CIVE 6111 Graduate Seminar

Pollution Control in Agricultural Systems using Nanoscale Iron and Machine Learning

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2:45pm-3:45pm
Zoom: https://uh-edu-cougarnet.zoom.us/j/95702511696?pwd=VFIybkh4emhETHNITGV0dXRHS3pIZz09

Abstract

Particulate zerovalent iron can undergo several chemical reactions, including electron donation, adsorption of solutes, oxidation to dissolved iron, complexation, etc. Our research group is exploring how to take advantage of some of these reactions to address pollution in agricultural systems while using machine learning for treatment optimization. In this seminar I will describe two studies on how the chemistry of NZVI has been used for treating runoff, and metal(loid)-polluted soil. In the first study we investigated the performance of pristine and sulfidated nanoscale zerovalent iron (NZVI and SNZVI, respectively) for co-removal of copper (Cu^{2+}) and phosphate (PO_4^{3-}), which are typically present in agricultural runoff. Instead of competitive adsorption, surface reactions with NZVI and SNZVI led to improved removal when both contaminants were present. The relative importance of input parameters was calculated based on an artificial neural network function developed from experimental data. In the second study, we showed that arsenate immobilization in soil can be improved with NZVI sulfidation. Ongoing studies are investigating the suitability of NZVI- and SNZVI-treated soil for crop cultivation.

Bio

Dr. Adeyemi Adeleye is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of California, Irvine. He earned his PhD from the University of California, Santa Barbara in 2015. In 2016, Dr. Adeleye was awarded a National Research Council Research Associateship by the National Academies of Sciences Engineering and Medicine, which he spent as a postdoctoral researcher at the US Environmental Protection Agency's National Health and Environmental Effects Research Laboratory, Narragansett, Rhode Island. Dr. Adeleye's research interests include environmental nanotechnology, and emerging contaminants such as microplastics and perfluorinated compounds.