Electronic Supplementary Material (ESI) for Catalysis Science & Technology.




**Supporting Information**

**for**

# Small-pore molecular sieves SAPO-57 and SAPO-59: synthesis, characterization, and catalytic properties in methanol-to-olefins conversion

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**Table S1** Distributions of acid sites with different degrees of strength in a series of SAPO catalysts determined from deconvolution of the $NH_3$ TPD data

| Material | Relative amount (%) of total acid sites[a] | Relative distribution (%) | | |
|---|---|---|---|---|
| | | Weak acid site (250 - 280 °C)[b] | Intermediate acid site (320 - 370 °C)[b] | Strong acid site (400 - 450 °C)[b] |
| H-SAPO-57(*l*) | 4.78 | 45 | 37 | 18 |
| H-SAPO-57(*h*) | 4.59 | 48 | 32 | 20 |
| H-SAPO-59(*l*) | 1.00 | 57 | 24 | 19 |
| H-SAPO-59(*h*) | 2.80 | 43 | 33 | 24 |
| H-SAPO-34 | 3.09 | 12 | 41 | 47 |
| H-SAPO-35 | 3.84 | 15 | 42 | 43 |

[a] Reported relative to the total area of $NH_3$ desorption peaks from H-SAPO-59(*l*). [b] Temperature range of the desorption peak maxima corresponding to the respective acid sites determined from deconvolution of the $NH_3$ TPD profiles.

## Figure Captions

**Fig. S1** Powder XRD patterns and SEM images of the as-made form of (a) SAPO-34 and (b) SAPO-35 molecular sieves synthesized in this work.

**Fig. S2** $^{27}$Al MAS NMR spectra of the as-made (left) and proton (right) forms of (a) SAPO-57(*l*), (b) SAPO-57(*h*), (c) SAPO-59(*l*), and (d) SAPO-59(*h*).

**Fig. S3** $^{31}$P MAS NMR spectra of the as-made (left) and proton (right) forms of (a) SAPO-57(*l*), (b) SAPO-57(*h*), (c) SAPO-59(*l*), and (d) SAPO-59(*h*).

**Fig. S4** Powder XRD patterns of (a) H-SAPO-57(*l*), (b) H-SAPO-57(*h*), (c) H-SAPO-59(*l*), and (d) H-SAPO-59(*h*) after MTO at 350 °C and 0.67 $h^{-1}$ WHSV for 600 min on stream.

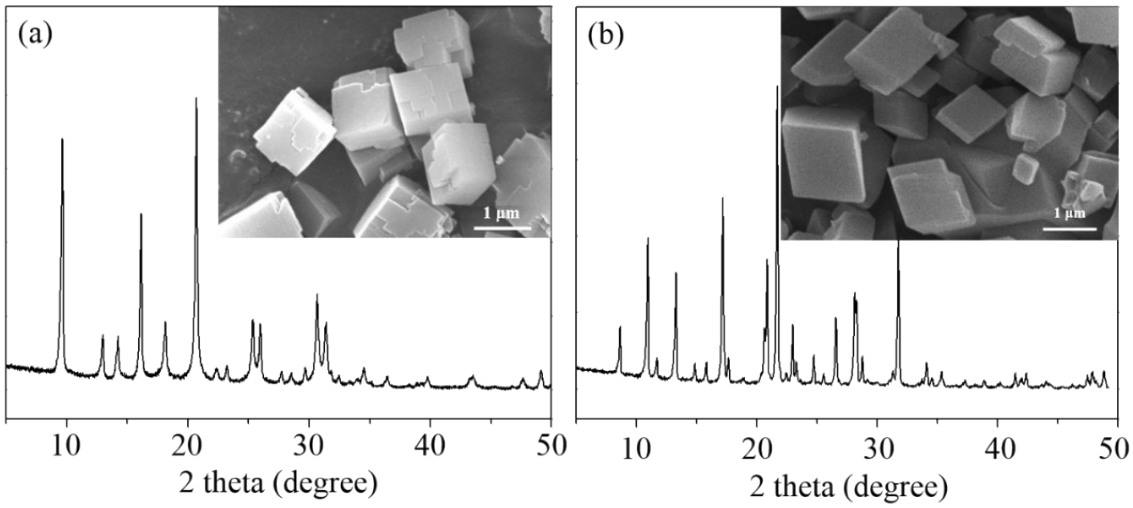
(a)
1 μm
10
20
30
40
50
2 theta (degree)
(b)
1 μm
10
20
30
40
50
2 theta (degree)

Fig. S1

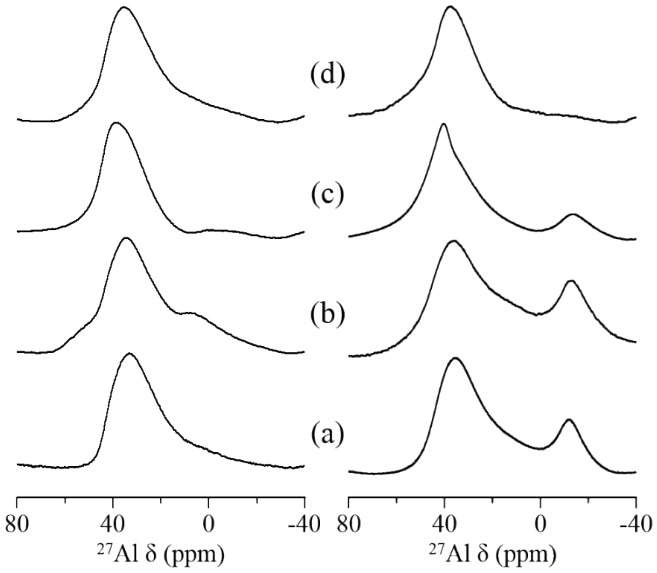


Fig. S2

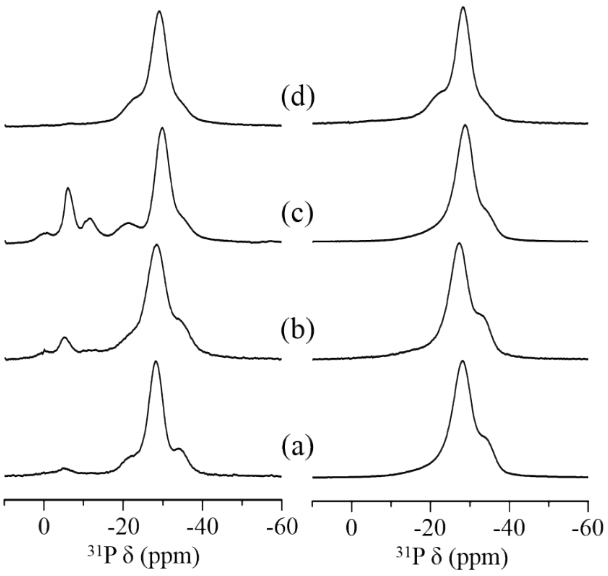


Fig. S3

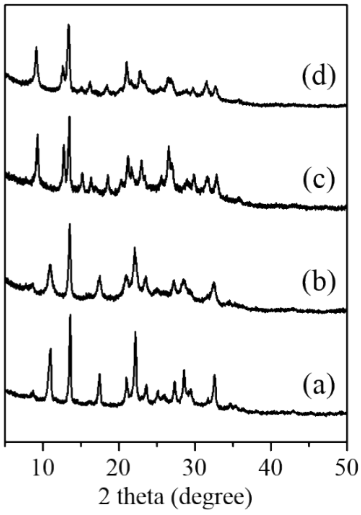


Fig. S4