PURDUE UNIVERSITY | Environmental and Ecological Engineering

EEE Research Seminar
Date: September 24, 2024, at 10:30AM
Location: POTR 234 (Fu Room)

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Closing the Loop on the Textile Industry with Sustainably Sourced Biochar for Aqueous Heavy Metal Remediation

Abstract
The implementation of the circular economy in the waste-heavy textile industry offers both opportunities and challenges in reducing the industry's destructive environmental impact by integrating sustainability into textile waste management. The United States Environmental Protection Agency estimates a substantial 11.3 million tons of municipal solid waste (MSW) textiles were received by landfills in 2018, accounting for 7.7% of all MSW landfilled. A potential new loop in the circular economy of the textile industry is the conversion of the landfill-destined textiles into a new product, surface-modified bulk textile-derived biochar (mBTD). Biochar is an emerging low-cost sorbent that exhibits unique surface physical and chemical properties that can be optimized through surface modification, such as increasing its adsorption capacity for aqueous heavy metal contaminants like hexavalent chromium with cationic surfactants. However, few studies focus on the production, characterization, or efficacy of BTD and mBTD biochar, highlighting the need for further investigation of their physical properties. This study focuses on characterizing BTD biochar at different pyrolysis temperatures, a critical step in evaluating its scalability potential as a novel technology in the circular economy, and in assessing the efficacy of mBTD for hexavalent chromium removal. By doing so, landfill-bound textiles can be transformed into a sustainably sourced biochar, effective for remediating aqueous heavy metal contaminants of concern.

Bio
Taymee Brandon (she/her/hers) is a PhD Candidate in Environmental Engineering at Purdue University. She is a Ford Foundation Fellow, Environmental Research and Education Foundation Scholar, Sloan Indigenous Graduate Partnership Scholar, and Gates Millennium Scholar. She received her BS in Chemistry from the University of Montana and MS in Environmental Engineering from Montana Technological University. Her research interests lie in aquatic chemistry and environmental engineering of sustainable adsorbents like biochar to remediate aqueous heavy metal contaminants from industrial and natural water systems.