

Simple Synthesis of a Highway Interchange Within a Zeolite

Scientific Achievement

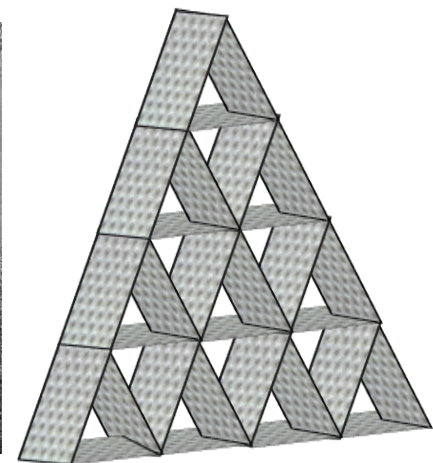
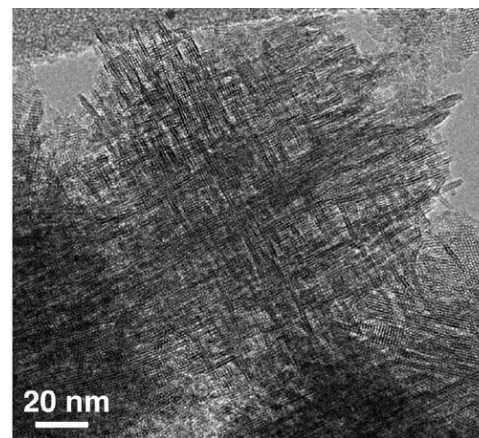
Repetitive branching, a novel and simple synthesis method, produces zeolite crystals with large-pore “highways” that improve transport and utilization of chemicals within the crystal.

Significance and Impact

Zeolite catalysts have important application spanning from petrochemicals to pharmaceuticals to biomass. This synthesis method improves the effectiveness of traditional zeolites with no increase in cost or unwanted change in functionality.

Research Details

- Zeolites derive many of their catalytic properties from pores less than a nanometer in diameter
- The repetitive branching technique stacks thin zeolite sheets at right angles producing a “house of cards” shaped crystal criss-crossed with channels which are 4-14 times larger than the reactive zeolite micropores
- Molecules can quickly pass through these channels to more easily reach the smaller, reactive pores within the crystal where chemicals travel slower
- No complex post-synthesis processing is required



Zhang, X.; Liu, D.; Xu, D.; Asahina, S.; Cychosz, K. A.; Agrawal, K. V.; Al Wahedi, Y.; Bhan, A.; Al Hashimi, S.; Terasaki, O.; Thommes, M.; Tsapatsis, M. *Science*, 2012, 336, 1684-1687.

Work was performed at the University of Minnesota



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