

Sorption Enhanced Mixed-Matrix Membranes by Metal-Organic Polyhedra for CO₂ SeparationSohail Muhammad^{1,2}, 안희성³, 윤양노⁴, Shah Syed Fawad Ali^{4,2}, 박영철⁴, 이종석³, 김현욱^{4,2,†}¹Korean Institute of Energy Research; ²University of Science and Technology; ³서강대학교; ⁴한국에너지기술연구원(hyunuk@kier.re.kr[†])

Polyethylene glycol (PEG) based thin film composite membranes have high gas permeability, but moderate selectivity limits their application for CO₂ separation. Introducing CO₂-phillic fillers in selective layer is a promising way to improve the separation properties. In present study, we have fabricated a thin film composite mixed matrix membrane through atom transfer radical polymerization with [Cu₂(m-bdc)₂(PEO)₃(DMF)₁₂] (EG₃-MOP) nanocages as CO₂-phillic filler molecules. These membranes have been well characterized and subjected to CO₂ separation studies. Due to the excellent compatibility between polymer and MOP, the thin film composite mixed matrix membrane shows enhanced separation properties towards CO₂/N₂/CH₄ gas pairs. Particularly, EG₃-MOP/PEGDMA9 membrane with 5% loading result in 50% and 15% increase selectivity of CO₂/N₂ and CO₂/CH₄ respectively, as compared to pristine composite membrane for single gas measurement.