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DISTINGUISHED SPEAKER SERIES

Electrocatalytic Reduction of Nitrate in Drinking Water

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In-person: Larrañaga Auditorium, Centennial Engr. Room 1041
Online: https://unm.zoom.us/j/94583599850

Abstract: Nitrate is the most common pollutant in groundwater, and a seasonal surface water pollutant in agricultural regions. Nitrate can cause methemoglobinemia in infants and is converted to carcinogenic N-nitrosamines in the human body. It is regulated in drinking water at a maximum concentration limit (MCL) of 10 mg-N/L, and its first transformation intermediate nitrite is regulated at 1 mg-N/L. The go-to technology for nitrate removal in drinking water treatment is ion exchange, but it is relatively expensive and the discharged brine from regenerating the resin can harm the environment. Electrocatalytic nitrate reduction has emerged as a viable replacement for ion exchange. It uses an applied current to provide electrons that reduce nitrate without creating a waste product. While promising, technology advancement has been limited by concerns regarding poor current efficiency, selectivity for the dinitrogen end product over ammonia, catalyst longevity, and reactor mass transfer limitations. The first two concerns are related to cathodic design, which largely determines selectivity for nitrate reduction over the hydrogen evolution reaction, and selectivity for N-N pairing versus nitrogen hydrogenation. The second two concerns are related to reactor design and operation. This talk will present advancements in cathodic material and reactor design to advance electrocatalytic reduction of nitrate in drinking water treatment.

Short Bio: Dr. Werth is a professor and the Bettie Margaret Smith Chair in Environmental Health Engineering at the University of Texas at Austin. His research and teaching focus on the reactive transport of water pollutants in porous media, with applications in (electro)catalytic water treatment, groundwater remediation, and geological carbon sequestration. He is editor of Journal of Contaminant Hydrology, and previously served on the USEPA Science Advisory Board. He received his BS degree in mechanical engineering from Texas A&M University, and MS and PhD degrees in environmental engineering from Stanford University.

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