

Dr. Daniel A. Moreno

Assistant Professor, Mechanical Engineering
Cooperative Engineering Program at Missouri State University
PCTR 2021G • 405 N. Jefferson Ave. • Springfield, MO 65897
417-837-2329 • danielmoreno@missouristate.edu

Adjunct Assistant Professor, Mechanical & Aerospace Engineering (Courtesy Appointment)
Missouri University of Science and Technology
573-341-4002 • danielmoreno@mst.edu

I. EDUCATION/PROFESSIONAL DEVELOPMENT

Education:

Georgia Institute of Technology, Atlanta, GA

Ph.D., Mechanical Engineering

5/2019

Thesis Title: Thermodynamics of Electrosorption-Based Separation Processes and Cycles

Advisor: Dr. Marta Hatzell

M.S., Mechanical Engineering

12/2015

The Cooper Union for the Advancement of Science and Art, New York, NY

B.Eng., Mechanical Engineering

5/2014

Previous Positions Held:

Postdoctoral Scholar, University of Kentucky Center for Applied Energy Research	5/2019 – 7/2021
Graduate Research Assistant, Georgia Institute of Technology	3/2016 – 5/2019
Graduate Teaching Assistant, Georgia Institute of Technology	1/2015 – 12/2016
Undergraduate Research Assistant, Olin College of Engineering	6/2013 – 8/2013

II. RESEARCH

Publications:

15. Moreno D, Nelson H, Cary G, Parker D, Skaggs P. Thermodynamic Evaluation of Electrode Storage for Capacitive Deionization. *ACS omega*. 2025 Mar 4;10(10):10139-51.

14. Matin N.S., Moreno, D., Abad, K., Omosebi, A., Liu, K., Thompson, J.. Life cycle assessment of charge carrier mediated electrocatalytic reduction of carbon dioxide to formic acid. *Journal of Environmental Chemical Engineering*. 2024 Dec 22:115184.

13. Moreno, D., Landgraf, N., Cornelison, D. “Evaluation and Mitigation of H₂ and O₂ Evolution in Ni-Zn Battery”. *In Preparation*.

12. Moreno D, Omosebi A, Jeon BW, Abad K, Kim YH, Thompson J, Liu K. Decoupling Charge Carrier Electroreduction and Enzymatic CO₂ Conversion to Formate Using a Dual-Cell Flow Reactor System. *ACS Omega*. 2024 Sep 9.

11. Moreno, D. “Theoretical performance optimization of enzymatic electrochemical CO₂ reduction to formate: Voltage, concentration, temperature, pressure, and flow rate.” *Journal of CO₂ Utilization*. 2024 May 1;83:102805.

10. Moreno, D., Omosebi A, Jeon BW, Abad K, Kim YH, Thompson J, Liu K. Electrochemical CO₂ conversion to formic acid using engineered enzymatic catalysts in a batch reactor. *Journal of CO₂ Utilization*. 2023 Apr 1;70:102441.

9. Moreno, D., Thompson J, Omosebi A, Landon J, Liu K. Electrochemical analysis of charge mediator product composition through transient model and experimental validation. *Journal of Applied Electrochemistry*. 2022 Nov;52(11):1573-84.7.

- 8.** Thompson, J., Omosebi, A., **Moreno, D.**, Matin, N., Abad, K., Liu, K. An Intensified Electro-Catalytic Process for Production of Formic Acid from Power Plant CO₂ Emissions: Final Technical Report. *University of Kentucky Research Foundation*; 2022 Apr 1.
- 7.** **Moreno, D.**, Hatzell, M. C. (2019). Constant chemical potential cycles for capacitive deionization. *Physical Chemistry Chemical Physics*, 21(44), 24512-24517.
- 6.** **Moreno, D.**, Hatzell, M. C. (2019). Efficiency of Thermally Assisted Capacitive Mixing and Deionization Systems. *ACS Sustainable Chemistry & Engineering*, 7(13), 11334-11340.
- 5.** Dixit, M. B., **Moreno, D.**, Xiao, X., Hatzell, M. C., Hatzell, K. B. (2019). "Mapping charge percolation in flowable electrodes used in capacitive deionization." *ACS Materials Letters*, 1(1), 71-76.
- 4.** **Moreno, D.**, Bootwala, Y., Tsai, W. Y., Gao, Q., Shen, F., Balke, N., Hatzell, K. B., Hatzell, M. C. (2018). "In situ electrochemical dilatometry of phosphate anion electrosorption." *Environmental Science & Technology Letters*, 5(12), 745-749.
- 3.** Gunawan, A., Simmons, R. A., Haynes, M. W., **Moreno, D.**, Menon, A. K., Hatzell, M. C., Yee, S. K. (2019). "Techno-economics of cogeneration approaches for combined power and desalination from concentrated solar power." *Journal of Solar Energy Engineering*, 141(2).
- 2.** **Moreno, D.**, Hatzell, M. C. (2018). "Efficiency of Carnot and conventional capacitive deionization cycles." *The Journal of Physical Chemistry C*, 122(39), 22480-22486.
- 1.** **Moreno, D.**, Hatzell, M. C. (2018). "Influence of feed-electrode concentration differences in flow-electrode systems for capacitive deionization." *Industrial & Engineering Chemistry Research*, 57(26), 8802-8809.

Grants, Contracts, and Related Sponsored Research:

- 14.** **Moreno, D.** NSF CAREER: Variable Temperature Operating Schemes to Optimize Long-Term Lithium-Ion Battery Performance (\$524,099). Submitted Jul. 2025. *Under Review*.
- 13.** NSF-Sponsored Travel Stipend for ASME 2025 Summer Heat Transfer Conference. \$1,500. Awarded Jul. 2025.
- 12.** **Ghosh, K., Moreno, D.** DMREF:NSF-DST: Development of Materials for Sodium Battery-Supercapacitor Hybrid Energy Storage Devices (\$492,039). *Submitted Feb. 2025. Declined*.
- 11.** **Ghosh, K., Santra, S., Moreno, D., Besara, T.** MRI: Acquisition of a Physical Properties Measurement System for Research and Education (\$643,620). *Submitted Nov. 2024, Under Review*.
- 10.** **Moreno, D.** Development of a Test Bed for Thermal Energy Storage Applications to Optimize Collected Heat Use. Faculty Research Grant, Missouri State University (\$7,500). *Awarded 6 Nov 2024*.
- 9.** **Moreno, D.** Flow-Electrode Capacitive Deionization: Optimizing Performance, Energy Use, and Ion Selectivity for Treating Total Dissolved Solids in Fracking Wastewater (\$70,000.00). American Chemical Society Petroleum Research Fund. *Submitted 6 Sep 2024*.
- 8.** **Moreno, D.** Evaluating Long-Term Effects of Li-ion Battery Subject to Different Temperature & Charging Conditions for Extraterrestrial Applications. NASA Missouri Space Grant Consortium Affiliates. *Awarded May 2024*.
- 7.** **Moreno, D.** Evaluating Effectiveness of Acidic Solution in Anode for Electrochemical Chemical Conversion of CO₂ from Petroleum-Derived Processes (\$70,000.00). American Chemical Society Petroleum Research Fund. *Rejected May 2024*.
- 6.** **Moreno, D.** ERI: Towards Net-Zero Emissions: Engineering Photoelectrochemical CO₂ Reduction Using Available Temperature and Pressure Variations (\$199,937.57). National Science Foundation Grant aimed at initiating research programs for engineering faculty in non-R1 institutions. *Rejected Feb. 2024*.
- 5.** **Moreno, D.** Large Temperature-Range Computational Modeling to Predict Lithium Ion Battery Performance. NASA Missouri Space Grant Consortium Affiliates. *Awarded Sep. 2023*.
- 4.** **Moreno, D.** ERI: Exploring the Physical and Theoretical Limits of Electrosorption-Based Electrodes for Capacitive Deionization and Capacitive Mixing (\$198,886). National Science Foundation Grant aimed at initiating research programs for engineering faculty in non-R1 institutions. *Rejected Mar. 2023*.

3. Cornelison, D., **Moreno, D.** Ni/Zn Battery gas evolution under operational conditions (\$10,646). Private Contract, Sponsored by Aesir Technologies. Applied May 2022, *Received Jun. 2022*.
2. MSU 2023 Summer Faculty Fellowship (\$6,000 stipend). Applied Oct. 2022, *Awarded Dec. 2022*.
1. MSU International Travel Grant Award (\$1,000). Submitted March 2022, *Awarded May 2022*.

Patents:

1. Thompson, J., Liu, K., Widger, L., **Moreno, D.**, Omosebi, A, Landon, J. “Method and apparatus of a dual cell electrochemical reactor.” *Mar. 2023*.

Invited Talks:

4. **Moreno, D.** “Evaluating Thermodynamics and Physical Principles to Predict Limitations to Optimized Performance for Capacitive Mixing and Deionization Processes”. *Civil Engineering and Environmental Science & Engineering Graduate Seminar Series, University of Texas – San Antonio*. 2 Apr. 2024.
3. **Moreno, D.** “Thermodynamic Analogies for Salt Water Mixing and Desalination Processes.” *Presented to Department of Mechanical Engineering, Missouri University of Science & Technology*. Apr. 2023.
2. **Moreno, D.** “Exploring the Limits of Electrosorption-Based Electrodes for Capacitive Deionization Using Thermodynamic Principles.” *Presented to Department of Chemical and Biomedical Engineering, University of Missouri - Columbia*. Oct. 2022. *Presented to Department of Physics, Astronomy, Materials Science, Missouri State University*. Nov. 2022.
1. **Moreno, D.** “Employing Thermodynamics Principles to Optimize Electrochemical Capacitor Performance: Capacitive Mixing & Deionization”. *Presented to Department of Chemistry, Missouri State University*. Sep. 2021.

Recent Conference Poster/Oral Presentations:

15. **Steel, D., Moreno, D.** “Optimizing Heat Transfer in a Modular Concentric Tube Heat Exchanger for Renewable Energy Applications.” *ASME International Mechanical Engineering Congress & Exhibition (IMECE)*. Submitted Aug. 2025.
14. **Moreno, D.**, Reeves, J., Simpson, S., Wijahat, A. “A Lab-Scale Test Stand for Evaluating Thermal Energy Storage Using Different Modes of Heat Transfer.” *ASME International Mechanical Engineering Congress & Exhibition (IMECE)*. Submitted Aug. 2025.
13. Drecker, M., **Moreno, D.** “Analyzing Li-Ion Battery Performance at Different Temperatures & Cycling Conditions.” *ASME International Mechanical Engineering Congress & Exhibition (IMECE)*. Submitted Jul. 2025.
12. **Moreno, D.**, Rapp, E., Shortt, J. “Connecting Physical and Circuit-Based Li-Ion Battery Models Under a Large Range of Temperature Conditions”. *ASME Power 2024*. 17 Sep. 2024.
11. Simpson, S., **Moreno, D.** “Development of an Enhanced Heat Transfer Model of Laminar Pipe Flow for Pedagogical and Research Purposes”. *ASME Regional Midwest Section Conference*. 9 Sep. 2024. *Awarded Third Place at Student Poster Competition*.
10. **Moreno, D.**, Cota, J., Reese, G. “Optimizing Electrochemical CO₂ Reduction to Formate Using Temperature Variations in Batch and Flow Reactors.” *2024 ASME Energy Sustainability*. Jul 2024.
9. Reese, G, **Moreno, D.** “Effect of Temperature and Pressure on Electrochemical Production of Formic Acid” *Presented at Spring 2024 MSU Undergraduate Research Symposium*. May 2024.
8. Rapp, E., **Moreno, D.** “Large Temperature-Range Physical Model to Predict Li-Ion Battery Performance”. *33rd Annual Spring Meeting of the NASA-Missouri Space Grant Consortium, Missouri University of Science & Technology*. 19 Apr 2024.
7. Nelson, H., Cary, G., **Moreno, D.** “Experimentally Investigating the Thermodynamic Adsorption Limits of Carbon-Based Electrodes for Capacitive Deionization (CDI)”. *March Meeting of the American Physical Society (APS)*. Poster Presentation. 9 Mar 2024.

- 6. Moreno, D.** Skaggs, P., Parker, D. “Evaluating the Limits of Electrosorption-Based Electrodes for Capacitive Deionization Using Thermodynamic Principles.” *ASME International Mechanical Engineering Congress & Exhibition (IMECE)*. Nov. 2023.
- 5. Moreno, D.** “Employing Variable Current/Voltage Control Schemes to Develop Carnot-Analogous Mixing Engines for Salinity Gradient Energy Extraction.” *Proceedings of the ASME 2023 Power Conference*. Aug. 2023.
- 4. Landgraf, N., Mandava, P., Cox, J., Skaggs, P., Cornelison, D., Moreno, D.** “Gas Evolution Characterization of NiZn Batteries with Residual Gas Analysis.” Poster Presentation. *Proceedings of the 241st Electrochemical Society Meeting*, May 2023.
- 3. Moreno, D., Omosebi, A., Landon, J., Thompson, J., Liu, K.** “A Computational Model to Optimize the Electrochemical Reduction of CO₂ to Formic Acid Using an Enzymatic Catalyst”. *Proceedings of the 241st Electrochemical Society Meeting*, May 2023.
- 2. Torres, A., Moreno, D., Obafemi-Ajayi, T.** “The Effect of Different Types of Charging Cycles and Composition on the Aging of Li-Ion Batteries for Electric Vehicles.” *Presented at Spring 2023 MSU Undergraduate Research Symposium*. Apr. 2023.
- 1. Cox, J, Moreno, D..** “Electrochemical Carbon Dioxide Reduction and Formic Acid Production.” *Presented at Spring 2023 MSU Undergraduate Research Symposium*. Apr. 2023. **Awarded First Place with Engineering Division.**

Student Advising:

Graduate:

- Niklas Landgraf (Materials Science) (Co-advised with Dr. David Cornelison) 6/2022 – 5/2024
- David Iyodo (Materials Science) 3/2023 - 5/2024
- Olumide Akindoru (Materials Science) (Co-advised with Dr. Robert Mayanovic) 8/2024 - Present

Undergraduate:

- Joshua Cox (Mechanical Engineering) 1/2022 – 5/2023
- Ana Torres (Mechanical Engineering) (Co-advised with Dr. Tayo Obafemi-Ajayi) 1/2022 – 5/2023
- Pablo Skaggs (Mechanical Engineering) 2/2022 – 5/2024
- Devon Parker (Mechanical Engineering) 5/2022 – 5/2023
- Joe Cota (Mechanical Engineering/Physics Dual Degree) 5/2023 – 8/2023
- Gavin Reese (Mechanical Engineering/Physics Dual Degree) 5/2023 – 5/2024, 5/2025 – 8/2025
- Grant Cary (Mechanical Engineering) 5/2023 – 8/2023
- Hunter Nelson (Physics) 5/2023 – 5/2024
- Emily Rapp (Physics) 8/2023 – Present
- Ryan Ellis (Mechanical Engineering) 5/2024 – 8/2024
- Stone Simpson (Mechanical Engineering) 5/2024 – 5/2025
- Mick Drecker (Mechanical Engineering/Physics Dual Degree) 8/2024 – Present
- John Reeves (Mechanical Engineering) 5/2025 – 8/2025
- Savan Patel (Mechanical Engineering/Physics Dual Degree) 8/2025 – Present

III. TEACHING

Teaching Experience:

- Primary Instructor, Thermodynamics** Missouri State University
- Primary Instructor, Applied Thermodynamics** Missouri State University
- Primary Instructor, Heat Transfer** Missouri State University
- Developed classes for MSU’s Co-op Mechanical Engineering Program. Curriculum adapted and corresponding degree awarded from Missouri University of Science & Technology (MS&T).

Training in Teaching:

- Annual Teaching & Learning Showcase** Missouri State University

- Attended talks, workshops, and networked with other faculty on teaching methods at MSU’s annual showcase hosted by the Faculty Center for Teaching & Learning.

Innovation in Teaching & Learning Conference *Missouri University of Science & Technology*

- Attended virtual talks to integrate course content developed with the student curriculum at MS&T.

Guest Lectures:

- “Strategies for Student Success”, Study and Careers in Engineering *10/2022, 8/2025*
- Lecture for freshmen engineering students on useful tips for time management and motivation.

Awards:

- CNAS Excellence in Teaching Award *4/2024*
- Awarded to select faculty for strong teaching evaluations and departmental recommendations.

IV. SERVICE

Committees:

CNAS Awards Committee *8/2024 - Present*

- Evaluation and selection of faculty for awards in CNAS (College of Natural and Applied Sciences).

CNAS Student Research Committee *8/2023 – 5/2025*

- Development of research programs for undergraduate and graduate students within CNAS.

ASME Renewable Energy System Committee *7/2022 - Present*

- Planning and development of future conferences with the ASME POWER division.
- Served as session chair for various presentation topics at 2023-2024 conferences.

ASME Heat Transfer In Energy Systems Committee *7/2025 - Present*

- Planning and development of future summer heat transfer conferences (SHTC).

ASME Advanced Energy Systems Committee *7/2025 - Present*

- Planning and development of future ASME energy systems (ES) conferences.

PAMS Graduate Student Committee *5/2022 - Present*

- Contributing to the recruitment and review of graduate students in the Materials Science program.

CNAS Scholastic Appeals Committee *1/2022 - Present*

- College-wide committee evaluating students on academic probation.

Peer Review:

- Contributed to additional papers in Energies, Batteries journals in 2025.
- Reviewed proceedings papers for the ASME POWER Conference in 2023.
- Submitted two paper reviews for the American Chemical Society (ACS) during 2021.
- Submitted five paper reviews for ASEE Midwest Regional Conference from 2023-2024.
- Served on NSF Pre-proposal review panel in 2023.
- Submitted paper reviews for Journal of Colloid and Interface Science and Electrochemical Society in 2023.

Community Activities:

Chapter Advisor, American Society of Mechanical Engineers (ASME) *Missouri State University*

- Advising student-led chapter of ASME within the MSU/MS&T Cooperative Engineering Program.

Volunteer Judge, Ozarks Science and Engineering Fair *Missouri State University*

- Scored and evaluated physics and engineering related projects for high school students.

Project Leader, Regional Science Olympiad *Missouri State University*

- Project leader for student teams at the middle school level on the fundamentals of waves.
- Developed a questionnaire along with three lab-based modules.

Leadership Positions:

Faculty Advisor, American Society of Mechanical Engineers (ASME), MSU/MS&T Co-op Program Chapter	<i>Missouri State</i>
Chair, CNAS Academic Appeals Committee	<i>Missouri State</i>
President, American Society for Engineering Education (ASEE)	<i>Georgia Tech</i>
Vice President, Mechanical Engineering Graduate Association (MEGA)	<i>Georgia Tech</i>
Co-Head Teaching Assistant, Creative Decisions and Design	<i>Georgia Tech</i>
Outreach Coordinator, Pi Tau Sigma	<i>Cooper Union</i>

Professional Organizations:

APS, American Physical Society	<i>10/2023</i>
ACS, American Chemical Society	<i>9/2023</i>
ECS, The Electrochemical Society	<i>9/2017</i>
ASEE, American Society for Engineering Education	<i>10/2016</i>
Order of the Engineer	<i>4/2014</i>
Pi Tau Sigma, Mechanical Engineering Honor Society	<i>4/2013</i>
ASME, American Society of Mechanical Engineers	<i>4/2012</i>