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Review

A review on emerging organic-containing microporous material membranes for carbon capture and separation

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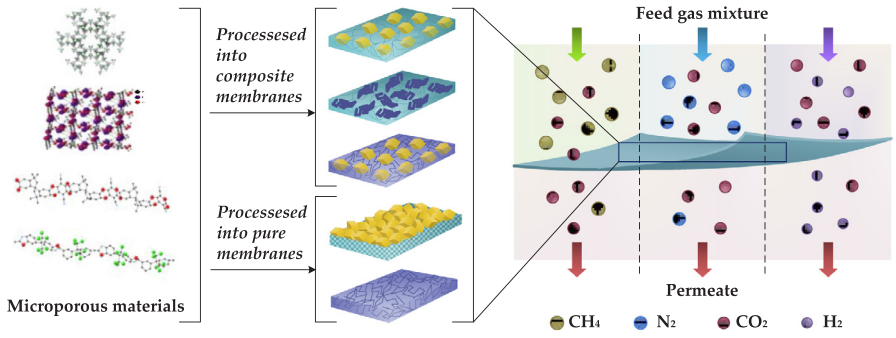
HIGHLIGHTS:

- Criteria in selecting microporous meterials for CO_2 separation membrane is given.
- The membrane fabrication based on MOFs, POFs, TR polymers, and PIMs is summarized.
- The membrane performance in CO_2 separation under differents conditions is analyzed.
- The challenge and perspective for future development are pointed out.

GRAPHICAL ABSTRACT



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ABSTRACT

Membrane technology has gained great attention as one of the promising strategies for carbon capture and separation. Intended for such application, membrane fabrication from various materials has been attempted. While gas separation membranes based on dense polymeric materials have been long developed, there is a growing interest to use porous materials as the membrane material. This review then focuses on emerging organic-containing microporous materials to be used for the fabrication of membranes that are designed for CO_2 separation. Criteria for selecting the materials are first discussed, including physical and chemical properties, and parameters in membrane fabrication. Membranes based on these materials, such as metal-organic frameworks, porous organic frameworks, and microporous polymers, are then reviewed. Finally, special attention is given to recent advances, challenges, and perspectives in the development of such membranes for carbon capture and separation.

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