

Exponent®
Engineering & Scientific Consulting

Emily Edstrom, Ph.D.

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Professional Profile

As an Associate in the Thermal Sciences Practice, Dr. Edstrom integrates her expertise in chemical engineering, chemistry, and material science to address a broad spectrum of challenges. Her work encompasses root cause analysis, process safety and hazard analysis, consumer product research and development, and incident investigations involving reactive materials, chemical processes, fires, and explosions.

Before joining Exponent, Dr. Edstrom earned her B.S. in Chemical Engineering from the University of Arizona and her Ph.D. in Chemical Engineering from the University of California, Santa Barbara. During her doctoral studies, she specialized in heterogeneous catalysis and reaction engineering. Her experimental research included catalyst synthesis, characterization, and stability testing under reaction conditions, with applications focused on converting greenhouse gases into fuels and chemicals using light to promote photocatalytic reactivity. This work honed her expertise in thermodynamics, heat and mass transfer, and reaction kinetics. She also led a large collaborative Department of Energy project, serving as the primary researcher responsible for coordinating experiments and communicating results across multiple universities, national laboratories, and industrial partners.

Dr. Edstrom's academic training is complemented by practical experience gained through four internships across diverse industries. As an Environmental Engineer at Freeport-McMoRan's Morenci copper mine, she applied regulatory standards to mitigate environmental impact. At PepsiCo, she worked as a Supply Chain Engineer, optimizing heat exchanger and cooling tunnel performance and implementing leak detection procedures to reduce process waste. At XTO Energy, a subsidiary of ExxonMobil, she gained experience as a Facilities Engineer, managing a pilot plant project to capture and utilize flare gas at remote well pads using cryogenic compression technologies. Finally, during a Ph.D. residency at Google's moonshot factory, she conducted technoeconomic analysis and scale-up of multiphase reactors for sustainable chemical processes.

Dr. Edstrom's combination of academic achievements and industry experience underscores her ability to apply fundamental principles to solve complex problems within Exponent's Thermal Sciences Practice.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, University of California, Santa Barbara, 2024

B.S., Chemical Engineering, University of Arizona, 2019

W.A. Franke Honors College Thesis Award, 2019

University of Arizona Wildcat Excellence Full Tuition Scholarship, 2015-2019

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Society of Mining Engineers Intern Merit Scholarship, 2017

Licenses and Certifications

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Prior Experience

Chemical Engineering Ph.D. Resident, Google, X – The Moonshot Factory, 2023

Upstream Facilities Engineering Intern, XTO Energy, an ExxonMobil Subsidiary, 2019

Supply Chain Intern, PepsiCo Inc., 2018

Environmental Engineering Intern, Freeport-McMoRan Copper and Gold, 2017

Professional Affiliations

American institute of Chemical Engineers (AIChE)

National Association of Fire Investigators (NAFI)

National Fire Protection Association (NFPA)

American Chemical Society (ACS)

Patents

Patents under the name E. Schroeder

WO Patent WO/2024/192101: Methods of preparing concrete precursors and systems thereof, 2024 (Jin S, Papania-Davis A, Schroeder E).

Publications

Publications under the name E. Schroeder

Chen X, Lee Y, Hong S, Schroeder EK, Gericke SM, Barber GD, Chen Z, Hesse SA, Tassone CJ, Rioux RM, Christopher P, Bare SR, Li M, Zakharov DN, Alexandrova AN, Head AR, Zhou G, Yang JC. Defect-driven redox interplay on anatase TiO2: surface-structure dependent activation for CO2 hydrogenation catalysis. Journal of the American Chemical Society 2025; 147(47):43273–43285.

Schroeder E, Hong S, Chen X, Hoffman A, Chen Z, Khan A, Barber G, Bac S, Rioux R, Yang J, Tassone C, Bare S, Christopher P. Structural evolution and stability of Rh/TiO2 catalysts under CO2 hydrogenation conditions: influence of the initial Rh structure. ACS Catalysis 2025; 15(14):12133–12147.

Schroeder E, Dasari P, Nadeem MA, Fickel D, Christopher P. Controlled pretreatment and reconstruction of a bimetallic Pt-Ir/Al2O3/ZSM-5 catalyst for increased stability during butane hydrogenolysis. ACS Engineering Au 2023; 3(5):301–315.

Schroeder E, Finzel J, Christopher P. Photolysis of atomically dispersed Rh/Al2O3 catalysts: controlling CO coverage in situ and promoting reaction rates. Journal of Physical Chemistry C 2022; 126(43):18292–

18305.

Hoffman A, Asokan C, Gadinas N, Schroeder E, Zakem G, Nystrom S, Getsoian A, Christopher P, Hibbits D. Experimental and theoretical identification and characterization of Rh single atoms supported on γ-Al2O3 during NO reduction by CO. ACS Catalysis 2022; 12(19)11697–11715.

Schroeder E, Christopher P. Chemical production using light: are sustainable photons cheap enough? ACS Energy Letters 2022; 7(2):880–884.

Presentations

Presentations under the name E. Schroeder

Lardinois TM, Schroeder E, Morrison T. Hazards and fundamentals of handling and transferring flammable, caustic, and toxic liquid chemicals in non-steady-state operations. AIChE Midwest Regional Conference, April 2025.

Schroeder E, Lardinois TM, Morrison T. Steam explosion: process safety in molten metal processes. AIChE Global Congress on Process Safety, April 2025.

Schroeder E, Christopher P, et al. Mechanism and kinetics of deactivation of Rh/TiO2 catalysts under reverse water gas shift conditions. Oral presentation, Catalysis Gordon Research Seminar; Poster presentation, Catalysis Gordon Research Conference, Colby-Sawyer College, New London, NH, 2024.

Schroeder E, Christopher P, et al. Untangling structure-function relationships for reconstructing Rh/TiO2 catalysts under CO2 hydrogenation conditions. Oral presentation, National Synchrotron Light Source II (NSLS-II) and Center for Functional Nanomaterials (CFN) User's Meeting, Brookhaven National Laboratory, Upton, NY, 2024.

Schroeder E, Christopher P, et al. Controlled reconstruction of a bimetallic catalyst for increased stability during butane hydrogenolysis. Oral Presentation, Graduate Student Symposium, Chemical Engineering Department, University of California Santa Barbara, 2023.

Schroeder E, Christopher P, et al. Photolysis for probing reaction mechanisms and promoting rates on atomically dispersed Rh Catalysts. Oral presentation, the 27th North American Catalysis Society Meeting, New York, NY, 2022.

Schroeder E. Selective catalytic methane activation on Rh active sites. Oral Presentation, First-Year Research Seminar, Chemical Engineering Department, University of California, Santa Barbara, 2020.

Schroeder E. Flare gas capture and utilization for electric power by remote CNG technology. Oral presentation, Internship Final Presentations, ExxonMobil Campus, Spring, TX, 2019.

Project Experience

Occupational and Chemical Process Safety

- Evaluated standard operating procedures, job hazards analyses, regulatory standards and industry best practices related to hazardous chemical production and transportation
- Evaluated OSHA incident reports, employee training, and product manufacturer specifications and operating instructions of machine-related occupational injuries
- Analyzed chemical plant process instrumentation data to investigate process upsets related to chemical releases

Fire, Explosion, and Water-loss

- Investigated origin and cause of fires and explosions in commercial warehouses, chemical plants, industrial and manufacturing facilities and residential buildings.
- Reconstructed residential plumbing system to conduct fluid flow experiments for failure analysis related to a water-loss incident

Research and Development

- Analyzed physical and chemical properties of alternatives to fluorinated (PFAS) and chlorinated chemicals in consumer products

Engineering Procurement Construction (EPC) and Construction International Arbitration (IA)

- Evaluated engineering drawings, field construction reports, and engineering contract specifications related to construction defect allegations
- Performed technical analysis of turn-key engineering contract, process data during commissioning, equipment specifications, material quality, and performance testing procedures

Chemical Engineering

- Designed, built, and tested prototypes of multiphase reactors (batch, CSTR, and PBR) for recycling raw materials
- Contributed to technoeconomic analysis to evaluate the feasibility and ROI of pilot plant scale-up
- Created P&IDs for natural gas processing and liquefaction equipment to reduce flare gas volumes
- Optimized heat exchanger and cooling tunnel performance for a pasteurization process in a commercial food-processing plant
- Designed experimental protocol to monitor subsurface containment of sulfuric acid leach solution in an open pit copper mine