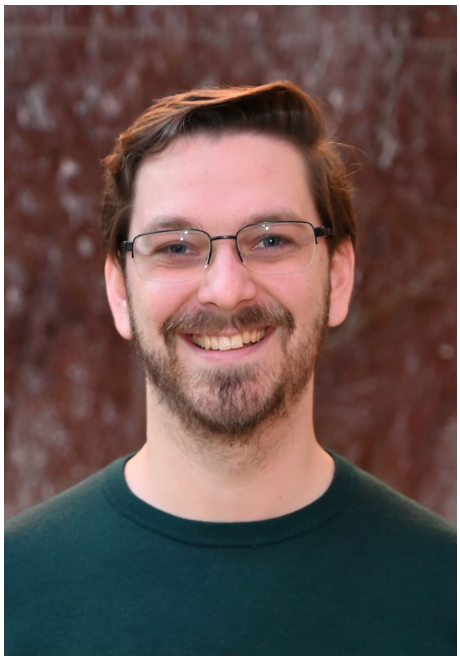
Analytical Chemistry Seminar

Tuesday, January 16, 2024
3:30 p.m. ~ WTHR 320

"Navigating Complex Environmental Matrices: Exploring spICP-MS as a Tool for Quantifying Anthropogenic Nano- and Submicron Pollutants in Environmental Water Matrices"



Dane Wagner
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Bio:

Dane Wagner is a second-year graduate student in the Jeffrey Dick Research Group working on molecularly imprinted polymer based electrochemical environmental sensors. Dane is originally from Springfield, Missouri where he attended Ozarks Technical Community College and Missouri State University receiving a B.S. in Chemistry in 2019 and continuing on to do masters work in Dr. Cyren Rico's lab. Dane's master's thesis was on the effects of perfluorooctane sulfonic acid (PFOS) on the velvetleaf plant specifically focusing on the changes to metabolic pathways at different concentrations of PFOS. Dane moved to Purdue University in the Fall of 2022 to begin his graduate studies.

Abstract:

The escalating concern over engineered nanoparticles, microplastics, and other pollutants in aquatic ecosystems has driven the search for sensitive and precise analytical techniques. The challenge lies in quantifying these pollutants in environmental water samples, where increasing matrix complexity gives rise to difficulties. This complexity is further compounded by the need to distinguish between naturally occurring nanoparticles and engineered counterparts. The dilute nature of anthropogenic nanoparticles and microplastics in water samples adds an additional layer of complexity for studying these particle populations.

Among the most challenging matrices for pollutant quantification is seawater, given its high salt concentration, which interferes with analytical techniques. Conventional methods often require extensive dilution or overall removal of interferents, leading to less representative samples. Single particle inductively coupled plasma-mass spectrometry (spICP-MS) emerges as a powerful tool for detecting and quantitatively analyzing engineered nanoparticles and submicron particles in environmental samples.

The development of standardization techniques, coupled with (spICP-MS), offers potential tools that can be seamlessly integrated into the analytical quantification toolbox. This exploration into the application of spICP-MS for water samples containing complex environmental matrices opens new avenues for addressing the growing challenges posed by emerging pollutants.