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Polyetherimide hollow fiber membranes for CO_2 absorption and stripping in membrane contactor application

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Porous asymmetric polyetherimide (PEI) hollow fiber membranes with various non-solvent additives, *e.g.* lithium chloride, methanol and phosphoric acid (PA) were prepared for CO_2 absorption and stripping process in a membrane contractor. The PEI membranes were characterized *via* gas permeation, liquid entry pressure of water (LEPw), contact angle and field emission scanning electronic microscopy analysis. The CO_2 absorption and stripping performance was evaluated *via* the membrane contactor system. Addition of non-solvent additives increased the LEPw and membrane porosity of the PEI membrane with the formation of various membrane microstructures and contact angles. Absorption test was performed at 40 °C showed that the PEI–PA membrane produced the highest absorption flux of 2.7 $\times$ 10^{-2} mol m^{-2} s^{-1} at 0.85 m s^{-1} of liquid velocity. Further testing on PEI–PA membrane was conducted on CO_2 stripping at 60 °C, 70 °C to 80 °C and the results indicated that the stripping flux was lower compared to the absorption flux. Stripping tests at 80 °C produced the highest stripping flux which might due to the increase in equilibrium partial pressure of CO_2 in the liquid absorbent. Modification of PEI membrane *via* incorporation of additive can enhanced the performance of a membrane contactor *via* increasing the absorption and stripping flux.

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