In situ Preparation of Fe_3O_4-*graft*-Poly(acrylic acid) composite in Supercritical CO_2 and Its Adsorption Capacity of Water-Soluble Dyes

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Herein we report the synthesis of Fe_3O_4-*graft*-poly(acrylic acid) nanocomposite via dispersion polymerization of acrylic acid in supercritical carbon dioxide in presence of surface modified magnetite nanoparticles. Firstly, Fe_3O_4 nanoparticles were surface modified with a silane-coupling agents namely 3-(trimethoxysilyl)propylmethacrylate. Secondly, polyacrylic acid (PAA) chains were successfully grafted from the surface of Fe_3O_4, resulting in the formation of core-shell nanostructures. The obtained product was confirmed for chemical and physical structure using Fourier transform infrared spectroscopy (FT-IR), thermogravimetric analysis (TGA), X-ray diffraction (XRD), and transmission electron microscopy (TEM). The analysis results of magnetic property indicated that composites were superparamagnetic. The adsorption of some dyes onto PAA-coated magnetite nanoparticles was investigated in phosphate buffer (pH 2-10) at 25°C. It indicated that the adsorption capacity increased with the increased in solution pH and with the increased in Fe_3O_4 contents in composites.