Morphology control of zeolite MFI crystals for membrane separation applications

김동훈†
전남대학교 화학공학부
(hetcor99@gmail.com†)

Molecular sieve membrane is a potentially energy-efficient alternative to conventional separation processes. These membranes effectively exclude any molecules larger than their pores and are expected to exhibit very high selectivity. High performance molecular sieve membranes have been sought by searching proper pore structures and controlling microstructures and morphologies, which are favorable to selective molecular transport. Our effort has been focused on zeolite MFI membranes, in order to serve as an improved separation solution for xylene isomers. This crystalline porous silicate material provides high-density uniform pores (~0.55 nm) with high thermal and chemical stabilities, while precise control of microstructures and morphologies is still required to achieve practical separation performances. I will discuss our effort on 1) synthesis of zeolite MFI nanosheets, 2) crystal growth control, and 3) membrane fabrications. A direct synthesis method allows a facile preparation of MFI nanosheets, which enabled a fabrication of thin, oriented, and defect free MFI membranes with unprecedented combinations of high separation factors and high fluxes for xylene isomers.