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Supplementary Information

Effects of the dissolution alkalinity and self-assembly on ZSM-5-based micro-/mesoporous composites: a study for relationship between porosity, acidity, and catalytic performance

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Synthesis method for conventional Al-MCM-41

Conventional Al-MCM-41 was synthesized by a hydrothermal method. Sodium metasilicate nonahydrate ($Na_2SiO_3 \cdot 9H_2O$, Sinopharm Chemical Reagent Co. Ltd), and sodium aluminate ($NaAlO_2$, Sinopharm Chemical Reagent Co. Ltd), and served as silicon and aluminum source, respectively.

In a typical experiment, 22.8 g $Na_2SiO_3 \cdot 9H_2O$, 0.23 g $NaAlO_2$ together with 150 mL 1.0 mol/L NaOH aqueous solution were mixed and stirred at 353 K for 1 hour. The pH was then adjusted to 10.5 by titration with 2.0 mol/L H_2SO_4. The slurry was then transferred to a Teflon-lined stainless steel autoclave and treated at 110 ºC for 24 h for self-assembly of the samples. Finally, the slurry was filtered and washed with deionized water, dried in an oven at 383 K, and subsequently calcined at 823 K for 6 h.

Al-MCM-41 was ion-exchanged with 0.5 mol/L ammonium chloride at 353K for 1h and such treatment was repeated three times. The samples were then calcined at 823 K for 4 h.

Synthesis method for Al-MCM-41-like mesostructures

Al-MCM-41-like mesostructures were synthesized by a hydrothermal method. The parent zeolite was commercial H form ZSM-5 with SiO_2/Al_2O_3 mass ratio = 28 (Nankai Catalyst Company). Typically, (5.000±0.005) g ZSM-5 was first mixed with a series of aqueous solutions containing select concentrations of NaOH (C_{NaOH} = 0.4, 0.6, and 1.0 mol/L). Vigorous agitation of the solution occurred at 353 K for 1 h and then the liquid in the slurry was filtered. (4.500±0.005) g CTAB that was dissolved in 60 mL of deionized H_2O and then added to the dissolution system. The pH was then adjusted to 10.5 by addition of 2.0 mol/L sulphuric acid solution. The slurry was then transferred into a Teflon-lined stainless steel autoclave for self-assembly at 383 K for 24 h. The solid product was filtered and washed with excess deionized water, dried in an oven at 383 K, and subsequently calcined at 823 K for 6 h.

Al-MCM-41-like mesostructures were ion-exchanged with 0.5 mol/L ammonium chloride at 353K for 1h and such treatment was repeated three times. The samples were then calcined at 823 K for 4 h.

Synthesis method for desilicated ZSM-5

Desilicated ZSM-5 was synthesized by alkali dissolution. In a typical experiment, (5.000±0.005) g commercial ZSM-5 (SiO_2/Al_2O_3 = 28), and 150 mL 1.0 mol/L NaOH aqueous solution was mixed and stirred at 353 K for 1 hour. The solid in the slurry was filtered and washed with deionized water, and subsequently dried in an oven at 383 K. This sample was denoted as AT-0.4.

Al-MCM-41 was ion-exchanged with 0.5 mol/L ammonium chloride at 353K for 1h and such treatment was repeated three times. The samples were then calcined at 823 K for 4 h.

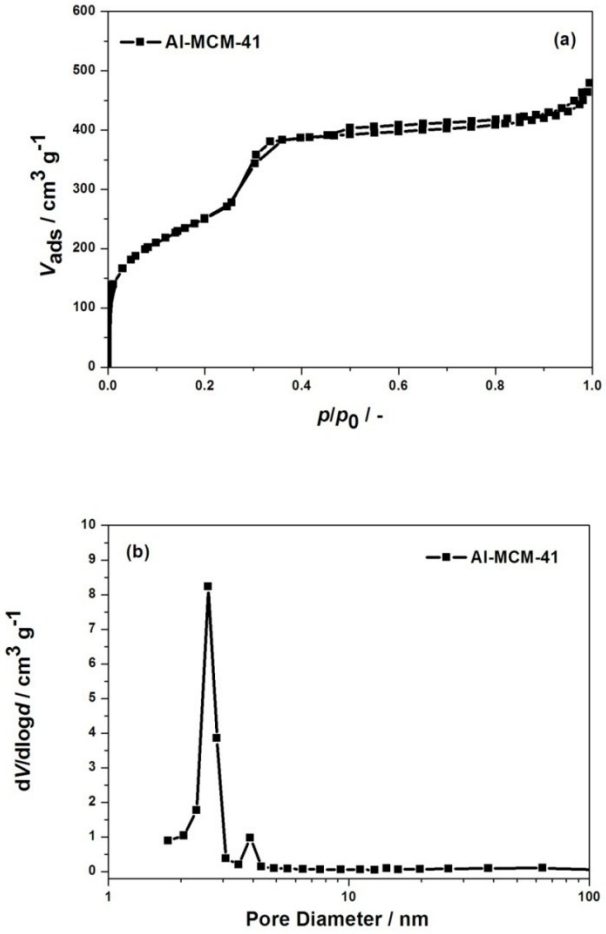
Tests of silica-alumina ratio in the Al-MCM-41-like mesostructures

In order to detect the silica-to-alumina ratio (SiO_2/Al_2O_3) in the Al-MCM-41-like mesostructures, Al-MCM-41-like mesostructures and conventional Al-MCM-41 mesoporous material were characterized by an X-ray fluorescence (XRF) analyzer. (PAN analytical Axios-Petro)

Figures Captions:

Figure S1 Nitrogen adsorption-desorption isotherm (a) and pore width distribution calculated from the BJH desorption branch (b) of Al-MCM-41

Figure S2 SEM (A) and TEM (B) images of Al-MCM-41



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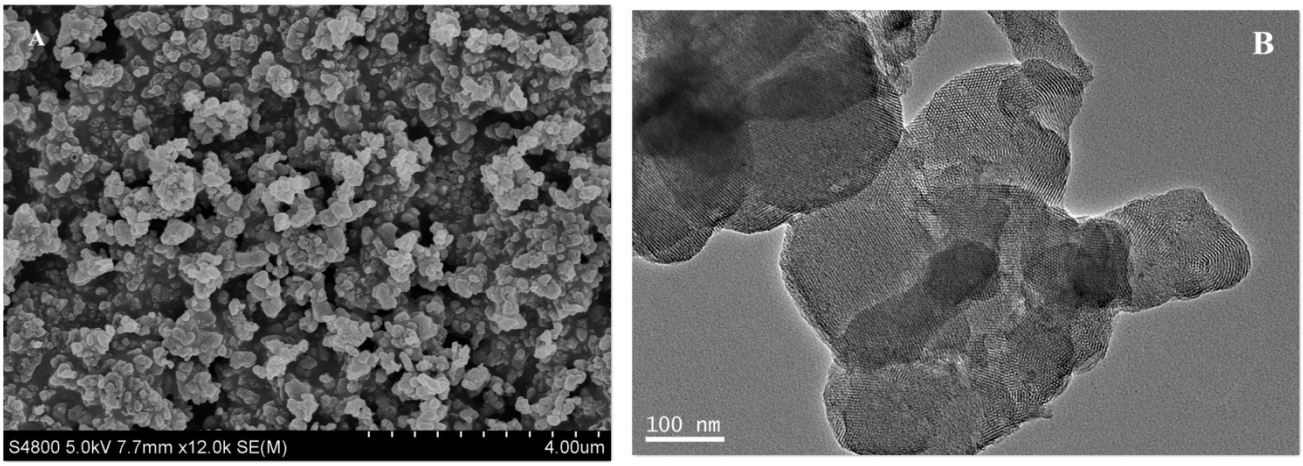

Figure S2 SEM (A) and TEM (B) images of Al-MCM-41

Table Captions:

Table S Elemental analysis of parent ZSM-5 and MCM-41 samples synthesized from the filtrate after alkali dissolution

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Sample	$n(SiO_2):n(Al_2O_3)$ / -
ZSM-5	**28**
MMZ-0.4	**133**
MMZ-0.6	**122**
MMZ-1.0	**71**