

PDMS (Polydimethylsiloxane)-Coated Silica Nanoparticles for Selective Removal of Oil and Organic Compound from Water

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In order to selectively remove oil and organic compound from water, silica nanoparticles with hydrophobic coating was used. Since silica nanoparticles are generally hydrophilic, removal efficiency of oil and organic compound, such as toluene, in water can be decreased due to competitive adsorption with water. In order to increase the removal efficiency of oil and toluene, hydrophobic polydimethylsiloxane (PDMS) was coated on silica nanoparticles in the form of thin film. Hydrophobic property of the PDMS-coated silica nanoparticles and hydrophilic silica nanoparticles were easily confirmed by putting it in the water, hydrophilic particle sinks but hydrophobic particle floats. PDMS coated silica nanoparticles were dispersed on a slide glass with epoxy glue on and the water contact angle on the surface was determined to be over 150° , which is called superhydrophobic. FT-IR spectroscopy was used to check the functional group on silica nanoparticle surface before and after PDMS coating. Then, PDMS coated silica nanoparticles were used to selectively remove oil and toluene from water, respectively. It was demonstrated that PDMS coated nanoparticles selectively aggregates with oil and toluene in the water and floats in the form of gel and this gel remained floating over 7 days. Furthermore, column filled with hydrophobic PDMS coated silica nanoparticles and hydrophilic porous silica was prepared and tested for simultaneous removal of water-soluble and organic pollutant from water. PDMS coated silica nanoparticles have strong resistibility for water and has affinity for oil and organic compound removal. Therefore PDMS-coated silica nanoparticles can be applied in separating oil or organic solvents from water.

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