PFAS in Soils and Sediments

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Effective treatment and removal of poly- and per-fluoroalkyl substances (PFAS) plays a detrimental role in soil, sediments and groundwater remediation strategies. The extreme resistance of PFAS to biological, thermal and chemical degradation processes are responsible for their presence in soils, groundwater and near- and sub-surface regions. Much of the prior studies have been focused on examining the adsorption efficiency of PFAS on materials such as activated carbon, anion-exchange resin, molecular imprinted polymers and metal-oxide interfaces. Although, these *ex-situ* techniques show promising behaviour towards mitigation strategies, it is vital to have a comprehensive understanding of the fate and partitioning of PFAS at geologically relevant settings representative of near- and sub-surface environments around contaminated sites in order to develop and implement effective remediation techniques and to understand potential sources of uptake by plants and animals. Furthermore, with the increasing numbers of potential mitigation strategies targeting the immobilization of PFAS in soil and sediment environments, insight about the potential long-term impact of these technologies in agricultural environments is vital. Despite these needs, the factors that dictate the interfacial behavior and transport of PFAS in the environment remains poorly understood.

This presentation discusses the impact of mineralogical composition, role of prevalent metal cations with drastically different hydration properties on the adsorption of PFAS at relevant thermodynamic conditions. In this presentation, we will provide the much-needed fundamental insights into the critical role exerted by different soil components on the adsorption of PFAS in near- and sub-surface environments. The importance of neutral and charged surfaces in regulating the interfacial properties of PFAS will be addressed. Such information could potentially serve as one of the fundamental resources for designing and validating effective in-situ remediation techniques of soils and sediments.

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