Mercury Extraction Using Sulfur Lignin Foams

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Mercury (Hg(II)) continues to be one of the most serious contaminants in our global waters due to its high toxicity and mobility in our ecosystems. To address this issue, we explored the potential use of lignin, a highly abundant material that shows great promise in heavy metal absorption, as a cost-effective solution for removing mercury in water. Specifically, we focused on lignin in the form of lignin-based foam, a more easily recycled, more lightweight, and larger surface alternative to raw lignin. To further enhance the absorption rates of our lignin foam, we introduced sulfur due to its known affinity toward mercury. We used scanning electron microscope (SEM), energy dispersive spectroscopy (EDS), and x-ray diffraction (XRD) to study the morphology and structural properties of our sulfur-based lignin foam. Inductively coupled plasma mass spectrometry (ICP-MS) was used to examine Hg absorption rates. The main goal of this project was to study the effectiveness of sulfur-based lignin foams in removing mercury in water. Our results showed that sulfur-based lignin foam removed significant amounts of Hg in water. Given the low cost and effectiveness of our material, sulfur-based lignin foam provides for a promising alternative to traditional mercury removal technologies, and could play a crucial role in addressing mercury contamination in our waters.

Awards Won: