# Electronic Supplementary Information (ESI)

# Synthesis of nano-sized SAPO-34 with facile micron-meter seeds processing method and their enhanced performance in methanol-to-olefin reactions

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# 1. Supplementary Sample Preparation

**Conventional SAPO-5 (AFI) preparation:** Conventional SAPO-5 molecular sieve was synthesized by hydrothermal synthesis with the gel molar ratio of 1.00TEA: 1.00$Al_2O_3$: 1.00$P_2O_5$: 0.50$SiO_2$: 50.00$H_2O$. The detailed synthesis steps are the same with that of SAPO-34-M preparation except that the silicon source is tetraethylorthosilicate (TEOS) instead of silica sol and the synthesis condition is under static.

**Conventional SAPO-35 (LEV) preparation:** SAPO-35 was hydrothermally synthesized from a gel composition of 1.35hexamethylenimine (HMI):0.6$SiO_2$:1.0 $Al_2O_3$:0.96 $P_2O_5$:55$H_2O$. The detailed synthesis steps are the same with Ref. 1.[1]

**Conventional SAPO-56 (AFX) preparation:** SAPO-56 was hydrothermally synthesized from a gel composition of 2.0 N,N,N',N'-tetramethyl-1,6-hexanediamine (TMHDA):0.6$SiO_2$:0.8 $Al_2O_3$:1.0$P_2O_5$:55$H_2O$. The detailed synthesis steps are the same with Ref. 2.[3]

**Conventional DNL-6 (RHO) preparation:** DNL-6 was hydrothermally synthesized from a gel composition of 2.0diethylamine (DEA):0.4$SiO_2$:1.0$Al_2O_3$:0.8 $P_2O_5$:0.2CTAB:100$H_2O$. The detailed synthesis steps are the same with Ref. 3.[3]

## 2. Supplementary Tables

**Table S1** Percentage composition of silicon species for the synthesized SAPO-34s samples

| Silicon species | Chemical shift /ppm | Percentage composition of silicon species /% | | | |
|---|---|---|---|---|---|
| | | SAPO-34-C | SAPO-34-T-2% | SAPO-34-T-4% | SAPO-34-T-8% |
| Defects | -88 | 10.5 | 4.4 | 3.8 | 3.1 |
| Si4Al | -90 | 16.8 | 27.0 | 34.4 | 37.8 |
| Si3Al1Si | -95 | 10.3 | 10.9 | 8.3 | 7.8 |
| Si2Al2Si | -100 | 10.3 | 9.1 | 7.4 | 7.6 |
| Si1Al3Si | -105 | 17.6 | 15.6 | 15.1 | 14.7 |
| Si4Si | -111 | 34.5 | 33.0 | 30.0 | 29.0 |

## 3. Supplementary Figures

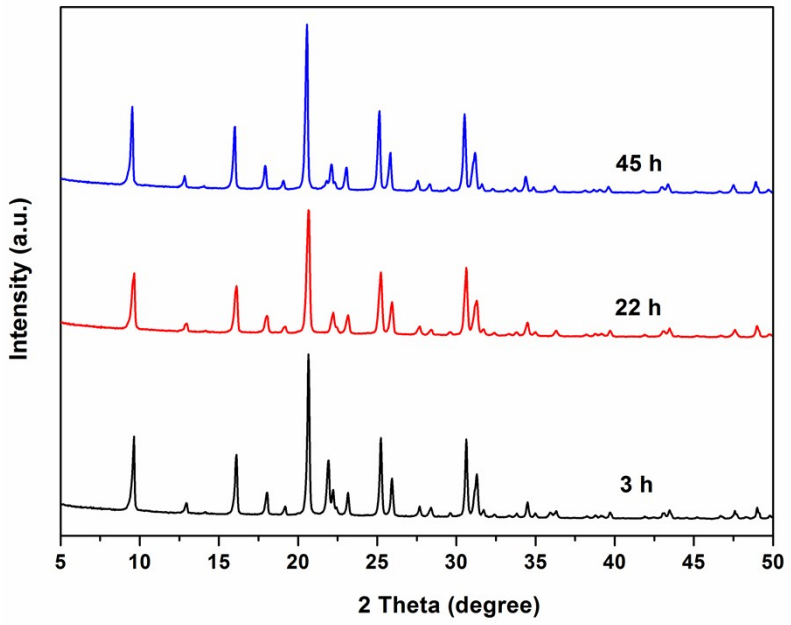


**Fig. S1** XRD patterns of samples prepared with conventional SAPO-5 seed after MOR treatment for different time.

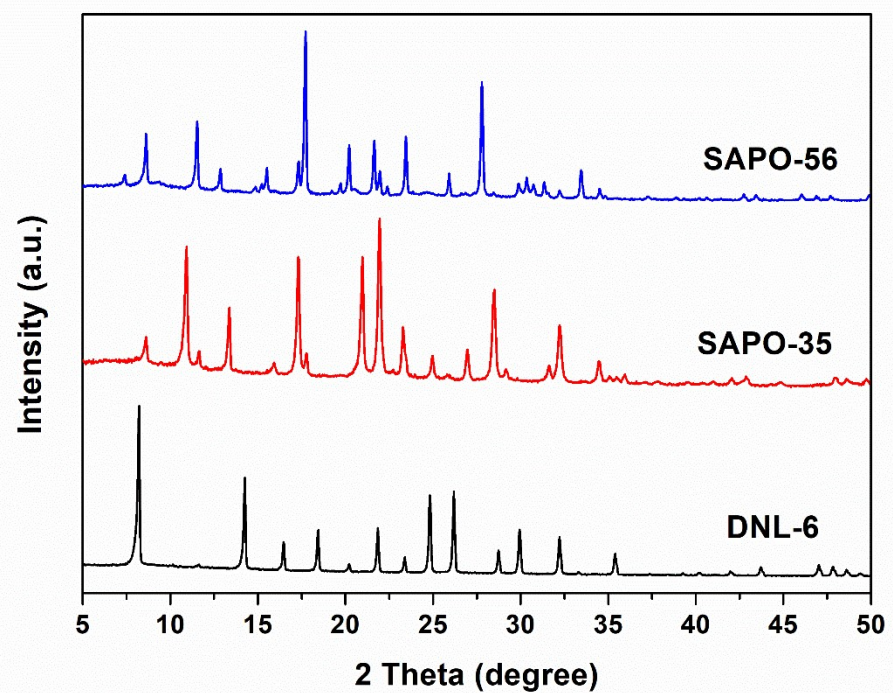


**Fig. S2** XRD patterns of SAPO seeds

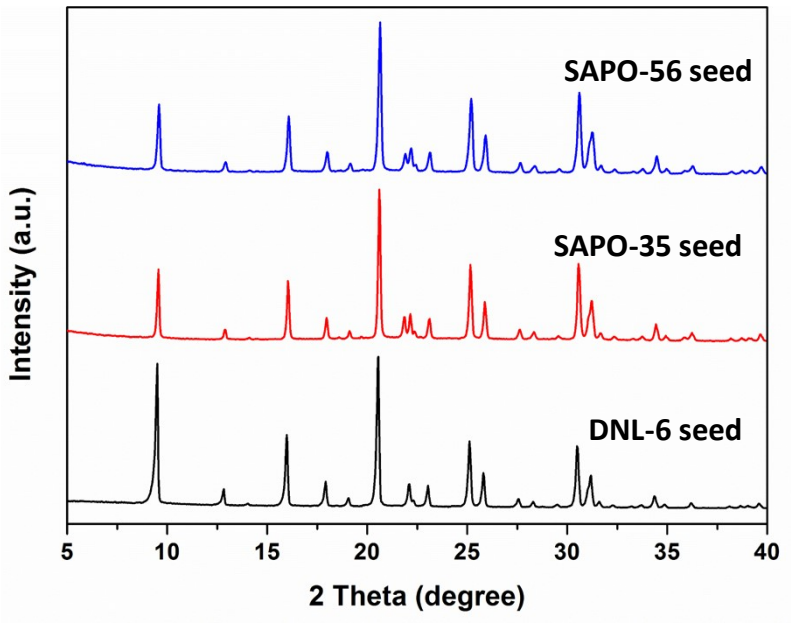


**Fig. S3** XRD patterns of samples prepared conventional DNL-6 (**RHO**), SAPO-35 (**LEV**) and SAPO-56 (**AFX**) seed after MOR treatment for 30 h. The mass fraction of seeds is fixed at 4%.

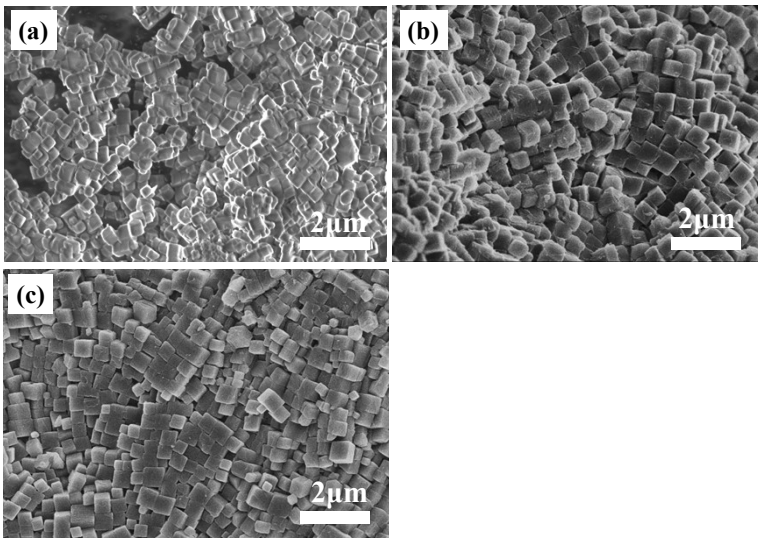


**Fig. S4** SEM images of samples prepared with conventional DNL-6 (**RHO**) seed (a) SAPO-35 (**LEV**) seed (b) and SAPO-56 (**AFX**) seed (c) after MOR treatment for 30 h. The mass fraction of seeds is fixed at 4%.

## 4. References


1. P. Tian, B. Li, S. T. Xu, X. Su, D. H. Wang, L. Zhang, D. Fan, Y. Qi and Z. M. Liu, Investigation of the crystallization process of SAPO-35 and Si distribution in the crystals, *J. Phys. Chem. C*, 2013, **117**, 4048-4056.
2. L. X. P. Tian, Z. M. Liu, C. L. Sun and T. Huang, Synthesis and characterization of SAPO-56, a new member of silicoaluminophosphate, *Chem. J. Chinese Universities*, 2001, **22**, 991-994.
3. X. Su, P. Tian, J. Z. Li, Y. Zhang, S. H. Meng, Y. L. He, D. Fan and Z. M. Liu, Synthesis and characterization of DNL-6, a new silicoaluminophosphate molecular sieve with the RHO framework, *Microporous and Mesoporous Mater.*, 2011, **1**, 911-918.