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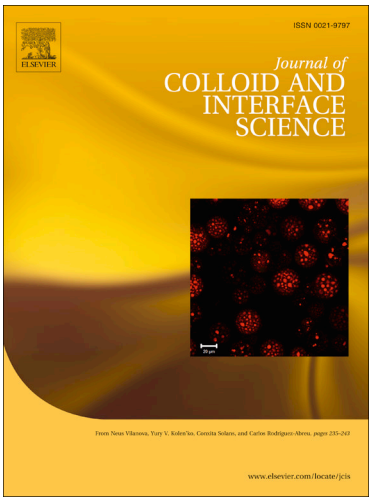


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# Fabrication of hydrophobic fluorinated silica-polyamide thin film nanocomposite reverse osmosis membranes with dramatically improved salt rejection

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**ABSTRACT**

Thin film nanocomposite reverse osmosis (TFN RO) membranes incorporated with hydrophilic nanoparticles show a potential problem that the salt rejection can not be improved significantly. In this study, novel TFN RO membranes incorporated with hydrophobic fluorinated silica nanoparticles were fabricated to improve the salt rejection. Fluorinated silica nanoparticles were well dispersed in organic phase during the interfacial polymerization (IP) process. The TFN RO membranes were characterized with attenuated total reflectance infra-red, field emission scanning electron microscopy, atomic force microscopy and water contact angle measurements. The preparation conditions of TFN RO membranes, including IP reaction time, organic solvent removal time, and fluorinated silica loading, were optimized by characterizing desalination performance using 2000 ppm NaCl aqueous solution at 1.55 MPa and 25 $^{o}$C. The salt rejection increased significantly from 96.0% without fluorinated silica nanoparticles to 98.6% with the optimal 0.12% (w/v) fluorinated silica nanoparticles, while the water flux decreased slightly from 0.99 $m^3/m^2/day$ to 0.93 $m^3/m^2/day$. This study demonstrated the potential use of hydrophobic