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Thermally treated ammonia functionalized graphene oxide / polyimide membranes for  
pervaporation dehydration of isopropanol

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Abstract

A novel mixed matrix membrane (MMM) consisting of a cross-linkable 6FDA polyimide matrix and ammonia functionalized graphene oxide (NHGO) particles has been molecularly designed at elevated temperatures for water/IPA separation. The reaction scheme was proposed and evidenced by FTIR and XPS analyses. The evolution of microstructure changes in each step of MMM formation was systematically studied by FESEM, XRD and PALS. The water-IPA solution-diffusion characteristics of the thermally treated MMMs at 400 °C were investigated in order to evaluate their impact towards IPA/water dehydration. The MMM containing 0.5% NHGO (PI-0.5%NHGO-400) exhibited the most favorable solution-diffusion properties for water-IPA separation and displayed the best pervaporation performance. This membrane showed a water permeability of  $0.198 \text{ mg m}^{-1} \text{ h}^{-1} \text{ KPa}^{-1}$  and a water/IPA molar selectivity of 6726 which was 35 times higher than that of the pristine co-polyimide without sacrificing the water

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