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Preparation of PVDF-CTFE hydrophobic membranes for MD application: Effect of LiCl-based mixed additives

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Abstract

Hydrophobic flat-sheet membranes were prepared by poly (vinylidene fluoride-co-chlorotrifluoroethylene) (PVDF-CTFE) via the non-solvent induced phase separation (NIPS) process for membrane distillation (MD) application. Different types of LiCl-based mixed additives were applied to investigate their effects on membrane properties and MD performance. The membranes were evaluated in terms of membrane morphology, pore size and distribution, porosity, surface roughness, hydrophobicity, as well as the direct contact membrane distillation (DCMD) performance. Clear evidences were obtained that the mixed additives altered the phase inversion process, which resulted in the variation in membrane morphology, structure, properties and performance. The mass ratio of PEG/LiCl ranging from 5:0 to 0:5 was comprehensively investigated to study the synergistic effects of two additives on PVDF-CTFE membranes. The membrane M5 (PEG: LiCl=1:1, total content 8 wt.%) showed optimal properties and MD performance for combining the structure of higher hydrophobicity and pore interconnectivity, small pore size