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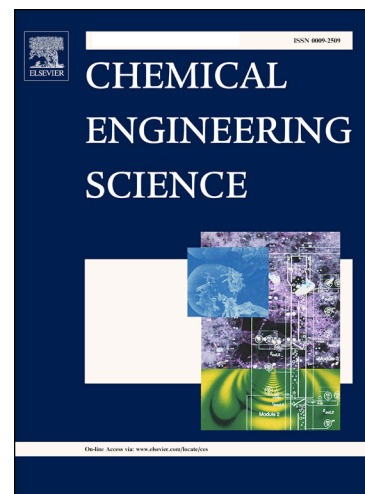
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# Highly efficient H<sub>2</sub>/CO<sub>2</sub> separation via an ultrathin metal-organic framework membrane

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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<sub>3</sub>N<sub>4</sub>) nanosheets at room temperature. The negatively charged g-C<sub>3</sub>N<sub>4</sub> nanosheets with abundant nitrogen coordinating sites are capable to capture and anchor Zn<sup>2+</sup> 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<sup>2+</sup>/g-C<sub>3</sub>N<sub>4</sub> nanosheets and the ligand (2-methylimidazole), the *in situ* formed ZIF-8 crystal nucleus on g-C<sub>3</sub>N<sub>4</sub> nanosheets promote the further growth of continuous defect-free membranes. The ZIF-8/g-C<sub>3</sub>N<sub>4</sub> 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<sub>2</sub>/CO<sub>2</sub> 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<sub>3</sub>N<sub>4</sub>

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