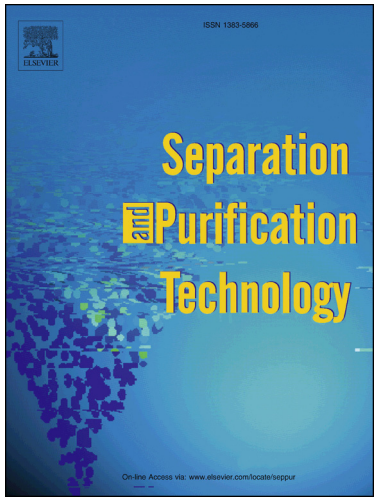

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ABSTRACT

This work describes the synthesis of Fe-Ag/functionalized-multiwalled carbon nanotube (f-MWCNT)/polyethersulphone (PES) nanostructured-hybrid membranes *via* a modified phase inversion method and its permeability properties. As-synthesized MWCNTs were first treated with acid and then Fe and Ag nanoparticles (Fe-Ag NPs) were uniformly dispersed on the surface of the f-MWCNTs using a microwave-assisted polyol method prior to addition to the PES polymer matrix. The addition of Fe-Ag/f-MWCNTs into the PES polymer increased the surface roughness of PES membranes and resulted to a higher hydrophilicity. Thermal stability and crystallinity properties of PES were significantly improved. The Fe-Ag/f-MWCNTs enhanced the surface charge density of the PES membranes and were found not to leach from PES. Performance evaluation studies revealed that the addition of Fe-Ag/f-MWCNTs into the PES polymer matrix increased water flux from 26.5 to 36.9 L/m^2 h and improved the rejection of Cr^{6+} ions (up to 94%) in a cross-flow system. Furthermore, the addition of Fe-Ag/f-MWCNTs improved fouling resistance of PES membranes. The improved properties of these hybrid membranes make the ideal for use as either point-of-use or end-of-use water purification system for production of potable water.

Key words: Hybrid membranes, multi-walled carbon nanotubes, nanoparticles, polyethersulfone, water treatment.