlattices” PIERS 2015, Prague, Czech Republic, July 2015. (oral)
64. “Nanoscale form dictates mesoscale function in plasmonic DNA–nanoparticle superlattices” PIERS 2015, Prague, Czech Republic, July 2015. (oral)
65. “Nanoscale form dictates mesoscale function in plasmonic DNA nanoparticle superlattices” Northwestern Computational Research Day, Evanston, IL, April 2015. (poster)
66. “Using anisotropy at the nanoscale and mesoscale to engineer the optical properties of plasmonic metamaterials” Noble Metal Nanoparticles: Gordon Research Conference, South Hadley, MA, June 2014. (poster)
67. “Using anisotropy at the nanoscale and mesoscale to engineer the optical properties of plasmonic metamaterials” Noble Metal Nanoparticles: Gordon Research Seminar, South Hadley, MA, June 2014. (poster)
68. “Using anisotropy at the nanoscale and mesoscale to engineer the optical properties of plasmonic metamaterials” Northwestern Computational Research Day, Evanston, IL, April 2014. (poster)

### **TRAINEE PRESENTATIONS AND STUDENT THESES**

1. Presenter: Silas W. Bollen. “Design of Room-Temperature Synthesis for Noble-Metal High-Entropy Alloy Nanoparticles” Honors Thesis, University of Massachusetts Lowell, Lowell, MA. May 2024.
2. Presenter: Sarah S. Dawes. “Designing Multimetallic Core-Satellite Nanoarchitectures by Galvanic Exchange” Senior Thesis, University of Massachusetts Lowell, Lowell, MA. May 2024.
3. Presenter: Julianne D. Gath. “Understanding Nanoscale Interactions using Intrinsically Disordered Proteins (IDPs) and Au Nanoparticles” Honors Thesis, University of Massachusetts Lowell, Lowell, MA. May 2024.
4. Presenter: Duc Vu. “Shape controlled nanoparticles for electrocatalysis” Northeast Regional American Chemical Society Meeting (NERM), Boston, MA, June 2023 (poster)
5. Presenter: Noah L. Mason. “Phase-dependent plasmonics in post-transition metal alloy nanoparticles” Northeast Regional American Chemical Society Meeting (NERM), Boston, MA, June 2023 (oral)
6. Presenter: Porvajja Nagarajan. “Strategies for multi-step carbon dioxide upgrading and valorization” Northeast Regional American Chemical Society Meeting (NERM), Boston, MA, June 2023 (oral)
7. Presenter: Connor Sullivan. “Designing multimetallic catalysts for hydrogen evolution in saline electrolyte using rapid synthesis on carbon paper supports” Northeast Regional American Chemical Society Meeting (NERM), Boston, MA, June 2023 (oral)
8. Presenter: Chuntao Wang. “Gold-based nanoparticle substrates for Surface-Enhancement Raman Spectroscopy (SERS) detection of PFAS” Northeast Regional American Chemical Society Meeting (NERM), Boston, MA, June 2023 (oral)
9. Presenter: Duc Vu. “Shape controlled nanoparticles for electrocatalysis” Honors Thesis, University of Massachusetts Lowell, Lowell, MA. May 2023.
10. Presenter: Noah L. Mason. “Phase dependent plasmonics in noble metal tin alloys” Honors Thesis, University of Massachusetts Lowell, Lowell, MA. May 2023. Winner, Best Thesis.
11. Presenter: Noah L. Mason. “Size-dependent phase transitions in plasmonic post-transition metal nanoparticles” American Chemical Society Meeting, Chicago, IL, Aug. 2022 (poster)

12. Presenter: Maria V. Fonseca Guzman. "Using post-transition metals to access higher energy plasmons" American Chemical Society Meeting, San Diego, CA, Mar. 2022 (poster)
13. Presenter: Maria V. Fonseca Guzman. "Post-Transition Nanoparticle Plasmonic Activity in the Ultraviolet" American Chemical Society Meeting, San Diego, CA, Mar. 2022 (oral)
14. Presenter: Melissa E. King. "Leveraging Bismuth Immiscibility to Create Highly Concave Noble Metal Nanoparticles" Noble Metal Nanoparticles, Gordon Research Conference, South Hadley, MA, June 2022. (poster)
15. Presenter: Maria V. Fonseca Guzman. "Using Post-Transition Metals to Access Higher Energy Plasmons" Honors Thesis, University of Massachusetts Lowell, Lowell, MA. May 2021.

## TEACHING

Instructor, Sustainable and Green Chemistry, University of Massachusetts Lowell	Spring 2025
Instructor, Forensic Chemistry for Non-Scientists, University of Massachusetts Lowell	Spring 2025
Instructor, Solid-State Materials Chemistry, University of Massachusetts Lowell	Fall 2024
Instructor, Spectroscopy, GPS, University of Massachusetts Lowell	Fall 2024
Instructor, Green and Sustainable Chemistry, University of Massachusetts Lowell	Spring 2024
Instructor, Solid-State Materials Chemistry, University of Massachusetts Lowell	Spring 2023
Instructor, Spectroscopy, GPS, University of Massachusetts Lowell	Spring 2022
Instructor, Intro. to Discipline of Chem., University of Massachusetts Lowell	Fall 2022
Instructor, Spectroscopy, GPS, University of Massachusetts Lowell	Fall 2022
Instructor, Solid-State Materials Chemistry. University of Massachusetts Lowell	Spring 2021
Instructor, Spectroscopy, GPS, University of Massachusetts Lowell	Fall 2020
Instructor, Spectroscopy. University of Massachusetts Lowell	Fall 2019

Graduate Student Mentees: 2019–present  
Chuntao Wang (Chemistry), Connor Sullivan (Chemistry), Porvajja Nagarajan (Chemistry), Anthony Branco (Chemistry), Ji Hyeon Cha (Chemistry), Tannaz Farrokhi (Polymer Science), Oluwatosin Badru (Chemistry)

Masters Student Mentees: 2024–present  
Julianne Gath (Chemistry, Honors Thesis), Sarah Dawes (Chemistry, Thesis),

Undergraduate Student Mentees: 2019–present  
Maria Fonseca Guzman (Chemical Engineering, Honors Thesis), Gavin Alexander (Chemical Engineering), Karim Naija (Chemical Engineering), Ryan Butler (Biomedical Engineering), Ryzek Chretien (Chemical Engineering), Noah Mason (Chemistry, Honors Thesis), Duc Vu (Chemistry, Honors Thesis), Julianne Gath (Chemistry, Honors Thesis), Sarah Dawes (Chemistry, Thesis), Priyanka Kumar (Chemical Engineering), Silas Bollen (Chemistry, Honors Thesis), Samantha Silva (Chemistry, Thesis), Joseph Cavaco (Chemistry, Honors Thesis), Stephanie Ceballos (Chemistry, Honors Thesis), Ceceila Ho (Chemistry), Devansh Ramani (Chemical Engineering), Josh Cooper (Chemistry)

Postdoctoral Mentees:  
Dr. Melissa King 2019–2022

## Michael B. Ross: Curriculum Vitae

Dr. Sangmin Jeong 2022–present

### Visiting Scholars:

Maelisse Trancart, University of Versailles Saint-Quentin-en-Yvelines University 2022  
Valerie Renarison, University of Versailles Saint-Quentin-en-Yvelines University 2023  
Marie Adjinou, University of Versailles Saint-Quentin-en-Yvelines University 2024

### High School Mentees:

Shashank Jarmale 2020–2021

### Doctoral Committees:

2019–present  
Elizabeth Farrell (Chemistry), Anna-Maria Routsis (Chemistry), Dhanushka Wickramasinghe (Chemistry), M. Amin Kiani (Chemistry), Abbas P. Khazi (Chemistry), Jia Tu (Chemistry), Maduka Praveen (Chemistry), Subrata Chandra (Chemistry)

### Master's Committees:

2021–present  
Kaylyn Michaud (Chemistry), Wendy Gavin (Chemistry), Smita Chatterjee (Chemistry), Grace McLaughlin (Chemistry)

Teaching Assistant, Advanced Inorganic Chemistry, Northwestern University 2012–2013

Teaching Assistant, General Chemistry, Northwestern University 2011–2012

## PROFESSIONAL SERVICE

Referee: *Nat. Catal.*, *Nat. Commun.*, *Joule* (>10x), *J. Am. Chem. Soc.* (>30x), *Proc. Nat. Acad. Sci.*, *U.S.A.*, *Chem. Sci.*, *Adv. Mater.*, *Chem. Mater.*, *Nanoscale Horiz.*, *Acc. Chem. Res.*, *ACS Catal.*, *J. Phys. Chem. Lett.*, *J. Phys. Chem. C*, *J. Catal.*, *Adv. Opt. Mater.*, *J. Phys. Chem. Au*, *Small Methods*, *ACS Photonics*, *J. CO<sub>2</sub> Util.*, *Inorg. Chem. Front.*, *EcoMat*, *ACS Appl. Nano Mater.*, *ACS Appl. Energy Mater.*, *Inorganic Chem.*, *Chem. Comm.*, *Chem. Cat. Chem.*, *ACS Sustain. Chem. Eng.*, *Phys. Chem. Chem. Phys.*, *Appl. Phys. Lett.*, *Chem. Phys. Lett.*, *Opt. Lett.*, *MRS Adv.*, *Cell Rep. Phys. Sci.*, *iScience*, *Sci. Rep.*

Referee: *National Science Foundation (NSF)*, *The Research Foundation–Flanders (FWO)*, *NESACS Grant-In-Aid Program*, *ACS Petroleum Research Fund (PRF)*, *Irish Research Council*, *Swiss National Science Foundation*

Community Board Member, *Nanoscale Horizons Journal* 2023–present

Panelist, *National Defense Science and Engineering Graduate Fellowship* 2019–present

Member, *American Association for the Advancement of Science (AAAS)* 2020–present

Member, *Materials Research Society (MRS)* 2014–present

Member, *American Chemical Society (ACS)* 2010–present

Session Chair, *American Chemical Society Meeting, Inorganic Division* 2017, 2024

Session Organizer, *Canadian Institute for Advanced Research Meeting, Catalysis* 2016–2017

## DEPARTMENT AND UNIVERSITY SERVICE

Interdisciplinary Task Force, Faculty Senate 2023–present

RHED Faculty Fellow, Sustainability 2023–present

## Michael B. Ross: Curriculum Vitae

Student Recruitment Committee, Chemistry Department	2023–present
Director and Creator, CatalyzeUML Launch Program	2022–present
Faculty Senate	2022–present
Non-ionizing Radiation Safety Committee	2022–present
ACS Chapter Student-Faculty Advisor	2021–present
Graduate Curriculum and Policy Committee, Chemistry Department	2020–present
Immersive Scholar Mentor	2020–present
Riverhawk Academy Mentor	2020–2022
Chemistry Strategic Planning Committee	2021
Volunteer, Open House, University of Massachusetts Lowell	2020

### **LEADERSHIP, OUTREACH, AND EXTERNAL SERVICE**

Organizer, Day of Discovery, UML Chemistry, KCS Science Week	2022–present
Co-Author, -Panelist, and -Host, Future of Hydrogen Workshop	2021
Host Mentor, High School Teacher, Commonwealth Regional Skills Development Program for STEM Teacher Externships	2021
Volunteer, Bay Area Scientists in Schools (BASIS), Berkeley, CA	2017–2019
Volunteer, Science in the Classroom (SITC), Evanston, IL	2012–2016
Representative, Graduate–Faculty Liaison Committee, Evanston, IL	2012–2016
Representative, NU-MRSEC Student/Postdoc Leadership Council,	2014–2016
Elected Officer: Awards Chair, Phi Lambda Upsilon Honor Society	2014–2015
Elected Officer: Social Chair, Phi Lambda Upsilon Honor Society	2013–2014
Management for Scientists and Engineers, Kellogg School of Management, Evanston IL	2014