Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Hydrophilic Sulfonic Acid-Functionalized Micro-Bead Silica for Dehydration of Sorbitol to Isosorbide

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Table S1 Results of elemental analysis for different SA-SiO_2 catalysts.

Entry	Sample code	ω (MPTS loading)/%	C/%	H/%	S/%
1	Silica-gel	0	0.10 (0)	0.19 (0)	0 (0)
2	SA-SiO_2-10.6	10.6	2.4 (2.5)	0.5 (0.5)	2.2 (2.3)
3	SA-SiO_2-22.5	22.5	5.6 (5.4)	1.1 (1.0)	4.8 (4.8)
4	SA-SiO_2-33.1	33.1	7.9 (7.9)	1.4 (1.5)	7.2 (7.0)
5	SA-SiO_2-40.9	40.9	9.8 (9.7)	1.9 (1.9)	8.8 (8.7)
6	SA-SiO_2-52.0	52.0	12.1 (12.4)	2.6 (2.4)	10.9 (11.0)
7	SA-SiO_2-60.5	60.5	14.5 (14.4)	2.7 (2.8)	13.0 (12.8)
8	SA-SiO_2-71.9	71.9	17.1 (17.1)	3.3 (3.3)	15.1 (15.2)
9	SA-SiO_2-83.3	83.3	19.8 (19.8)	3.8 (3.9)	17.8 (17.7)

Table S2 Catalyst activity of various reported hydrophilic catalysts used for dehydration of sorbitol to isosorbide.

Catalyst	Temperature (℃)	Time (h)	Conv (%) [a]	Yield (%) [b]
Sulfated tin oxide[1]	180	2	100	65
sulfated zirconia[2]	210	2	100	61
boron phosphate[3]	220	24	100	72.3
$Zr(SO_4)_2$[4]	160	60	100	65
$Ti(SO_4)_2$[4]	160	60	100	68
CuSO-650[5]	200	4h	99.7	67.3

[a] Conversion of sorbitol. [b] Yield of isosorbide.

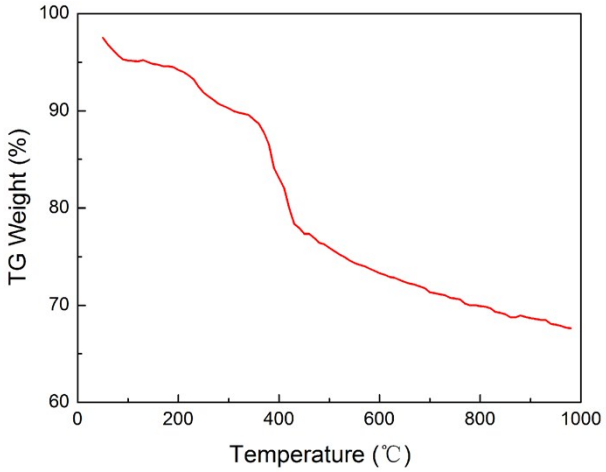

Fig. S1 Thermogravimetric analysis (TGA) curves of SA-SiO_2-60.5 catalyst used after tenth runs.

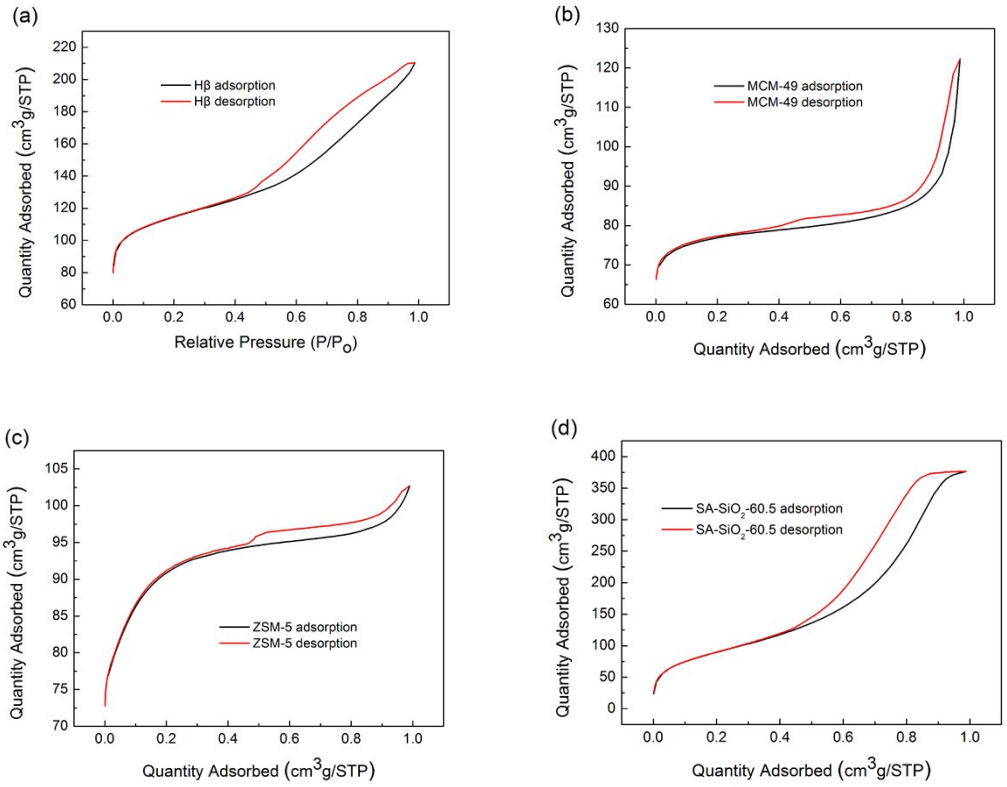

Fig. S2 N_2 adsorption and desorption isotherms of Hβ (a), MCM-49 (b), HZSM-5 (c) and SA-SiO_2-60.5 (d).

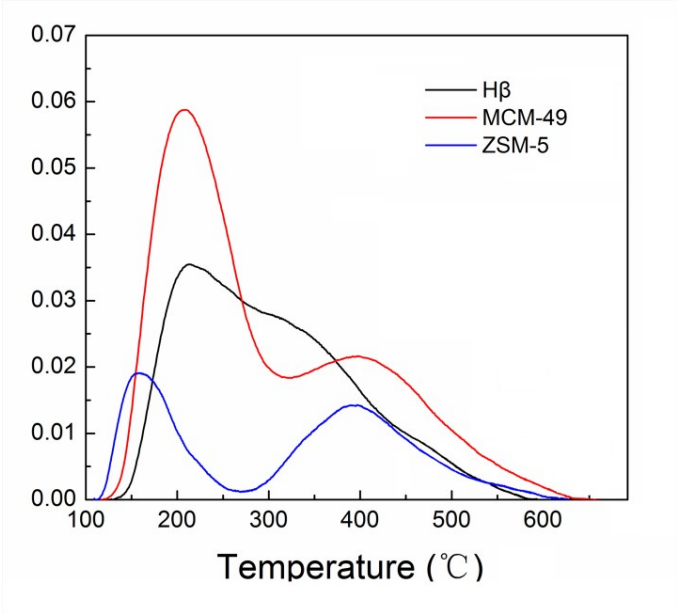

Fig. S3 NH_3-TPD profile of the Hβ, MCM-49 and ZSM-5 zeolites.

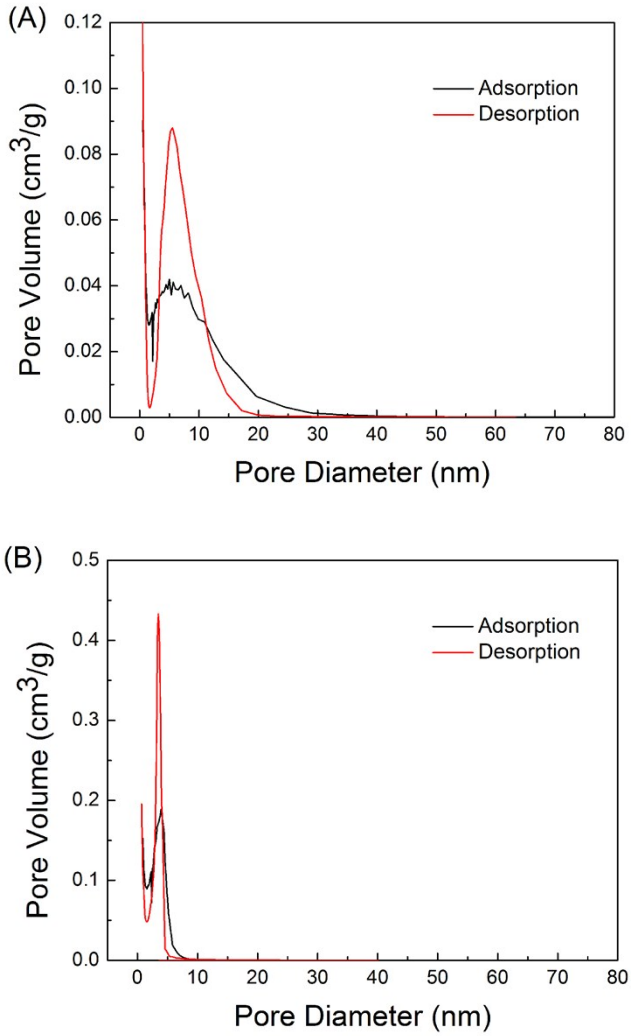

Fig. S4 Pore size distributions (BJH Adsorption/Desorption dV/dD Pore Volume) of used SA-SiO_2-60.5 (A) and SBA-15-SO_3H (B).

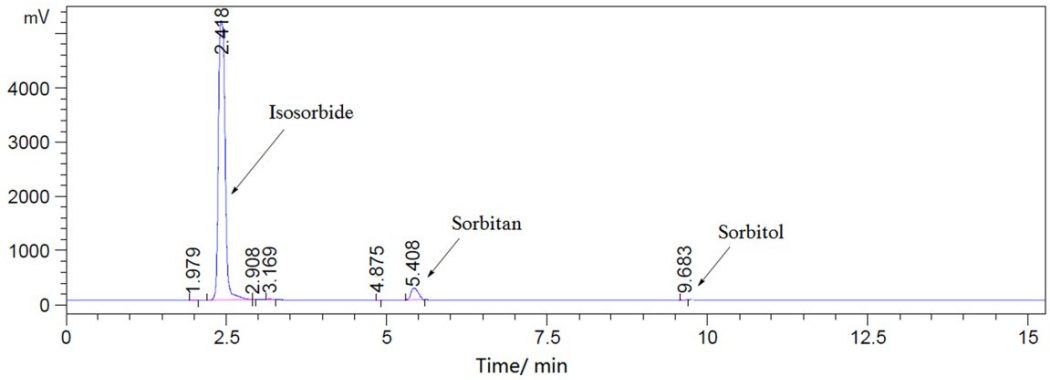

Fig. S5 Typical HPLC pattern of dehydration of sorbitol in solvent free condition. (Reaction condition: 50 g sorbitol, 1.0 g SA-SiO_2-60.5 catalyst, 120 ℃, 10 h, 1000 Pa (abs)).

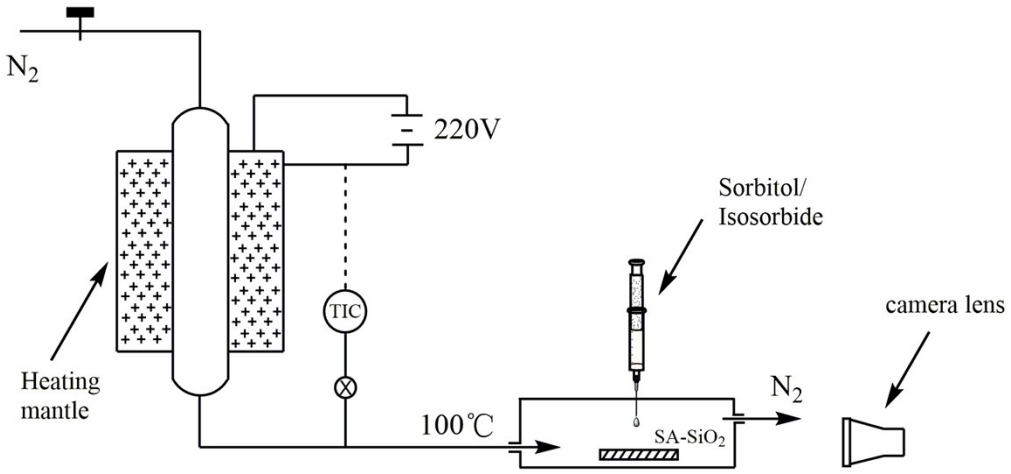

Fig. S6 Diagram of the process of measuring the contact angle.

Reference

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