Carbon Molecular Sieve Membranes Based on a Polyimide of Intrinsic Microporosity Precursor

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Carbon molecular sieve (CMS) membranes are microporous amorphous structures that are able to precisely separate gas mixtures at a molecular level and simultaneously possess very high thermal, chemical, and (when adequately supported) mechanical stability. The combination of those advantages makes CMS membranes promising candidates to tackle difficult, energy-intensive separations such as natural gas purification or treatment of some high value petrochemical streams. Successful implementation of CMS membranes into large-scale chemical processes requires, however, fabrication of defect-free and sufficiently permeable membranes.

In this poster, we will present a detailed study on fabrication of thin-film composite CMS membranes based on a polyimide of intrinsic microporosity (PIM-PI) precursor and supported by cost-effective stainless steel tubular supports[1]. The chosen PIM-PI CMS precursor is unique because it undergoes two micropore evolution events: thermal rearrangement (400 – 450 °C) and pyrolysis (>600 °C). As a consequence, the resulting CMS membranes possess high gas permeances and moderate/high selectivities despite avoidance of excessively thin selective layers.

References

1. Ogieglo, W.; Puspasari, T.; Alabdulaaly, A.; Nga Nguyen, T. P.; Lai, Z.; Pinnau, I., Gas separation performance and physical aging of tubular thin-film composite carbon molecular sieve membranes based on a polyimide of intrinsic microporosity precursor. *Journal of Membrane Science* **2022**.