

Facile defect engineering of zeolitic imidazolate frameworks towards enhanced C_3H_6/C_3H_8 separation performance

안희성, 이종석[†]

서강대학교

(jongslee@sogang.ac.kr[†])

I will present a facile and highly scalable synthesis of isostructural ZIF-8 nanoparticles with high processability and rigid network for high C_3H_6/C_3H_8 separation performance via a simple, but effective defect engineering. The addition of amine modulators under the suppressed nuclei concentrations allowed for the formation of new Zn-alkyl amine (Zn-AA) point defects in the resultant ZIF-8 nanoparticle, but suppressed that of typical Zn-OH analogues by fast coordination reaction. The AA-defective ZIF-8 (AZIF8) exhibited a more restricted flipping motion of the organic linkers, resulting in a more rigid framework. Moreover, the Zn-AA coordination improved the dispersibility due to the inductive effect and thereby the compatibility between various polymer matrices and AZIF8s, as confirmed by FIB-SEM and MD simulations. Consequently, the highly concentrated 6FDA-DAM/AZIF8 (50/50 w/w) mixed matrix membrane (MMM) exhibited superior C_3H_6/C_3H_8 separation performance (C_3H_6 permeability of 79.4 Barrer and C_3H_6/C_3H_8 selectivity of 39.8) to most existing MMMs.