Electronic Supplementary Information

(ESI)

Table S1 The SiO_2/Al_2O_3 and solid yields of ZM-X samples

Samples	SiO_2/Al_2O_3	Solid yield (%)
ZM-1	30	92.32
ZM-2	28	90.23
ZM-3	26	86.56
ZM-4	27	86.69
ZM-5	25	83.69

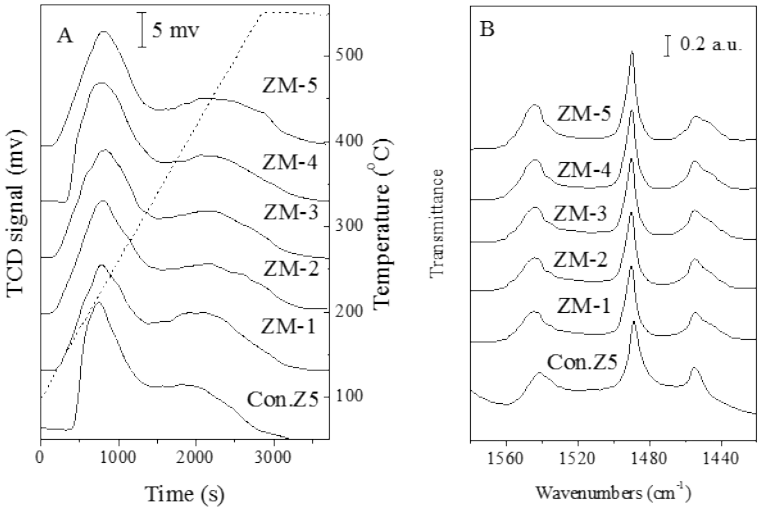

Figure S1 The NH_3-TPD profiles (A) pyridine-FTIR spectra collected at 100 °C (B)

Table S2 The acidic properties data of NH_3-TPD and pyridine/collidine-FTIR

Samples	NH_3-TPD		pyridine-FTIR (100 °C)			collidine-FTIR (100 °C)			
	Concentration of acid sites [μmol NH3 g-1]	S/W[a]	Concentration of B acid sites [b] [μmol pyd g-1]	Concentration of L acid sites [μmol pyd g-1]	B/L	A[c] 1633 cm-1 [a.u.cm-1]	A 1639 & 1650 cm-1 [a.u.cm-1]	Concentration of B acid sites [d] [μmol coll g-1]	B_{coll}/B_{pyd} [e] [μmol coll/μmol pyd]
Con.Z5	758	1.35	291	140	2.09	/	/	/	/
ZM-1	832	1.59	307	153	2.00	4.13	0.21	66	0.21
ZM-2	812	1.56	318	166	1.92	7.00	0.32	102	0.32
ZM-3	821	1.54	318	174	1.83	8.76	0.38	121	0.38
ZM-4	866	1.66	343	172	1.99	3.5	0.15	50	0.15
ZM-5	875	1.73	380	169	2.25	3.16	0.12	45	0.12

[a] the ratio of strong acid amount to weak acid amount

[b] calculated with the the corresponding extinction coefficients (Brønsted: 1.67 cm/μmol; Lewis: 2.22 cm/μmol)

[c] the area of the bands integration in collidine FTIR sprctra.

[c] calculated with the the corresponding extinction coefficients (Brønsted: 8.1 cm/μmol)

[d] the proportion of external Brønsted acid sites concentration detected by collidine absorption in bulky Brønsted acid sites concentration detected by pyridine absorption.

Table S3 The conversion of IPB over the Con Z5 and hierarchical zeolite microspheres

Samples	Conversion (%)[a]
Con.Z5	92.6
ZM-1	95.3
ZM-2	97.6
ZM-3	96.9
ZM-4	96.1
ZM-5	95.3

[a] Conversion(Conv.) = 100% – area percent of reactant and its isomers calculated by normalization method.

The cracking reaction of isopropylbenzene (IPB, 97%, Aldrich) was evaluated in a micro-reactor with a quartz-tube of 6 mm inner diameter. 50 mg of 20–60 mesh zeolite ZSM-5 pellets without a binder was pretreated at 510 ^{o}C for 60 min in a stream of N_2 before reaction. Maintaining the catalyst at the scheduled temperature, 0.5 μL substrate was injected into the catalyst bed with N_2 from the top of the reactor. The flow of the carrier gas is 80 mL min^{-1}. The IPB cracking products were analyzed by an on-line gas chromatograph of GC-9800A (Shanghai Kechuang, FFAP capillary column, 30 m × 0.25 mm × 0.25 μm) equipped with a flame ionization detector.

Table S4 The performance of LDPE cracking

Samples	Reaction temperature /°C	Conversion /%	Selectivity /%							
			C_1	C_2	C_3	C_4	C_5	C_6-C_{12}	C_{13}-C_{16}	C_{16}^+
LDPE-T_1	340	5.11	/	/	/	/	/	/	/	/
LDPE-T_2	400	19.23	0.36	1.78	4.65	4.85	6.23	40.04	22.69	19.40
Con.Z5	340	37.85	0.02	0.26	9.53	19.09	28.51	34.13	5.86	2.60
ZM-1	340	75.32	0.04	0.77	8.77	14.06	9.06	47.72	11.82	7.75
ZM-2	340	79.32	0.02	0.36	7.90	13.14	7.37	53.07	12.89	5.26
ZM-3	340	82.88	0.03	0.37	7.41	11.65	6.54	51.34	15.56	7.17
ZM-4	340	73.25	0.03	0.47	9.52	14.96	8.41	46.69	11.46	5.91
ZM-5	340	66.32	0.01	0.64	9.53	16.04	14.57	45.96	8.44	4.81

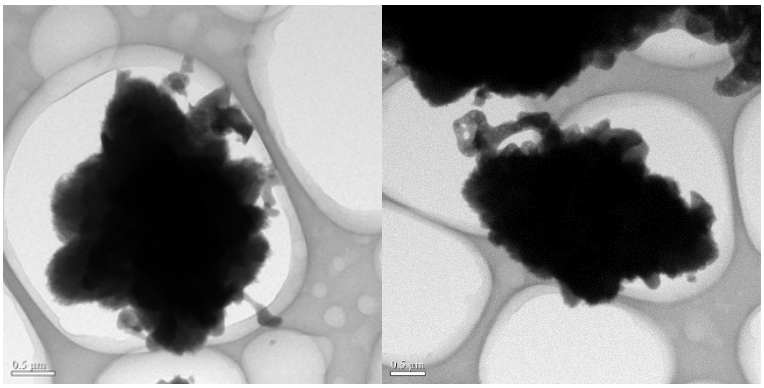

Figure S2 The TEM images of ZM-3 intermediate at crystallization of 28 h

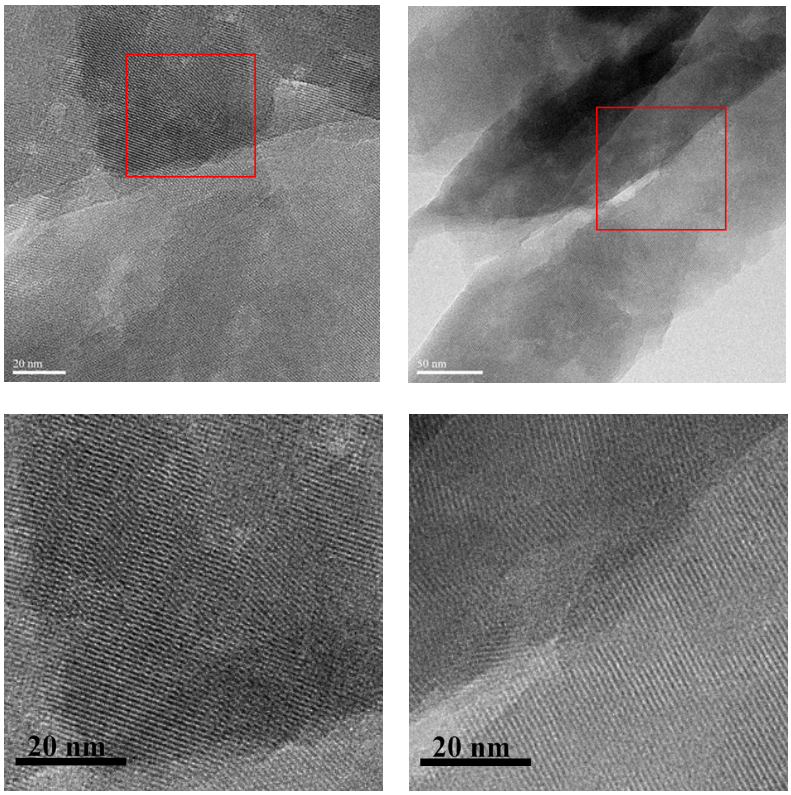

Figure S3 The TEM images of ZM-3 inner section