

## Supporting Information

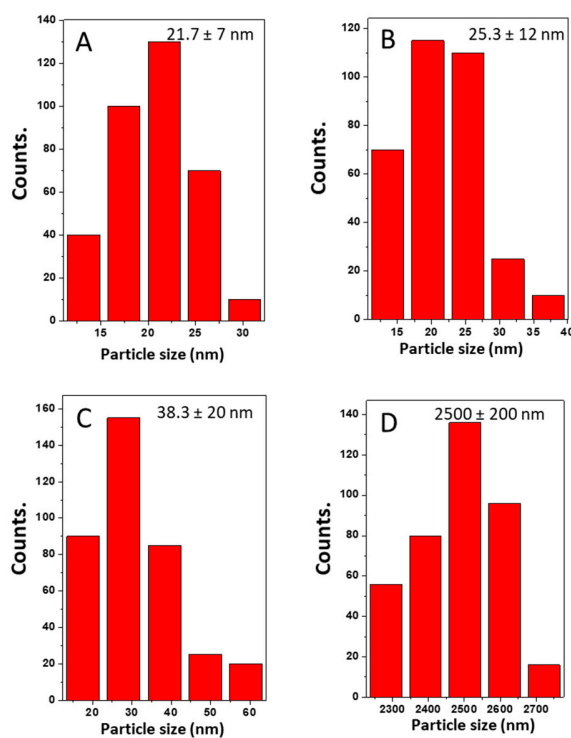
# In Situ Synthesis of Sn-Beta Zeolite Nanocrystals for Glucose to Hydroxymethylfurfural (HMF)

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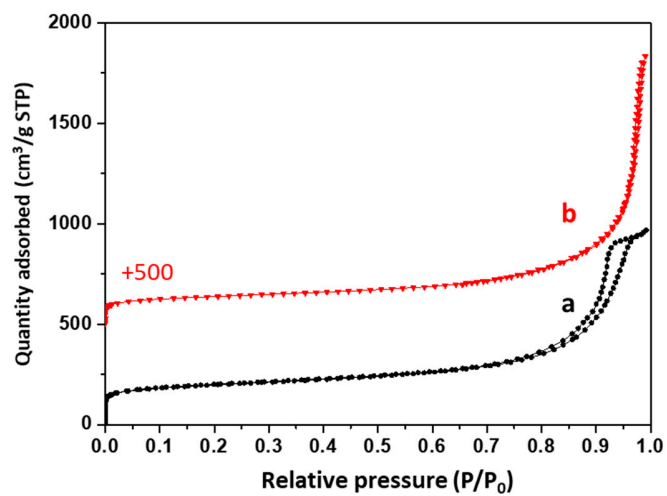
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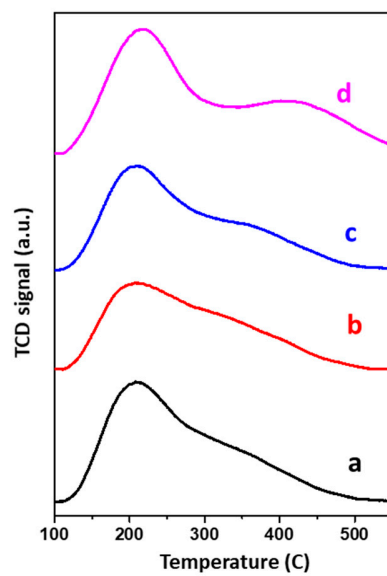
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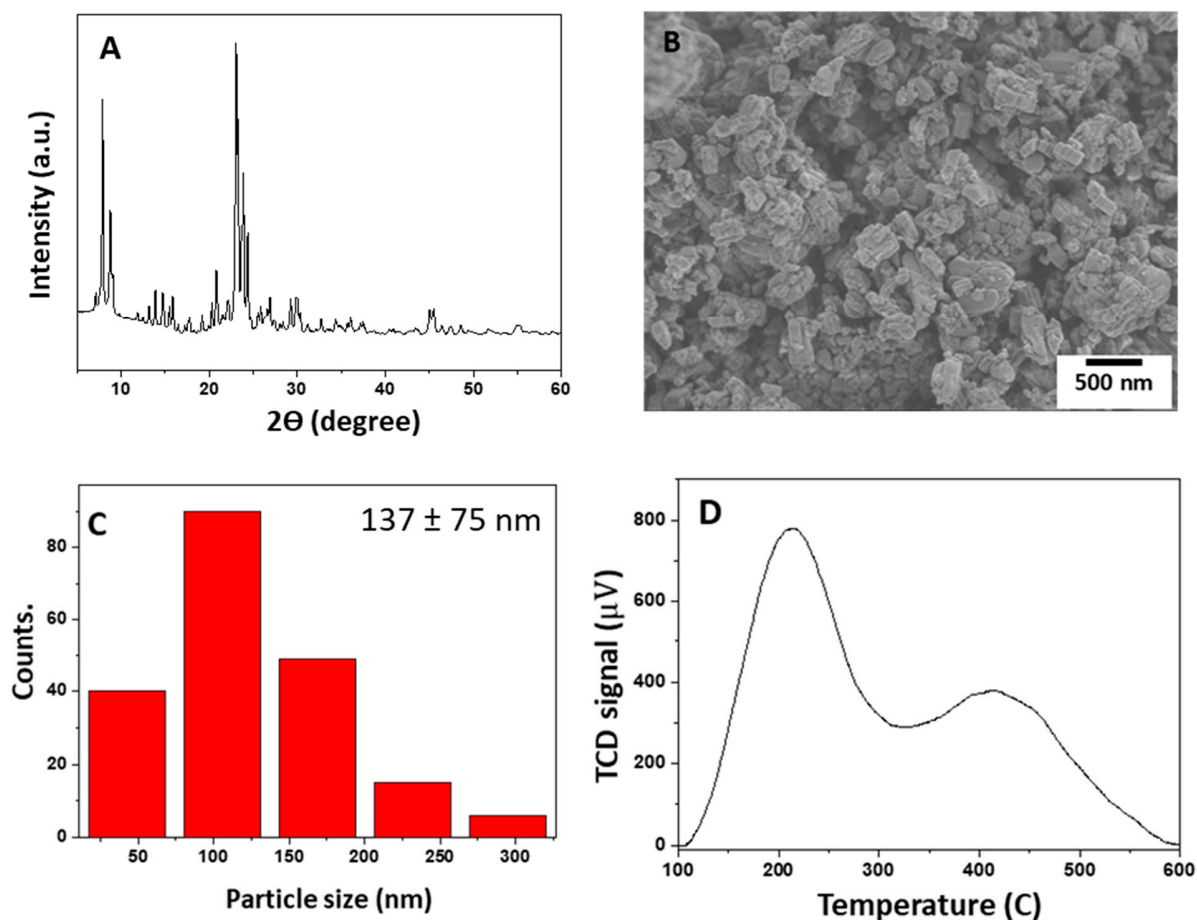
**Figure S1.** Particle size distribution of: (a) the synthesized bare Beta, (b) the in-situ synthesized Sn incorporated Beta (0.4 wt% Sn-Beta), (c) the commercial Beta (Beta-COM), and (d) the conventional ZSM-5 (ZSM-5-CON).



**Figure S2.** N<sub>2</sub> adsorption/desorption isotherms of (a) the synthesized bare Beta, and (b) the in-situ synthesized Sn incorporated Beta (0.4 wt% Sn-Beta).



**Figure S3.** NH<sub>3</sub>-TPD profiles of (a) the synthesized bare Beta, (b) the in-situ synthesized Sn incorporated Beta (0.4 wt% Sn-Beta), (c) the commercial Beta (Beta-COM), and (d) the conventional ZSM-5 (ZSM-5-CON).



**Figure S4.** (A) XRD pattern (B) SEM image, (C) Particle size distribution and (D) NH<sub>3</sub>-TPD profile of the commercial ZSM-5 (ZSM-5-COM) zeolite.

**Table S1.** Chemical compositions analyzed by XRF of the synthesized bare Beta, the in-situ synthesized Sn incorporated Beta (0.4 wt% Sn-Beta), the commercial Beta (Beta-COM), and the conventional ZSM-5 (ZSM-5-CON).

Catalysts	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	SnO <sub>2</sub>	Sn	Si/Al ratio <sup>a</sup>	Si/Sn ratio
Bare Beta	90.8	8.46	-	-	9.1	-
0.4 wt% Sn-Beta	90.8	8.90	0.96	0.40	9.4	56
Beta-COM	93.1	6.78	-	-	11.7	-
ZSM-5-CON	89.4	6.62	-	-	11.5	-

<sup>a</sup> Calculate from mole ratio of Si/Al

**Table S2.** Bronsted/Lewis acid site ratio was calculated by integrated area of main peaks.

Catalysts	Bronsted acid site (B)	Lewis acid site (L)	B/L ratio
Bare Beta	1.83	0.34	5.37
0.4 wt% Sn-Beta	2.33	0.87	2.69

**Table S3.** Acid sites density of all samples determined via the ammonia temperature-programmed desorption (NH<sub>3</sub>-TPD)

Samples/T <sub>max</sub> (°C)	Acid site density (mmol g <sup>-1</sup> ) <sup>a</sup>		
	Weak (180 °C)	Strong (300-550 °C)	Total
ZSM-5-COM	0.487	0.492	0.979

<sup>a</sup> The number of acid sites measured by NH<sub>3</sub>-TPD and analyzed by Gaussian deconvolution.