NSF Convergence Accelerator's 2023 Cohort Phase 1 Award

Project Title
Bio-Inspired and Biocatalytic Degradation of "Forever Chemicals"

Awardee
Geosyntec Consultants, Inc.

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Principal Investigator
Chao Zhou
czhou@geosyntec.com

Co-Principal Investigators
Dimin Fan
Yujie Men
Zhiwu Wang
Dongye Zhao

NSF Funded Program
NSF Convergence Accelerator

NSF Program Director
Chris Sanford
Track M: Bio-Inspired
Design Innovations
Convergence Accelerator
Directorate of Technology,
Innovation and Partnerships
csanford@nsf.gov

PROJECT ABSTRACT

Per- and polyfluoroalkyl substances (PFAS) are a large group of compounds characterized as having carbon atoms linked to each other and bonded to fluorine atoms at most or all of the available carbon bonding sites. PFAS are widespread in the environment and have been linked to adverse health effects in humans and animals. With recent regulatory actions taken by the U.S. Environmental Protection Agency, there are even more urgent needs and economic implications for society to address the PFAS contamination in the environment.

PFAS are known as "forever chemicals" because a key feature of them is their persistence in the environment. The Bio-Inspired and Biocatalytic Degradation of "Forever Chemicals" project, led by Geosyntec Consultants, Inc., aims at developing a cost-effective bio-inspired solution to destroy PFAS to permanently remove them from the environment. The solution involves the design of novel reductive defluorination pathways and catalysts inspired by biological reductive dehalogenase. The bio-inspired reductive defluorination mechanism will then be applied to develop prototype treatment systems to destroy PFAS in environmental media such as contaminated groundwater and biosolids produced by wastewater treatment plants.

The convergence research will be supported by interdisciplinary academic researchers at San Diego State University, University of California, Riverside, and the Virginia Polytechnic Institute and State University with relevant expertise in PFAS destruction, catalyst design, bioremediation, and biological wastewater treatment. To accelerate the translation from fundamental research to practical application and maximize the societal impact of the solution, the project team will work closely with partners and end user communities such as non-profit industry research organizations, wastewater utilities, government regulatory agencies, and government and industry users with potential responsibilities to clean up the PFAS in the environment.