Environmental Engineering & Sciences

Department of Civil and Environmental Engineering
CEE 595AG Seminar

Friday, October 27, 2023 | 10:00 – 10:50 a.m. CST | 2311 Yeh Center

Electrochemical Phosphorus Recovery and Dewaterability Improvement in Anaerobic Digestate

Anaerobic digestate is a solid-liquid mixture produced from anaerobic digestion. More than 1,200 wastewater treatment plants (WWTPs) in the US use anaerobic digestion for solids treatment and resource recovery. Phosphorus (P) is an essential and non-renewable resource for agricultural production. On average, 90% of P wastes in WWTPs are converted into solid sludge and accumulate in the anaerobic digestate. However, high chemical consumption and concerns over persistent chemicals impede the application of P recovery in anaerobic digestate. Electrochemical systems receive growing interests because of its potential to achieve P separation with low chemical/energy input. In this talk, I will explore membrane-based and precipitation-based electrochemical strategies to release and recover P from anaerobic digestate. The advantage of precipitation-based strategy, namely electrochemical phosphorus recovery cell, will be demonstrated with a low energy consumption and zero chemical input. The application of the recovered P product will be demonstrated in high-purity microalgae cultivation. Without the addition of coagulants, a surprisingly significant dewaterability improvement was observed after electrochemical P recovery. I will explore the synergistic mechanisms of electrochemical acidification and cation removal that led to such dewaterability improvement. My work proves that electrochemical platforms can play a key role in improving the sustainability of resource recovery and solids management in WWTPs.

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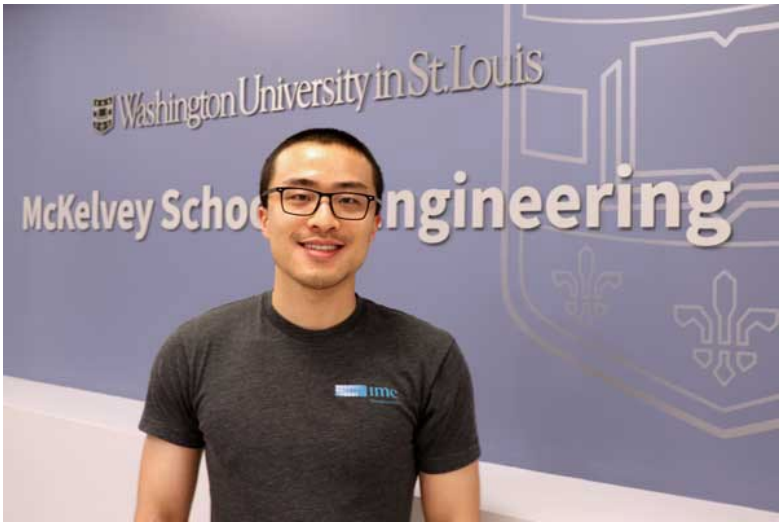

Bio: Zixuan (Zach) Wang is currently a 5th year PhD candidate in the Department of Energy, Environment & Chemical Engineering at Washington University in St. Louis. Zixuan earned his bachelor's degree from Xi'an Jiaotong University and master's degree from Virginia Tech. Zixuan is the recipient of the Outstanding Graduate Student Award from CAPEES, Annual Research Impact award from EECE department at WashU, and several presentation awards from Virgnia, Missouri, and Illinois AWWA/WEF joint conferences. His research primarily focuses on the sustainable treatment of wastewater and electrochemical processes for resource recovery. During free time, Zixuan enjoys listening to podcasts, playing guardian tales, and working out.