

Exponent®
Engineering & Scientific Consulting

Matt Naughton, Ph.D.

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Professional Profile

Dr. Naughton is a chemical engineer specializing in electrochemical technologies, hydrogen systems, membranes, catalytic processes, CO2 conversion, and process optimization. He has extensive experience designing, executing, and analyzing controlled experimental programs while translating results into technically defensible conclusions. His technical expertise includes high-temperature electrolysis, ceramics processing, perovskites, and carbon nanotube production from CO2. He is skilled at communicating technical findings/concepts clearly and effectively to diverse audiences.

Dr. Naughton's graduate research with the University of Delaware in collaboration with Idaho National Laboratory focused on engineering proton-conducting solid oxide electrolyzers for efficient green hydrogen production in the 400-600 °C temperature range. Leveraging fundamental principles of transport phenomena and reaction kinetics, he developed and integrated advanced electrolyte and interlayer materials to reduce internal resistance and increase Faradaic efficiency. He also played a key role on a multidisciplinary team that developed an electro-thermochemical process for 3D printing carbon nanocomposites from CO2, concentrating on understanding and optimizing carbon nanotube growth in steel wool catalysts. Through his research, Dr. Naughton developed materials characterization proficiency including SEM, EDX, XPS, and XRD. He is also familiar with thin-film fabrication of ceramics and material preparation using ball mills, tape casters, dip-coating, screen printing, sintering, and ink preparation.

Dr. Naughton served as the lab safety coordinator for his research group and has industrial exposure to wastewater processing and large-scale manufacturing processes including investment casting.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, University of Delaware, 2025

B.S., Chemical Engineering, University of Massachusetts, Amherst, 2021

Prior Experience

Graduate Researcher, University of Delaware, 2021-2025

Graduate Researcher, Idaho National Laboratory, 2023-2025

Engineering Intern, Heartland Water Technology, 2020

Quality Engineering Intern, Hitchiner Manufacturing, 2019

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Professional Affiliations

Electrochemical Society (ECS)

American Institute of Chemical Engineers (AIChE)

National Fire Protection Association (NFPA)

Publications

Naughton M, et al. Effect of high scandium doping in barium zirconate on nickel diffusion and performance of proton-conducting solid oxide electrolyzer cells. Journal of Power Sources 2025; 659:238432.

Crandall BS, Naughton M, Park S, et al. Transforming CO2 into advanced 3D printed carbon nanocomposites. Nature Communications 2024; 15:10568.

Presentations

Naughton M, Zhao Z, Yan Y, Ding D. Proton-conducting solid oxide electrolysis cells with scandia-doped barium zirconate electrolytes. ECS PRIME, Honolulu, HI, 2024.

Naughton M, Abdelrahman O. Remote operation of alkylamine Hofmann elimination reactor. New England Catalysis Society, 2021.

Peer Reviews

Chemical Engineering Journal