Supporting information

Embryonic zeolite-assisted synthesis of SSZ-13 with superior efficiency and their excellent catalytic performance

Linying Wang,[a] Dali Zhu,[ab] Juan Wang, [ac] Wenhao Cui,[ab] Jingfeng Han,[a] Bing Li,[a] Dong Fan,[a] Peng Tian,*[a] and Zhongmin Liu*[abc]

[a.] *National Engineering Laboratory for Methanol to Olefins, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian, 116023, China. E-mail: tianpeng@dicp.ac.cn; liuzm@dicp.ac.cn*

[b.] *University of Chinese Academy of Sciences, Beijing 100049, China.*

[c.] *Zhang Dayu School of Chemistry, Dalian University of Technology, Dalian, 116024, China.*

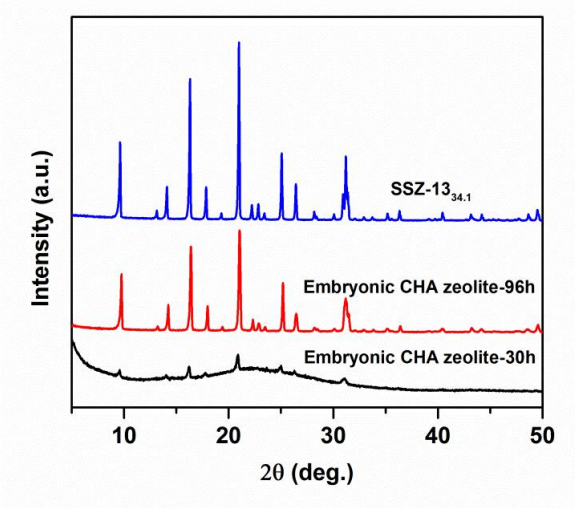

Fig. S1. XRD patterns of the embryonic CHA zeolite after crystallization at 140 °C for 30 h and 96 h. For comparison, the XRD pattern of SSZ-13$_{34.1}$ was also shown in the figure.

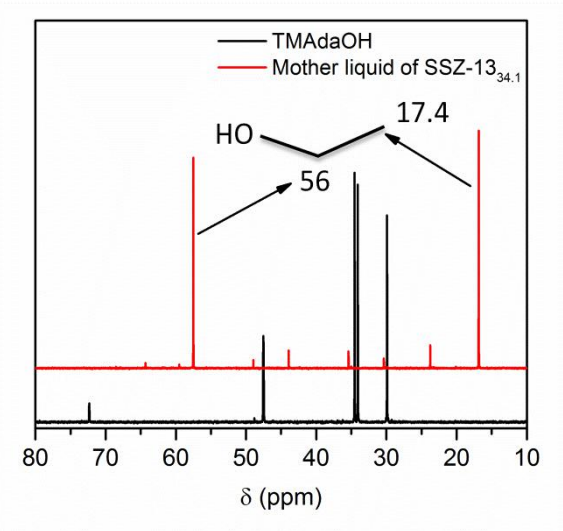

Fig. S2. ^{13}C NMR spectra of commercial TMAdaOH solution and the mother liquid of SSZ-13$_{34.1}$.

No signals assigned to TMAdaOH can be found in the spectrum of the mother liquid. The two strong signals could be ascribed to ethanol coming from the hydroxylation of TEOS, which is used as silicon source for the formation of embryonic zeolites. These results imply that the TMAdaOH is completely consumed during crystallization due to its low dosage.

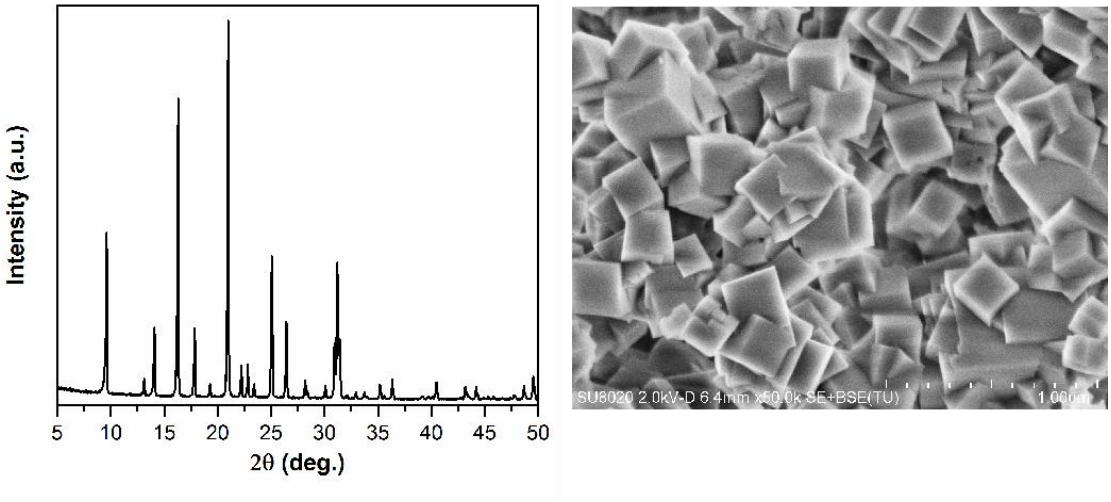

Fig. S3. XRD pattern (left) and SEM image (right) of the solid H-SSZ-13 seeds (SAR=23.9 determined by XRF).

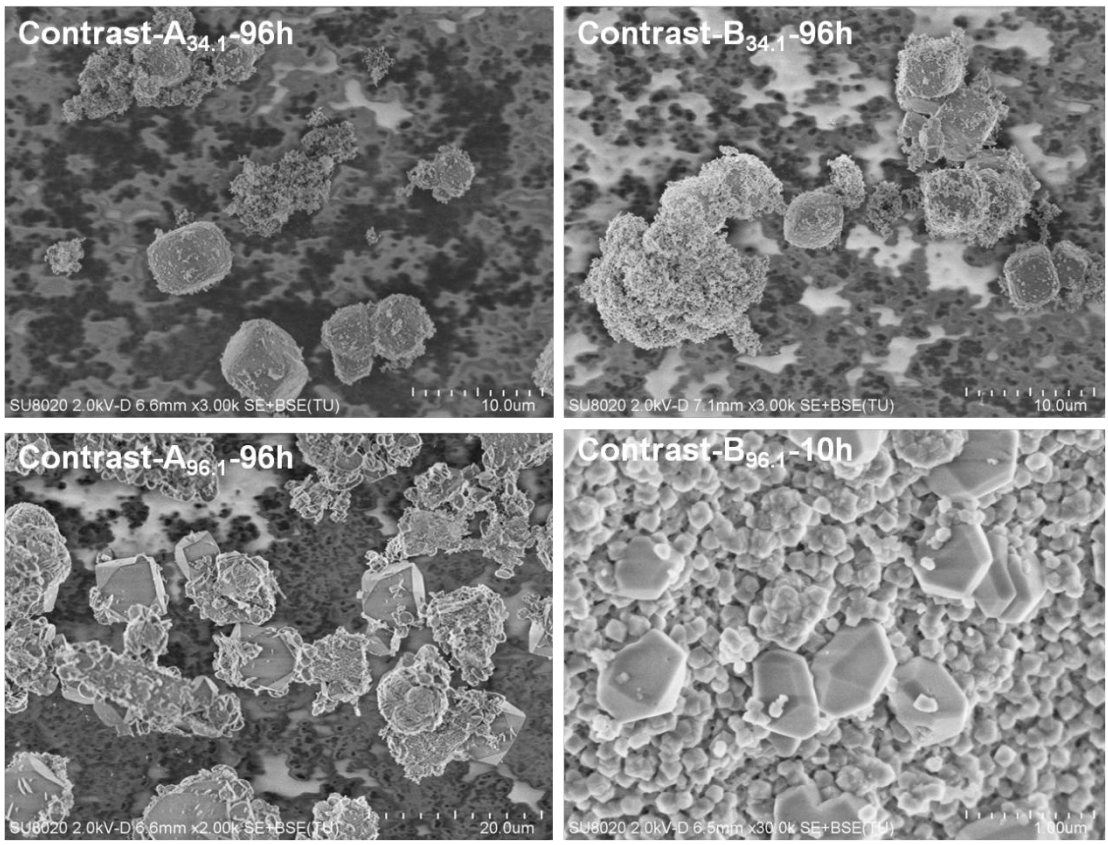

Fig. S4. SEM images of the samples in the contrast experiments

Table S1 Synthesis conditions of the samples in the contrast experiments

Sample	Gel composition				Crystallization condition		Phase
	m[a]	n[a]	x[b]	y[b]	T (°C)	Time (h)	
Contrast $A_{34.1}$-96 h	-	-	36.1	0.040	175	96	CHA+Amor.
Contrast $B_{34.1}$-96 h	38.0	0.044	36.1	0.040	175	96	CHA+Amor.
Contrast $A_{96.1}$-10 h	-	-	116.6	0.050	175	10	Amor.
Contrast $A_{96.1}$-96 h	-	-	116.6	0.050	175	96	CHA+Impurity
Contrast $B_{96.1}$-10 h	190.0	0.055	116.6	0.050	175	10	CHA+Impurity
Contrast $B_{96.1}$-96 h	190.0	0.055	116.6	0.050	175	96	CHA+Impurity

a) Initial gel before the addition of solid seeds (H-SSZ-13): 1 SiO_2: 1/mAl_2O_3: 0.053 Na_2O: n TMAdaOH: 22.7 H_2O.

b) Final gel for the crystallization of SSZ-13: 1 SiO_2: 1/xAl_2O_3:0.048 Na_2O: y TMAdaOH: 20.6 H_2O, which contains the sources from the solid seeds (10% addition, based on SiO_2).