

# Jay T. Bender

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## Education

2020-Present Ph.D. Candidate in Chemical Engineering, University of Texas at Austin.

Advisors: Professors Joaquin Resasco & Delia Milliron

2016-2020 B.S. Chemical Engineering, Cornell University, 2020, *Magna Cum Laude*

Minor in Sustainable Energy Systems

## Research & Industry Experience

2020-present Graduate Research Assistant, University of Texas at Austin. Principal Investigator: Joaquin Resasco.

2020-present Graduate Research Assistant, University of Texas at Austin. Principal Investigator: Delia Milliron.

2017-2020 Undergraduate Research, Cornell University. Principal Investigator: Jefferson W. Tester.

2019 Technical Operations Specialist Intern, Merck. Manager: Susan Froman.

## Awards and Honors

- UT Chevron Energy Graduate Fellowship 2024-2025
- McKetta Department of Chemical Engineering 2024 Paper of the Year winner for "Understanding cation effects on the hydrogen evolution reaction" 2024
- Dr. Thomas F. Edgar Endowed Graduate Fellowship in Chemical Engineering 2024
- McKetta Department of Chemical Engineering Teaching Assistant of the Year Award 2023
- Paige H. and J. Jeff Weidner Endowed Presidential Fellowship in Chemical Engineering 2023
- University of Texas at Austin Graduate School Professional Development Award (x2) (2022, 2023)
- National Science Foundation Graduate Research Fellowship 2020
- Harry P. Whitworth Endowed Graduate Fellowship in Engineering 2020
- Cornell University Robert F. Smith School of Chemical & Biomolecular Engineering Outstanding Service Award 2020
- AIChE National Student Conference Undergraduate Poster Competition: Catalysis & Reaction Engineering IV Third Place Award 2019
- AIChE Eckhardt Northeast Student Regional Conference Paper Competition First Place Award 2019

- AIChE National Student Conference Undergraduate Poster Competition: Catalysis & Reaction Engineering II Second Place Award 2018
- Cornell University College of Engineering Dean's List (x6)

## Publications

### [Google Scholar Profile](#)

8. **Bender, J. T.**; Sanspeur, R. Y.; Valles, A. E.; Uvodich A. K.; Milliron, D. J.; Kitchin, J. R.; Resasco, J. The potential of zero total charge predicts cation effects for the oxygen reduction reaction. *Under review*.
7. McGregor, J. M.; **Bender, J. T.**; Petersen, A. S.; Canada, L.; Rossmeisl, J.; Brennecke, J. F.; Resasco, J. The role of organic cations in the electrochemical reduction of CO<sub>2</sub> in aprotic solvents. *Under review*.
6. Marquez, R. A.; Kalokowski, E.; Espinosa, M.; **Bender, J. T.**; Son, Y. J.; Kawashima, K.; Chukwunke, C. E.; Smith, L. A.; Celio, H.; Dolocan, A.; Zhan, X.; Miller, N.; Milliron, D. J.; Resasco, J.; Mullins, C. B, Transition metal incorporation: electrochemical, structure, and chemical composition effects on nickel oxyhydroxide oxygen-evolution electrocatalysts. *Energy & Environmental Science*, **2024**, *17*, 2028-2045.
5. **Bender, J.T.**, Petersen, A.S., Østergaard, F.C., Wood, M.A., Heffernan, S.M.J., Milliron, D.J., Rossmeisl, J., & Resasco, J. Understanding Cation Effects on the Hydrogen Evolution Reaction. *ACS Energy Letters*, **2022**, *8*, 657-665.
4. Staller, C.M., Gibbs, S.L., Gan, X.Y., **Bender, J.T.**, Jarvis, K., Ong, G.K., & Milliron, D.J. Contact Conductance Governs Metallicity in Conducting Metal Oxide Nanocrystal Films. *Nano Letters* **2022**, *22*, 5009-5014.
3. Hawkins, A.J., **Bender, J.T.**, Grooms, R.D., Schissel, C.J., & Tester, J.W. Temperature-responsive smart tracers for field-measurement of inter-well thermal evolution: Heterogeneous kinetics and field demonstration. *Geothermics* **2021**, *92*, 102046.
2. Beentjes, I., **Bender, J.T.**, Hawkins, A.J., & Tester, J.W. Chemical Dissolution Drilling of Barre Granite Using a Sodium Hydroxide Enhanced Supercritical Water Jet. *Rock Mechanics and Rock Engineering* **2020**, *53*, 483-496.
1. Beentjes, I., **Bender, J.T.**, & Tester, J.W. Dissolution and thermal spallation of barre granite using pure water hydrothermal jets. *Rock Mechanics and Rock Engineering* **2019**, *52*, 1339-1352.

## Invited Seminar Presentations

1. "How electrolyte composition influences electrocatalytic water splitting activity" Fall 2023 PREM-MRSEC Seminar, San Marcos, TX.

## Selected Conference Presentations

1. **J. Bender**, A. Petersen, F. Østergaard, M. Wood, S. Heffernan, D. Milliron, J. Rossmeisl, J. Resasco. "Understanding Cation Effects for the Hydrogen Evolution Reaction" The 28<sup>th</sup> North American Catalysis Society Meeting 2023, Providence, RI.
2. **J. Bender**, A. Petersen, F. Østergaard, A. Bagger, M. Wood, S. Heffernan, J. Rossmeisl, D. Milliron, J. Resasco. "Influence of Alkali Metal Cations on the Hydrogen Evolution Reaction in Acidic and Basic Electrolytes" American Institute of Chemical Engineers Annual Meeting 2022, Phoenix, AZ.
3. **J. Bender**, A. Hawkins, R. Grooms, C. Schissel, J. Tester. "Heterogeneous Hydrolysis of a Thermally Degrading Tracer" 45<sup>th</sup> Workshop on Geothermal Reservoir Engineering, Stanford, CA.
4. I. Beentjes, **J. Bender**, S. Hillson, J. Tester. "Hydrothermal Spallation of Barre Granite Using Supercritical Water Jets" 43<sup>rd</sup> Workshop on Geothermal Reservoir Engineering, Stanford, CA.

### Teaching

- 2023 Graduate Teaching Assistant, *Chemical Reactor Analysis and Design*, CHE 372. Instructor: B. Keith Keitz  
Teaching assistant rating: 4.73/5.00
- 2022 Graduate Teaching Assistant, *Reaction Kinetics*, CHE 391J. Instructor: Joaquin Resasco  
Teaching assistant rating: 4.76/5.00
- 2020 Undergraduate Teaching Assistant, *Chemical Engineering Thermodynamics*, CHEME 3130. Instructor: Jeffrey Varner
- 2020 Undergraduate Teaching Assistant, *Applied Process Controls*, CHEME 3700. Instructor: Franklin Lomax
- 2018 Undergraduate Teaching Assistant, *Physics II: Electromagnetism*, PHYS 2213. Instructor: Alan Giambattista
- 2017 Undergraduate Teaching Assistant, *Chemical Concepts*, CHEM 1002.

### Service

- 2023-2024 Chair of UT Austin's Electrochemical Society. Organized student-led chalk talks on interdisciplinary electrochemistry topics and graduate student networking events between UT Austin and Texas A&M University.
- 2023 Edison Lecture Series volunteer. Demonstrated water electrolysis to local 6-12<sup>th</sup> graders.
- 2022 My Introduction to Engineering (MITE) volunteer. Taught 20+ high school students from around Texas about optical properties of CdSe quantum dots.
- 2021-2024 McKetta Department of Chemical Engineering peer mentor.
- 2021-2024 McKetta Department of Chemical Engineering recruitment volunteer.

- 2021-2022 Capital of Texas Undergraduate Research Conference judge. Evaluated 20+ undergraduate student research poster and seminar presentations with a panel of four judges during live Q&A sessions.
- 2021 UT Austin Girl Day Booth Organizer. Designed an asynchronous virtual science experiment for elementary school aged students to follow along with at home. Taught students thermodynamic states and phase transitions through making homemade ice cream.
- 2021-2022 Treasurer for University of Texas at Austin McKetta Department of Chemical Engineering Graduate Leadership Council. Planned and managed budget of \$10,000.
- 2020-2021 First Years' representative for University of Texas at Austin McKetta Department of Chemical Engineering Graduate Leadership Council. Coordinated virtual and socially distanced events to ease the transition into graduate school for Fall 2020 and Fall 2021 graduate student cohorts.
- 2019-2020 President of Cornell University's AIChE student chapter. Organized educational fieldtrips, led professional development workshops, and arranged social events to help classmates achieve professional goals and promote cohesiveness among the undergraduate student body.
- 2018-2019 Fundraising and Outreach Chair of Cornell University's AIChE student chapter. Collaborated with on-campus outreach groups to teach socioeconomically underrepresented high school students chemical engineering principles. Taught approximately 120 students throughout the 2018-2019 academic year.
- 2017-2018 Sophomore Representative of Cornell University's AIChE student chapter. Planned and taught a four-week chemical engineering course for more than 20 Ithaca High School students.

### **Students Mentored**

Sean Heffernan, B.S. Chemical Engineering 2023, University of Texas at Austin, Current affiliation: LyondellBasell

Angel Valles, B.S. Chemical Engineering, University of Texas at Austin, Expected graduation: 2026

Alyssa Uvodich, B.S. Chemical Engineering, University of Texas at Austin, Expected graduation: 2027

Nicolas Bueno Ponce, B.S. Biochemistry, Texas State University at San Marcos, Expected graduation: 2025