 Functionalization of polyacrylonitrile nanofiber mat via surface-initiated atom transfer radical polymerization for copper ions removal from aqueous solution

Jianqiang Wang, Peng Jia, Kai Pan*, Bing Cao*

Key Laboratory of Carbon Fiber and Functional Polymers, Ministry of Education, Beijing University of Chemical Technology, Beijing 100029, China, Tel. +86 10 64413857; Fax: +86 10 64436876; email: pankai@mail.buct.edu.cn (K. Pan); bcao@mail.buct.edu.cn (B. Cao)

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ABSTRACT

Poly (acrylic acid) (PAAc)-functionalized PAN nanofiber (PAN-COOH) mats were prepared via electrospinning followed by atom transfer radical polymerization for the removal of copper ions from aqueous solution. Attenuated total reflections Fourier transform infrared and X-ray photoelectron spectroscopy results confirmed the presence of PAAc layer on the surface of PAN nanofibers. The morphology of PAN-COOH nanofibers was studied by scanning electron microscopy. Adsorption results indicated that the adsorption capacity was pH dependent. Adsorption equilibrium reached within 30 min as the initial solution concentration increased from 108 to 268 mg/L, and the process can be described using the pseudo-second-order model. Isotherm data fitted well to the Langmuir isotherm model. Desorption results showed that adsorption capacity can remain up to 90% after five times usage.

Keywords: Nanofiber; ATRP; Adsorption; Heavy metal ion

*Corresponding author.

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