Tailoring hydrophobicity of polyethersulfone membrane support for levulinic acid extraction using supported liquid membrane process

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Abstract–This study investigated the effect of various hydrophobic fillers on polyethersulfone (PES) membrane support properties. Graphene, kaolin, ZIF-8, and fluoroalkylsilane were loaded from 0.1 wt% to 5 wt% in membrane casting solution. The structure and properties of the membrane changed accordingly based on the type of filler used. The finger-like pores in the PES membrane were extended, providing additional space for the liquid membrane impregnation. The contact angle value in the mixed matrix membranes was increased compared to the pristine PES membrane. The highest contact angle was shown by the additional of 0.5 ZIF-8 wt% in PES membrane with top and bottom contact angle value of 92.5° and 103.9°, respectively. PES membrane with 0.1 wt% graphenes showed the highest porosity of 87.1%. PES membrane loaded with 0.1 wt% ZIF-8 showed the most elevated tensile stress among the membrane support fabricated with a value of 1,036 kPa. The best extraction of levulinic acid (LA) from 10 g/L LA feed solution was achieved using 0.1 wt% graphene-PES membrane support with 89.2% extraction percentage.

Keywords: Hydrophobicity, PES Membrane, Levulinic Acid, Supported Liquid Membrane

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

CREDIT AUTHOR STATEMENT

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