Supporting Information

Pt Nanoparticles Supported on Mesoporous Graphitic Carbon Nitride as Catalysts for Hydrolytic Dehydrogenation of Ammonia Borane

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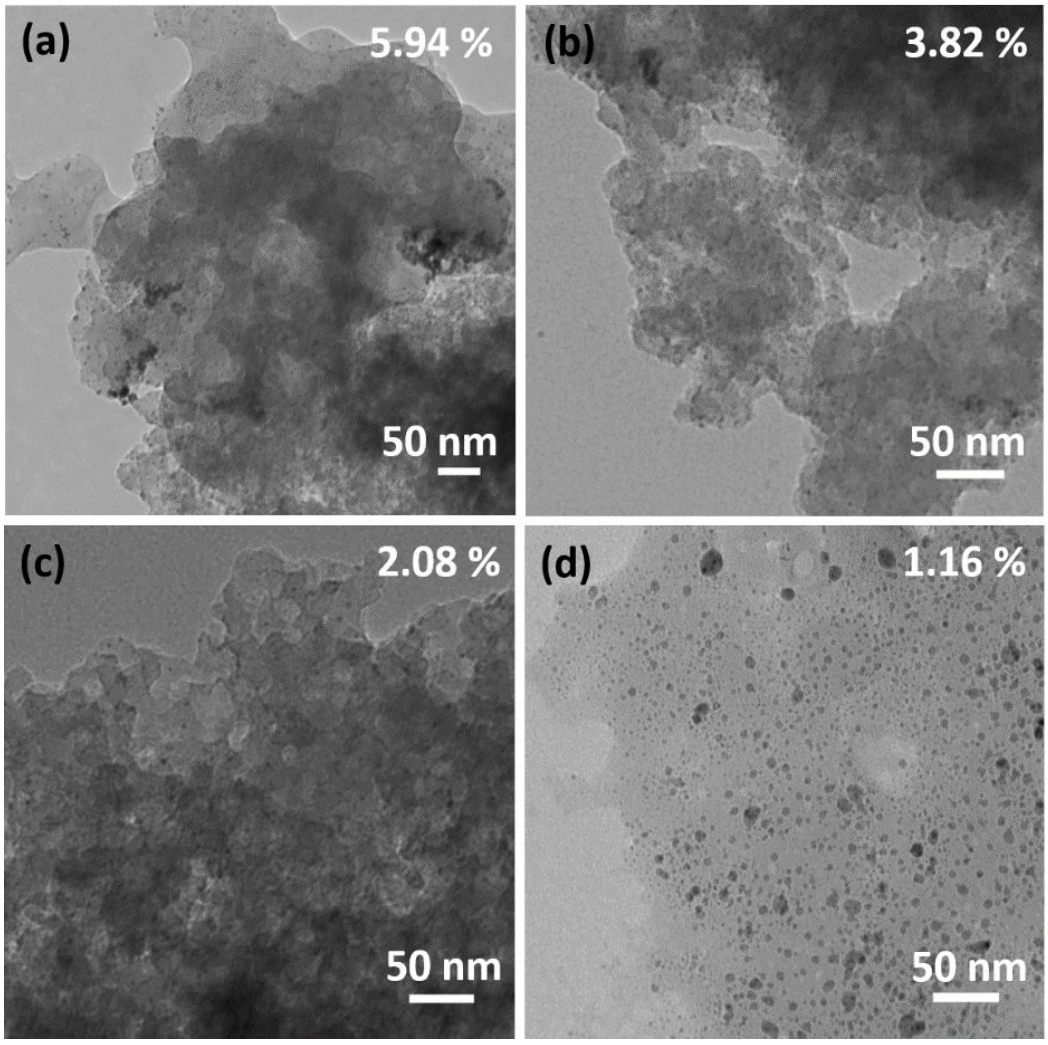

Figure S1. TEM images of mpg-CN /Pt nanocomposites with different experimental Pt loadings (a) 5.94 **wt%, (b)** 3.82 **wt%, (c)** 2.08 wt% and **(d)** 1.16 wt% Pt.

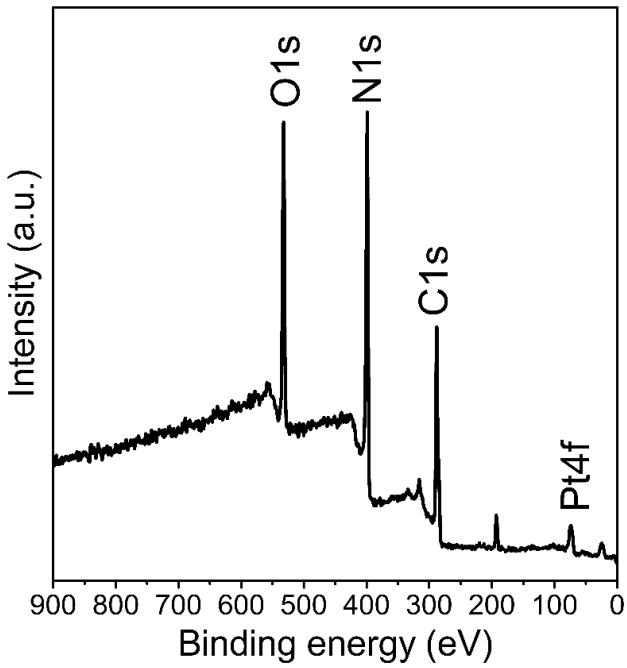

Figure S2. XPS survey spectrum of mpg-CN/Pt nanocatalysts (3.82 wt% Pt loading).

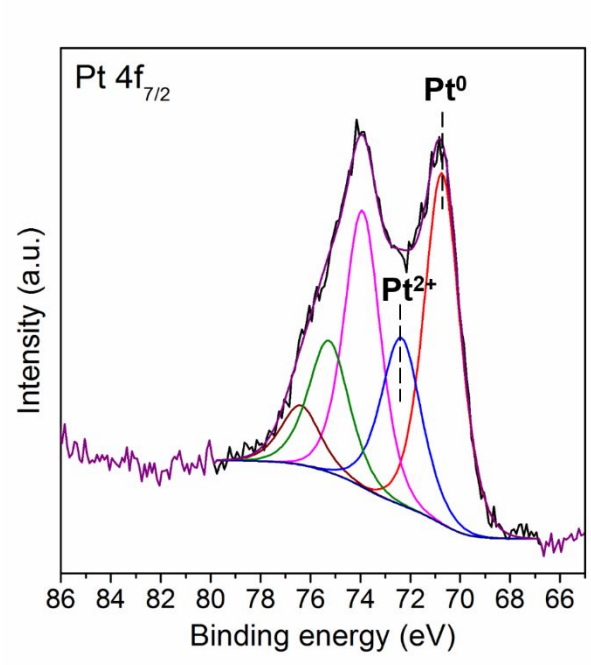

Figure S3. Pt $4f_{7/2}$ XPS spectra of mpg-CN/Pt nanocatalysts reduced by Sodium Borohydride instead of Ammonia Borane.

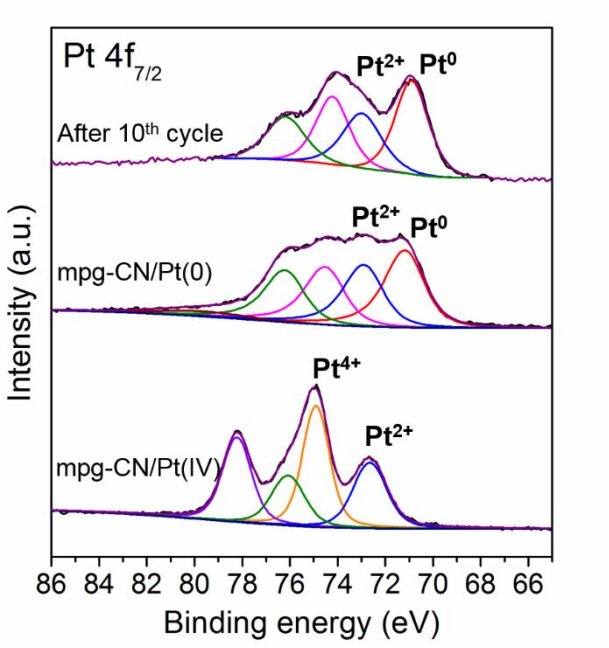

Figure S4. Pt $4f_{7/2}$ XPS spectra of mpg-CN/Pt (IV) composite (3.82 wt% Pt loading) before AB dehydrogenation, after AB dehydrogenation, together with the same catalyst after 10th run reusability test.

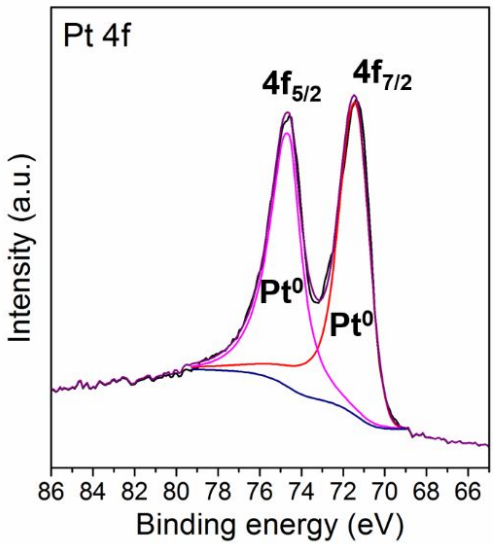

Figure S5. Pt 4f XPS spectra of rGO/Pt (0) nanocatalysts reduced by AB.

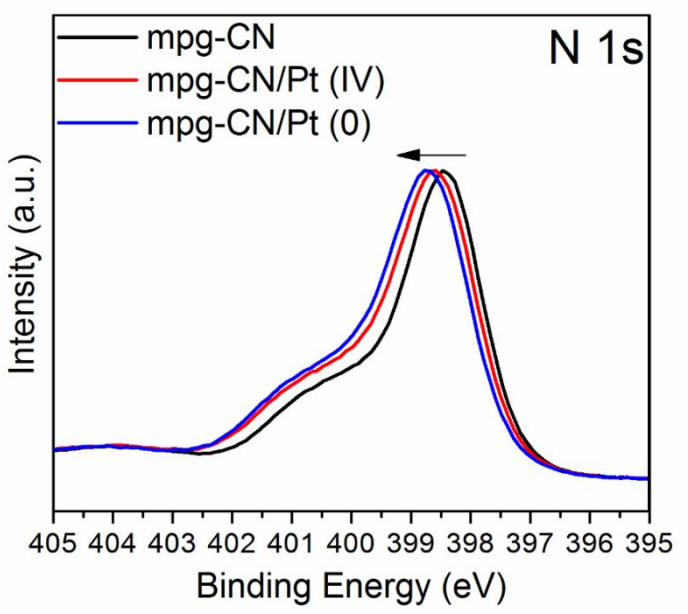

Figure S6. High-resolution XPS spectra of N1s region of mpg-CN, mpg-CN/Pt (IV) composite and mpg-CN/Pt nanocatalysts (3.82 wt% Pt loading)

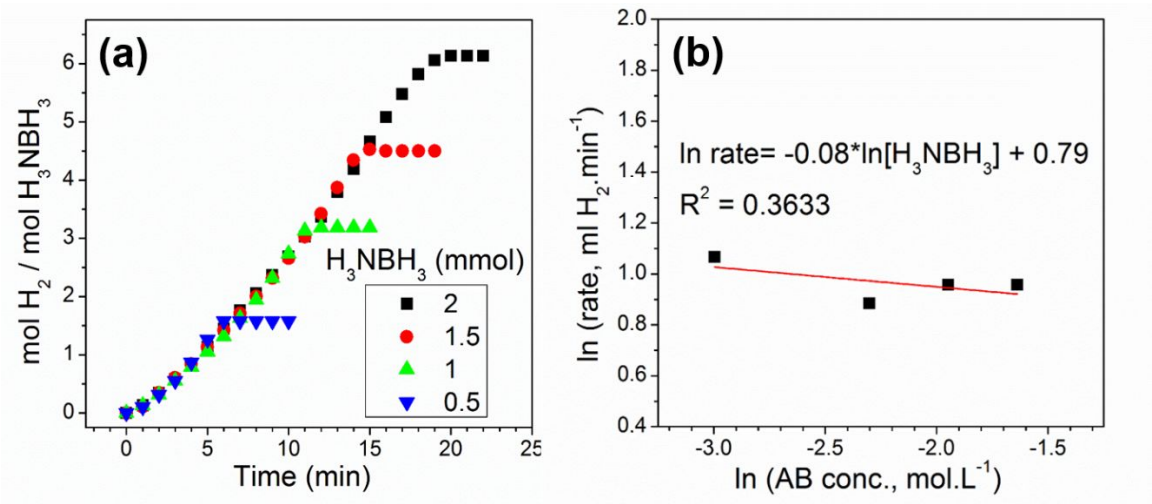

Figure S7: Plot of volume of H_2 generated from AB hydrolysis catalyzed by mpg-CN/Pt nanocatalysts (3.82 wt% Pt loading) versus time at reaction conditions: [AB] = 50-200 mM, T = 25 °C, [Pt] = 0.2 mM **(a)** and logarithmic plots of H_2 generation rate versus AB concentrations **(b)**.

Table S1. Pt loading weight percent (w/w %) of mpg-CN/Pt composites experimentally and by ICP-MS.

Pt loading experimentally (w/w %)	Pt loading by ICP-MS (w/w %)
10	5.94
5	3.82
2.5	2.08
1.25	1.16

Table S2. The corresponding binding energy values for each nanocomposite.

N groups	mpg-CN	mpg-CN/Pt (IV)	mpg-CN/Pt (0)
C=N-C	398.47	398.58	398.68
$N(-C-)_3$	399.87	399.98	399.98
$(–C–NH_2)$	400.97	401.08	401.08

Table S3. Catalytic activity of reported platinum based catalysts used for the hydrolysis of AB together with the percentage of initial catalytic activity maintained after the reusability test.

Entry	Catalyst	E_a (kJ/mol)	TOF (min^{-1})	Cycle number	Maintaining initial Catalytic Activity	Ref.
1	SiO_2@$Pt_{0.1}Co_{0.9}$	37.05	25.59	5	70	[1]
2	$Pt_{12}Ni_{48}$ DENS		32			[2]
3	Pt(8%)/CCF-500	39.2	35.0			[3]
4	SNP-$Pt_{65}Ti_{35}$	39.4	51.4	5	63	[4]
5	NP-$Pt_{70}Ru_{30}$	38.9	59.6	5	70	[5]
6	Pt-CeO_2/rGO NCs	64.7	93.8	10	92	[6]
7	$Cu_{50}Pt_{50}$ NPs	36	102.5	3	75	[7]
8	hnp–$Pt_{35}Cu_{65}$	40.5	108	5	68	[8]
9	Pt/C		111			[9]
10	PC3/SAG	30.2	123.1	2	100	[10]
11	PdPt @PVP NPs	51.7	125.0	5	61	[11]
12	NP–$Pt_{40}Co_{60}$/Co_3O_4 composite	38.8	131	5	65	[12]
13	Pt@PC-POP	56.4	133.2 (at 35 ^oC)	8	96	[13]
14	Pt/CNT-G	35.34	135			[14]
15	Pt@CF-12	30.7	139.3	4	100	[15]
16	Pt@SiO_2		158.6	5	100	[16]
17	Pt/CeO_2		182			[17]
18	**mpg-CN/Pt (3.82 %)**	**40.7**	**202.89**	**10**	**78**	**This study**
19	Pt/ γ -Al_2O_3	21	222			[18]
20	**mpg-CN/Pt (5.94 %)**		**274.18**			**This study**
21	Pt–Ru@PVP NPs	56.3	308.0	5	72	[19]
22	Pt20/CNT (by ALD)	48.3	416.5	4	40	[20]
23	Pt-Co@PG	32.79	461.17	5	81.2	[21]
24	3 wt%Pt-3 wt%Ru/CNT	36	547			[22]
25	Pt/CNTs-O-HT		567 (at 30 ^oC)			[23]
26	PtCo20/CNTs (by ALD)	42.5	675.1			[24]
27	$Cu_{68}Pt_{32}$/KB	39	859	5	75	[25]
28	PtNi/NiO	43	1240.3			[26]
29	Pt@NiO/Ni-CNT	24.9	2665			[27]

DENS=dendrimer-encapsulated nanoparticles, CCF=cotton derived carbon fiber, SNP=Stratified nanoporous, NC=nanocomposite, hnp= hierarchical nanoporous, PC/SAG=Platinum-Cobalt/ Mesoporous Silica Aerogel, PVP= Poly(N-vinyl-2-pyrrolidone), POP=Porous Organic Polymer, CNT-G= carbon nanotube-graphene, CF-12=Carboxylic acid Functionalized Cage-Type Mesoporous Silica FDU-12, CNTs-O-HT= carbon nanotubes acid oxidation and high temperature treated, ALD= Atomic Layer Deposition, PG= Nanoporous graphene, KB= Ketjen Black

Table S4: Catalytic activity of reported mpg-CN based catalysts used for the hydrolysis of AB together with the percentage of initial catalytic activity maintained after the reusability test.

Entry	Catalyst	E_a (kJ/mol)	TOF (min^{-1})	Cycle number	Maintained Activity	Ref.
1	Ni/g-C_3N_4	36	18.7	4	75	[28]
2	Pd(0)/g-C_3N_4-CS	35.3	27.7 (at 30 ^oC)	8	72.9	[29]
3	Co/ g-C_3N_4		55.6			[30]
4	mpg-C_3N_4/Pd	53.6	66.3	5	75	[31]
5	FeCo/g-C_3N_4		68.2			[30]
6	CuCo/g-C_3N_4		75.1			[30]
7	$Cu_{0.4}Co_{0.6}MoO_4$/g-C_3N_4	14.46	75.7			[32]
8	$Ni_{0.5}Co_{0.5}$O-NCN	43.18	76.1	6	83.2	[33]
9	mpg-C_3N_4@$Ag_{42}Pd_{58}$-AAt	28.2	94.1	5	70	[34]
10	**mpg-CN/Pt (3.82 %)**	**40.7**	**202.89**	**10**	**77.5**	**This study**
11	$Pd_{74}Ni_{26}$/MCN	54.1	246.8			[35]
12	$Ag_{0.1}Co_{0.9}$/ g-C_3N_4	40.91	249.02	5	52	[36]
13	**mpg-CN/Pt (5.94 %)**		**274.18**			**This study**
14	Rh/g-C_3N_4	24.2	969	4	44.2	[37]
15	Au-Co@CN		2897			[38]

CS=Chitosan, NCN= Nitric-acid treated Carbon Nitride, AAt= Acetis acid treated, MCN= Mesoporous Carbon Nitride,

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