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Preparation of super-hydrophobic PVDF membrane for MD purpose via hydroxyl induced crystallization-phase inversion

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Abstract:

This study aimed to develop an effective method to fabricate super-hydrophobic polyvinylidene fluoride (PVDF) membrane for direct contact membrane distillation (DCMD). Hydroxyl rich silica particle was prepared and added into PVDF dope solution, which was used to prepare super-hydrophobic PVDF membrane via phase inversion method. The influence of the particle on the membrane structure and performance were studied, and the micro-structure forming mechanism of the membranes was researched. It was found that the special spherical micro-structure was formed due to the addition of the hydroxyl rich silica. The spherical micro-structure is mainly composed of γ type crystal, and the transition of PVDF chains from α to γ was induced by the hydroxyl group of the silica particle. Furthermore, the silica particle also acted as the nuclei for crystallization, and the hydrogen bond formed between hydroxyl groups and PVDF chains could facilitate the three-dimensional growth of polymeric spherulites. The pure water contact angle (CA) on the membrane surface reached 153° at the optimum addition (1.5 wt%) of

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