Remediate PFAS-Impacted Soils Using Magnetic Activated Carbon (MAC)

Chih-Hsuan Shih, Shih-Hung Yang, Andersen French, and ***Kung-Hui Chu***
(kchu@civil.tamu.edu)
(Texas A&M University, College Station, TX, USA)

Background/Objectives. Per-and polyfluoroalkyl substances (PFAS) are a group of emerging contaminants of great concern due to their persistent characteristics and potential risk to human health. They are widespread in wastewater, groundwater, and soil. Activated carbon (AC) has been applied to reduce the bioavailability of persistent organics such as PAHs or PCBs in contaminated soils; however, the spent AC still remained in the treated soils, serving as a long-term sink for the contaminants. Thus, a method to remove spent AC from the treated media is needed. This study examined the feasibility to apply magnetic activated carbon (MAC) to remediate PFAS-impacted soils, focusing on the ability to remove spent MAC from treated soils.

Approach/Activities. MAC was synthesized for PFAS removal from different PFAS-impacted soils. Both clean and PFAS-impacted soils with high and low organic contents were used. Clean soils were first spiked with a known amount of PFAS before adding MAC. The soil and MAC mixtures were then incubated at room temperature with gentle shaking and samples were collected over time for PFAS analysis. Parallel experiments using aged PFAS-impacted soils were also conducted. The removal efficiency of PFAS adsorption by MAC was determined based on changes of PFAS in soils before and after incubating with MAC.

Results/Lessons Learned. MAC was able to remediate PFAS-spiked soils, with removal ranging from 50% to 85% after one month of treatment and from 70% to 90% after three months of treatment. Lower PFAS removal was observed from the aged PFAS-contaminated field samples. Ongoing efforts are to determine whether PFAS removal can be improved by repeated applications of MAC, and whether repeated MAC applications can shorten treatment time. Overall, our results suggested that MAC showed a great potential to remediate PFAS-impacted soils.