Stanford

Christopher J. Miller

Postdoctoral Scholar, Photon Science, SLAC

Bio

BIO

I am a chemist and Postdoctoral Scholar at SLAC National Accelerator Laboratory, where my research focuses on the core challenges of electrochemical energy conversion and sustainable chemistry. Working within the DOE BETO CO2RUe consortium, I investigate the dynamic behavior of catalysts in CO# electrolyzers. My primary approach involves using advanced operando characterization techniques, particularly X-ray Absorption Spectroscopy (XAS), to build comprehensive models that link a catalyst's atomic-scale structure to its real-world device performance.

My philosophy is that progress requires bridging fundamental science with practical systems engineering. To that end, my expertise includes the ground-up design, construction, and automation of experimental systems. I specialize in building fully integrated electrochemical test stations and gas delivery infrastructure, tailored to deliver high-quality, reproducible data with robust safety features and remote-operation capabilities. Complementing this hardware, I develop custom MATLAB software suites to automate data processing and analysis, significantly accelerating the path from raw data to actionable scientific insight.

In addition to my research, I am deeply committed to education and professional service. As a recent fellow in Stanford's Preparing Future Professors (PFP) program, I received formal training in pedagogy and gained direct mentorship experience at San Jose State University. This commitment extends to the broader scientific community through my long-standing leadership roles within the American Chemical Society (ACS), where I contribute to governance, chemical safety initiatives, and professional development for younger chemists. I am always interested in discussing new collaborations at the intersection of spectroscopy, catalysis, and system design.

STANFORD ADVISORS

- Britt Hedman, Postdoctoral Faculty Sponsor
- Dimosthenis Sokaras, Postdoctoral Research Mentor

Publications

PUBLICATIONS

- **Insights on Covalent Attachment of a Re Bipyridyl Catalyst onto p-Si(111) Using an Alkyl Linker for Photoelectrochemical CO₂ Reduction** *INORGANIC CHEMISTRY*
  Lee, B., Miller, C. J., Freeze, J. G., Prabhakar, R., Chen, G., Okuno, S., Lampert, J. S., Batista, V. S., Kubiak, C. P.
  2026
- **Excited State Dynamics of CO₂ Reduction Catalyst under Vibrational Strong Coupling** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*

Jin, T., Gebre, S. T., Miller, C. J., Kubiak, C. P., Ribeiro, R. F., Lian, T.
2025

- **A Reexamination of CO₂ Reduction with Fe₂S₂ Hydrogenase Mimics: Lessons in Using a Hydrogen Evolution Reaction Catalyst for CO₂ to Formate Catalysis** *CHEMELECTROCHEM*
  Miller, C. J., Lee, B., Barrett, J. A., Palasz, J. M., Chan, T., Shandilya, A., Kubiak, C. P.
  2025
- **Fano Resonance in CO2 Reduction Catalyst Functionalized Quantum Dots.** *Journal of the American Chemical Society*
  Gebre, S. T., Martinez-Gomez, L., Miller, C. J., Kubiak, C. P., Ribeiro, R. F., Lian, T.
  2025; 147 (13): 10966-10973
- **Hydricity as a Guide in H₂ Evolution, Formic Acid Decomposition, and Transfer Hydrogenation: A Case Study with Ir(Cp*)(2-phenylpyridine)H** *ORGANOMETALLICS*
  Miller, C. J., Weddle, L. R., Okuno, S., Brunner, F. M., Lee, B., Waldie, K., Kubiak, C. P.
  2024; 43 (24): 3258-3264
- **Amine Hole Scavengers Facilitate Both Electron and Hole Transfer in a Nanocrystal/Molecular Hybrid Photocatalyst.** *Journal of the American Chemical Society*
  Gebre, S. T., Kiefer, L. M., Guo, F., Yang, K. R., Miller, C., Liu, Y., Kubiak, C. P., Batista, V. S., Lian, T.
  2023; 145 (5): 3238-3247
- **PM-IRRAS and DFT investigation of the surface orientation of new Ir piano-stool complexes attached to Au(111).** *Dalton transactions (Cambridge, England : 2003)*
  Miller, C. J., Brunner, F. M., Kelly, H. R., Cheung, P. L., Torquato, N. A., Gembicky, M., Okuno, S., Chan, T., Batista, V. S., Kubiak, C. P.
  2022; 51 (46): 17688-17699
- **Electrochemical Reduction of CO₂ Using Group VII Metal Catalysts** *TRENDS IN CHEMISTRY*
  Barrett, J. A., Miller, C. J., Kubiak, C. P.
  2021; 3 (3): 176-187
- **Heterogenized Molecular Catalysts: Vibrational Sum-Frequency Spectroscopic, Electrochemical, and Theoretical Investigations.** *Accounts of chemical research*
  Ge, A., Rudshteyn, B., Videla, P. E., Miller, C. J., Kubiak, C. P., Batista, V. S., Lian, T.
  2019; 52 (5): 1289-1300
- **Selective Reduction of CO₂ to CO by a Molecular Re(ethynyl-bpy)(CO)₃Cl Catalyst and Attachment to Carbon Electrode Surfaces** *ORGANOMETALLICS*
  Zhanaidarova, A., Ostericher, A. L., Miller, C. J., Jones, S. C., Kubiak, C. P.
  2019; 38 (6): 1204-1207
- **CO2 Reduction Catalysts on Gold Electrode Surfaces Influenced by Large Electric Fields.** *Journal of the American Chemical Society*
  Clark, M. L., Ge, A., Videla, P. E., Rudshteyn, B., Miller, C. J., Song, J., Batista, V. S., Lian, T., Kubiak, C. P.
  2018; 140 (50): 17643-17655
- **The Effect of Ar/O2 and H2O Plasma Treatment of SnO2 Nanoparticles and Nanowires on Carbon Monoxide and Benzene Detection.** *ACS applied materials & interfaces*
  Stuckert, E. P., Miller, C. J., Fisher, E. R.
  2017; 9 (18): 15733-15743
- **Gas-phase diagnostics during H₂ and H₂O plasma treatment of SnO₂ nanomaterials: Implications for surface modification** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B*
  Stuckert, E. P., Miller, C. J., Fisher, E. R.
  2017; 35 (2)
- **In-Depth View of the Structure and Growth of SnO2 Nanowires and Nanobrushes.** *ACS applied materials & interfaces*
  Stuckert, E. P., Geiss, R. H., Miller, C. J., Fisher, E. R.
  2016; 8 (34): 22345-53
- **Structure and Lewis-base reactivity of bicyclic low-valent germanium and tin complexes bridged by bis(diisopropylphosphino)amine** *POLYHEDRON*

Miller, C. J., Chadha, U., Ulibarri-Sanchez, J. R., Dickie, D. A., Kemp, R. A.
2016; 114: 351-359