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**INOR-037: "Encapsulation of Hazardous Metals with Organic Modified Minerals"**

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Our studies have focused on the development of new materials for the control, treatment, and long term storage of hazardous metals. The process involves the introduction of hazardous cations into the matrix of clays through aqueous ion-exchange methods. These cations are subsequently encapsulated within the clay by treating the material with a variety of organic silanes. This treatment results in the formation of organic coatings which are chemically bonded to the surface of the clay. The coatings are hydrophobic in nature, and may restrict the diffusion of water into and out of the pores contained within the clay. The goal of this process is to reduce the undesirable migration of hazardous metals from the ion-exchanged clays into the environment.

A smectite type clay, bentonite, has been the primary inorganic matrix for this study. Bentonite, which is a form of montmorillonite, consists of two-dimensional sheets of aluminosilicates. Like other smectite clays, these sheets are separated by an interlayer which contains cations and water. The reactive groups within the alkyl silanes react with hydroxyl groups on the clay surface, as well as water contained on and within the clay. Our results show that there is little difference in the metal content of the coated and non-coated clays. The cations are not removed from the clay by exposure to the silane. The clays also maintain their general structure and crystallinity upon surface modification. The organic coatings are stable to 500 °C when heated under nitrogen. The ability of these systems to encapsulate the cations and prevent their migration into the environment is currently being evaluated.

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