

EEE Research Seminar

Date: February 27, 2024, at 10:30AM

Location: POTR 234 (Fu Room)

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Environmental Impacts and Resource Potential of Legacy Coal Ash Wastes

Abstract

Coal ash residues are the solid wastes produced at coal fired power plants and represents one of the largest industrial waste streams in the United States. The long history of coal-based electricity in the U.S. has resulted in more than 2 billion tons of coal ash currently stored in hundreds of disposal sites around the country. Failures of these coal ash impoundments in the past decade have highlighted the risks of contaminant leaching from disposal sites ash as well as the need to find alternative methods for ash disposal or reuse. In this presentation, Dr. Hsu-Kim will discuss the enrichment of arsenic and selenium in coal fly ash, two elements that pose risks for ecosystems near disposal sites. The chemical forms of arsenic and selenium in coal ash entail heterogeneous associations at the micro- and nano-scale, and this complexity helps to explain why the leachability of these elements from coal ash is not easy to predict. Dr. Hsu-Kim will also discuss renewed efforts to valorize coal ash by mining the material for valuable metals such as rare earth elements. While such efforts could provide an alternative supply market for critical metals of global significance, major challenges persist in recovering and concentrating rare earth elements from coal ash. Dr. Hsu-Kim will discuss technological challenges in the context of the complex geochemical composition of coal ash.

Bio

Heileen (Helen) Hsu-Kim is a Professor of Environmental Engineering at Duke University, where she has been a member of the faculty since 2005. Prior to joining Duke, Dr. Hsu-Kim completed her B.S. degree in Environmental Engineering at MIT, and M.S./Ph.D. degrees in Environmental Engineering at UC-Berkeley. Dr. Hsu-Kim's expertise area is aquatic geochemistry, and her research focuses on trace metals and metalloids in the environment. In addition to her research on coal ash geochemistry, Dr. Hsu-Kim studies mercury pollution in the environment, the impacts of artisanal gold mining in Latin America, and new methods to quantify personal exposures to metals in the ambient environment.