UNIVERSITY OF RHODE ISLAND
Department of Chemistry
SEMINAR

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Prof. Carrie McDonough

Stony Brook University
Stony Brook, NY

"Per- and polyfluoroalkyl substances (PFASs) and fluorinated organic 'dark matter' in human blood"

HOST

Dugan Hayes
Department of Chemistry
401-874-5516

Per- and polyfluoroalkyl substances (PFASs) and fluorinated organic “dark matter” in human blood

Carrie McDonough
Department of Civil Engineering
Stony Brook University

Per- and polyfluoroalkyl substances (PFASs) are a class of synthetic organic compounds used in industrial and consumer products including cosmetics, stain- and grease-resistant coatings, and class B firefighting foams (AFFFs). These compounds have been nicknamed "forever chemicals" due to their remarkable environmental persistence. The stability and aquatic mobility of PFASs has led to widespread contamination of global water resources, and PFASs are now present in the blood of virtually all Americans. Elevated blood serum PFAS levels have been associated with adverse health outcomes including several cancers, liver disease, and immunosuppression. The number of known PFASs exceeds 5,000 compounds, and new PFASs are continually being discovered in the environment. Biomonitoring studies have shown that a significant fraction (up to 70%) of total PFASs in human blood remains unidentified, and this unknown portion is increasing over time. We need to uncover the identities of the compounds making up this fluorinated “dark matter” in human blood and determine their major sources. Without this information, we cannot grasp the true extent of human exposure to “forever chemicals” or the potential health consequences. The complexity of PFAS chemistry confounds traditional sample preparation and analytical techniques, necessitating highly selective yet comprehensive high-resolution mass spectrometry (HRMS) approaches. This talk will provide an overview of how we are using HRMS screening methods to obtain a more comprehensive understanding of PFAS mixtures in our environment and in our bodies. I will focus on the characterization of AFFFs, which are a major contributor to PFAS contamination in drinking water. HRMS screening methods coupled with AFFF-dosed mouse models, in vitro assays, and human biomonitoring data from AFFF-impacted cohorts will be used to trace the path of these pollutants from sources to exposure pathways, and ultimately to their accumulation in the human body.