

Synthesis of Na-Y nanozeolite on glassy carbon by seeding method

Yuni Krisyuningsih, author

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Abstrak

Nanozeolite synthesis was carried out through seeding method, in which the seed was Y zeolite (member of faujasite, FAU, family) using tetraethyl ortho silicate (TEOS) as silica source, and aluminium isopropoxide $\text{Al}[(\text{CH}_3)_2\text{CHO}]_3$ as aluminum source, and tetramethylammoniumhydroxide (TMAOH) as template, under hydrothermal condition. The seeds then were grown on glassy carbon (GC) sheet, that prior being used was modified, using layer by layer (LbL) technique, with three layers of polyelectrolytes:

Poly(diallyldimethylammoniumchloride), PDDA; Poly-4-sodium-styrenesulfonate, PSS; and PDDA again.

The seeded GC sheet then was immersed into colloidal suspension with molar composition as follow:

$14\text{Na}_2\text{O} : \text{Al}_2\text{O}_3 : 10\text{SiO}_2 : 798\text{H}_2\text{O} : 3\text{Na}_2\text{SO}_4$ and the pH of the suspension was kept at 9,0 before was treated hydrothermally for 20 hours at 100°C . The variation on number of seed layers on GC (1, 2 and 3 layers), observed by SEM, showed that homogenous structure and crystal size was obtained with 1 layer of seeds applied on the surface of glassy carbon. When more layers of seeds applied, the agregation and intergrowth of zeolite crystals in the thin film of zeolite became more visible. XRD pattern of the as-prepared thin film zeolite indicates that the zeolite has nanoparticle structure. Furthermore, the pattern of glassy carbon predominated the XRD pattern and covered the pattern of Y-zeolite. On the other hand, XRD of as prepared bulk Y-zeolite shows structure of FAU framework.