

Formation Pathway for LTA Zeolite Crystals in an Organic-Inorganic Hybrid System

박민범, 이유림, Anmin Zheng¹, Feng-Shou Xiao², Christopher P. Nicholas³, Gregory J. Lewis³, 홍석봉*

포항공과대학교; ¹Chinese Academy of Science;

²Zhejiang University; ³UOP LLC

(sbhong@postech.ac.kr*)

Despite the great success that zeolites, with channel and cavities of molecular dimensions, have had as industrial adsorbents, ion-exchangers, and catalysts, understanding how they nucleate and grow remains one of the most challenging issues in modern zeolite science. These highly porous crystals are metastable in nature, so their wide structural diversity must rely on the nucleation process which determines the phase selectivity of the crystallization. Here we show that the nucleation of high-silica LTA zeolite in the presence of both organic and inorganic structure-directing agents begins with the formation of lta-cages rather than notably smaller sod- and d4r-cages in the solid phase. We also report that sod-cages are first built around the preorganized lta-cage and d4r-cages in turn constructed by the progressive addition of low molecular weight (alumino)silicate species, which promotes the formation and growth of embryonic LTA zeolite crystals at a higher Si/Al ratio.