Electronic supplementary information

A comparative synthesis of ZSM-5 with ethanol and TPABr template: Distinction of Brönsted/Lewis acidity ratio and its impact on n-hexane cracking

Tong Ma, Luoming Zhang, Yu Song, Yunshan Shang, Yanliang Zhai, Yanjun Gong*

State Key Laboratory of Heavy Oil Processing, The Key Laboratory of Catalysis of CNPC, College of Chemical Engineering, China University of Petroleum (Beijing), Beijing 102249, China

*Corresponding author.

E-mail: gongyj@cup.edu.cn

Telephone: +86-(010)-89733066

Fax: +86-(010)-89733066

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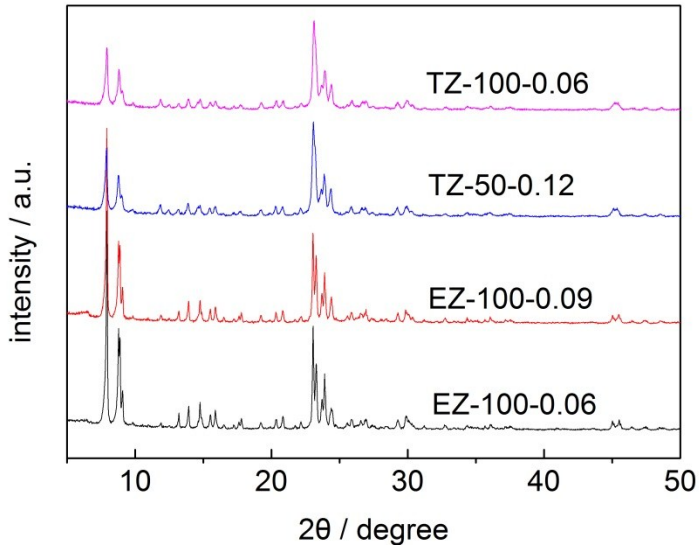


Fig. S1. XRD patterns of ZSM-5 samples prepared by EtOH and TPABr

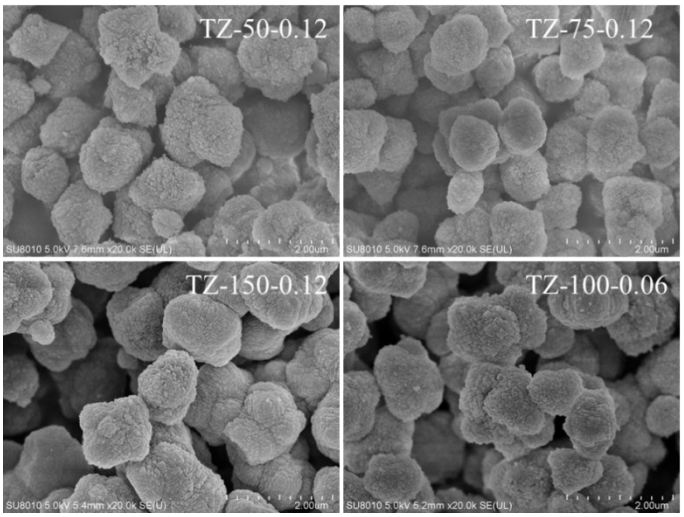


Fig. S2. SEM images of ZSM-5 samples prepared with TPABr

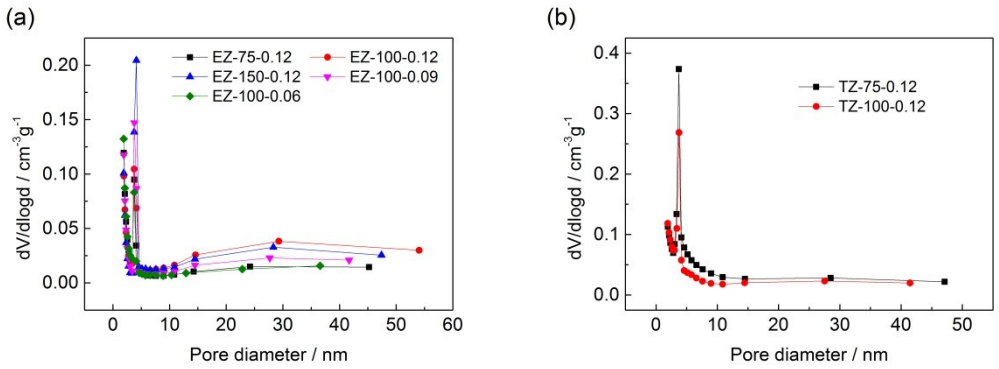


Fig. S3. BJH pore-size distribution of ZSM-5 samples prepared by (a) EtOH and (b) TPABr

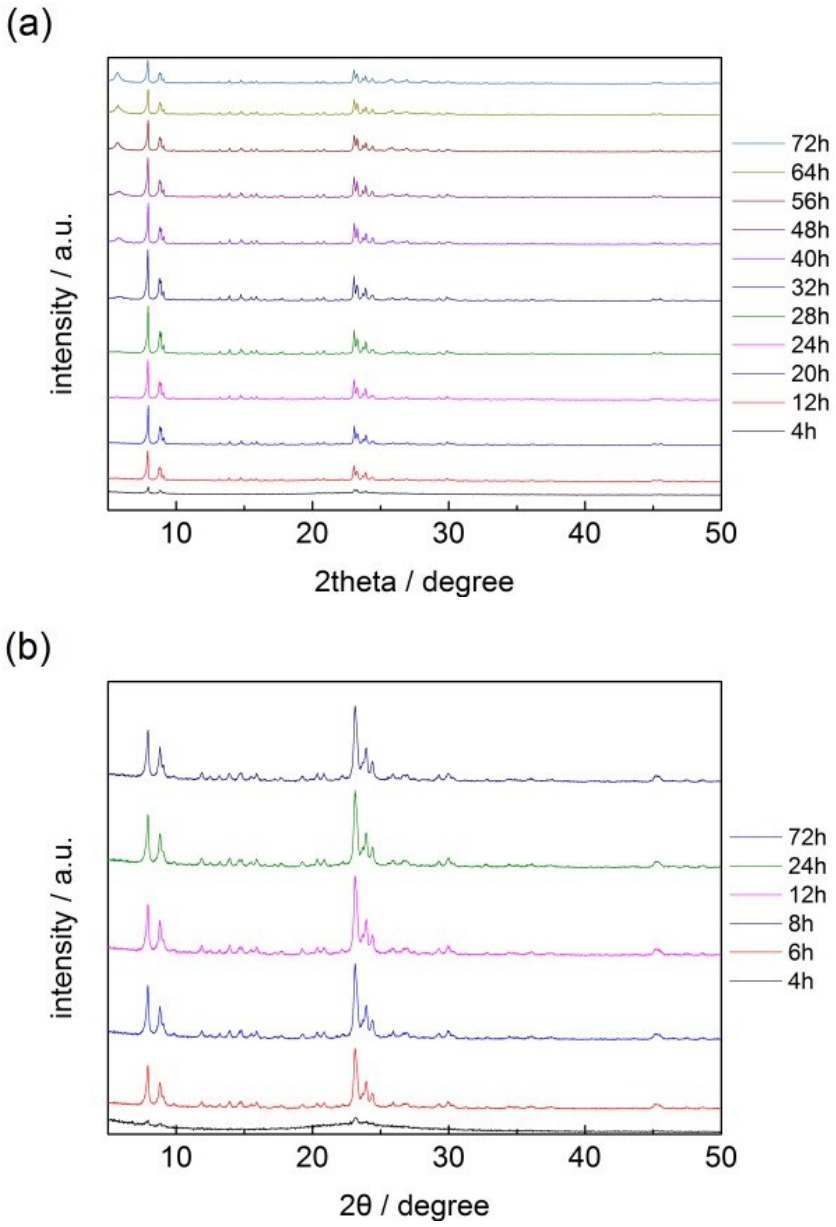


Fig. S4. XRD patterns of (a) EZ-150-0.12 and (b) TZ-150-0.12 at different crystallization time

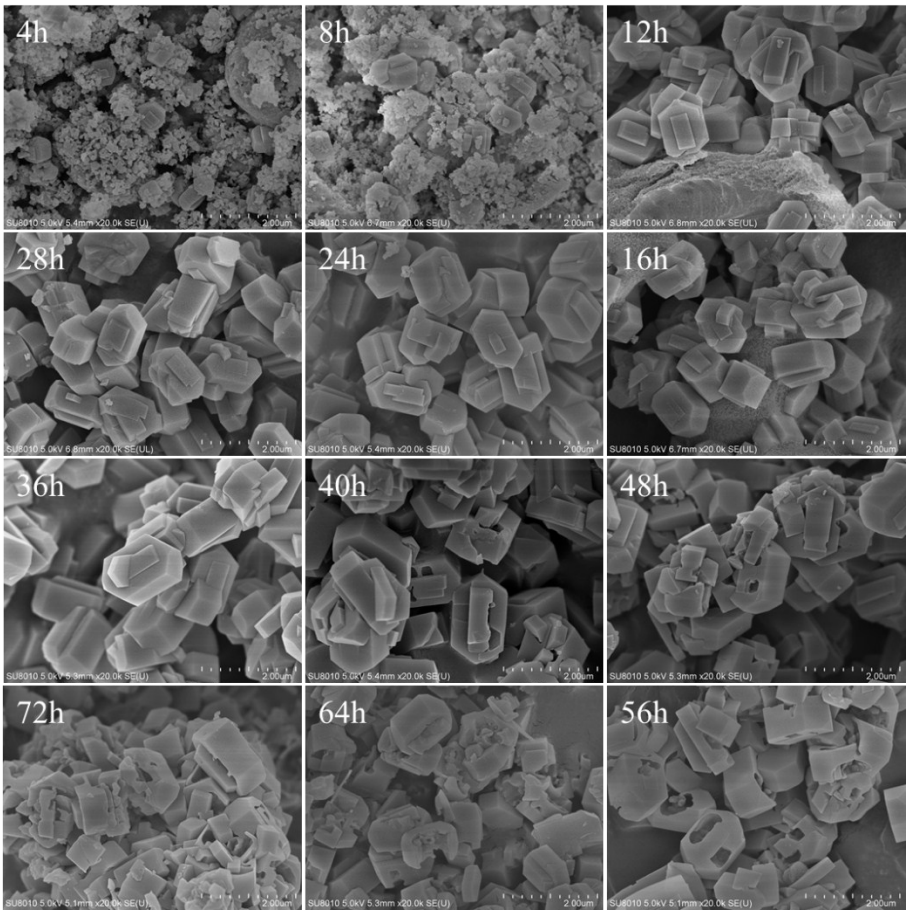
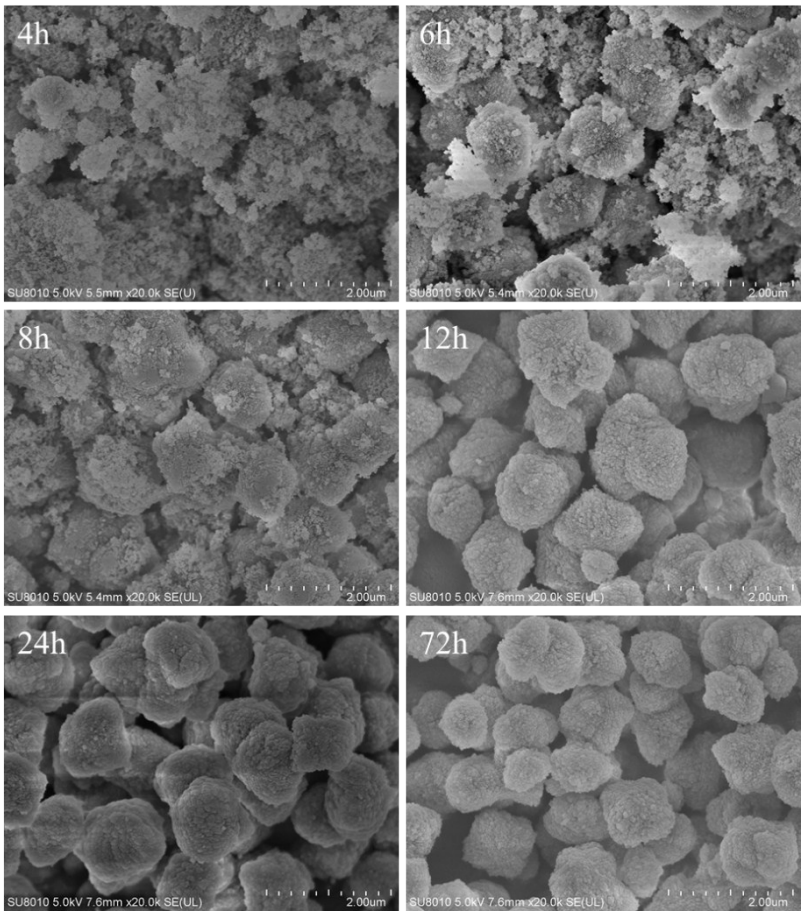


Fig. S5. SEM images of EZ-150-0.12 sample at different crystallization time



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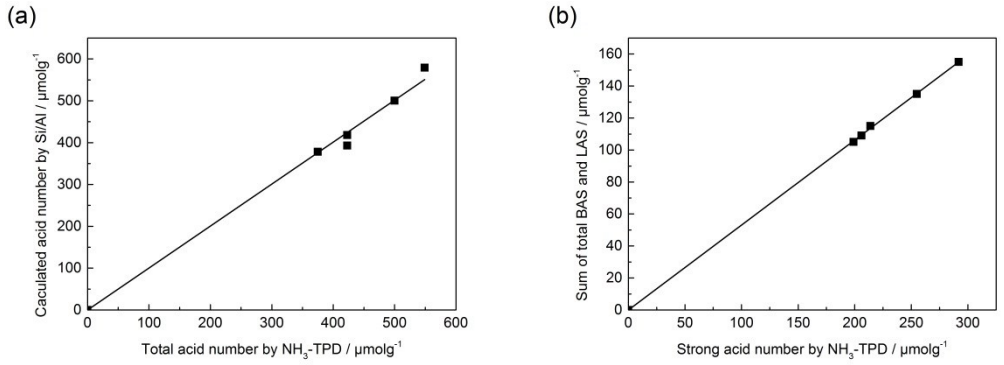


Fig. S7. Linear correlation of acid sites by different methods

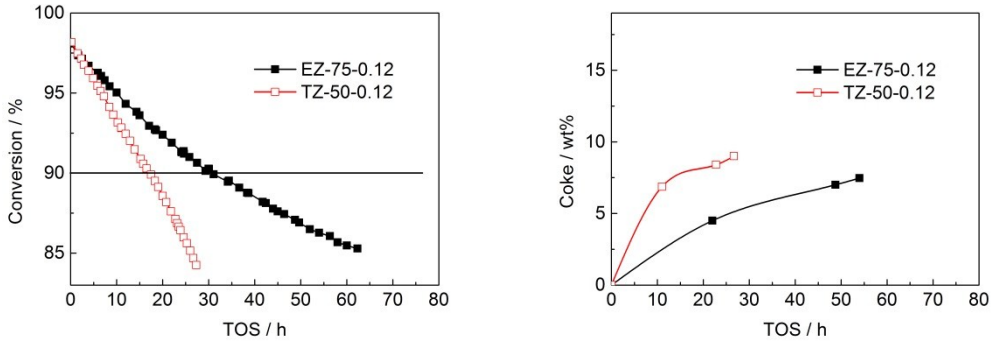


Fig. S8. Change of (a) the conversion and (b) coke content with TOS over HZSM-5 samples

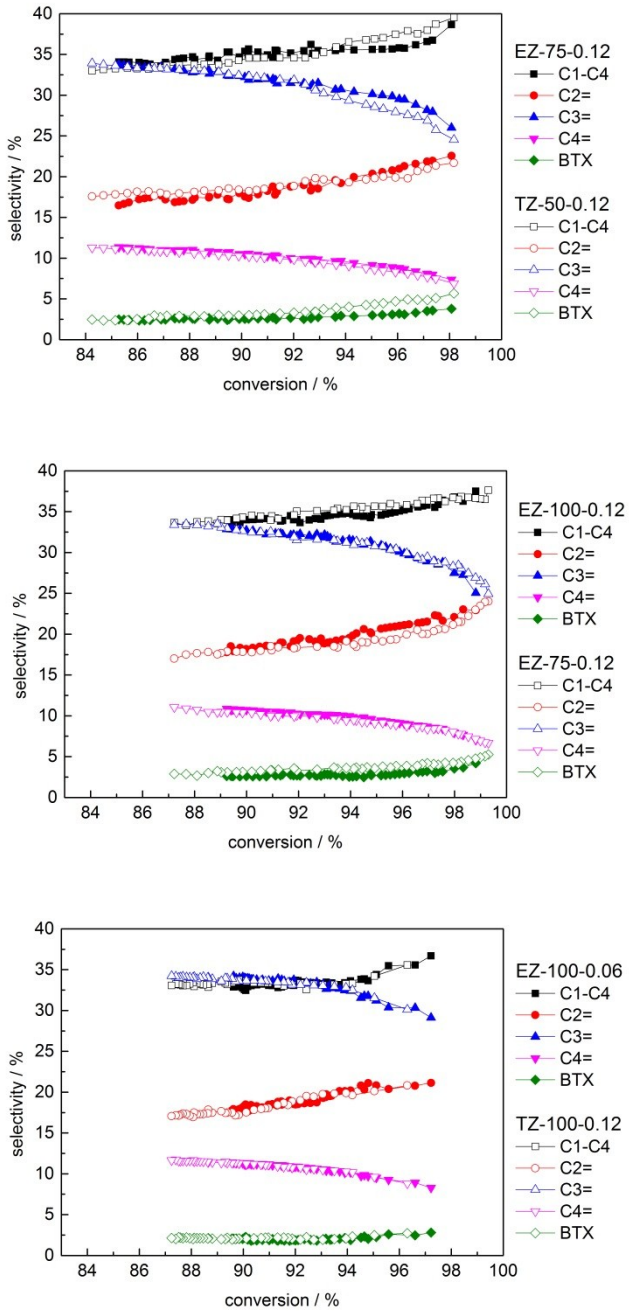
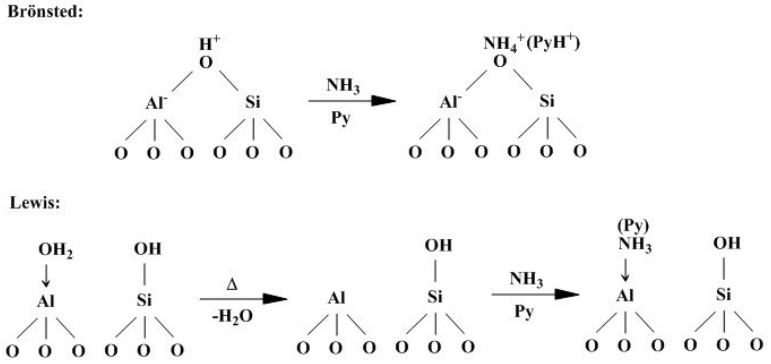


Fig. S9. Product selectivities with the various conversions at different TOS



Scheme S1. Proposed generation of Lewis acid by tri-coordinated Al ‘‘defect’’ sites and extra silanols

Table S1. Brönsted and Lewis acidity of HZSM-5 samples on literatures

Literature	Bulk Si/Al	T/°C[a]	T/°C[b]	BAS/μmolg^{-1}	LAS/μmolg^{-1}	B/L
1	26.8	500	25	450	60	9
1	28.6		25	430	50	8.6
2	36	450	150	250	70	3.6
3	53	500	350	170	19	9.1
4	51	500	150	--	--	9.7
5	27	550	150	530	111	4.8
6	42	450	150	249	39	6.4
7[c]	25	400	150	97	11	8.8
			250	93	11	8.4
			350	80	11	7.3
7[c]	40	400	150	68	11	6.2
			250	55	11	5
			350	30	11	2.7
8[c]	25	400	250	220	31	7.1
			350	173	24	7.2
			400	102	16	6.4
8[c]	40	400	250	173	39	4.4
			350	86	39	2.2
			400	24	24	1

[a] Temperature of previous activation by outgassing.

[b] Temperature of the pyridine desorption.

[c] The unit of acid site is a.u..

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Table S2. Product selectivities over HZSM-5 with similar conversion

	EZ-75-0.12	EZ-100-0.12	EZ-100-0.06	TZ-50-0.12	TZ-75-0.12	TZ-100-0.12
BAS[a]	131	98	89	--	98	84
LAS[a]	2	2	2	--	13	14
Cov./%[b]	97.35	97.38	96.61	97.47	97.35	96.51
C_{1-4}/%	36.73	35.87	35.38	38.73	36.64	35.58
$C_2^=$/%	21.97	21.83	20.99	21.38	20.59	20.82
$C_3^=$/%	27.96	28.83	30.32	25.76	28.64	30.12
$C_4^=$/%	7.98	8.63	8.90	7.48	8.45	8.82
BTX/%	3.56	3.18	2.47	5.09	4.01	2.72
P/O[c]	0.63	0.61	0.59	0.71	0.64	0.60

[a] BAS and LAS at 350°C, $\mu molg^{-1}$.

[b] Conversion at 0.5h by adjusting WHSV.

[c] P/O stands for paraffin/olefin ratio.