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Increasing the performance of reverse osmosis membranes via the interfacial copolymerization of β-cyclodextrin with *m*-phenylenediamine/trimesoyl chloride

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ABSTRACT

A novel β-cyclodextrin (β-CD)/polyamide film reverse osmosis (RO) membrane was prepared by in situ interfacial polymerization via mixing β-CD with *m*-phenylenediamine in the aqueous phase prior to reaction with trimesoyl chloride. The effects of the β-CD concentration on the morphology and separation performance of the RO membrane were studied. β-CD was employed to improve the pure water flux of the membrane. When the concentration of β-CD in aqueous solution was 1.5% (w/v), both the rejection of NaCl and the pure water flux were maintained at a high level. In this case, water flux of the β-CD-modified RO membrane was nearly1.52 times that of the β-CD-free polyamide membrane. This increase might have been caused by the high concentration of β-CD hydrophilic hydroxyl groups, which appeared to directly improve the performance of the composite film. In addition, the unique properties of the resulting membrane, including the loosely cross-linked structure formed by β-CD and the polyamide film, the intramolecular cavity existed in β-CD and the affinity of β-CD to water molecules, was ascribed as the reasons for the improved performance of higher permeability.

Keywords: β-cyclodextrin; Polyamide; Reverse osmosis; Interfacial polymerization; Surfactants

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