

# Joy S. Zeng

Incoming Assistant Professor, Brown University  
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## PROFESSIONAL APPOINTMENTS

2023 – present      **Postdoctoral Fellow**  
Harvard University, Department of Chemistry and Chemical Biology  
Advisor: Theodore A. Betley

## EDUCATION

2017 – 2023      **Ph.D., Chemical Engineering**  
Massachusetts Institute of Technology (GPA: 4.9/5.0)  
Advisors: Karthish Manthiram and Yuriy Román-Leshkov  
Dissertation: “Traversing catalytic contexts for interrogation and design of carbon conversion electrocatalysts”

2013 – 2017      **B.S., Chemical Engineering**  
Stanford University (GPA: 4.0/4.0)  
Advisor: Bruce M. Clemens

## HONORS AND AWARDS

2024      Harvard CCB Postdoctoral Travel Award  
2023      AIChE Women in Chemical Engineering Travel Award  
2021      MIT ChemE Rising Star  
2021      MIT Energy Initiative Chevron-MIT Energy Fellowship  
2021      MIT Chemical Engineering Dow Travel Award  
2021      MIT Research Slam Finalist  
2020      MIT Teaching Development Fellowship  
2019      MathWorks Engineering Fellowship  
2017      MIT Presidential Fellowship  
2017      Frederick E. Terman Award for Scholastic Achievement in Engineering, Stanford University  
2016      Channing Robertson Award in Chemical Engineering, Stanford University  
2016      Female all-around winner, National Collegiate Wushu Tournament  
2014 & 2015      Shell Technical Scholarship  
2014      President’s Award for Academic Excellence in the Freshman Year, Stanford University

## PUBLICATIONS

‡ Denotes equal contribution; § Denotes undergraduate mentee

13. T. Latendresse, N. Litak, **J. Zeng**, S-L. Zheng, T. Betley, “High-Spin [Fe<sub>3</sub>] Cluster Capable of Pnictogen Atom Capture” *Journal of the American Chemical Society*, 146, 37, 25578–25588 (2024)
12. **J. Zeng**‡, V. Padia‡, Y. Chen, A. Limaye, J. Maalouf, A. Liu§, M. Yusov, I. Hunter, K. Manthiram, “Non-Idealities in CO<sub>2</sub> Electroreduction Mechanisms Revealed by Automation-Assisted Kinetic Analysis” *ACS Central Science*, 10, 7, 1348–1356 (2024)
11. **J. Zeng**, E. Cosner‡, S. Delgado-Kukuczka‡, C. Jiang, J. Adams, Y. Román-Leshkov, K. Manthiram, “Electrifying Hydroformylation Catalysts Exposes Voltage-Driven C–C Bond Formation” *Journal of the American Chemical Society*, 146, 24, 16521–16530 (2024)
10. M. Chung, K. Jin, **J. Zeng**, T. Ton, K. Manthiram, “Tuning Single-Atom Dopants on Manganese Oxide for Selective Electrocatalytic Cyclooctene Epoxidation” *Journal of the American Chemical Society*, 144, 38, 17416–17422 (2022)
9. J. Park, **J. Zeng**, A. Sahasrabudhe, K. Jin, Y. Fink, K. Manthiram, P. Anikeeva, “Electrochemical Modulation of Carbon Monoxide-Mediated Cell Signaling” *Angewandte Chemie International Edition*, 60, 37, 20325–20330 (2021)
8. **J. Zeng**, K. Manthiram, “Redox Reservoirs: Enabling More Modular Electrochemical Synthesis” *Trends in Chemistry*, 3, 3 157–159 (2021)
7. A. Limaye, **J. Zeng**, A. Willard, K. Manthiram “Bayesian Data Analysis Reveals No Preference for Cardinal Tafel Slopes in CO<sub>2</sub> Reduction Electrocatalysis” *Nature Communications*, 12, 703 (2021)
6. M. Chung, K. Jin, **J. Zeng**, K. Manthiram, “Mechanism of Chlorine-mediated Electrochemical Ethylene Oxidation in Saline Water” *ACS Catalysis*, 10, 23, 14015–14023 (2020)
5. **J. Zeng**, N. Corbin, K. Williams, K. Manthiram, “Kinetic Analysis on the Role of Bicarbonate in Carbon Dioxide Electroreduction at Immobilized Cobalt Phthalocyanine” *ACS Catalysis*, 10, 7, 4326–4336 (2020)
4. N. Corbin, **J. Zeng**, K. Williams, K. Manthiram, “Heterogeneous Molecular Catalysts for Electrocatalytic CO<sub>2</sub> Reduction” *Nano Research*, 12, 2093–2125 (2019)
3. K. Williams, N. Corbin, **J. Zeng**, N. Lazouski, D. Yang, K. Manthiram, “Protecting Effect of Mass Transport During Electrochemical Reduction of Oxygenated Carbon Dioxide Feedstocks” *Sustainable Energy & Fuels*, 3, 5, 1225–1232 (2019)
2. M. Zhu, D. Yang, R. Ye, **J. Zeng**, N. Corbin, and K. Manthiram, “Inductive and Electrostatic Effects on Immobilized Cobalt Porphyrins for Electrocatalytic CO<sub>2</sub> Reduction” *Catalysis Science and Technology*, 9, 974–980 (2019)
1. **J. Zeng**, X. Xu, V. Parameshwaran, J. Baker, S. Bent, H.-S. P. Wong, B. Clemens, “Photoelectrochemical Water Oxidation by GaAs Nanowire Arrays Protected with Atomic Layer Deposited NiOx Electrocatalysts” *Journal of Electronic Materials*, 47, 932–937 (2018)

## INVITED TALKS

2. **J. Zeng** “Traversing catalytic contexts for the interrogation and design of carbon conversion electrocatalysts” Brown University, September 2023, Providence, RI
1. **J. Zeng**, N. Corbin, K. Williams, K. Manthiram “Quantitative kinetic analysis on the mechanism of carbon dioxide electroreduction at an immobilized molecular catalyst” Advanced Materials Frontier Zhejiang University-MIT Graduate Forum, October 2021, virtual

## CONFERENCE PRESENTATIONS

13. **J. Zeng**, V. Padia, J. Maalouf, A. Limaye, A. Liu, M. Yusov, I. Hunter, K. Manthiram, “Automated platform for quantitative kinetic analysis of CO<sub>2</sub> electroreduction mechanisms at immobilized metal tetrapyrroles” AIChE Annual Meeting, November 2023, Orlando, FL (oral)
12. **J. Zeng**, C. Jiang, S. Delgado, J. Adams, Román-Leshkov, K. Manthiram, “Electrifying hydroformylation catalysts exposes voltage-driven C–C bond formation” AIChE Annual Meeting, November 2023, Orlando, FL (oral)
11. **J. Zeng**, C. Jiang, J. Adams, S. Delgado, Román-Leshkov, K. Manthiram, “Electrified C–C bond formation at hydroformylation catalysts” North American Catalysis Society Meeting, June 2023, Providence RI (oral)
10. **J. Zeng**, C. Jiang, J. Adams, S. Delgado, Román-Leshkov, K. Manthiram, “Electrified C–C bond formation at hydroformylation catalysts” Inorganic Reaction Mechanisms Gordon Research Seminar & Conference, March 2023, Galveston, TX (poster)
9. **J. Zeng**, Y. Román-Leshkov, K. Manthiram, “Importing hydroformylation catalysts on electrode surfaces unlocks novel voltage-driven reactivity”, AIChE Annual Meeting, November 2022, Phoenix, AZ (oral)
8. **J. Zeng**, Y. Román-Leshkov, K. Manthiram, “Hydroformylation-inspired catalysts for electrochemical C–C coupling”, Electrochemistry Gordon Research Seminar & Conference, September 2022, Ventura, CA (GRS – oral; GRC – poster)
7. **J. Zeng**, Y. Román-Leshkov, K. Manthiram, “Hydroformylation-inspired catalysts for electrochemical C-C coupling”, Catalysis Gordon Research Seminar & Conference, June 2022, New London, NH (poster)
6. **J. Zeng**, Y. Román-Leshkov, K. Manthiram “Hydroformylation-like reactions enable electrochemical pathways from CO<sub>2</sub> to extended carbon chains” ECS Spring Meeting, May 2022, Vancouver, Canada (oral)
5. **J. Zeng**, N. Corbin, K. Williams, K. Manthiram “Quantitatively deconvoluting the influences of electrolyte and potential on atomically precise catalysts at electrified interfaces” AIChE Annual Meeting, November 2021, Boston, MA (oral)
4. **J. Zeng**, A. Limaye, N. Corbin, K. Williams, K. Manthiram “Cohesive, statistically rigorous kinetic analyses challenge common wisdoms of electrocatalytic reaction mechanisms” ACS Spring Conference, April 2021, virtual (oral)
3. **J. Zeng**, N. Corbin, K. Williams, K. Manthiram “Role of buffering anions and proton donors in CO<sub>2</sub> reduction at immobilized cobalt phthalocyanine” MRS Conference, December 2019, Boston, MA (oral)
2. **J. Zeng**, M. Zhu, D. Yang, R. Ye, N. Corbin, K. Manthiram, “Inductive and Electrostatic Effects on Cobalt Porphyrins for Heterogeneous Electrocatalytic Carbon Dioxide Reduction” North American Catalysis Society Meeting, June 2019, Chicago, IL (oral)
1. **J. Zeng**, X. Xu, V. Parameshwaran, J. Baker, S. Bent, H.-S. P. Wong, B. Clemens, “GaAs Nanowire Arrays for the Photoelectrochemical Oxidation of Water” Electronic Materials Conference, June 2017, South Bend, IN (oral)

**TEACHING**

2020 – 2021

**Teaching Development Fellow** in Chemical Engineering

- Hosted a “TA Fair” event and created an online “TA Wiki” resource to help up and coming ChemE TAs set expectations and receive advice about choosing TAs and being TAs
- Hosted the first annual “ChemE Teach-Off” teaching competition

Fall 2019

**Teaching Assistant**

Chemical Engineering Thermodynamics, 10.40 Instructor rating: 6.7/7

Selected student comments:

- *“great at explaining difficult concepts in a way that makes sense... also really patient and helpful when working one-on-one with students”*
- *“recitations were extremely clear, and linked information together very well... well prepared and gave great answers to questions”*
- *“tons of energy at the board which made her engaging and interesting during recitation”*

Summer 2019

**Kaufman Teaching Certificate Program Participant****RESEARCH MENTORSHIP**

2023 – present

Avinashi Bhandari, Harvard Chemistry Undergraduate

2022 – 2023

Emma Cosner, Caltech Chemistry Graduate Student

2022 – 2023

Spencer Delgado, Caltech ChemE Graduate Student

2020 – 2022

Alexander Liu, MIT ChemE Undergraduate

2018 – 2019

Sierra Brooks, MIT ChemE Undergraduate

**SERVICE AND ACTIVITIES**

2024

Session co-chair, CRE Division, Electrocatalysis II, AIChE Annual Meeting

2024

Conference co-chair, Electrochemistry Gordon Research Seminar

2019 – 2023

REFS-X Member (departmental peer-to-peer counseling)

2020

ChemE Application Mentorship Program (ChAMP) Mentor (graduate school application mentorship for applicants of under-represented backgrounds)

2017 – 2020

Netpals Mentor (educational outreach for local 7<sup>th</sup> graders)

2018 – 2019

Departmental Netpals Coordinator

2019

Cambridge School Volunteer (math outreach program for 5<sup>th</sup> graders)

2016 – 2017

Students for a Sustainable Stanford, Project Leader (developed lecture materials, expanded sustainability initiatives in dorms)