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# Polyol-functionalized Thin-Film Composite Membranes with Improved Transport Properties and Boron Removal in Reverse Osmosis

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## Abstract

Thin-film composite membranes comprising modified polyamide layers were cast on an ultrafiltration polysulfone support using sequential interfacial polymerization, thus obtaining bilayer membranes with a final layer of polyols at the surface. A traditional polyamide layer made by interfacial polymerization of trimesoyl chloride and m-phenylene diamine, as well as a reference bilayer membrane with a topmost layer of m-phenylenediamine, were compared with novel bilayer membranes containing N-Methyl-D-glucamine, ( $\pm$ ) 3-amino-1,2-propanediol, or serinol functionalizations. Filtration experiments performed with pure water, or with solutions containing 2000 mg/L NaCl and 5 mg/L boric acid, indicated that the water permeance of the modified membranes was improved with no associated loss of salt rejection compared to reference membranes. In particular, functionalization using ( $\pm$ )-3-amino-1,2-propanediol allowed achievement of the highest water flux and the best rejection (NaCl permeance, B, of  $0.18 \text{ L m}^{-2} \text{ h}^{-1}$ ) with 40% reduction in salt passage compared to the reference membranes (B of  $0.26 \text{ L m}^{-2} \text{ h}^{-1}$ ). Bilayer membranes also showed enhancement in boron

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