Electronic Supplementary Information

Dual template-directed synthesis of SAPO-34 nanosheet assemblies with improved stability in the methanol to olefins reaction

Chan Wang,[a,b,c] Miao Yang,[a,b] Peng Tian,[a,b] Shutao Xu,[a,b] Yue Yang,[a,b] Dehua Wang,[a,b,c] Yangyang Yuan,[a,b,c] and Zhongmin Liu*[a,b]

[a] *Dalian National Laboratory for Clean Energy, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian, P. R. China.*
[b] *National Engineering Laboratory for Methanol to Olefins, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian, P. R. China*
[c] *University of Chinese Academy of Sciences, Beijing, P. R. China*
* *E-mail: liuzm@dicp.ac.cn*

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Synthesis of conventional SAPO-34

Pseudoboehmite, water, phosphoric acid, silica sol, and DEA were mixed in sequence with a gel composition of 2.0 DEA:1.0 Al_2O_3:1.0 P_2O_5:0.55 SiO_2:50 H_2O. The crystallization was conducted in a stainless steel autoclave at 200 ºC for 24 h under rotation. The product was filtrated, washed thoroughly and dried in air. The composition of the product is $Al_{0.480}P_{0.362}Si_{0.158}O_2$. The XRD pattern and SEM image are shown in Fig. S1 and S2.

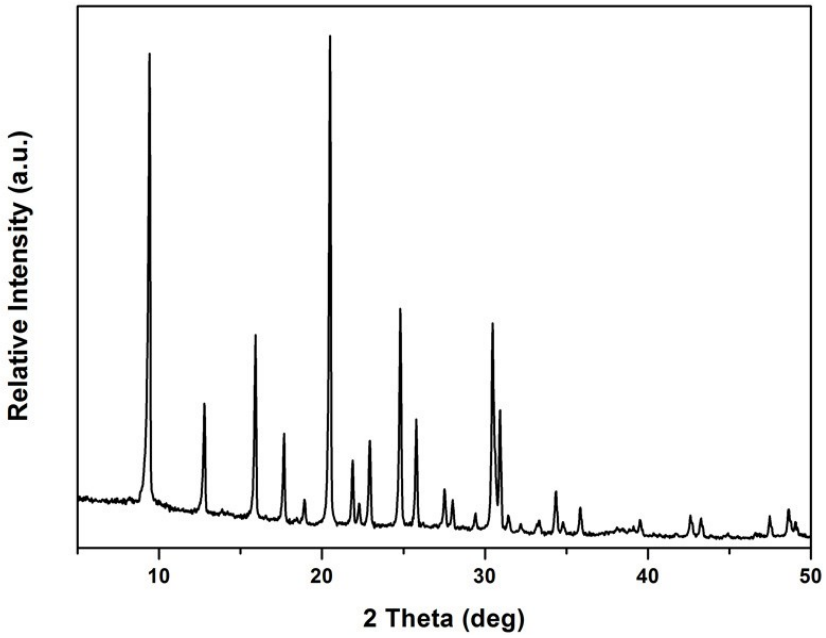

Fig. S1 XRD pattern of as-synthesized conventional SAPO-34.

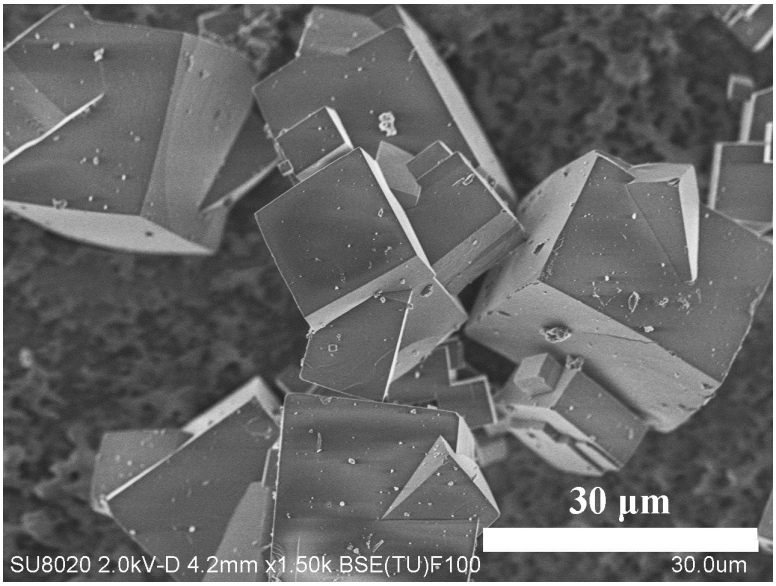

Fig. S2 SEM image of as-synthesized conventional SAPO-34.

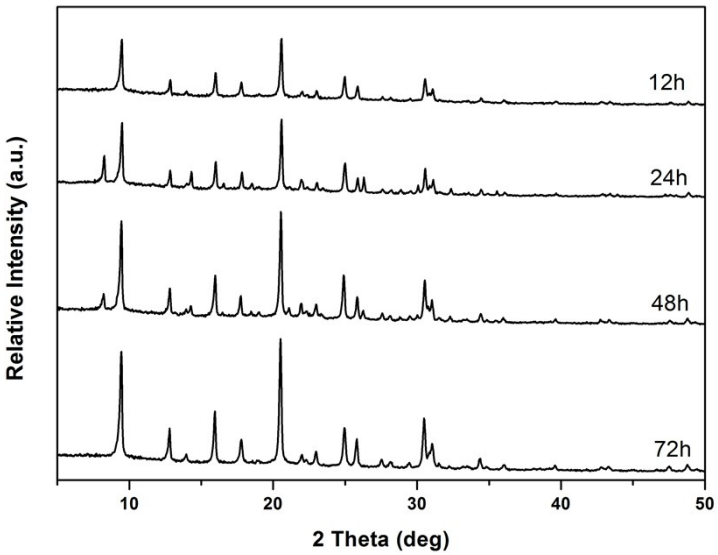

Fig. S3 XRD patterns of samples synthesized with TPOAC/TEOS of 1/3 at different crystallization time.

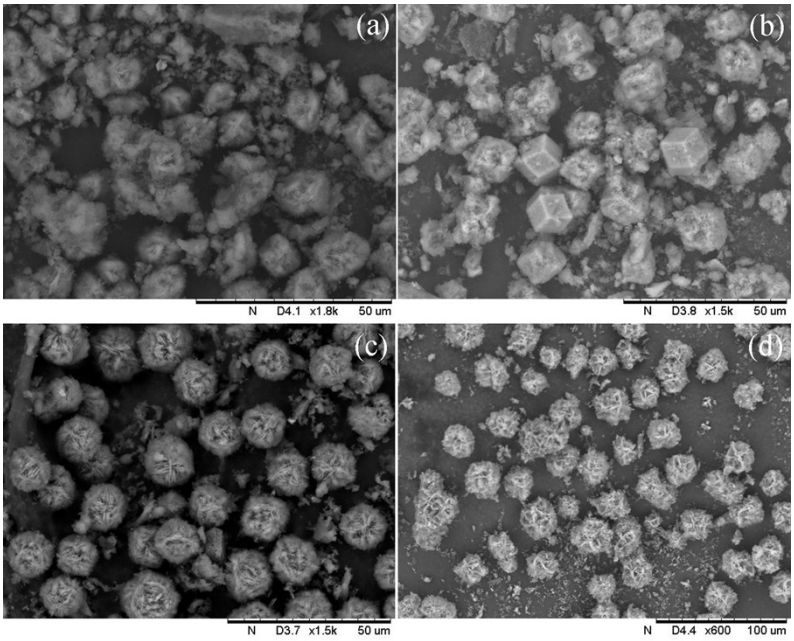

Fig. S4 SEM images of samples synthesized with TPOAC/TEOS of 1/3 at different crystallization times: 12 h (a), 24 h (b), 48 h (c), and 72 h (d).

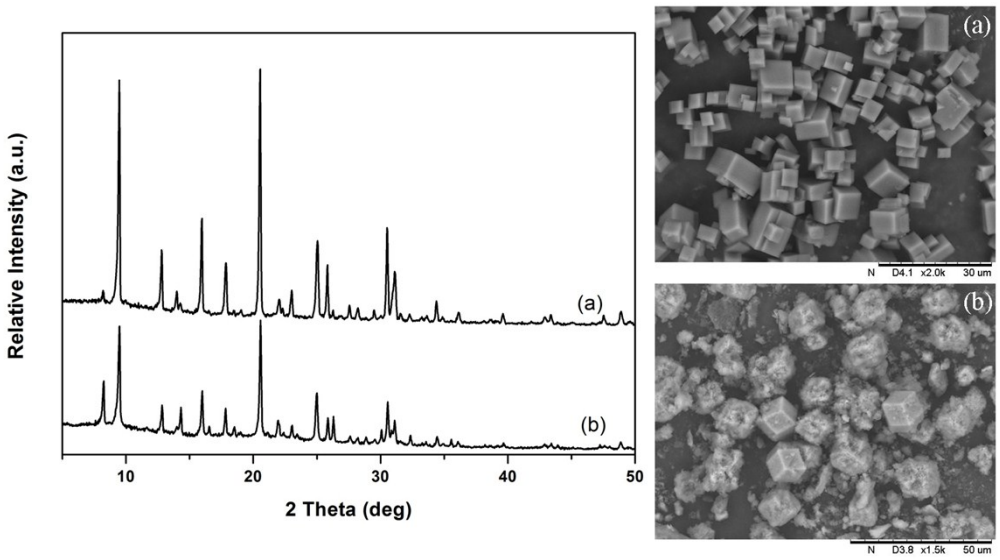

Fig. S5 XRD patterns and SEM images of synthesized samples without (a) and with (b) TPOAC crystallized for 24h.

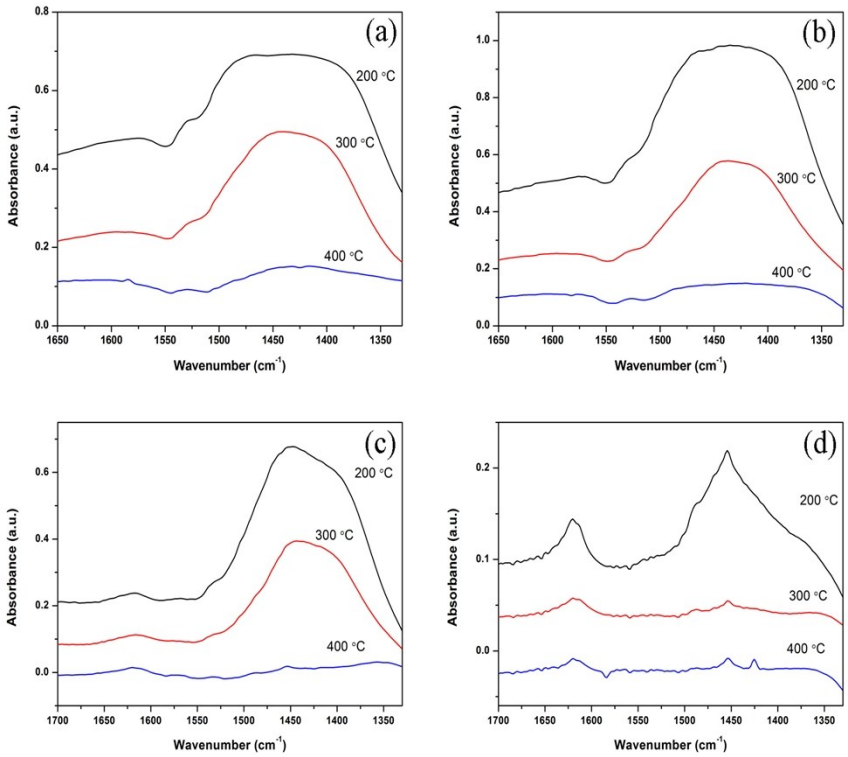

Fig. S6 IR spectra of NH_3 adsorbed on conventional SAPO-34 (a), sample 6 (b), sample 7 (c) and sample 8 (d) at varied temperatures.

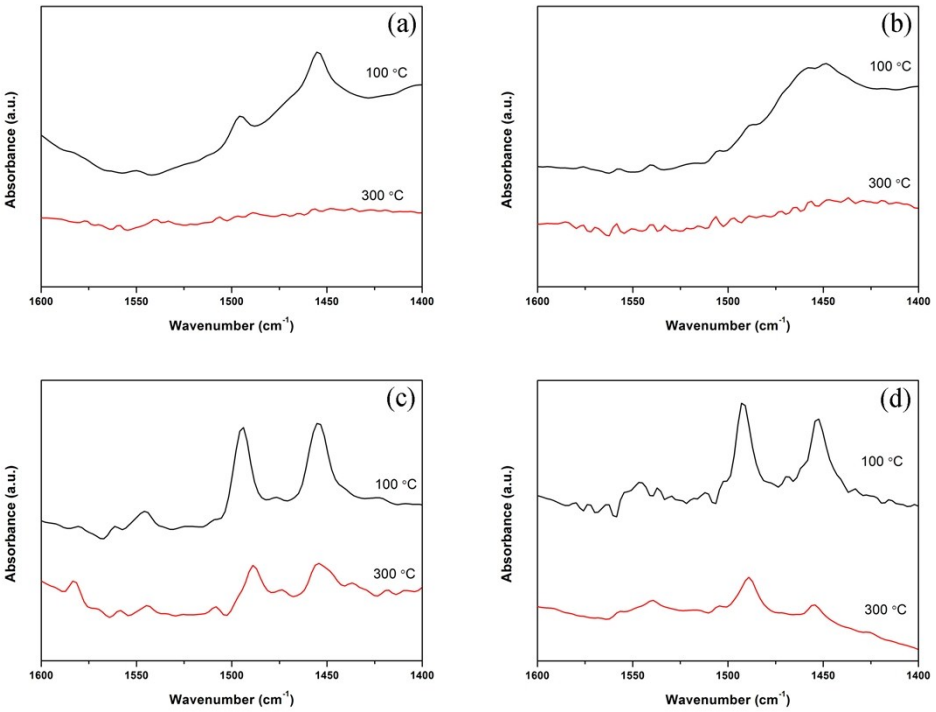

Fig. S7 IR spectra of pyridine adsorbed on conventional SAPO-34 (a), sample 6 (b), sample 7 (c) and sample 8 (d) at varied temperatures.

The bands at 1545 and 1455 cm^{-1} can be assigned to pyridine adsorbed on Brönsted and Lewis acid sites, respectively[1]. Comparing the spectra of the four samples at 100 °C and 300 °C, it is concluded that the strength of acid sites on the external surface of sample 7 and 8 is larger than conventional SAPO-34 and sample 6.

1. R. B. Borade and A. Clearfield, *J. Mol. Catal.*, 1994, **88**, 249-266.

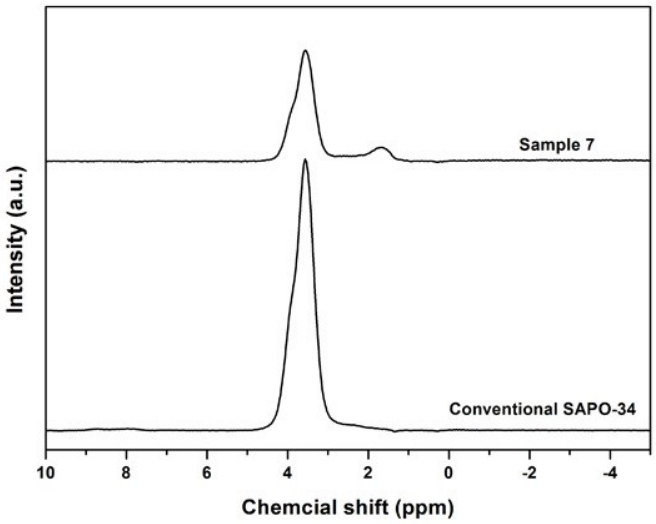

Fig. S8 ^{1}H NMR spectrum of calcined sample 7 and conventional SAPO-34.

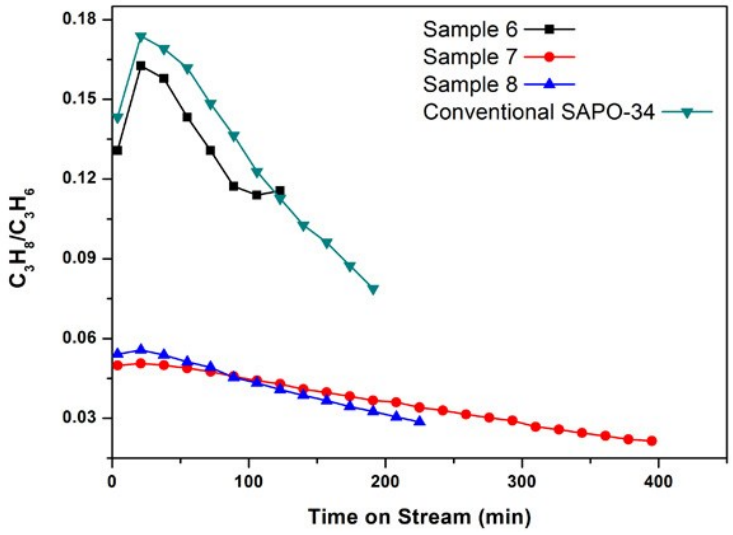

Fig. S9 C_3H_8/C_3H_6 variation with time-on-stream over sample 6, 7, 8 and conventional SAPO-34.