



Membranes

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## Advanced Membrane Materials for CO<sub>2</sub> Capture and Separation

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Climate change caused by anthropogenic CO<sub>2</sub> emissions has become a global challenge. The combustion of fossil fuels produces large amounts of CO<sub>2</sub> in flue gas, which are released into the atmosphere. To mitigate CO<sub>2</sub> emissions, it is necessary to capture CO<sub>2</sub> for utilization or sequestration. Membrane-based separation offers an effective approach for CO<sub>2</sub> capture due to its high energy efficiency, small footprint, and simplicity in operation and maintenance. However, advanced membrane material designs are still needed to achieve superior CO<sub>2</sub> separation performance and reduce the cost of carbon capture.

This Special Issue focuses on recent advances in novel and emerging materials for membrane-based carbon capture. Topics include novel membrane materials—such as polymers, metal–organic frameworks, two-dimensional (2D) materials, and mixed-matrix membranes—for various capture schemes, including post-combustion capture, pre-combustion capture, carbon capture from industrial sources, and direct air capture. It also covers techno-economic analyses, as well as the preparation and characterization of thin-film composite membranes and hollow fiber membranes.

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