

Exponent®
Engineering & Scientific Consulting

Mackenzie Todd, Ph.D., P.E.

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Professional Profile

Dr. Todd is a chemical engineer, with expertise in catalysis and renewable fuels compliance. She applies chemical engineering fundamentals in technical consulting and investigates performance issues and failures in a variety of industries. Her core areas of expertise include biomass-derived fuel processing and fuel product compliance, including upgrading of woody biomass pyrolysis oil and production of renewable natural gas (RNG).

Prior to joining Exponent, Dr. Todd helped clients demonstrate compliance with their renewable fuel production facilities, specifically with EPA's Renewable Fuel Standard (RFS) and California's Low Carbon Fuel Standard (LCFS). She drove submission packages that included compiling relevant documentation and reviewing Engineering Review registrations to the RFS program. She also conducted site visits and evaluated facility production data to ensure compliance with the RFS Quality Assurance Program (QAP) as well as LCFS verification. Dr. Todd's deep expertise spans across the renewable fuels industry and includes renewable natural gas (RNG) from agricultural digesters, wastewater treatment digesters, and landfill gas, as well as biodiesel, renewable diesel, and corn kernel fiber ethanol.

Dr. Todd earned her doctorate in chemical engineering while studying and performing research at the University of Maine. Her doctoral thesis included experimentation that leveraged a combination of laboratory studies and reaction kinetics simulation modeling. Her research determined appropriate processing conditions for catalytic upgrading and conversion of woody biomass into diesel fuel additives. She also studied the impact of solvent properties on reaction kinetics by exploring data analysis methods to illustrate the impact of liquid solvents on reaction kinetics across platforms of heterogeneously catalyzed reactions. In addition to her graduate work, Dr. Todd also participated in education-based research projects during her undergraduate studies at Bucknell University. These projects included designing a new laboratory ion exchange column and developing an outreach program to introduce local grade-school students to STEM fields including chemistry and engineering.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, University of Maine, Orono, 2023

B.S., Chemical Engineering, Bucknell University, 2019

Licenses and Certifications

Professional Engineer, Illinois, #062.089600

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

Certified Fire and Explosion Investigator (CFEI)

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Prior Experience

Supervising Chemical Engineer, Energy Compliance Services at Weaver and Tidwell, LLP, 2023-2025

Summer Intern, The Nature's Bounty Company, 2018

Summer Student Employee, BorgWarner Morse Systems, 2015-2017

Publications

Todd MR, Park J, Kuenen M, Drake G, Al-Gharrawi M, Roling LT, Schwartz TJ. Solvation effects in liquid-phase esterification reactions catalyzed by hydrogen-form ion exchange resins. Energy and Environmental Science Catalysis 2026.

Todd MR. Solid acid catalyzed dehydration of biomass-derived alcohols. PhD Dissertation 2023.

Presentations

Todd MR, Schwartz TJ. Catalytic upgrading of pyrolysis oil to diesel fuel additives. Oral presentation, AIChE Fall 2022, Phoenix, AZ, 2022.

Todd MR, Park J, Kuenen M, Drake G, Al-Gharrawi M, Roling LT, Schwartz TJ. Solvation effects in liquid-phase esterification reactions catalyzed by hydrogen-form ion exchange resins. Poster presentation, Advancing Sustainable Technologies Through Catalysis Gordon Research Conference, New London, NH, 2022.

Todd MR, Park J, Kuenen M, Drake G, Al-Gharrawi M, Roling LT, Schwartz TJ. Solvation effects in liquid-phase esterification reactions catalyzed by hydrogen-form ion exchange resins. North American Catalysis Society Meeting, New York, New York, 2022.

Todd MR, Park J, Kuenen M, Drake G, Al-Gharrawi M, Roling LT, Schwartz TJ. Solvation effects in liquid-phase esterification reactions catalyzed by hydrogen-form ion exchange resins. Oral Presentation, ACS Spring 2022, San Diego, CA 2022.

Todd MR, Park J, Kuenen M, Drake G, Al-Gharrawi M, Roling LT, Schwartz TJ. Solvation effects in liquid-phase esterification reactions catalyzed by hydrogen-form ion exchange resins. Poster Presentation, New England Catalysis Society Meeting, virtual, 2021.