Exceptional CO_2 separation performance from thin film composite membranes of acid-hydrolyzed PIM-1

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Abstract:

The polymer of intrinsic microporosity PIM-1 was synthesized in both predominately linear and more branched forms by varying the polymerization temperature profile [1]. PIM-1 was acid-hydrolyzed [2] to introduce carboxylic acid functionality. Thin film composite (TFC) membranes were prepared via a simple kiss-coating method directly on a commercially available ultrafiltration support, without any further crosslinking or other post-treatment. The best performing TFC membranes showed CO_2 permeance of 3200 GPU with selectivity of 64 for CO_2/N_2 and 45 for CO_2/CH_4, and maintained stable performance over 60 days. This falls within the performance range that is suitable for post combustion carbon capture [3]. The appropriate polymer topology was crucial for membrane anti-aging properties.

References

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