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Enhanced separation performance of PES ultrafiltration membranes by imidazole-based deep eutectic solvents as novel functional additives

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Abstract

Herein, high performance polyethersulfone (PES) membranes were fabricated by introducing a series of imidazole-based deep eutectic solvents (DESs) as functional additives, which could tailor membrane structure due to the synergetic effect between DES components in phase inversion process. The addition of those DESs to the casting solutions all improved membrane porous structure, which contributes to a remarkably enhanced permeability and a high selectivity of the resultant membranes. Especially, the PES membrane with tetrabutylammonium chloride/imidazole as additive had a maximum water flux of 781 L/(m^2·h), which was about 6.45 times that of the additive-free membrane, and a high BSA rejection of 97.7% at 2 bar. Moreover, the antifouling performance as well as thermal and mechanical properties of the prepared membranes was investigated. Overall, this work indicates the promise of imidazole-based DESs as alternative pore-forming additives for the fabrication of ultrafiltration membranes with superior performance.

Keywords:

Polyethersulfone; Deep eutectic solvent; Ultrafiltration; Imidazole