Supplementary Material

Silicalite-1 zeolite acidification by Zn modification and its catalytic properties for iso-butane conversion

Guodong Liu, [a] Jiaxu Liu, [a] Ning He, [a] Cuilan Miao, [a] Jilei Wang, [a] Qin Xin [b] and Hongchen Guo*[a]

[a] Department of Catalytic Chemistry and Engineering & State Key Laboratory of Fine Chemicals, Dalian University of Technology, Dalian 116012, P. R. China

[b] State Key Laboratory of Catalysis, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian 116023, P. R. China

* Corresponding author, E-mail: hongchenguo@dlut.edu.cn

Table S1. XRF analysis of parent S-1 zeolite.

Elements	Compounds	Composition /wt.%
Si	SiO_2	99.92
Na	Na_2O	0.034
Ti	TiO_2	0.010
Fe	Fe_2O_3	0.010
Zn	ZnO	0.001
Cl	Cl	0.015

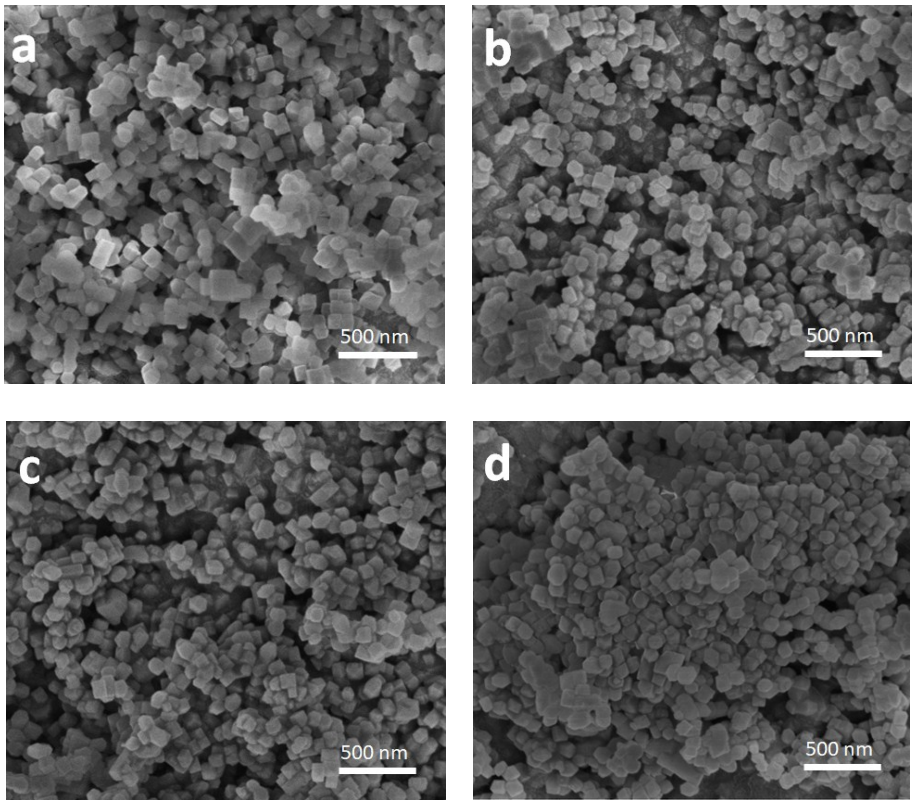

Figure S1. FE-SEM images of Zn_x/S-1 catalysts with different Zn loading: parent S-1 zeolite (a); $Zn_{1.0}$/S-1 (b); $Zn_{6.0}$/S-1 (c); $Zn_{12.0}$/S-1 (d).

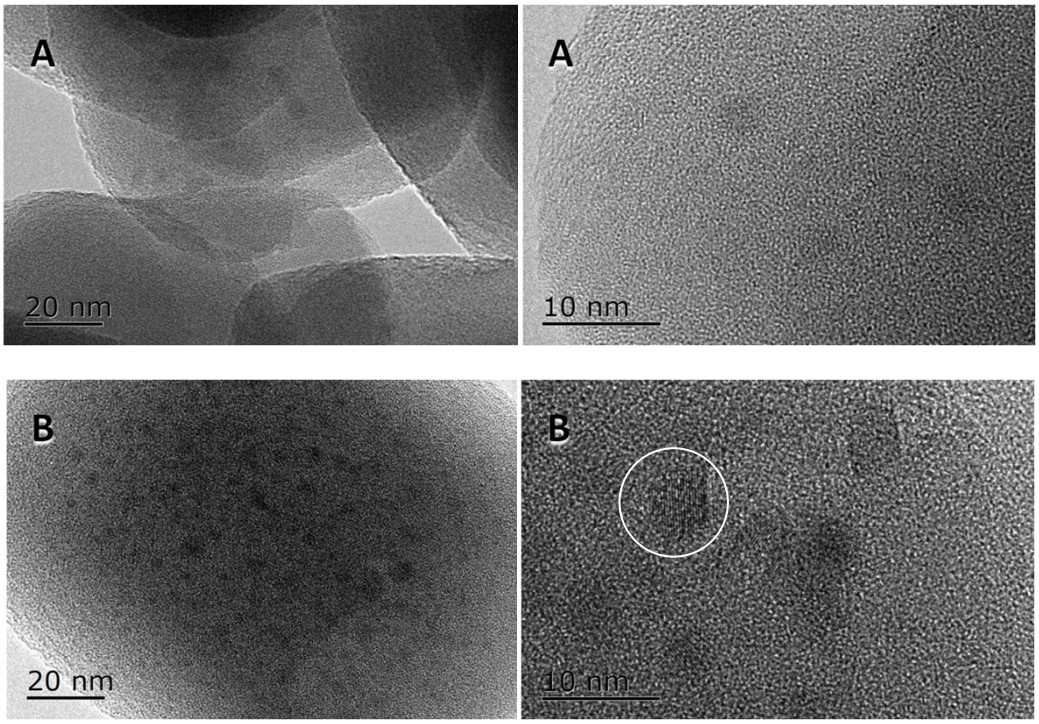

Figure S2. HRTEM images of $Zn_{6.0}$/S-1 (A) and $Zn_{12.0}$/S-1(B).

Table S2. The relative crystallinity of Zn_x/S-1 catalysts

Catalysts	Crystallinity (%)
S-1	100
$Zn_{1.0}$/S-1	85.1
$Zn_{3.0}$/S-1	80.3
$Zn_{6.0}$/S-1	75.2
$Zn_{8.0}$/S-1	61.8
$Zn_{12.0}$/S-1	53.5

Table S3. The acid amounts of catalysts as determined by NH_3-TPD

Catalysts	Acid amount (mmol/g)
S-1	0.00367
$Zn_{1.0}$/S-1	0.0736
$Zn_{3.0}$/S-1	0.134
$Zn_{6.0}$/S-1	0.142
$Zn_{8.0}$/S-1	0.151
$Zn_{12.0}$/S-1	0.137
$Zn_{6.0}$/ZSM-5	0.555
HZSM-5	0.676

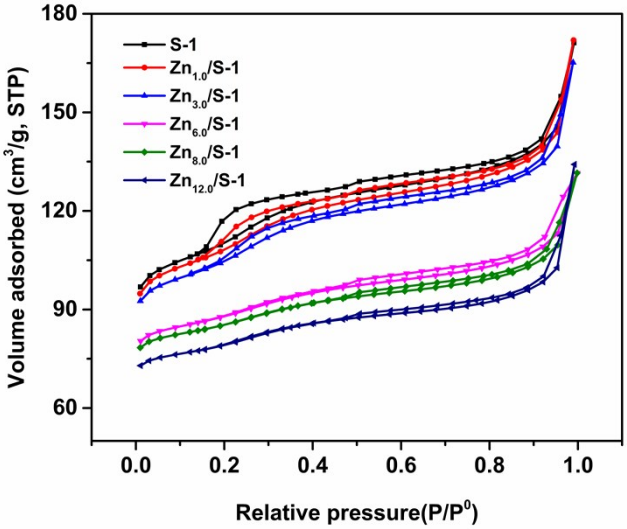

Figure S3. N_2 adsorption-desorption isotherm of Zn_x/S-1 (x from 0.0 to 12.0).

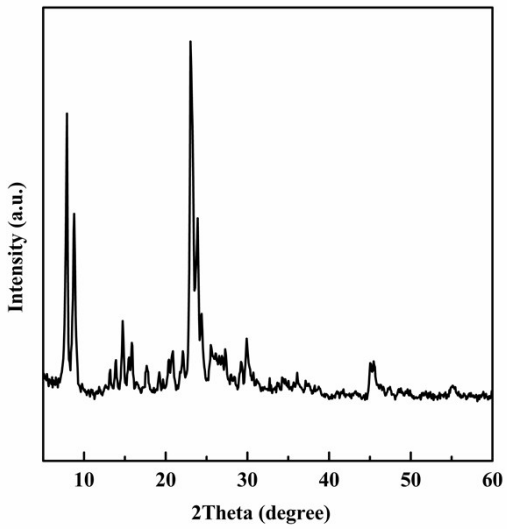

Figure S4. XRD pattern of H-type ZSM-5 zeolite.

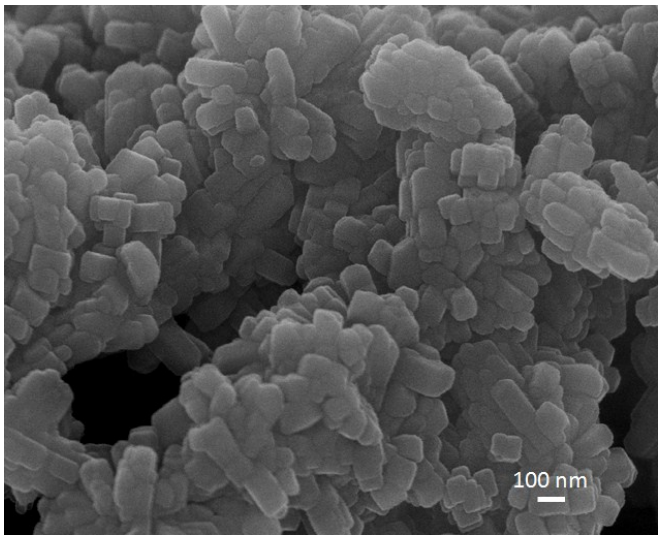

Figure S5. SEM images of H-type ZSM-5 zeolite under the scale bar of 100 nm.