Highly permeable and selective thermally rearranged (TR) membranes for advanced gas separation

우경택[1], 김승주[2], 한상훈[2], 이영무[2,1,*]
[1]한양대학교 에너지공학과; [2]한양대학교 화학공학과
(ymlee@hanyang.ac.kr*)

High free volume polymers such as polyacetylene-based polymers and polymers with intrinsic microporosity (PIMs) have recently received much interest for gas separation due to their superior permeation characteristics for small gas penetrants. From commercial and industrial perspectives, high flux membranes with proper selectivity are known to be much advantageous for CO2 separation, the most critical issue to tackle the urgent global warming problem. Pacing with these trends, we reported a novel polymer derived from thermal rearrangement (TR) of ortho-functional polyimides (PIOFGs) in our preceding study. TR membranes exhibited extraordinary gas permeation properties surpassing polymeric upper bounds for any binary gas mixtures, and the performance can be controlled by thermal treatment time, temperature and conditions. In addition, the performances can be diversified as including unconverted polyimide domain in the main chain in order to understand and optimize gas permeation properties through picoporous cavities evolved after thermal rearrangement. In this study, poly(benzoxazole-co-imide) with various composition were prepared and characterized.