

Projects That Will Address PFAS Contamination in Wisconsin

The Freshwater Collaborative of Wisconsin is funding programs and research to address Wisconsin's 10 Grand Water Challenges, including Water Quality Safety and Emerging Contaminants. A number of projects are addressing PFAS, pervasive toxic chemicals that are contaminating drinking and ground water. If you would like to participate in a PFAS working group, please email us at freshwater-collab@uwm.edu.

Collaborative Research on Synthesis of Graphene Oxide from Sustainable Resources and Its Application for Removal of Per- and Polyfluoroalkyl Substances (PFAS) from Water

Institutions: UW-Stevens Point, UW-Madison

Principal Investigators: Seyed Javad Amirfakhri, UW-Stevens Point; Xuejeun Pan, UW-Madison

PFAS is a group of chemicals detected in the drinking water of millions of Americans due to their widespread applications. They have been linked to several health concerns. The main objective of this work is to synthesize graphene oxide (GO) from sustainable resources, such as walnut shells, and to investigate the performance of GO for PFAS removal from water. Several students from UW-Stevens Point and UW-Madison will be trained to perform the research. Moreover, they will participate in disseminating the results, collaborating with industrial partners, engaging our community with STEM education, and increasing public scientific literacy on PFAS contamination.

Deposition and Removal of Emerging Contaminants in the Milwaukee Estuary Area of Concern

Institutions: UW-Madison, UW-Milwaukee

Principal Investigators: Inna Popova, UW-Madison; Laodong Guo, UW-Milwaukee

The Greater Milwaukee Estuary faces pollution from emerging contaminants, such as PFAS and pharmaceuticals, that pose risks to the environment and public health. These contaminants are removed from the water through natural processes and accumulate in sediment, where they can persist for long periods, threatening organisms and humans who encounter them. The pollution history of these contaminants in the estuary remains poorly understood. This collaborative research project involves the analysis of sediment cores to study the contaminants' history and behavior. The findings will aid in managing and remediating aquatic contaminations.

Development of a Collaborative Undergraduate Research Experience to Improve Per- and Polyfluoroalkyl (PFAS) Adsorption in Nanoporous Solids

Institutions: UW-Stevens Point, UW-Milwaukee

Principal Investigators: Joseph Mondloch, UW-Stevens Point; Yin Wang, Shangping Xu, UW-Milwaukee

Per- and polyfluoroalkyl substances (aka PFAS) are emerging contaminants in Wisconsin's waterways. This project provides funding to develop a collaborative undergraduate research experience between UW-Stevens Point and UW-Milwaukee to develop new PFAS adsorption technology. Researchers will

test our technology against PFAS contaminated waters including real-world samples from Wisconsin's waterways. Hands-on experience using start-of-the-art instrumentation will prepare students to enter the workforce with experience in PFAS chemistry, analysis, and treatment.

Engaging Undergraduate Students in Cutting-Edge Research on the Use of Earth Materials for the Removal of Contaminants including Per- and Polyfluorinated Substances (PFAS)

Institutions: UW-Parkside, UW-Milwaukee

Principal Investigators: Zhaohui Li, Lori Allen, UW-Parkside; Shangping Xu, Yin Wang, UW-Milwaukee

Per- and polyfluoroalkyl substances (PFAS) are forever chemicals, indicating that they stay in water and the environment permanently. UW-Parkside and UW-Milwaukee will engage 10 undergraduate students per year to conduct cutting-edge research for PFAS and color dyes removal from water. In addition, they will conduct PFAS analyses using state-of-the-art instruments for water samples collected from local drainage and Lake Michigan. The results will help southeastern Wisconsin to develop strategies to remove emerging contaminants from water and to help protect the region from contamination by forever chemicals.

Land Application and the Occurrence, Fate, and Mitigation of Per- and Polyfluoroalkyl Substances and Nitrate

Institutions: UW-Green Bay, UW-Madison, UW-Platteville, UW-Stevens Point

Principal Investigator: Michael Holly

In Wisconsin, land application is typically the most cost-effective and common practice for handling biosolids, the semi-solid residual of wastewater treatment. However, groundwater contamination is a potential risk. Per- and polyfluoroalkyl substances (PFAS), suspected hazardous chemicals present in numerous household products and used in manufacturing, aren't included in biosolids land application regulations. This research will help predict future PFAS groundwater contamination, generate future guidelines to protect groundwater wells from PFAS, identify Wisconsin groundwater sources at risk, and evaluate a low-cost treatment (biochar produced from agricultural waste) to minimize PFAS and nitrate leaching. Undergraduates will be trained in methods for measuring the fate and transport of contaminants that affect water quality.

Mitigating PFAS Contamination of Groundwater: Biochar Sequestration of PFAS in Biosolid Leachate at the Field Scale

Institutions: UW-Green Bay, UW-Milwaukee

Principal Investigators: Kpoti Gunn, Michael Holly, UW-Green Bay; Yin Wang, UW-Milwaukee

Sewage sludge or biosolids generated in Wisconsin are largely applied to agricultural lands. Through this practice, biosolids may be the most diffuse source PFAS contamination of groundwater resources. This project aims to evaluate onsite the PFAS immobilization performance of activated biochar incorporated in soils receiving biosolids, and to develop methods for PFAS analysis of soil and groundwater leachate. Four undergraduate students involved in the project will contribute to experimental setup, soil, and water sampling; laboratory and data analysis; and results publication. The project will provide students and faculty with research experience critical to the development of an emerging contaminant workforce.