

Periodic mesoporous aluminosilicas with crystalline walls

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Scientific Achievement

The synthesis of periodic mesoporous aluminosilicas with crystalline pore walls was achieved using high pressure conditions.

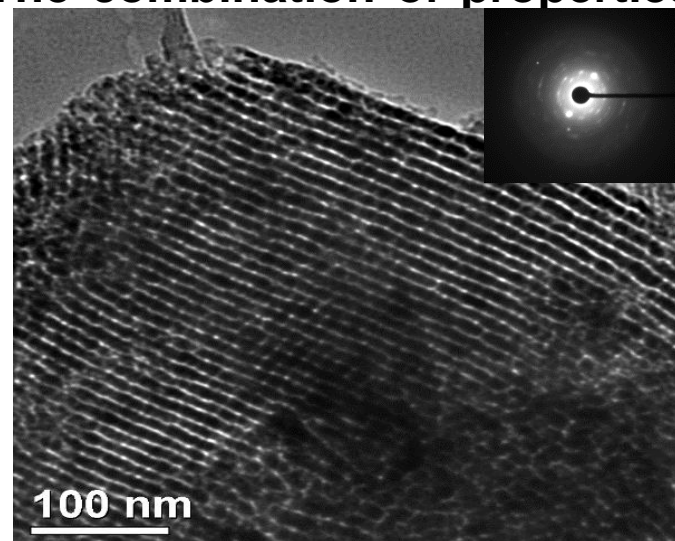
Significance and Impact

Periodic mesoporous silicas with crystalline pore walls have increased hydrothermal stability and potentially higher catalytic activity compared to their amorphous counterparts. In addition, they have better mass transport properties compared to microporous zeolites. The combination of properties is attractive for petroleum cracking applications.

Research Details

- Carbon-filled Al-doped SBA-15 was prepared using a combination of a surfactant-templated self-assembly and a melt-infiltration method.
- The channel walls of the Al-SBA-15 materials were crystallized at 2-4 GPa and temperatures between 550 and 650°C, and the hydrothermal stability of the materials was determined.

TEM image with selected area electron diffraction pattern (inset) of Al-SBA-15 with crystalline pore walls produced at 2 GPa and 650°C.



Mandal, Manik; Manchanda, Amanpreet S.; Liu, Cong; et al.

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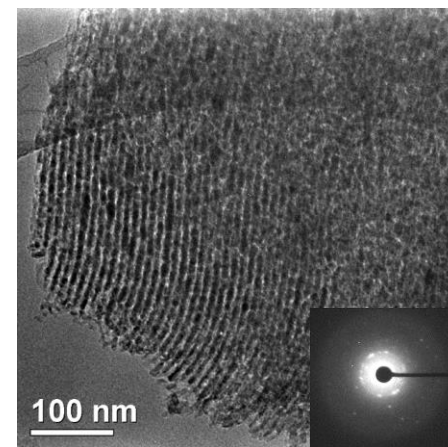
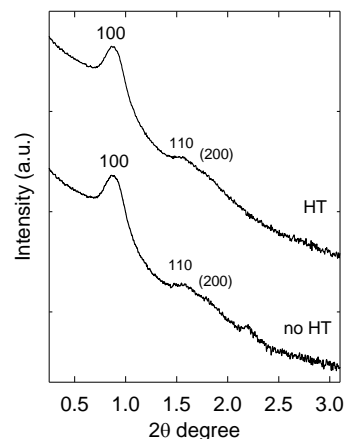
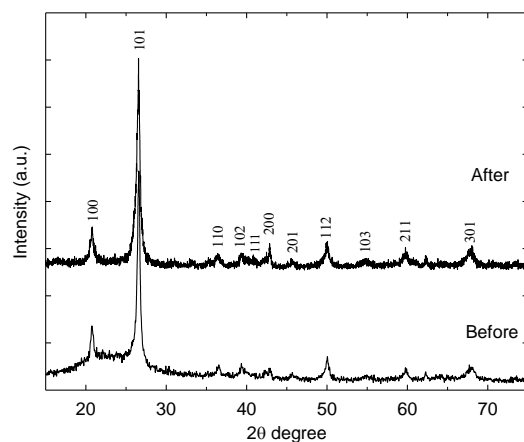
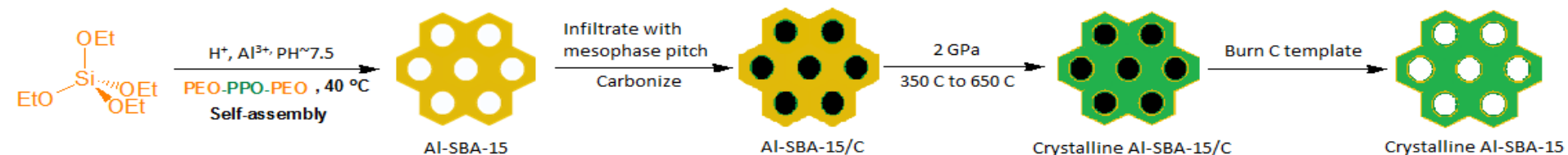
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Synthesis scheme and hydrothermal stability



XRD(left) and SAXS(middle) patterns for crystalline aluminosilica synthesized at 2 GPa and 650 °C before and after treatment in pure steam at 800 °C for 2 hours. TEM(right) image for the material after treatment.

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