Marquette University Opus College of Engineering
Environmental Engineering Seminar Series

Wednesday, March 29 from **12:00-12:50 pm**
Engineering Hall, Room 236
1637 W Wisconsin Ave, Milwaukee WI 53233

Low-temperature Mineralization of Perfluorocarboxylic Acids

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STAT News (Sharon Begley Science Reporting Fellow)

Abstract
Per- and polyfluoroalkyl substances (PFAS) used in industry and in consumer products pollute water resources at concentrations harmful to human health. Current strategies for PFAS degradation use non-targeted energy inputs and often do not fully degrade PFAS. Here we report the mineralization of perfluoroalkyl carboxylic acids (PFCAs) through a previously unrecognized pathway that proceeds through the sodium hydroxide-mediated defluorination of perfluoroalkyl anions. The decarboxylation of PFCAs in a polar aprotic solvent at 120 °C affords access to reactive perfluoroalkyl ion intermediates and allows mineralization of PFCAs at temperatures as low as 40 °C. Analysis of the reaction products from a series of PFCAs after 24 hours shows the degradation produces high amounts of fluoride ion (78–104%); a small amount of trifluoroacetate, which degrades more slowly; and a variety of carbon-based byproducts. Notably, the patterns in the product analysis were inconsistent with the typical one-carbon chain-shortening mechanisms often proposed in PFAS degradation studies and our computational studies instead identified a new likely mechanism comprised of fluoride elimination, hydroxide addition, and carbon–carbon bond-scission processes consistent with a broad range of experimental observations. By generalizing this reactivity to branched perfluoroalkylether carboxylic acids such as [ollutant GenX, we further demonstrate this approach's promise for PFAS degradation, which might be extended to other PFAS classes as methods to activate their headgroups are developed

Bio
Brittany has an undergraduate degree in chemistry and English from the Ohio State University, where she researched organic dyes for dye-sensitized solar cells with Dr. Yiying Wu. She spent a summer in Germany with the DAAD RISE research intern program and another summer at Lawrence Berkeley National Lab as a research intern at the Molecular Foundry. She earned her PhD at Northwestern University with Prof. William Dichtel, where she developed PFAS remediation strategies. During her graduate studies, she also worked at the Milwaukee Journal Sentinel for a summer as a AAAS Mass Media Fellow. Dr. Trang is now a Sharon Begley Science Reporting Fellow at STAT News, a health, medicine, and life sciences publication in Boston.

Here is a link to the webinar: https://events.teams.microsoft.com/event/f1b7f847-aff0-4ee0-96b9-94f67b44355d@abe32f68-c72d-420d-b5bd-750c63a268e4