

Adsorption of lanthanide ions on surface modified magnetic nanoclusters

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The synthesis of SiO₂ coated magnetic nanoparticle has been focused for the adsorption of heavy metal ions and separation due to the outstanding ability to separate adsorbent materials via external magnetic field. Magnetic adsorbents were prepared with fabricating colloidal crystals and surface functionalization by using monodisperse SiO₂ coated magnetic nanoparticle microsphere with a core-shell structure and various functional group on surface to remove heavy metal ions from aqueous media. Magnetic adsorbents were synthesized in the basic condition with magnetic nanoparticles. Second surfactant, tetraethyl orthosilicate (TEOS) and ammonium hydroxide(NH₄OH) via two main steps by a modified Stober process and the layer-by-layer(LbL) assembly technique due to hydrophobic surface property of magnetic nanoparticles. The hydroxide surface properties of magnetic adsorbents were functionalized to amine, carboxylate, hydroxide group by the surface modification process. The functionalized adsorbents were synthesized for use in the removal of heavy metal ions from aqueous solutions. The magnetic adsorbents were separated with external magnetic field.