Poly(acrylic acid)/SiO\textsubscript{2} composite nanofiber functionalized with mercapto groups for the removal of humic acid from aqueous solution

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Received 30 April 2018; Accepted 19 October 2018

**A B S T R A C T**

Functionalized poly(acrylic acid)/SiO\textsubscript{2} (PAA/SiO\textsubscript{2}) composite nanofiber with mercapto groups have been prepared through an electro spinning process. The characterization of the composite nanofiber was performed using FTIR, optical microscopy, SEM, TEM and Brunauer-Emmett-Teller (BET) analysis. Finally, the prepared nanofiber was used for the adsorption of humic acid (HA) from an aqueous solution using a batch adsorption technique. The effects of pH, contact time, initial concentration, dosages and temperature on adsorption capacities were studied in a batch mode. The experimental data was well described by the Langmuir isotherm model with an adsorption capacity of 427.62 mg/g. It was found that the kinetic data follow the pseudo-second-order models. The data of thermodynamic parameters indicated that the HA adsorption process was non-spontaneous and endothermic under the experimental conditions with the values of Gibbs free energy ($\Delta G^\circ$) being in the range of 3.235 to 5.914 kJ mol\textsuperscript{-1}; as well as the values of enthalpy ($\Delta H^\circ$) and entropy ($\Delta S^\circ$) that were found to be 22.41 kJ mol\textsuperscript{-1} and 55.59 J mol\textsuperscript{-1} K\textsuperscript{-1}, respectively. The functionalized composite nanofiber exhibited as a high potential adsorbent for the adsorption of HA from an aqueous solution.

**Keywords:** Adsorption; Composite nanofiber; Humic acid; Mercapto groups

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