

Zeolitic Imidazolate Framework ZIF-8 Films with Controllable Microstructures Prepared via ZnO to ZIF-8 Conversion and Their Usage as Seed Layers for Propylene-selective ZIF-8 Membranes

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Supported ZIF-8 films with varying microstructures were prepared by ZnO to ZIF-8 conversion reaction in a 2-methylimidazole solution. The grain size and continuity of the film were controlled by manipulating conversion parameters such as solvents and their combinations and conversion temperature. The ZIF-8 films with varying microstructures were used as seed layers to synthesize propylene-selective ZIF-8 membranes. The propylene/propane separation performances were greatly affected by the microstructures of the seed layers. Non-continuous seed layers covered with compactly packed ZIF-8 nanocrystals tended to yield membranes with improved grain boundary structure compared to those grown from continuous seed layers with a larger grain size. The membranes were mechanically stronger than those grown from conventional seed layers, which were obtained by dip-coating ZIF-8 nanocrystals on substrates, likely due to the presence of mechanical interlocks between the membranes and porous substrate network.