

Organic Sulfonium-Directed Synthesis of Silicate Zeolite Analogues

조창범, 이승준¹, 조성준², 유 룡[†]
기초과학연구원; ¹한국과학기술원; ²전남대학교
(rryoo@kaist.ac.kr[†])

Zeolite (*i.e.*, microporous crystalline aluminosilicates) and zeolite analogues are very important materials as adsorbents, molecular sieves, and catalysts in current industries and science. Most zeolites are hydrothermally synthesized using ammonium cations as structure-directing agents (SDAs). Cyclic ethers, metal complexes, and phosphonium cations are also used, although uncommon.

In this contribution, we show that sulfonium cations can be employed as SDAs for the synthesis of silicate zeolite analogues. We synthesized a crystalline silicate zeolite of MEL structure type and three other zeolite analogues composed of germanosilicate frameworks using tributylsulfonium, triphenylsulfonium, tri-*p*-tolylsulfonium. Among them, one germanosilicate was obtained with a new zeolite structure, which was solved using X-ray powder diffraction with the aid of charge-flipping method. The organosulfonium cations are quite stable under the zeolite synthesis condition, and are readily removed from the zeolite framework by air or ozone calcination. We believe that the organosulfonium cations would give a great opportunity to synthesize new zeolite and zeolite analogues.