

Porous silicon nanoparticles and magnetite-chitosan-reduced graphene oxide for simultaneous removal of heavy metals and anionic surfactant

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The simultaneous removal of different types of pollutants is extremely challenging for environmental and material science. Water dispersible magnetite-chitosan reduced graphene oxide (MCRGO) submicron particles were synthesized and combined with positively charged porous silicon nanoparticles (PSi NPs) mainly through electrostatic interactions for the simultaneous removal of toxic heavy metals and anionic detergent pollutants, organic dye and pesticide as well. PSi NPs offer great potential for the simultaneous removal of inorganic and organic compounds due to their ability for adsorbing hydrophobic and hydrophilic compounds, and other negative charged materials, on their internal and external surface. The MCRGO hybrids showed high binding capacity for positive charged heavy metal ions and were easily separated by an external magnetic field. Here, we report the combination of MCRGO and PSi NPs as an efficient biocompatible platform for complete elimination of toxic heavy metals cadmium (Cd^{2+}) and lead (Pb^{2+}) as well as the anionic $\text{C}_{12}\text{H}_{25}\text{SO}_4^-$ from sodium dodecyl sulfate (SDS) water solutions, and dye oil red O and pesticide by adsorption. Overall, the combination of MCRGO and PSi NPs holds great potential for complex waste water treatment beyond multiple heavy metals, detergent and pesticide based pollutants.

Biography

Mingtan Hai has her expertise in cancer research, material science and water treatment. Her group and weitz group cooperates on cancer research, material science, microfluidics and environmental science.

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