

عنوان مقاله:

Seawater desalination with Penetration impression of nanoparticles, solvent and surfactant treatments on thin film nanocomposite membranes

محل انتشار:

سومین کنفرانس ملی پژوهش های نوین در علوم و مهندسی شیمی (سال: 1396)

تعداد صفحات اصل مقاله: 13

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خلاصه مقاله:

Thin film composite membranes (TFC) consisting of an ultra-thin polyamide layer made from interfacial polymerization remain to be of paramount importance for seawater desalination. Incorporation of nanoparticles into the polyamide layer has produced thin film nanocomposite (TFN) membranes with better performance than traditional TFC membranes. However, challenges of defect formation with the introduction of nanoparticles need careful adjustments in order to surpass the trade-off relationship between permeability and selectivity. Here, we explored the influential effects of nanoparticles, solvent and surfactant treatments on the desalination performance of TFN membranes under 55 bar using 35,000 ppm NaCl as the feed at 25 °C. TFN membranes with various loadings of polyhedral oligomeric silsesquioxane (POSS) and TiO₂-SiO₂ core-shell nanoparticles were fabricated. Surfactant treatment was performed in two different ways: membrane soaking and intank addition. Unexpectedly, the latter endows the membrane with an improved rejection without sacrificing its flux possibly due to the formation of a surfactant monolayer to heal defects in TFN membranes. The newly developed TFN-T membrane with the aid of synergic effects from nanoparticles, ethanol and surfactant post-treatments shows comparable performance to most commercial membranes. This work may provide useful insights to overcome the trade-off relationship between permeability and selectivity of TFN membranes for seawater desalination.

کلمات کلیدی:

Membranes, Reverse osmosis, Nanoparticles, Surfactant, Polyamide membrane

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<https://civilica.com/doc/695817>

