The influences of deposited silica nanoparticles on a forward osmosis membrane

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Received 21 March 2017; Accepted 5 June 2017

\textbf{ABSTRACT}

The effect of silica nanoparticles (SNPs) deposition on the properties of a commercial forward osmosis (FO) membrane was investigated in this work. Deposition of SNPs on the FO membrane was performed by a conventional sol–gel hydrolysis of tetraethyl orthosilicate and a simple dip-coating procedure. Scanning electron microscopy, X-ray photoelectron spectroscopy and attenuated total reflectance–Fourier transform infrared spectroscopy confirmed the successful deposition of SNPs on the membrane surface. The coated membranes were used in a bench scale FO system and their performance was evaluated through measuring the permeate water flux and fouling resistance. Successful deposition of SNPs smoothed out the membrane surface and increased surface hydrophilicity. The effects of SNP enabled a higher water flux and fouling resistance than for the pristine FO membrane, possibly due to increased hydrophilicity and decreased membrane roughness.

Keywords: FO membrane; Membrane coating; Sol–gel hydrolysis; Silica nanoparticles; Membrane fouling