

SPRING 2024 SEMINAR SERIES

ELECTROCHEMICAL WASTEWATER REFINING: USING REACTIVE SEPARATIONS TO CONVERT NITROGEN POLLUTANTS TO PRODUCTS

APR 12 | 10:15 AM | 102 COLBURN LAB

WILLIAM TARPEHSTANFORD UNIVERSITY
Assistant ProfessorAttend virtually: <https://udel.zoom.us/j/91386404306>

Over the past century, humans have altered the global nitrogen cycle so drastically that managing nitrogen has emerged as a grand engineering challenge and urgent need. The emissions-intensive Haber-Bosch process for industrial fertilizer production, which converts nitrogen gas into ammonia, outpaces wastewater nitrogen removal due to fertilizer runoff and 80% of wastewater being discharged without treatment. This net discharge of reactive nitrogen (e.g., NH_4^+ , NO_3^-) threatens aquatic ecosystems and human health by inducing harmful algal blooms that affect 70% of U.S. surface waters and cost over \$2.2 billion annually to remediate. Refining nitrate and ammonia into valuable products through reactive separations, which integrate catalysis and separations, is a useful approach for addressing both water pollution and chemical manufacturing. For example, selective membranes and adsorbents can be leveraged to control catalytic performance by tuning microenvironments near catalyst active sites. This seminar will focus on recent work designing nitrogen-selective processes, materials, and molecular mechanisms to valorize wastewaters.

ABOUT THE SPEAKER

Dr. William Tarpeh is an assistant professor of chemical engineering at Stanford University. The Tarpeh Lab develops and evaluates selective separations in “waste” waters at several synergistic scales: molecular mechanisms of chemical transport and transformation; novel unit processes that increase resource efficiency; and systems-level assessments that identify optimization opportunities. Will completed his B.S. in chemical engineering at Stanford, his M.S. and Ph.D. in environmental engineering at UC Berkeley, and postdoctoral training at the University of Michigan in environmental engineering. His recent awards include the Dreyfus Teacher-Scholar Award, AIChE 35 Under 35 and the Environmental Division Early Career Award, and the Electrochemical Society Young Investigator Fellowship.