Photoinduced In-Situ Deposition of Uniform and Well-Dispersed PtO_2 Nanoparticles on ZnO Nanorods for Efficient Catalytic Reduction of 4-Nitrophenol

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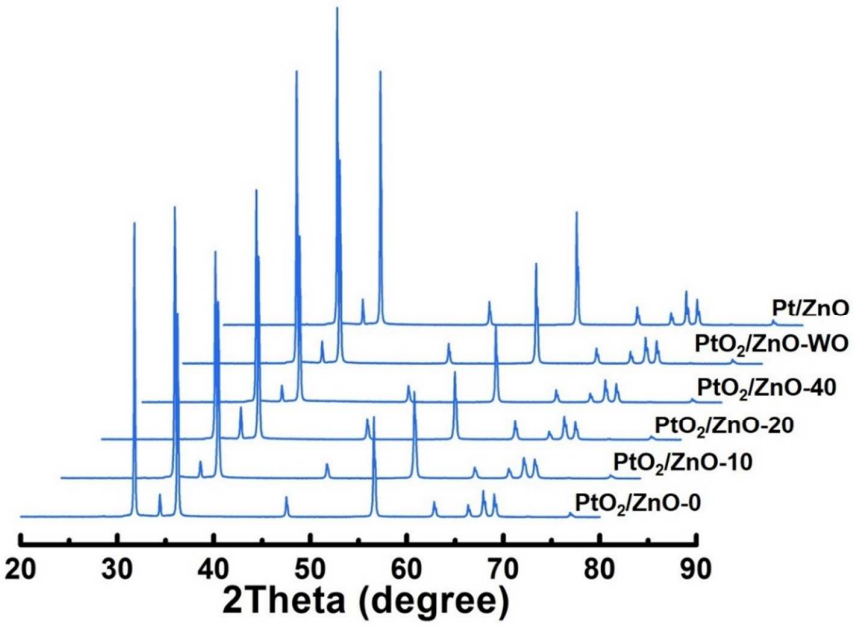

Figure S1. XRD patterns of PtO_2/ZnO-0, PtO_2/ZnO-10, PtO_2/ZnO-20, PtO_2/ZnO-40, PtO_2/ZnO-WO and Pt/ZnO.

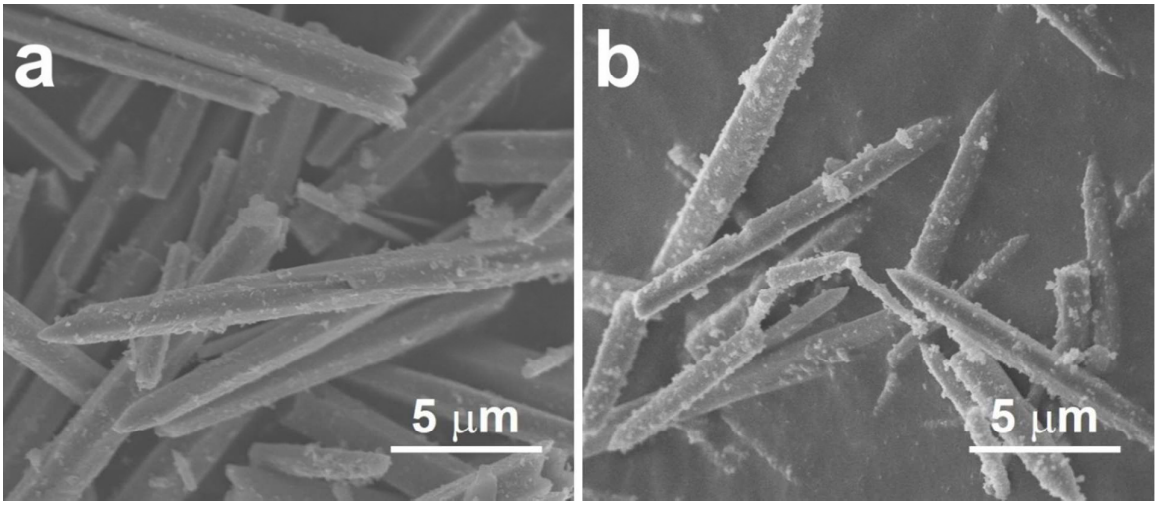

Figure S2. Typical SEM images of (a) PtO_2/ZnO-WO and (b) Pt/ZnO.

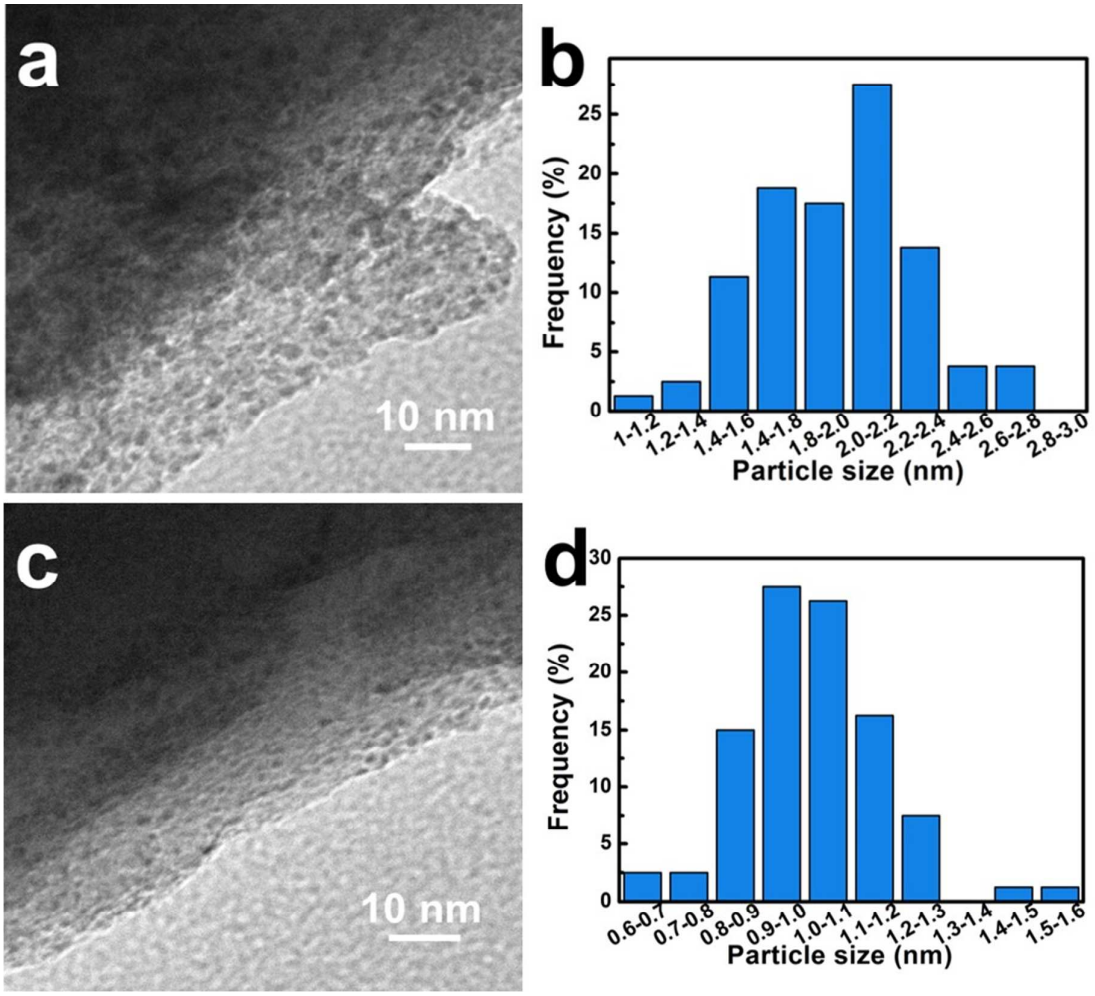

Figure S3. TEM images of (a) PtO_2/ZnO-WO and (b) Pt/ZnO; Size distributions of particles in (c) PtO_2/ZnO-WO and (d) Pt/ZnO.

Table S1. PtO_2 loading, reaction constants, and TOF of various catalysts involved in this work for the reduction of 4-NP [a]

Catalyst	PtO_2 loading (wt %)		k (min^{-1})	TOF [d] ($mmol \cdot g^{-1} \cdot s^{-1}$)
	Theoretical value	Practical value [b]		
PtO_2/ZnO-0	3.38	0.17	0.005	7.06
PtO_2/ZnO-10	3.38	1.40	0.172	30.62
PtO_2/ZnO-20	3.38	2.38	0.209	22.78
PtO_2/ZnO-30	3.38	2.80	0.521	27.43
PtO_2/ZnO-40	3.38	2.77	0.191	16.63
PtO_2/ZnO-WO	3.38	1.90	0.225	23.04
Pt/ZnO [c]	2.90	1.87	0.063	15.67

[a] Reaction conditions: 3 mg catalysts, 25 μL 4-NP (0.01 M) and 2.5 mL $NaBH_4$ (0.01M); [b] Practical PtO_2 loading is obtained by ICP-OES; [c] Theoretical and practical data of Pt/ZnO are Pt loading; [d] TOF is calculated by experimental results at 6.25 min of reaction time.

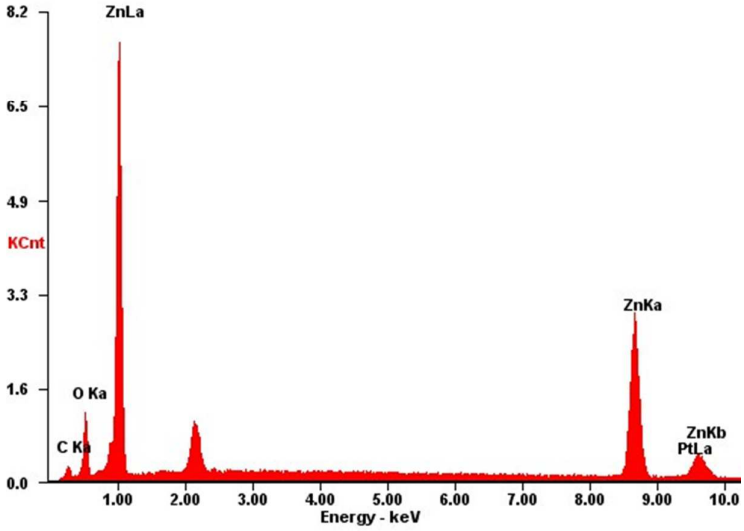

Figure S4. EDS of PtO_2/ZnO-30.

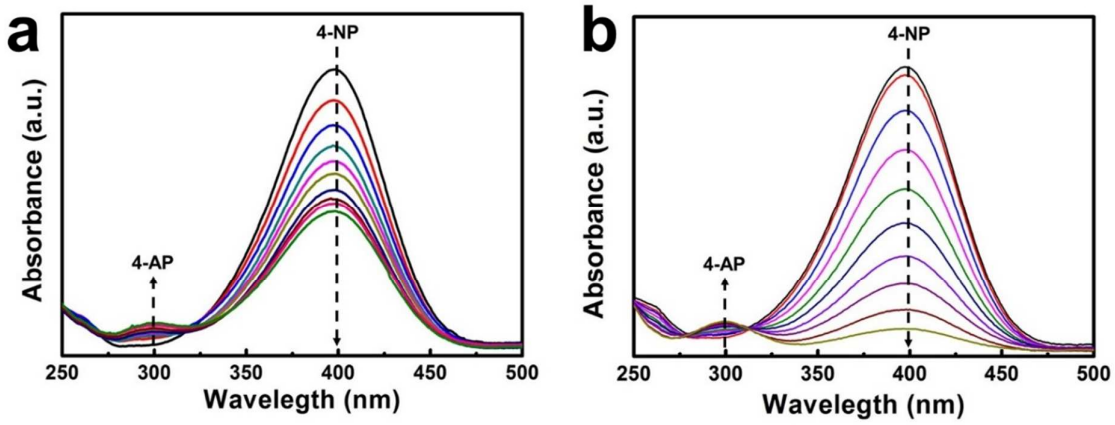

Figure S5. Reduction of 4-NP solution recorded every 1.25 min over 3.0 mg of (a) Pt/ZnO and (b) PtO_2/ZnO-WO.

Table S2. Catalytic performance of various materials reported for the reduction of 4-NP

Catalyst	k (min^{-1})	k_n ($min^{-1}g^{-1}$) [a]	Reference
PtO_2/ZnO-30	0.52	6.19	this work
Pt/Fe_2O_3 MF	0.24	5.85	*Catal. Comm.*, 2017, **100**, 214-218
PtPd/Fe_3O_4@C	1.21	5.34	*ACS Appl. Mater. Interfaces*, 2014, **6**, 2671-2678
Pd/CPM	4.18	2.09	*J. Mater. Chem. A*, 2014, **2**, 16015-16022
Ir/IrO_x	0.15	0.19	*ACS Appl. Mater. Interfaces*, 2015, **7**, 16738-16749
Co/NCC	2.82	3.53	*Chem. Eng. J.*, 2016, **298**, 183-190
$Ni_{0.22}$/CB	0.60	2.71	*Appl. Catal. B: Environ*, 2016, **180**, 408-415

[a] k_n is the normalized rate constant of various catalysts in terms of their active species amount.

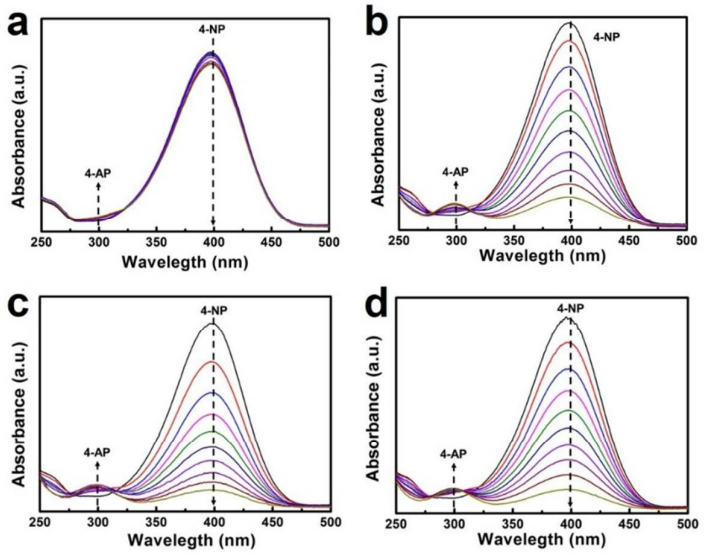

Figure S6. Reduction of 4-NP solution recorded every 1.25 min over 3.0 mg of (a) PtO_2/ZnO-0, (b) PtO_2/ZnO-10, (c) PtO_2/ZnO-20, and (d) PtO_2/ZnO-40.

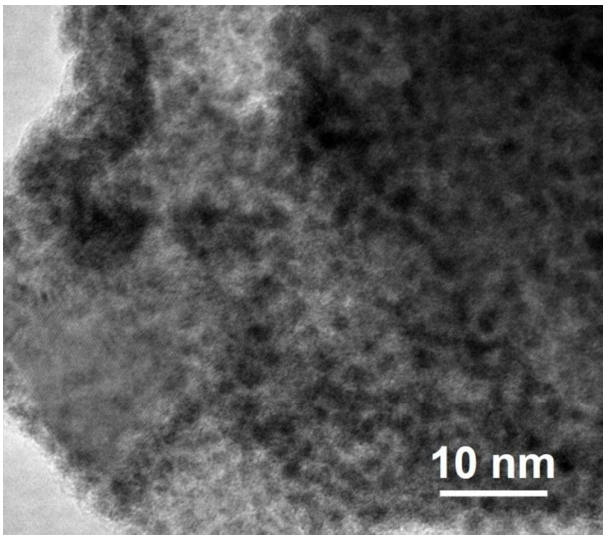

Figure S7. TEM images of PtO_2/ZnO-40.