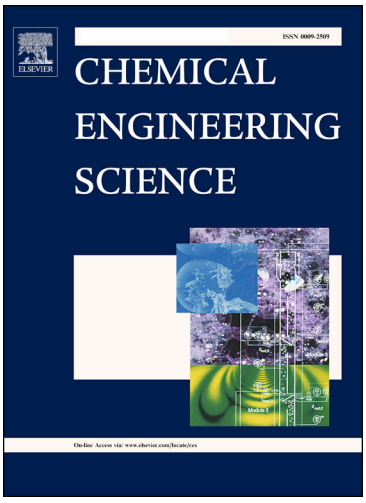

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Highly efficient H_2/CO_2 separation via an ultrathin metal-organic framework membrane

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Abstract

We propose a strategy for rapid *in situ* fabrication of zeolitic imidazolate framework-8 (ZIF-8) hybrid membrane with assistance of the two dimensional (2D) graphitic carbon nitride (g-C_3N_4) nanosheets at room temperature. The negatively charged g-C_3N_4 nanosheets with abundant nitrogen coordinating sites are capable to capture and anchor Zn^{2+} and thus provide a large number of heterogeneous nucleation sites for the formation of initial ZIF-8 crystals. During the cyclical spin coating of the Zn^{2+}/g-C_3N_4 nanosheets and the ligand (2-methylimidazole), the *in situ* formed ZIF-8 crystal nucleus on g-C_3N_4 nanosheets promote the further growth of continues defect-free membranes. The ZIF-8/g-C_3N_4 membrane with thickness of ~240 nm can be obtained using this strategy within 30 min at room temperature, which is attractive for fast and facile preparation of molecular sieving membranes. Moreover, it exhibits promising H_2/CO_2 separation performance with the selectivity up to 42, which is superior to many other ZIF-8 membranes.

Key words: membrane, gas separation, metal organic frameworks (MOFs), ZIF-8, C_3N_4