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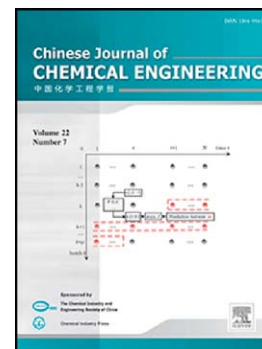
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Substrate matters: The influences of substrate layers on the performances of thin-film composite reverse osmosis membranes*

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Abstract Thin-film composite (TFC) reverse osmosis (RO) membranes are playing the dominating role in desalination. Tremendous efforts have been put in the studies on the polyamide selective layers. However, the effect of the substrate layers is far less concerned. In this review, we summarize the works that considering the impacts of the substrates, including pore sizes, surface hydrophilicity, on the processes of interfacial polymerization and consequently on the morphologies of the active layers and on final RO performances of the composite membranes. All the works indicate that the pore sizes and surface hydrophilicity of the substrate evidently influence the RO performances of the composites membranes. Unfortunately, we find that the observations and understandings on the substrate effect are frequently varied from case to case because of the lack of substrates with uniform pores and surface chemistries. We suggest using track-etched membranes or anodized alumina membranes having relatively uniform pores and functionalizable pore walls as model substrates to elucidate the substrate effect. Moreover, we argue that homoporous membranes derived from block copolymers have the potential to be used as substrates for the large-scale production of high-performances TFC RO membranes.

Keywords reverse osmosis; thin-film composite; interfacial polymerization; homoporous membranes; substrate effect

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