Seeding and Secondary Growth Synthesis of ZIF-8 Membranes for Propylene/Propane Separation using Conversion reaction of ZnO layer as seeding method

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As ZIF materials have their unique properties such as high surface area, tunable pore structure, thermal and chemical stability, they can be used in various applications including gas separation. For synthesis of ZIF membranes, fixing sub-micron ZIF seed particles on the support is challenging and important. In this work, we synthesized ZIF-8 seed layer by combining ZnO coating on the support and the conversion synthesis of ZnO layer in H-mIm solution to ZIF-8 layer, followed by the secondary growth synthesis for ZIF-8 membranes. The effect of solvent on conversion seeding had been investigated to control the reaction rate combining the dissolution rate of ZnO and the crystallization rate. The optimum solvent combination (water and methanol) was studied according to the thickness of the ZnO layer used in the conversion seeding. The obtained membranes showed excellent performance for propylene / propane gas separation. The thicker the ZnO layer, the lower the permeability.