

Iron oxide nanoparticles immobilized PAN nanofibers: Synthesis and adsorption studies

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In this study we have prepared (Polyacrylonitrile) PAN/iron oxide composite nanofibers by three different methods and have compared their removal efficiency for the adsorption of Congo red (CR) dye from aqueous solution. In the first method, we have prepared electrospun PAN/iron(III) acetylacetonate composite nanofibers by electrospinning followed by hydrothermal method for in situ growth of iron oxide nanoparticles on the surface of PAN nanofibers. In the second method the electrospun PAN nanofibers were immersed into the iron alkoxide solution followed by hydrolysis reaction at 80°C. In the third method, PAN/iron oxide composite nanofibers were prepared by blending the previously prepared iron oxide nanoparticles with PAN solution followed by electrospinning technique. FE-SEM images clearly show the formation of iron oxide nanoparticles that are uniformly decorated on the surface of PAN nanofibers after hydrothermal reactions. The average diameters of the nanoparticles are observed to be in the range of 30 to 120 nm. CR dye is used as a model organic pollutant for adsorption study. The adsorption isotherm, kinetic study and thermodynamic study were carried out to elucidate the adsorption mechanism. More in RSC Adv., 2016, 6, 15402, DOI: 10.1039/c5ra20345g

