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Graphene Oxide-in-Polymer Nanofiltration Membranes with Enhanced Permeability by Interfacial Polymerization

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Abstract

Membranes with high permeability and selectivity are desired for energy-efficient liquid separation. In the present work, a highly wrinkled surface and ultrafast water transport channels centered in a graphene oxide (GO)-in-polyamide membrane were prepared by in-situ embedding GO nanosheets into the separation layer of a nanofiltration (NF) membrane via an interfacial polymerization. The rough and hydrophilic surface enabled the attraction of large amounts of water molecules to the membrane, and the sub-20 nm membrane thickness and two-dimensional capillary network formed by the stacked GO nanosheets accelerated the transport of water molecules through the membrane. This wrinkled and sandwich structured ultrathin NF composite membrane gave a water flux up to 242 LMH/MPa (nearly four-fold higher than those of reported NF membranes) and an unchanged high salt rejection, simultaneously.

Graphical Abstract

A highly wrinkled surface and ultrafast water transport channels centered in a polyamide membrane are prepared by *in-situ* embedding graphene oxide nanosheets into the separation layer of a nanofiltration membrane by interfacial polymerization, delivering an improved water flux with a high salt rejection.