



Novel thin-film composite membrane for seawater desalination with sulfonated poly(arylene ether sulfone) containing amino groups

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ABSTRACT

Sulfonated poly(arylene ether sulfone) containing sulfonic acid and amino groups (SDADPS) were successfully synthesized using direct-step polymerization as a novel thin-film composite (TFC) reverse osmosis (RO) membrane material for high chlorine resistance. TFC membranes were prepared using an interfacial polymerization (IP) reaction with trimesoyl chloride (TMC) and amine solution, containing m-phenylenediamine (MPDA) and SDADPS, on a polysulfone (PS) ultrafiltration (UF) support membrane. The synthesized SDADPS and fabricated TFC RO membranes were characterized by nuclear magnetic resonance spectroscopy and scanning electron microscope. Moreover, RO performances, salt rejection and water flux, were measured using a cross-flow cell instrument. Chlorine resistance was evaluated using sodium hypochlorite solution. The membrane fabricated with SDADPS was compared with a typical polyamide (PA) TFC membrane which was prepared by IP reaction with TMC and MPDA on a PS support membrane. The SDADPS RO membrane had much higher chlorine resistance than PA RO membrane and showed good RO performances, such as water flux (32 L/m² h) and salt rejection (95%).

Keywords: Desalination; Reverse osmosis; RO membrane; Sulfonated poly(arylene ether sulfone); Chlorine resistance

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