Electronic Supplementary Material

Constructing hierarchical ZSM-5 coated with small ZSM-5 crystals via oriented-attachment and in-situ assembly for methanol-to-aromatics reaction

Ning Yang, Tingjun Fu (✉), Chuntao Cao, Xueqing Wu, Huiling Zheng, Zhong Li

State Key Laboratory of Clean and Efficient Coal Utilization, College of Chemical Engineering and Technology, Taiyuan University of Technology, Taiyuan 030024, China

E-mail: futingjun@tyut.edu.cn

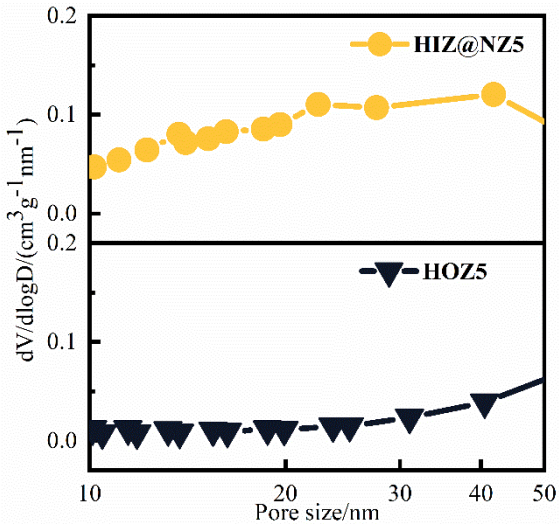

Fig. S1 pore size distribution at 10-50nm of HIZ@NZ5 and HOZ5.

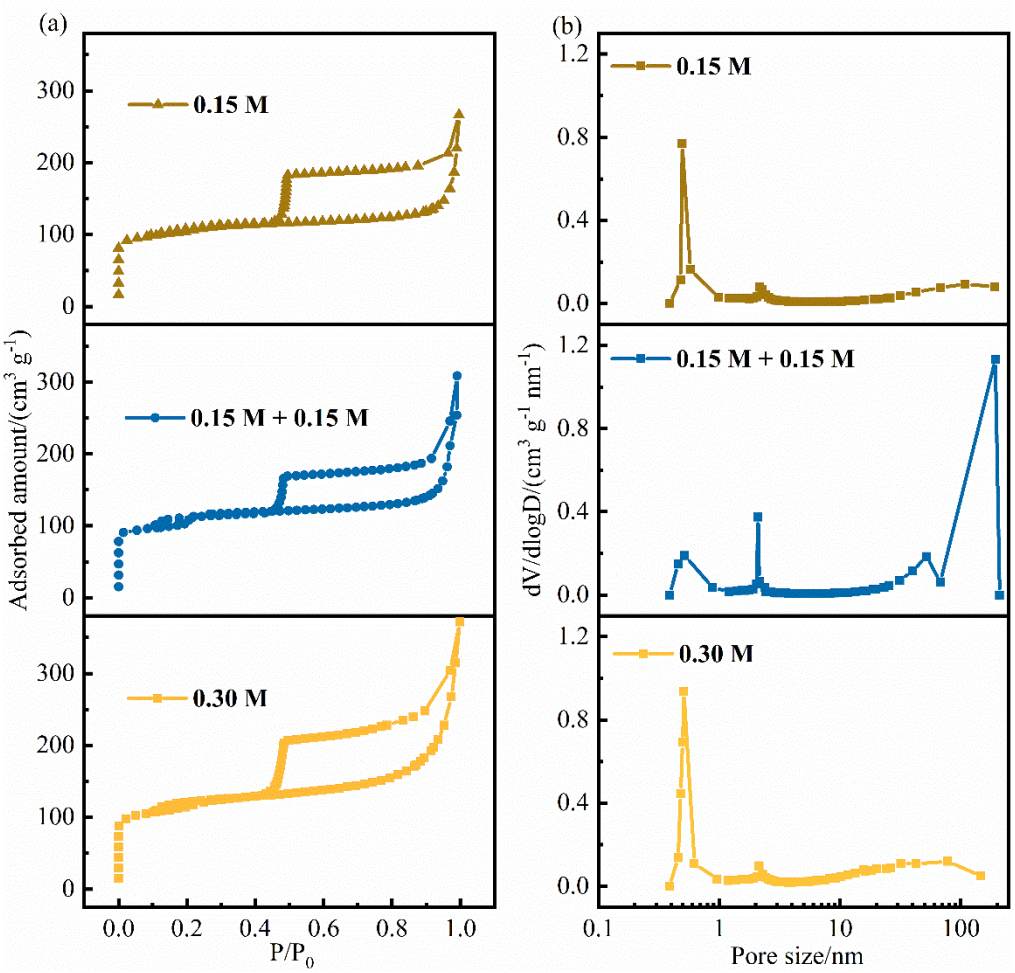

Fig. S2 (a) N_2 adsorption-desorption isotherms and (b) pore size distribution of the prepared samples under different desilication-recrystallization conditions.

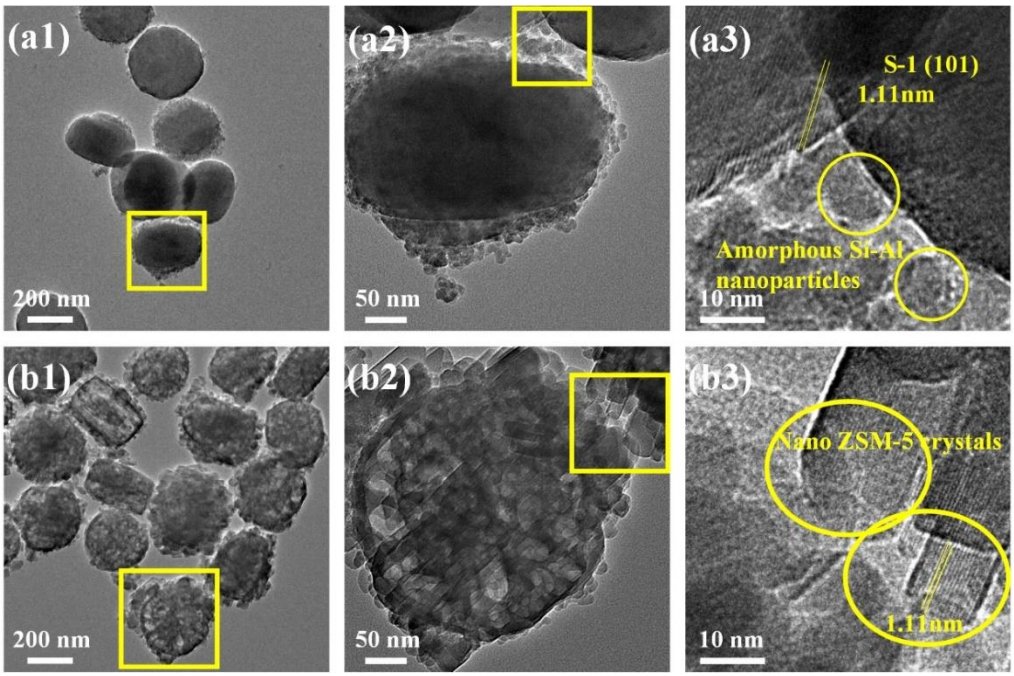

Fig. S3 TEM and HRTEM images of (a) S-1@NZ5 and (b) HIZ@NZ5.

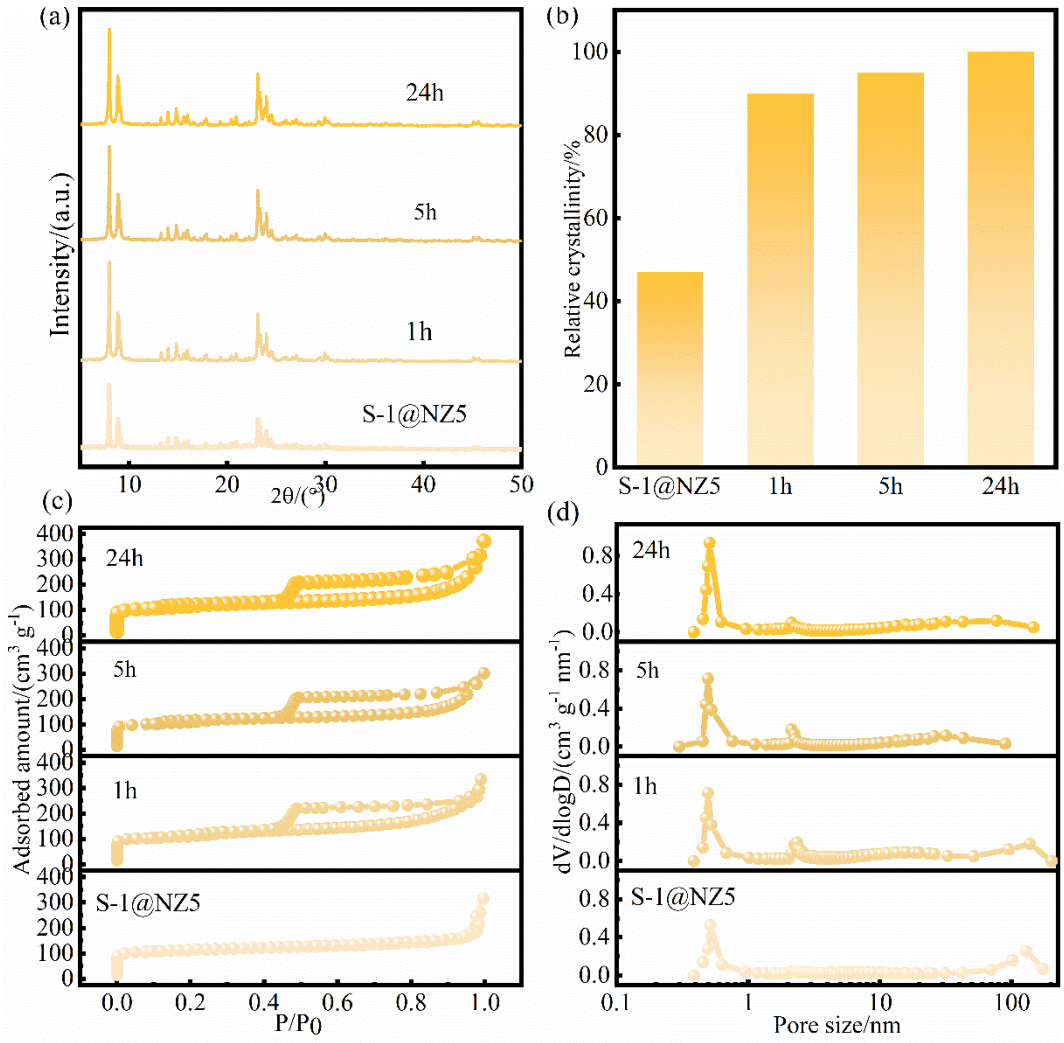

Fig. S4 (a) XRD patterns; (b) relative crystallinity; (c) N_2 adsorption-desorption isotherms and (d) pore size distribution of HIZ@NZ5 at different crystallization stages.

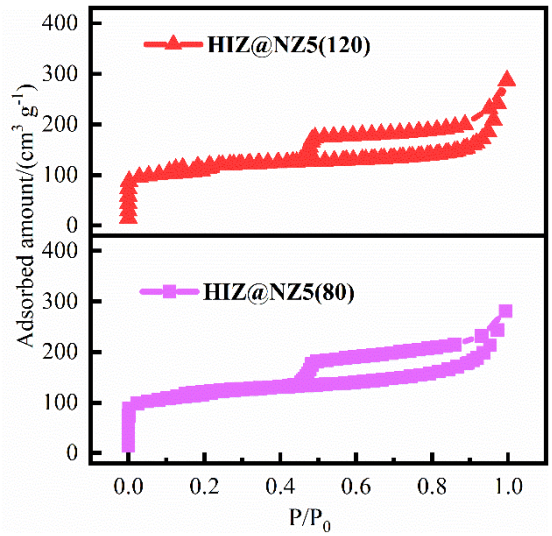

Fig. S5 N_2 adsorption-desorption isotherms of HIZ@NZ5(80) and HIZ@NZ5(120).

Table S1 Textural properties of HIZ@NZ5 at different crystallization stages: (a) before crystallization; (b) 1h; (c) 5h; (d)24h.

Sample	Surface area/(m^2 g^{-1})			Pore volume/(cm^3 g^{-1})			Relative crystallinity/(%)
	S_{BET}	S_{micro}	S_{exter}	V_{total}	V_{micro}	V_{meso}	
S-1@NZ5	375	255	120	0.42	0.12	0.30	47
1h	367	255	112	0.51	0.22	0.29	90
5h	369	303	66	0.44	0.15	0.29	95
24h	384	304	80	0.51	0.15	0.36	100

Table S2 Textural properties of HIZ@NZ5(80) and HIZ@NZ5(120).

Sample	Surface area/(m^2 g^{-1})			Pore volume/(cm^3 g^{-1})		
	S_{BET}	S_{micro}	S_{exter}	V_{total}	V_{micro}	V_{meso}
HIZ@NZ5(80)	389	298	91	0.42	0.15	0.27
HIZ@NZ5(120)	381	331	50	0.42	0.16	0.26

Table S3 Acidic properties of HIZ@NZ5(60), HIZ@NZ5(80), HIZ@NZ5(120), and HOZ5.

Sample	Py-IR/(μmol g^{-1})			NH_3-TPD/(μmol g^{-1})			
	Lewis[a)]	Brønsted[a)]	B/L	Weak	Medium	Strong	Total
HIZ@NZ5(60)	7.0	37.0	5.2	46	32	139	217
HIZ@NZ5(80)	5.3	55.3	10.4	68	24	195	287
HIZ@NZ5(120)	4.3	19.2	4.5	6	5	105	116
HOZ5	11.7	40.4	3.4	295	150	336	781

a) The concentrations of Brønsted and Lewis acid sites were estimated by integrating the vibration bands at 1547 and 1457 cm^{-1}, respectively.