Supplementary Information

Efficient synthesis of aluminosilicate RTH zeolite with good catalytic performances in NH_3-SCR and MTO reactions

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Supplementary Figure Captions

Figure S1 TG-DTA curves of as-synthesized RTH zeolite in the presence of 2,6-methyl-N-methylpyridinium.

Figure S2 (A) XRD patterns and (B) SEM images of RTH zeolite synthesized at (a) 150 °C for 7 h, (b) 180 °C for 3 h and (c) 240 °C for 50 min, respectively.

Figure S3 DRIFT spectra of H-RTH zeolites synthesized at (a) 130 °C, (b) 180 °C and (c) 240 °C, respectively.

Figure S4 (A) XRD patterns and (B) SEM images of zeolite RTH crystallized at 130 °C for (a) 3, (b) 6, (c) 9, (d) 10, (e) 11, (f) 12, (g) 288, and (h) 432 h, respectively.

*: peaks of Y zeolite, ◆: peaks of RTH zeolite.

Figure S5 Dependences of the RTH zeolite crystallinity on crystallization time using 1,2,3-trimethylimidazolium cation as organic template at (a) 180 °C, (b) 165 °C, (c) 150 °C, and (d) 130 °C, respectively.

Figure S6 XRD patterns of (a) as-synthesized RTH zeolite, and RTH zeolites calcined at (b) 550 °C, (c) 700 °C and (d) 850 °C, respectively.

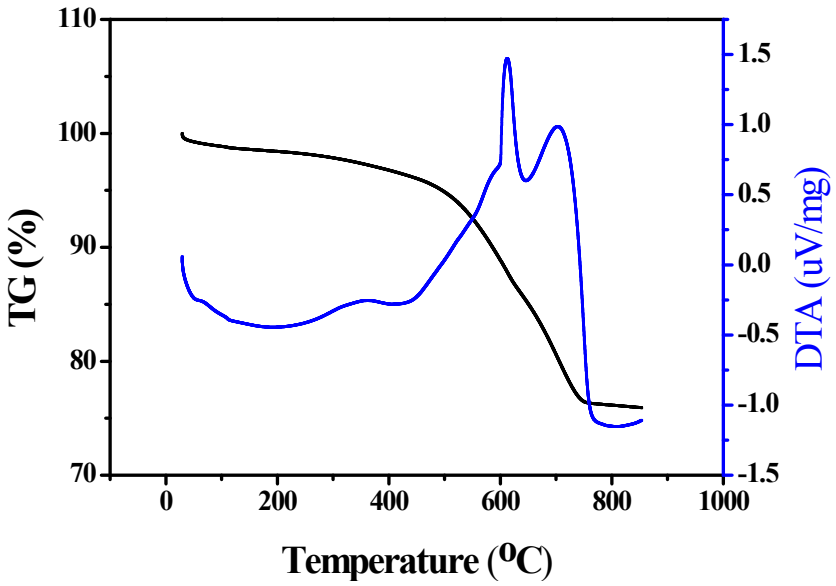
Figure S7 (A) ^{29}Si and (B) ^{27}Al MAS NMR spectra of H-RTH zeolites calcined at (a) 550 °C, (b) 700 °C and (c) 850 °C, respectively.

Figure S8 NH_3-TPD curves of the H-RTH zeolites calcined at (a) 550 °C, (b) 700 °C and (c) 850 °C, respectively.

Figure S9 (a) Methanol conversion (◆) and product selectivities of (b) ethylene with propylene (▲$C_2H_4 + C_3H_6$), (c) ethylene (■C_2H_4), (d) propylene (● C_3H_6), and (e)

hydrocarbons higher than C_4 (▼$\geqslant C_4$) in MTO over (A) H-RTH catalyst (temperature at 400 °C and WHSV at 1.0 h^{-1}), (B) H-RTH catalyst (temperature at 480 °C and WHSV at 2.0 h^{-1}), (C) H-ZSM-5 catalyst (temperature at 400 °C and WHSV at 1.0 h^{-1}), and (D) H-ZSM-5 catalyst (temperature at 480 °C and WHSV at 2.0 h^{-1}).

Table S1 BET surface area and micropore volume of H-RTH zeolite samples with different crystallization temperature and calcination temperature.



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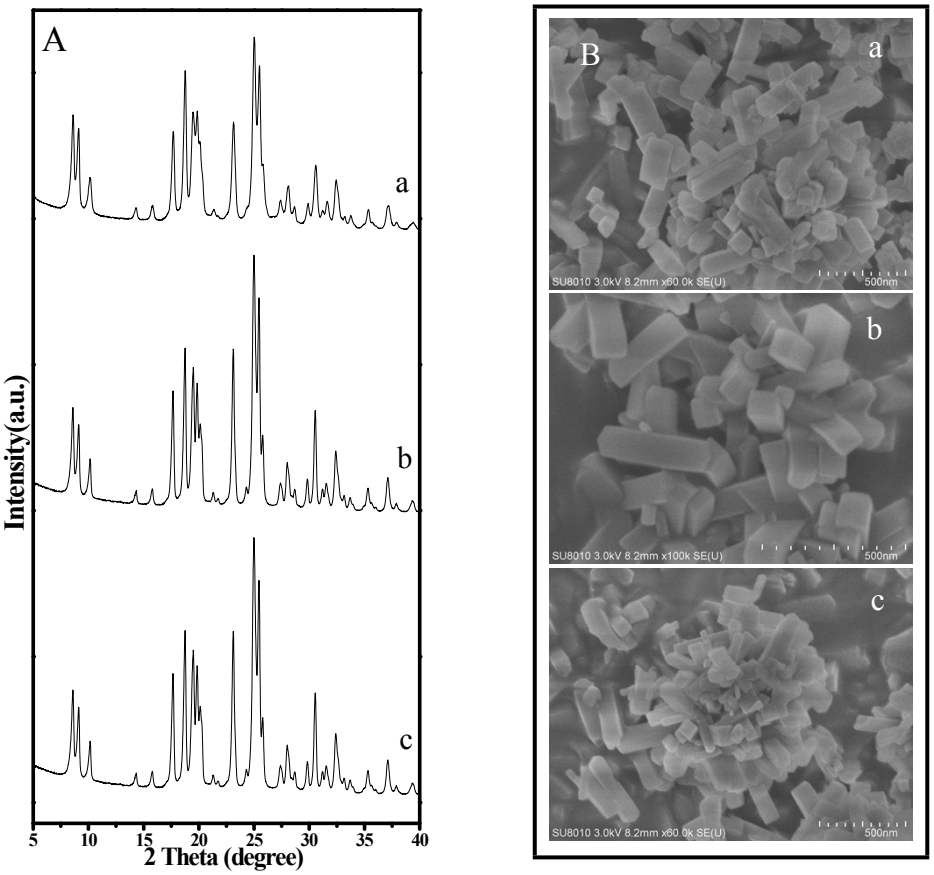


Figure S2 (A) XRD patterns and (B) SEM images of RTH zeolite synthesized at (a) 150 °C for 7 h, (b) 180 °C for 3 h and (c) 240 °C for 50 min, respectively.

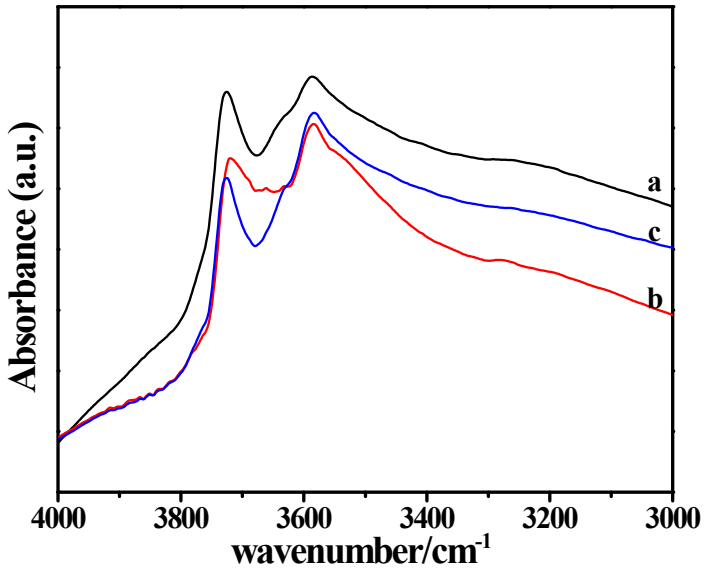
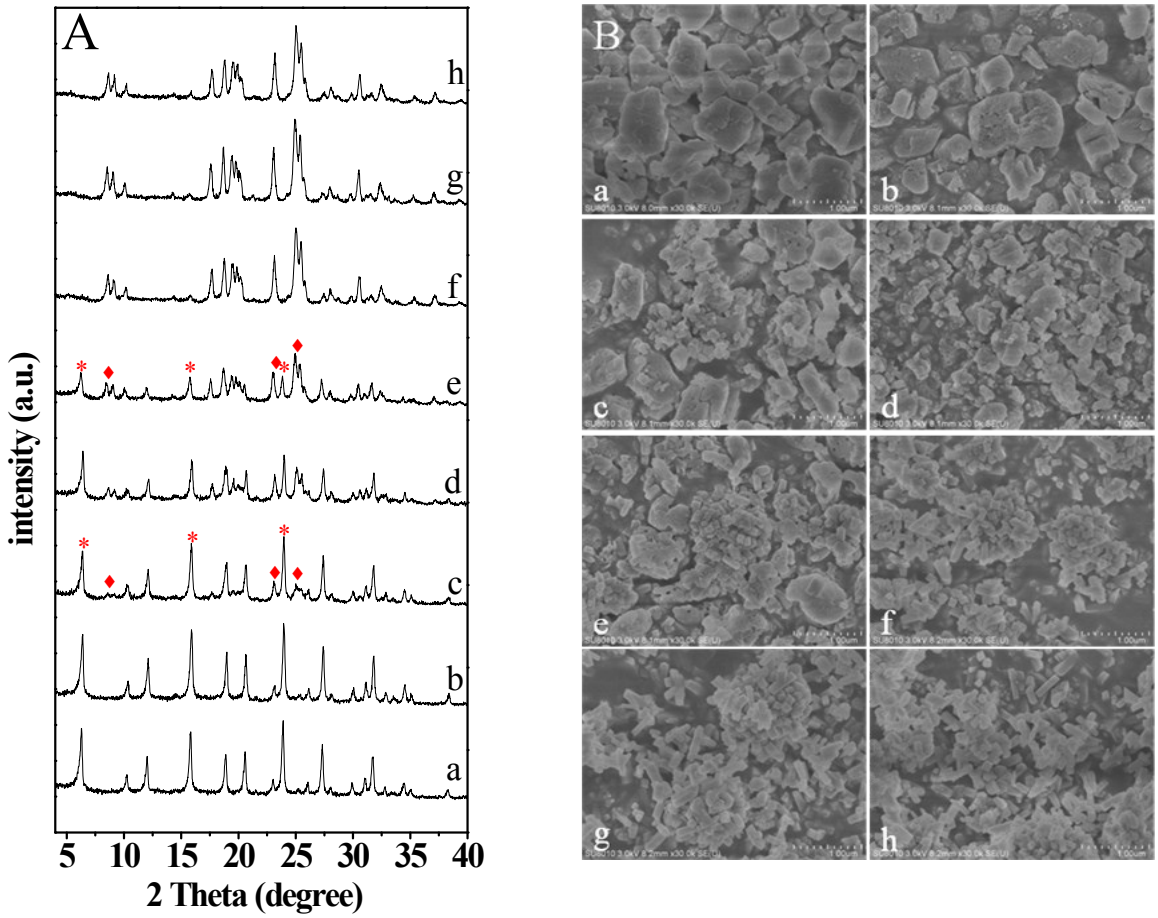


Figure S3 DRIFT spectra of H-RTH zeolites synthesized at (a) 130 °C, (b) 180 °C and (c) 240 °C, respectively.



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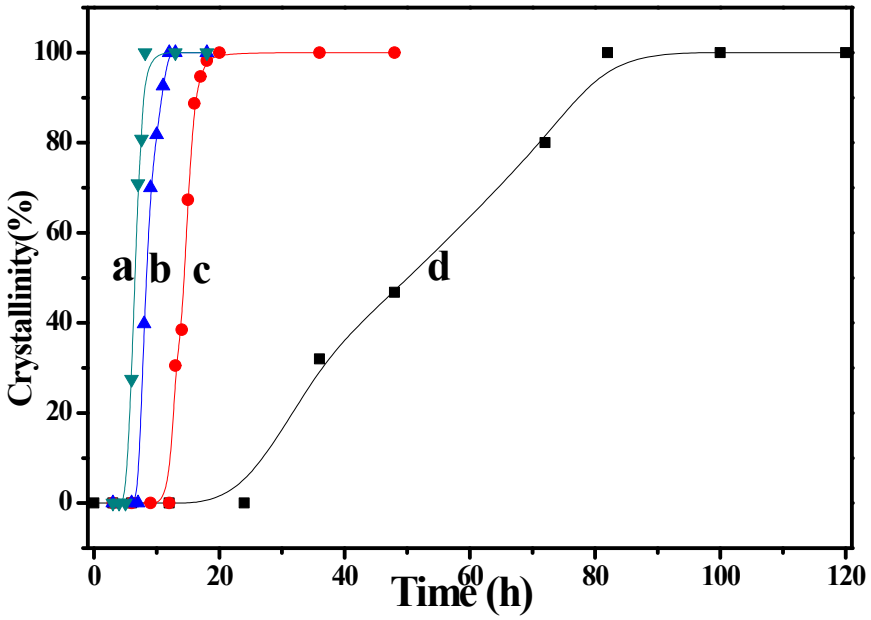
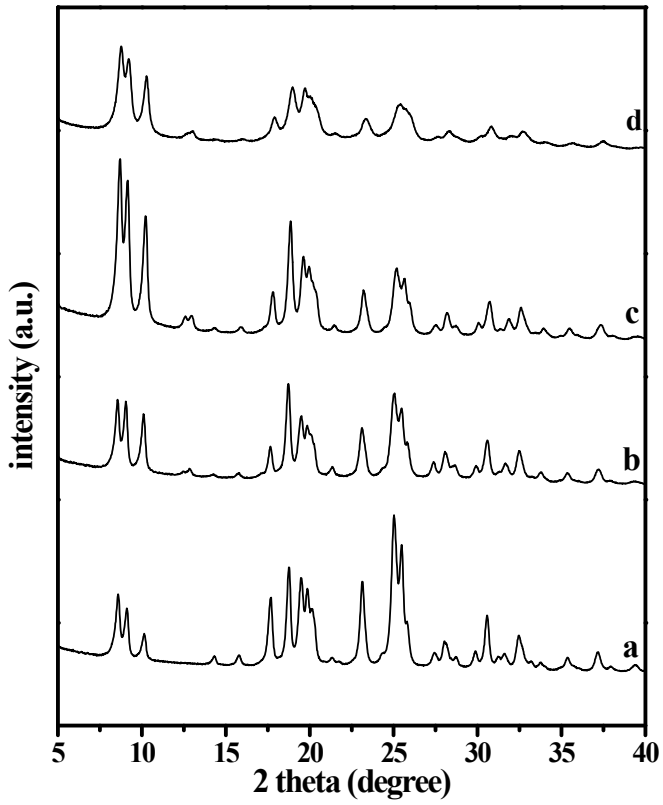


Figure S5 Dependences of the RTH zeolite crystallinity on crystallization time using 1,2,3-trimethylimidazolium cation as organic template at (a) 180 °C, (b) 165 °C, (c) 150 °C, and (d) 130 °C, respectively.



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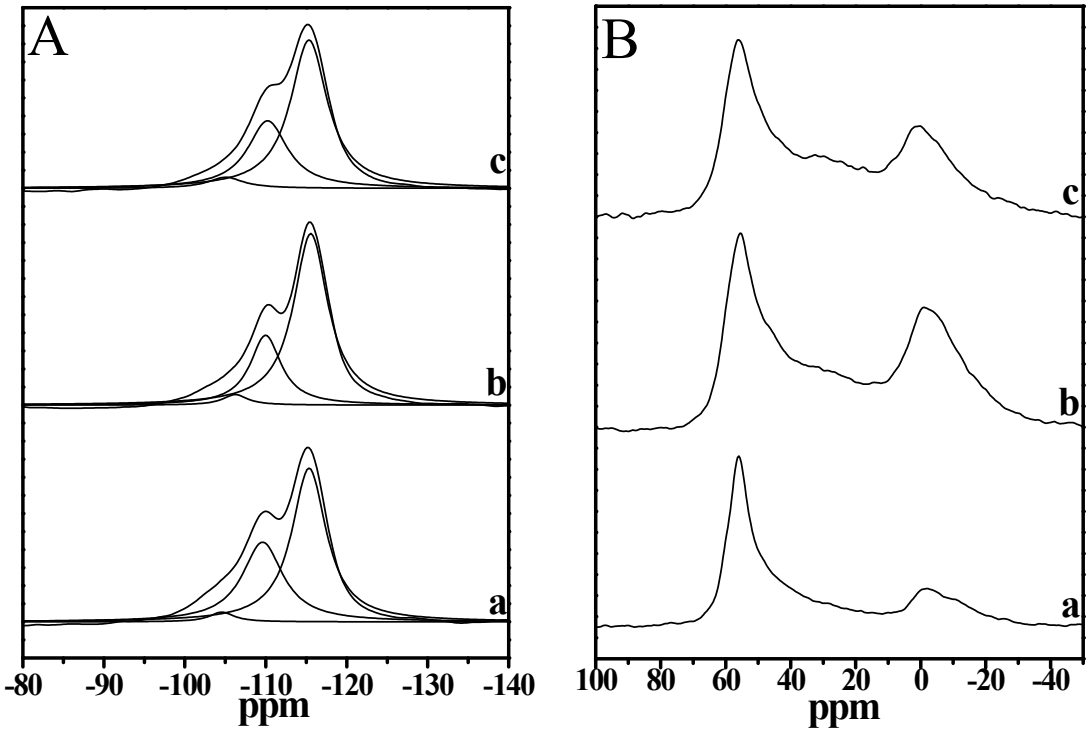

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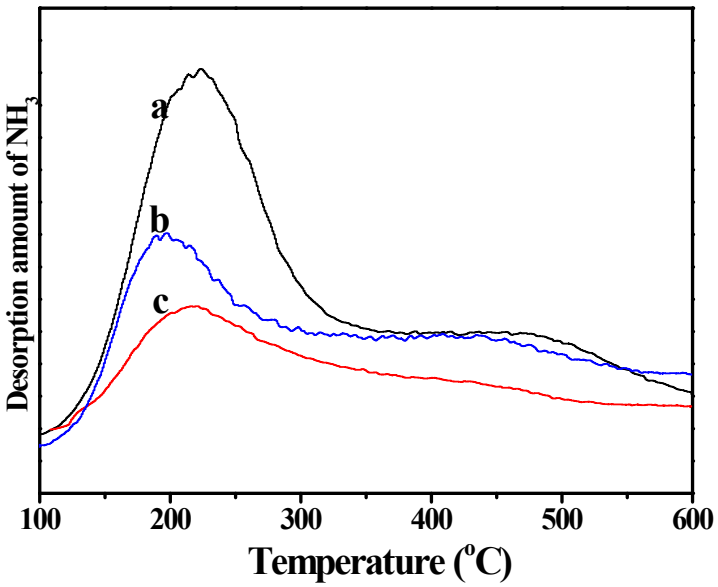

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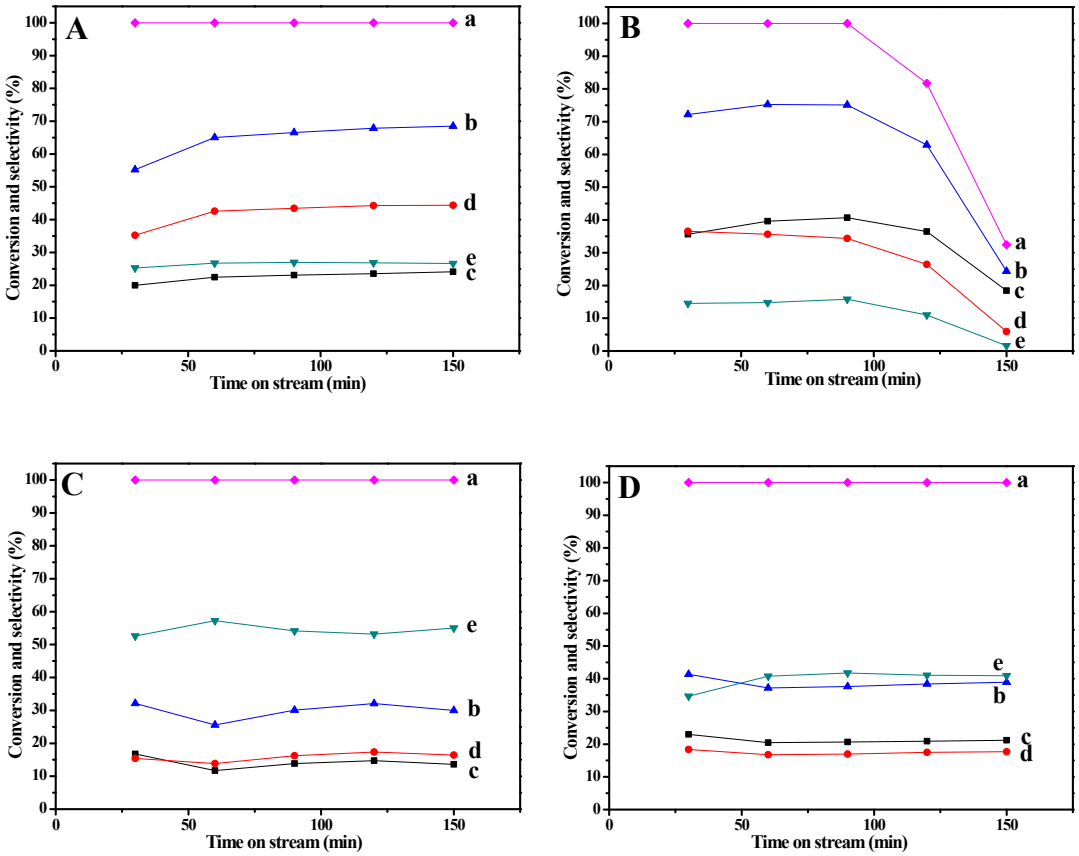

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Table S1. BET surface area and micropore volume of H-RTH zeolite samples with different crystallization temperature and calcination temperature.

Run	Crystallization temperature (°C)	Calcination temperature (°C)	BET surface area (m^2/g)	Micropore volume (cm^3/g)
1	130	550	576	0.26
2	180	550	583	0.28
3	240	550	559	0.24
4	130	700	558	0.26
5	130	850	427	0.20