

Supplementary Information

Noncrystalline Ni-P-B Nanotubes for Hydrogenation of *p*-Chloronitrobenzene

Min Mo, Ling Han, Jiangan Lv, Yan Zhu, Luming Peng, Xuefeng Guo and Weiping Ding*

Catalyst preparation: The Ni-B nanotubes were prepared by Tween 60 instead of Tween 40. NiCl₂•6H₂O (0.005 mol, 1.18 g) was dissolved in H₂O (9 mL) with CSA (0.005 mol, 1.16 g) and Tween 60 (0.005 mol, 6.15 g) at 333 K. The mixture was then cooled to around 298 K. The solution of 4 M NaBH₄ and 0.1 M NaOH was added to the mixture. The Ni-P-B nanoparticles were prepared with only CSA (without Tween 40) in 50 ml water solution.

Catalytic test and analysis: Hydrogenation of *p*-chloronitrobenzene was used to measure the catalytic performance. The 100 ml reactor was charged with 2.5 mmol of catalyst and 2.50 g of *p*-CNB in 60 mL of absolute ethanol solution. When the designated temperature (353 K) was reached, hydrogen was fed to the predetermined pressure (1.2 MPa) (time zero) that was maintained throughout the reaction. During the run, samples were withdrawn periodically and analyzed by SHIMADZU GC-2014 gas chromatograph.

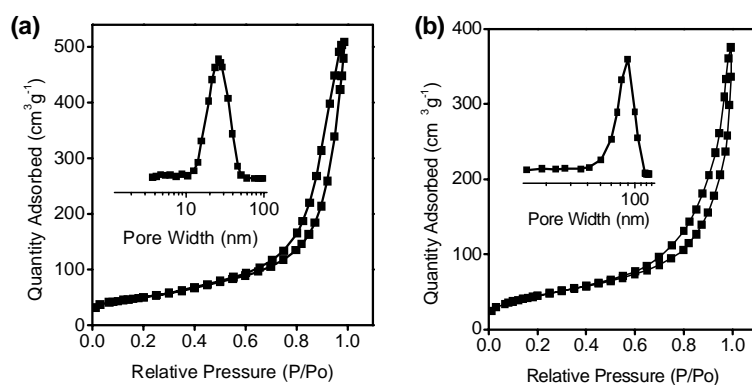


Fig. S1 Nitrogen adsorption isotherms of Ni-P-B nanotubes with the diameter of (a) 20-25 nm and (b) 80-89 nm measured at 77 K; the insets show the corresponding pore size distribution curves.

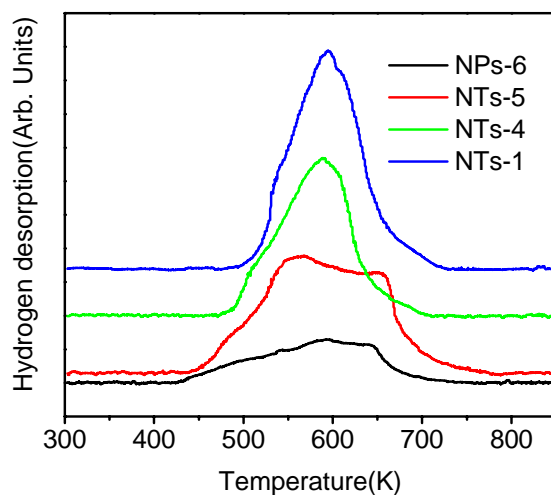


Fig. S2 H₂-TPD curves of the NTs-1, NTs-4, NTs-5 and NPs-6 catalysts.

Table S1 Activities and physical property changes after every cycle of NiPB NTs-1 and NiB NTs-5.

	NiPB NTs-1				NiB NTs-5			
	S _{BET} (m ² g ⁻¹)	Pore size (nm)	Pore volume (cm ³ g ⁻¹)	Conversion ^[a] (%)	S _{BET} (m ² g ⁻¹)	Pore size (nm)	Pore volume (cm ³ g ⁻¹)	Conversion ^[b] (%)
Cycle 1	120.6	23.8	0.79	97	94.0	61.0	0.63	80
Cycle 2	119.8	24.0	0.76	95	94.2	61.6	0.63	75
Cycle 3	118.6	24.1	0.73	91	81.1	62.8	0.55	60
Cycle 4	115.4	25.3	0.70	85	60.4	65.7	0.45	20
Cycle 5	109.2	25.8	0.70	79	40.9	69.1	0.35	12

[a] the conversion is within 60 min of *p*-CNB catalyzed by NiPB NTs-1; [b] the conversion is within 120 min of *p*-CNB catalyzed by NiB NTs-5.