Supporting information

An aqueous synthesis of porous PtPd nanoparticles with reversed bimetallic structures for highly efficient hydrogen generation from ammonia borane hydrolysis

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Fig. S1 (a) EDX spectra and (b) XRD patterns of the porous $Pt_{25}Pd_{75}$ NPs prepared in the presence of [C₁₆mim]Cl.



Fig. S2 (a) FT-IR spectra of $[C_{16}mim]Cl$, glycine and purified $Pt_{25}Pd_{75}$ NPs, and (b) TGA curve of purified $Pt_{25}Pd_{75}$ NPs.



Fig. S3 TEM images of the PtPd products prepared with 0.5 mL of AA ascorbic acid as reducing agent at different concentrations: (a) 38 M, (b) 75 mM, (c) 110 mM and (d) 150 mM.



Fig. S4 UV-vis spectra of glycine, H_2PtCl_6 and glycine, and Na_2PdCl_4 and glycine in aqueous solution.



Fig. S5 XPS spectra of (a) Pd 3d and (b) Pt 4f in the porous PtPd NPs prepared at different molar ratios.



Fig. S6 (a) N_2 adsorption-desorption isotherms and (b) pore diameter distribution of the porous $Pt_{25}Pd_{75}$ NPs with Pt-on-Pd structure.



Fig. S7 TEM images of (a,b) porous $Pt_{25}Pd_{75}$ NPs and (c,d) commercial Pt/C catalyst (a,c) before and (b,d) after five cycles for catalyzing ammonia borane hydrolysis; the inset of (b) shows the HRTEM image of porous $Pt_{25}Pd_{75}$ NPs after five cycles.



Fig. S8 XPS spectra of (a) Pd 3d and (b) Pt 4f in the porous $Pt_{25}Pd_{75}$ NPs after five cycles.

Catalyst	Metal/AB molar ratio	TOF (mol _{H2} /mol _{metal} /min)	Ea (kJ/mol)	Ref
Pt ₂₅ Pd ₇₅ NPs	0.0035	69.8	29.1	this work
PdPt cubic NPs	0.002	50	21.8	[1]
PdPt spherical NPs	0.002	22.5	57.3	[1]
Nanoporous Pt70Ru30	0.001	59.6	38.9	[2]
Cu ₄₈ Pd ₅₂ /C	0.072	53.2	-	[3]
PAN Pd-Pt alloy NPs	0.0095	51.9	-	[4]
PtTi alloys	0.0154	51.4	39.4	[5]
PAN Ag/Pd NPs	0.022	6.29	-	[6]
RGO/Pd	0.04	6.25	51±1	[7]
AuCo/XC-1	0.02	42.1	-	[8]
AuCo/CNT-1	0.02	36.05	38.82	[9]
AuCo/CNT-2	0.02	8.47	34.83	[9]
Au@AuCo/CNT	0.02	13.24	41.91	[9]
AuCo@MIL-101	0.0006	23.5	-	[10]
Pd@Co/Graphene	0.02	40.9	-	[11]

Table S1 TOF and Ea values for ammonia borane hydrolysis to produce hydrogen

 catalyzed by different catalysts.

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