

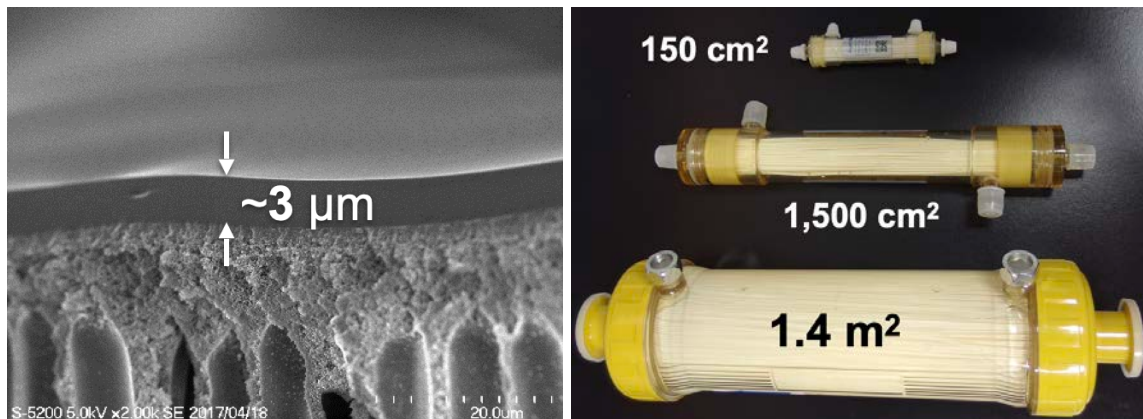
CO₂ capture by polymeric membranes: from bench to demonstration

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Membrane separation holds potential as an alternative technology of liquid amine scrubbing in CO₂ capture, and a number of CO₂ separation membranes with excellent gas transport properties have been developed over the last two decades. However, only a few membranes have reached demonstration level, and CO₂ separation membranes have not been commercialized except from the triacetyl cellulose membranes for natural gas sweetening. There are two major roadblocks for implementation of CO₂ separation membranes: membrane module preparation and demonstration with actual target gas.

In this work, CO₂ separation by membranes over H₂ has been investigated for pre-combustion CO₂ capture at an integrated gasification combined cycle plant. It is demonstrated that amine-containing polymeric membranes are suitable for the separation, and a required CO₂ permeability has been obtained. Herein, a new amine family is introduced to improve the CO₂ selectivity. Besides the pre-combustion CO₂ capture, we have been looking for other opportunities of CO₂ separation because the membrane materials we developed display very high CO₂ separation performance. Lastly, facile preparation of a hollow fiber membrane module was established for demonstration. Some recent updates will be shown in this presentation.



A cross sectional SEM image of the CO₂-selective layer on a hollow fiber (left) and the hollow fiber membrane modules developed (numbers denote effective membrane area.)