

Engineering Nanoporous Materials For Energy-Efficient Carbon Dioxide Capture

Tae-Hyun Bae[†]

School of Chemical & Biomedical Engineering and Singapore Membrane Technology
Center, Nanyang Technological University
(thbae@ntu.edu.sg[†])

The development of a cost-effective CO₂ capture system is critical to reducing global CO₂ emissions that have caused climate change. While current CO₂ capture technologies such as amine scrubber are too costly for widespread application, adsorptive carbon capture systems have demonstrated a potential toward reducing cost and improving performance. In my work, various nanoporous materials including zeolites, metal-organic frameworks and amine-appended sorbents were synthesized and evaluated for potential application in post-combustion CO₂ capture. Membrane technology has also been considered as an energy-efficient alternative to current energy-intensive CO₂ separation methods. One way to synthesize high-performance membrane is via incorporation of nanocrystals of a functional porous material into polymer matrix. We have explored various combinations of nanoporous materials and polymers to design mixed-matrix membranes for applications in CO₂ separations.