Electronic Supplementary Material (ESI) for Green Chemistry

Promoting effect of SnO_x on selective conversion of cellulose to polyols over bimetallic Pt-SnO_x/Al_2O_3 catalysts

Tianyin Deng and Haichao Liu*

Beijing National Laboratory for Molecular Sciences, College of Chemistry and Molecular Engineering, Peking University, Beijing 100871, China

Supplementary Information

Table S1 Cellulose conversion and product selectivity (not included in Table 2) on the Pt-SnO_x/Al_2O_3 catalysts with different Sn/Pt ratios.[a]

Sn/Pt	Conversion%	Selectivity%					
		Glucose	Sorbitol /Mannitol/Iditol	Arabitol /Xylitol	Erythriol /Theritol	Cellobiose alcohol	Methane
Pt/Al_2O_3	17.6	2.9	34.5/8.0/0.8	6.3/1.4	2.2/1.2	0.6	3.2
Pt-SnO_x(0.1)/Al_2O_3	16.3	0.6	68.9/7.7/1.4	4.9/2.0	1.1/0.6	1.5	3.9
Pt-SnO_x(0.3)/Al_2O_3	18.9	0.2	71.1/7.3/2.9	3.4/2.1	0.8/0.5	1.3	3.4
Pt-SnO_x(0.5)/Al_2O_3	17.1	0.5	68.4/8.6/5.7	1.6/2.5	0.7/0.4	1.6	3.7
Pt-SnO_x(1.0)/Al_2O_3	17.8	0.3	60.5/10.6/2.3	1.1/2.3	2.9/0.9	1.2	3.6
Pt-SnO_x(1.5)/Al_2O_3	19.6	0.9	36.9/4.3/2.2	1.0/1.6	3.8/1.4	0.6	3.6
Pt-SnO_x(2.1)/Al_2O_3	18.3	1.1	3.2	0.7/0.9	1.5/3.1	0.0	3.6
Pt-SnO_x(3.8)/Al_2O_3	22.5	1.3	0.8	0.0/1.6	1.1/0.0	0.0	2.6

[a] 1 g cellulose, 0.4 g catalyst, 473 K, 50 mL H_2O, 6 MPa H_2, 30 min.

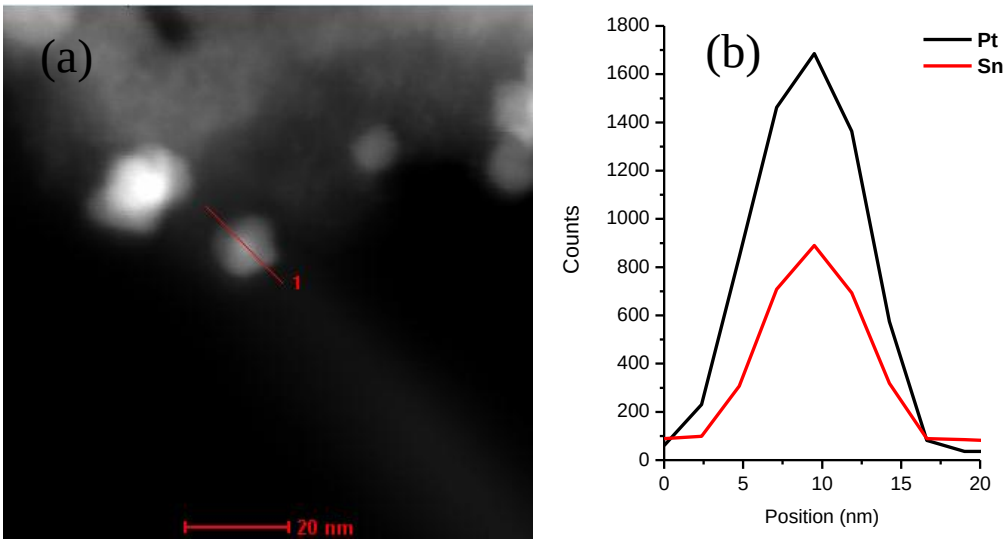

Fig. S1 The TEM image (a) and EDX patterns (b) for Pt-Sn alloy particles on Pt-SnO_x(3.8)/Al_2O_3 with a Sn/Pt atomic ratio of 3.8.

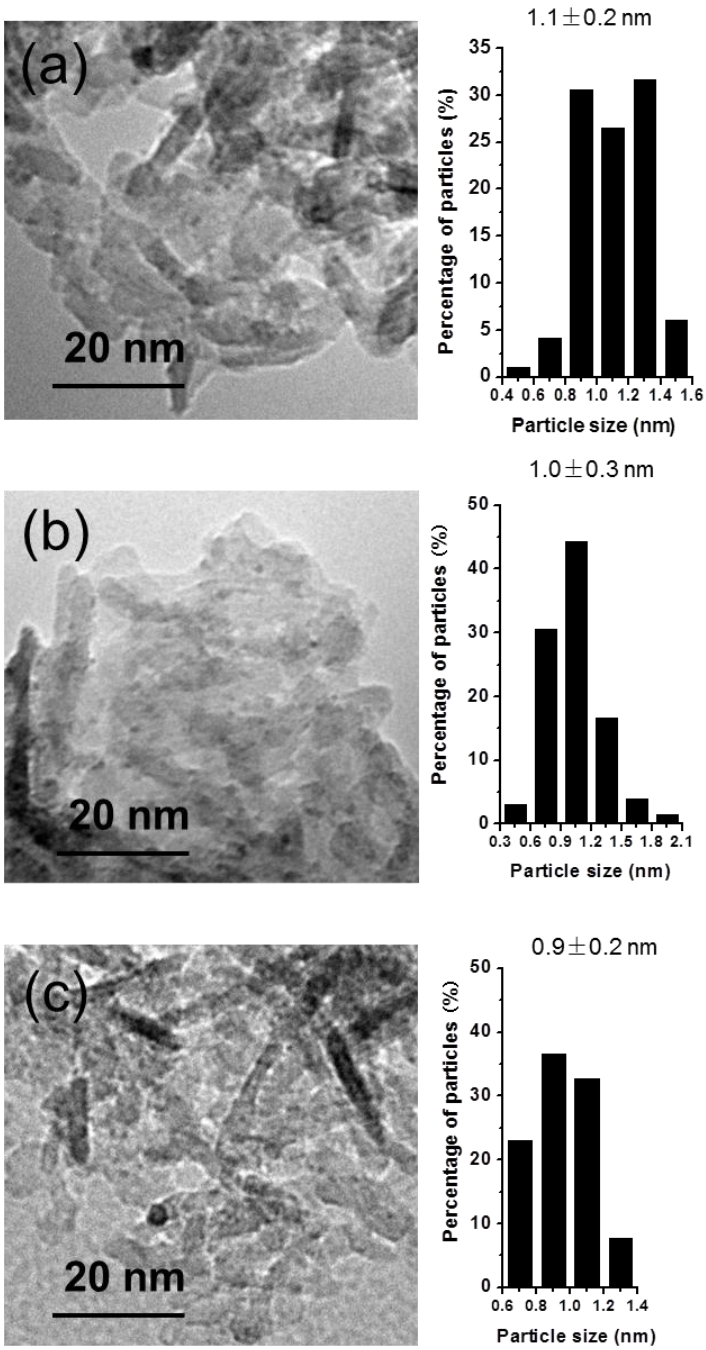

Fig. S2 TEM images and histograms of Pt particle size distributions for Pt-SnO_x/Al_2O_3 (2 wt% Pt) with different Sn/Pt atomic ratios of (a) 0.1, (b) 1.0 and (c) 2.1.

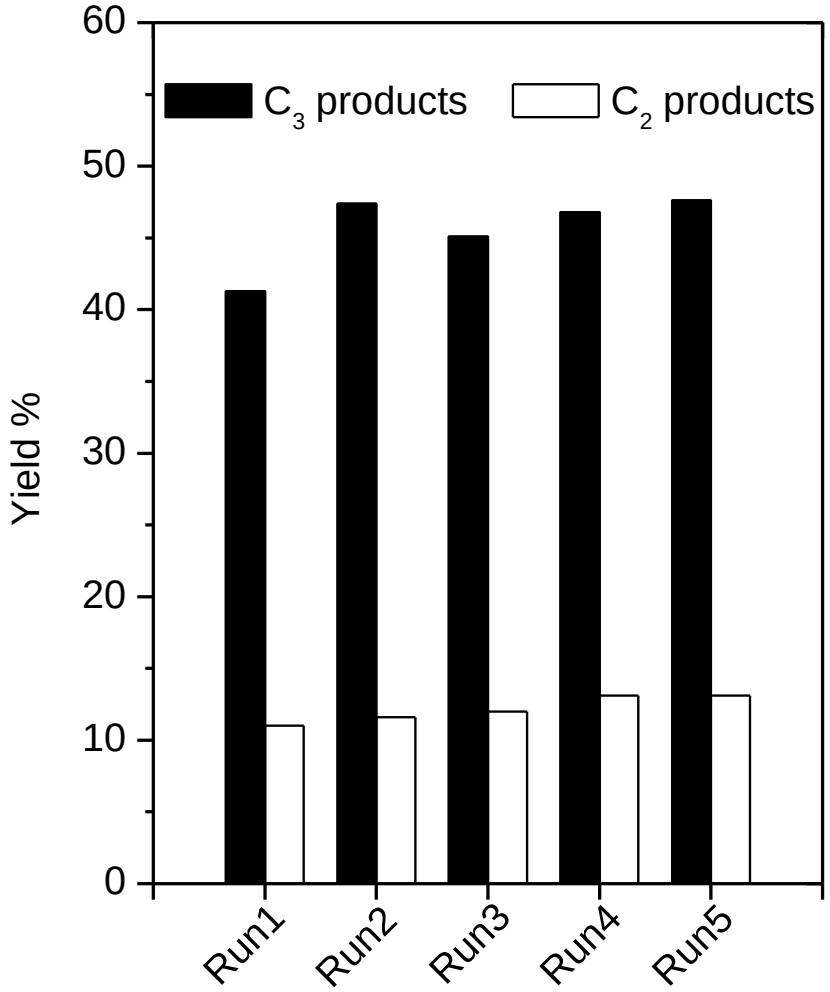

Fig. S3 Yields of C_2 (ethylene glycol and glycolic acid) and C_3 products (glycerol, 1,2-propanediol, acetol and lactic acid) for the five reaction cycles of glucose reaction (at ~100% conversion) on Pt-SnO_x(3.8)/Al_2O_3. Reaction conditions: 0.2 g glucose, 0.4 g Pt-SnO_x(3.8)/Al_2O_3 (~2 wt% Pt), 50 mL H_2O, 473 K, 6.0 MPa H_2, 30 min.

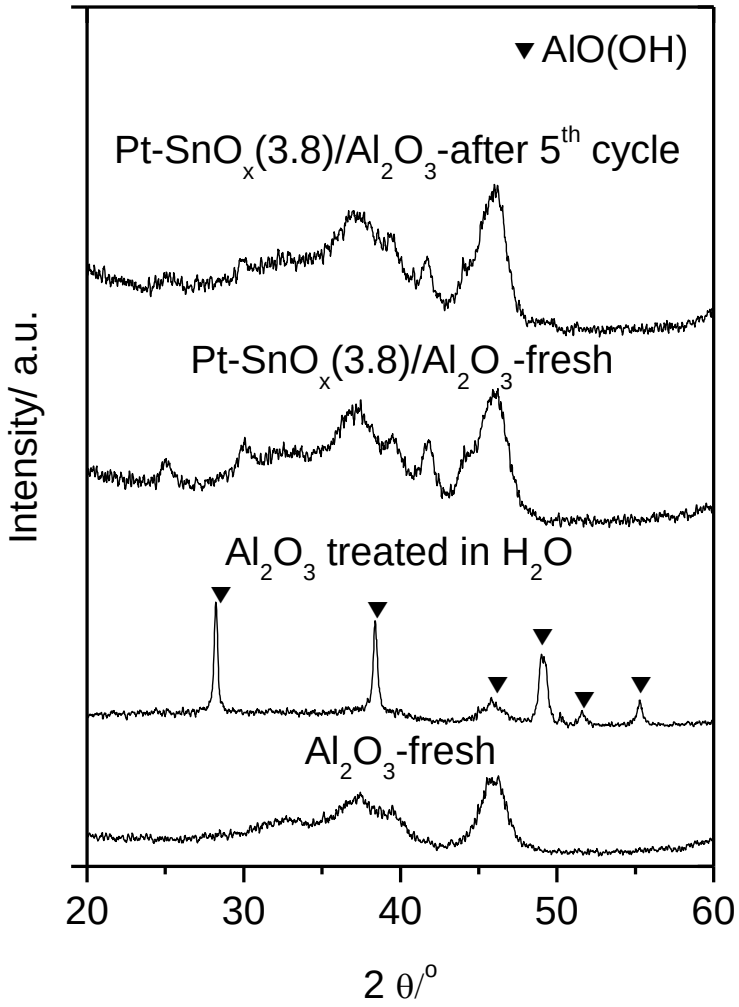

Fig. S4 XRD patterns of Pt-SnO_x(3.8)/Al_2O_3 (~2 wt% Pt) before and after five reaction cycles in glucose reaction, and of Al_2O_3 before and after hydrothermal treatment at 473 K and 6 MPa H_2 for 30 min.