

Fig. S1 SEM images of sample 13 (left) and sample 1(right)

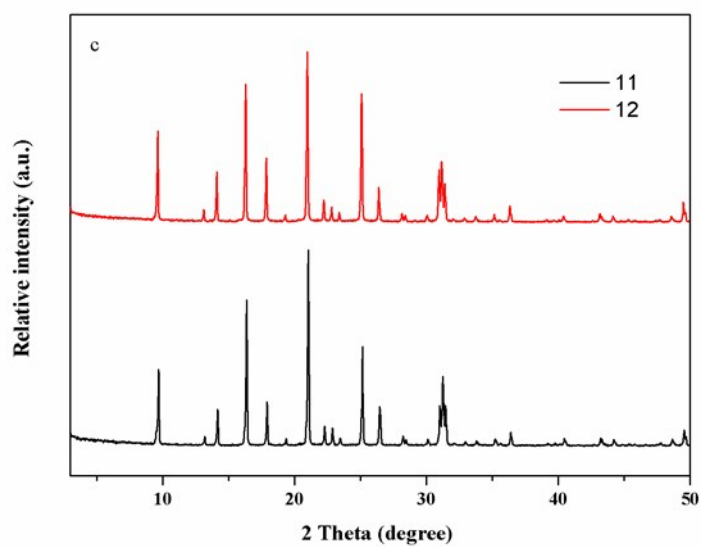


Fig. S2 XRD patterns of sample 11 and 12 heated for 12h.

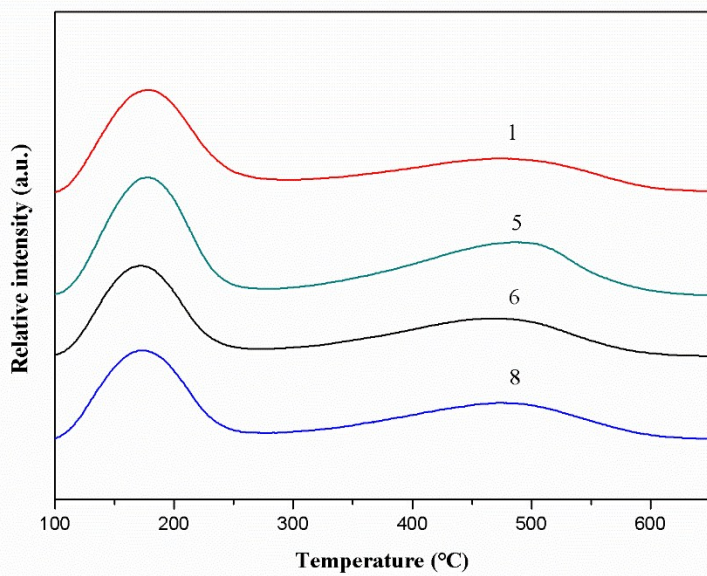
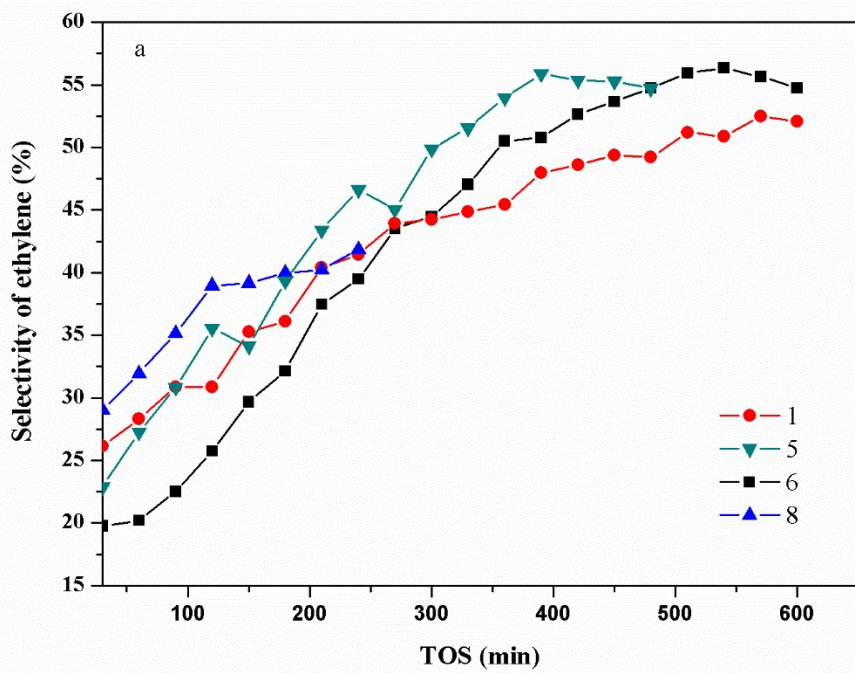
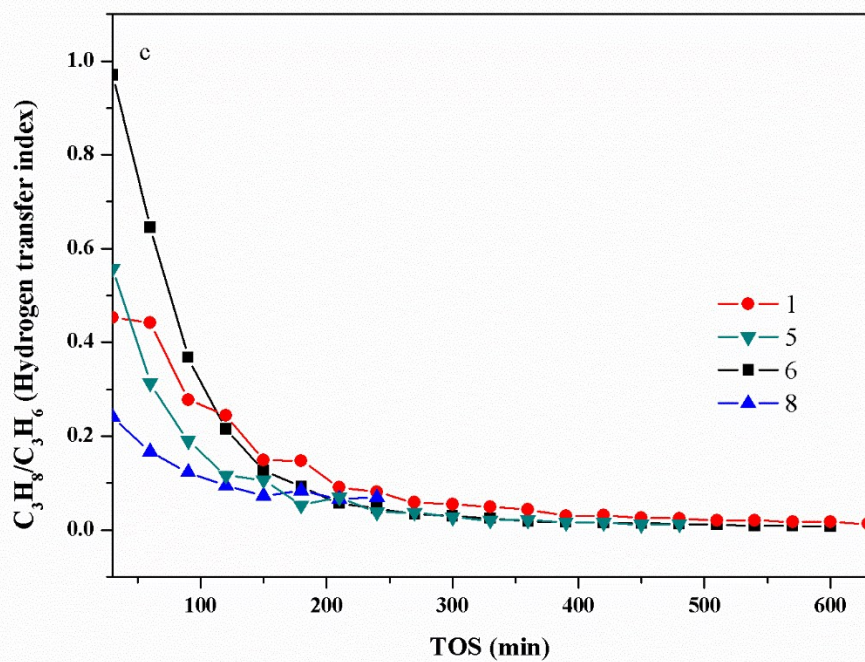
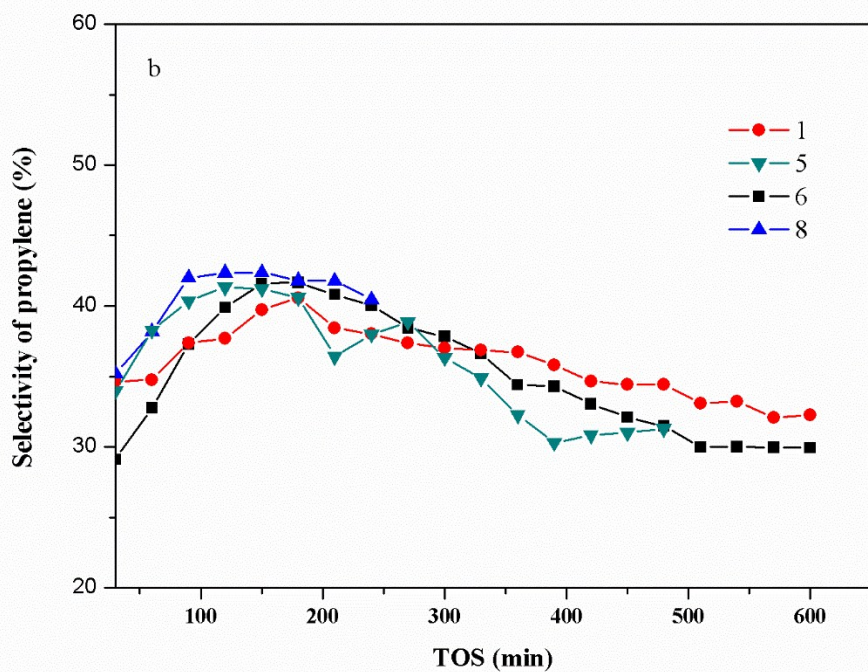
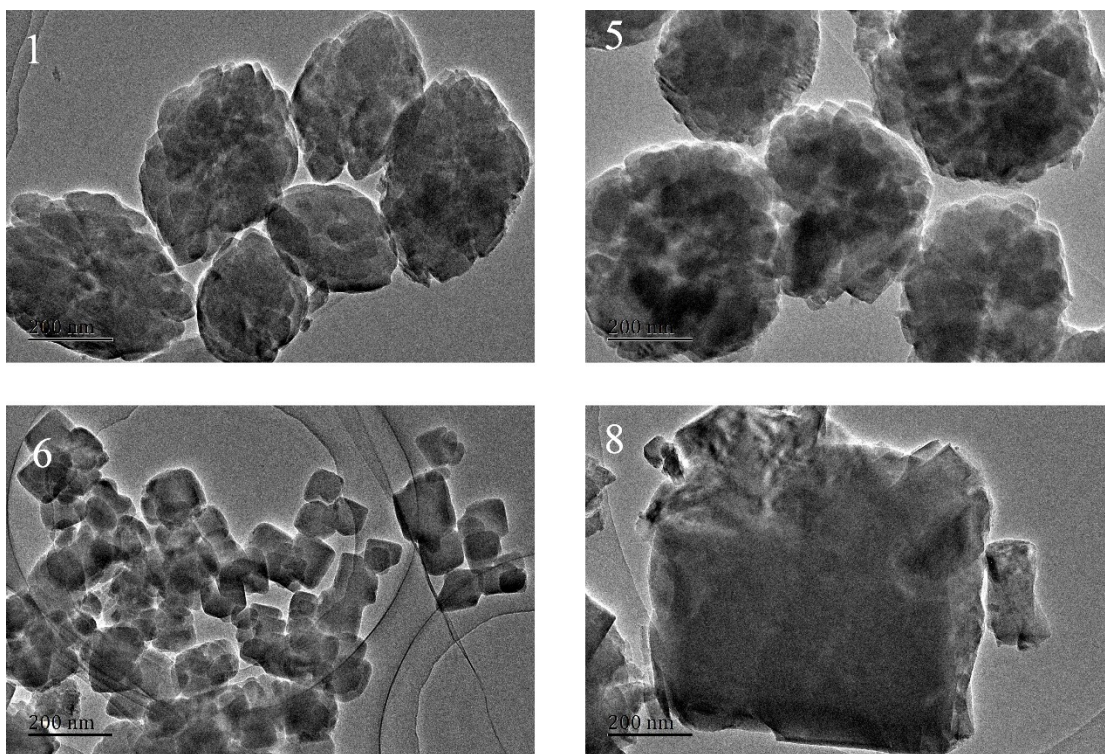


Fig. S3 NH<sub>3</sub>-TPD of sample 1; 6; 8.

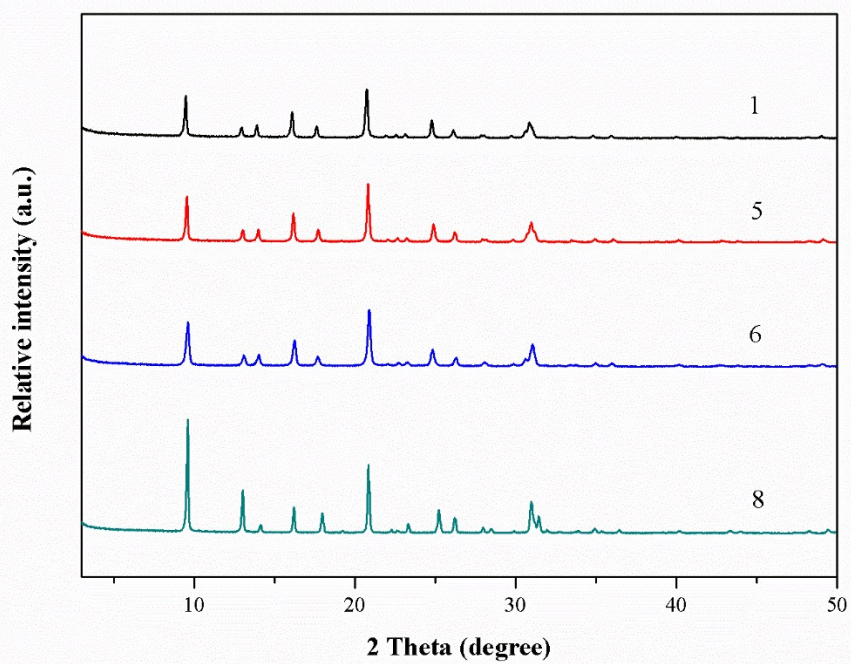




**Fig. S4** Ethylene selectivity (a) , propylene selectivity (b) and C<sub>3</sub>H<sub>8</sub> to C<sub>3</sub>H<sub>6</sub> ratio (c) of sample 6, 1 and 8 with time on stream



**Fig. S5** TEM images of samples 1, 5, 6 and 8 after MTO reaction.



**Fig. S6** XRD patterns of samples 1, 5, 6 and 8 after MTO reaction.