

## Supporting Information

A facile one-step way to anchor noble metal (Au, Ag, Pd) nanoparticles on the reduced graphene oxide mat with catalytic activity for selective reduction of nitroaromatic compounds

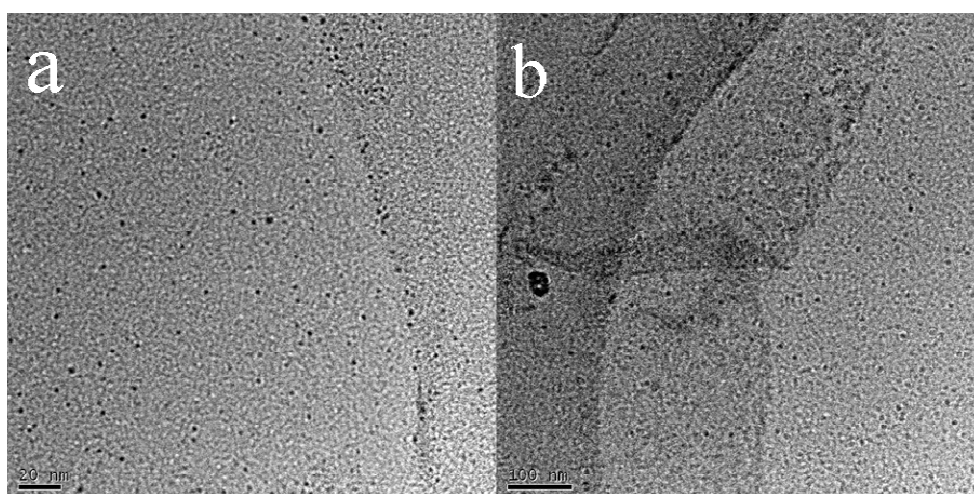
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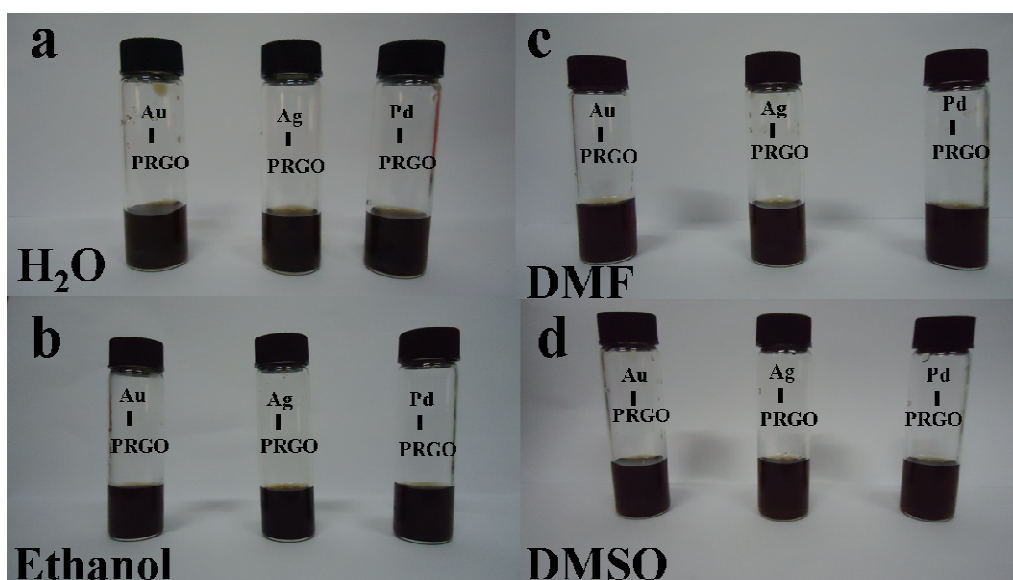
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**Preparation of PVP-protected noble metal Au and Pd colloids.**

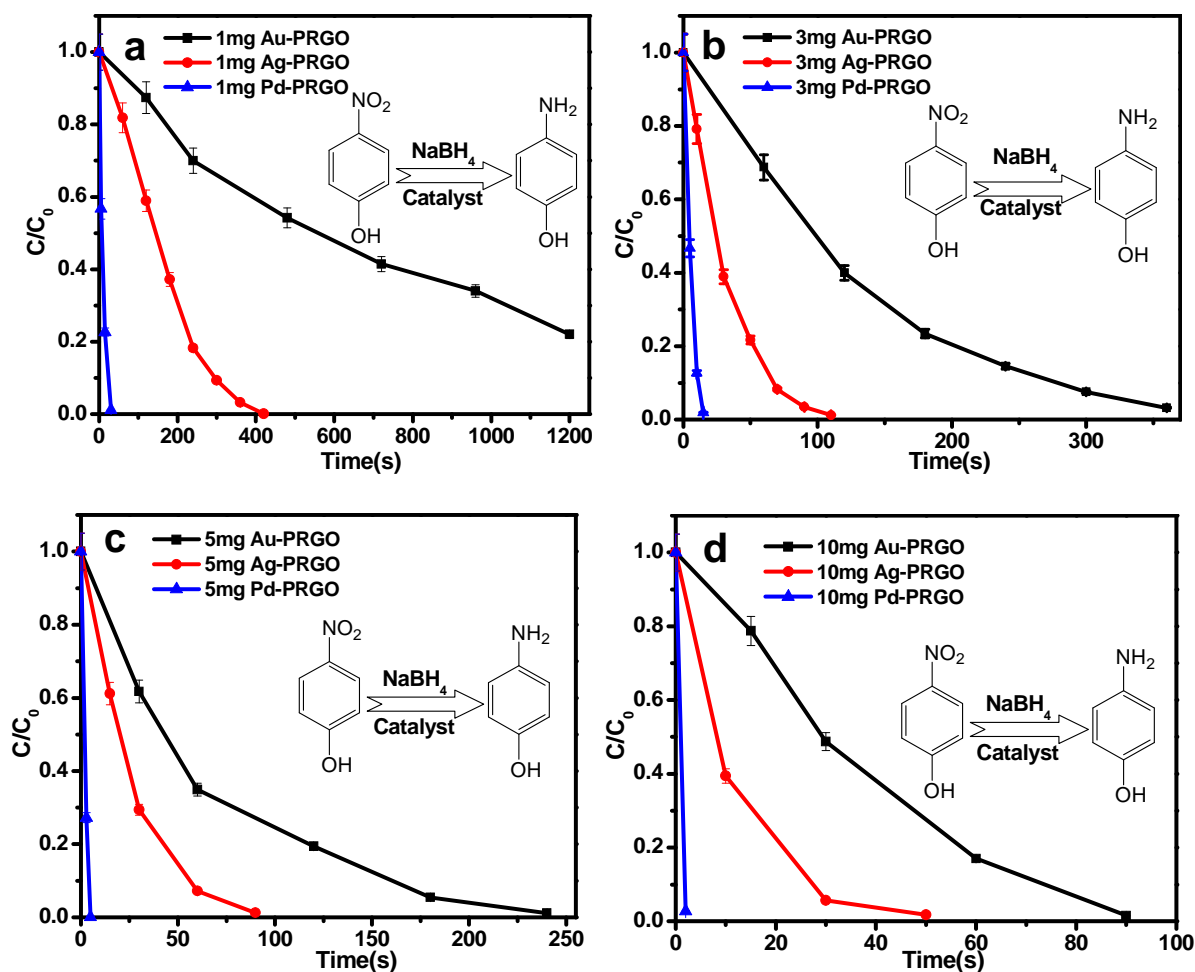
Typically, 10 mL of 2.0 mM noble metal precursors solution ( $\text{HAuCl}_4$ ,  $\text{H}_2\text{PdCl}_4$ ), 30 mL of  $\text{H}_2\text{O}$  and 0.0889 g of PVP (average molecular weight of PVP 40 000) was mixed homogeneously. Then, 2.4 mL of 0.1 M  $\text{NaBH}_4$  aqueous solution was added to the above solution quickly. After that, the mixture was stirred for 5 h and the resulting solution of Au and Pd colloids protected by PVP was obtained.



**Fig. S1** TEM images of the as-synthesized Au-PRGO nanocomposites.



**Fig. S2** Photographs of the as-synthesized Au, Ag, Pd-PRGO nanocomposites redispersed in deionized water, ethanol, N,N-dimethylformamide (DMF) and dimethyl sulfoxide (DMSO).

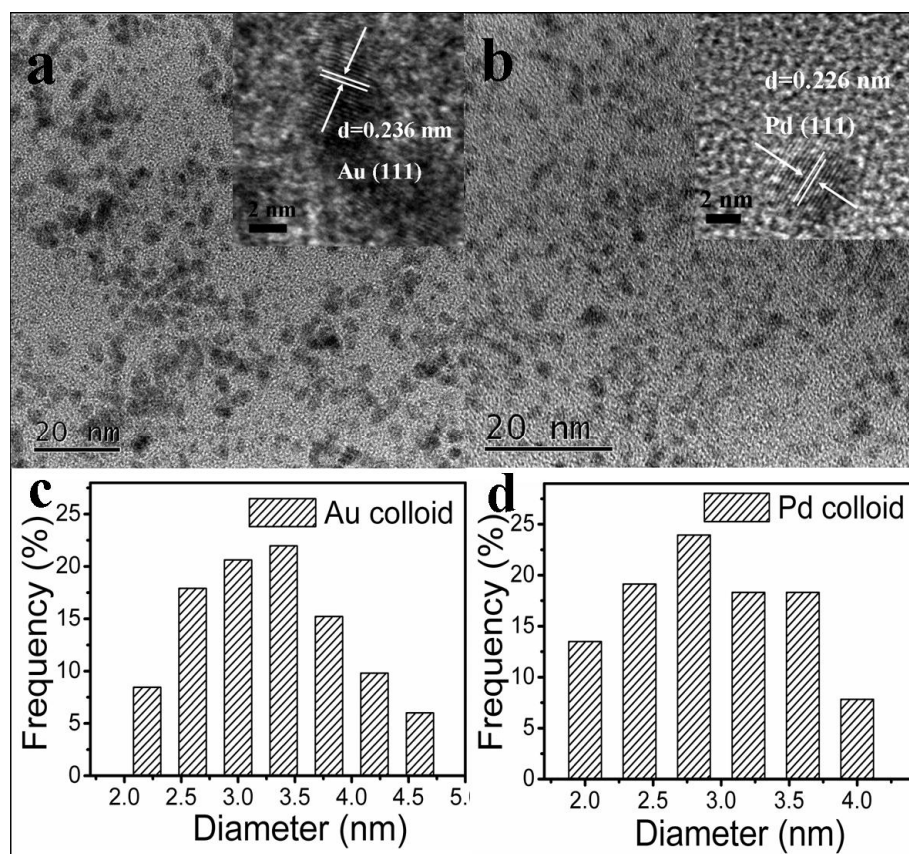


**Fig. S3** Catalytic activity for reduction of 4-nitrophenol (4-NP) to 4-aminophenol (4-AP) over Au, Ag, Pd-PRGO nanocomposites with different catalyst loadings at room temperature.

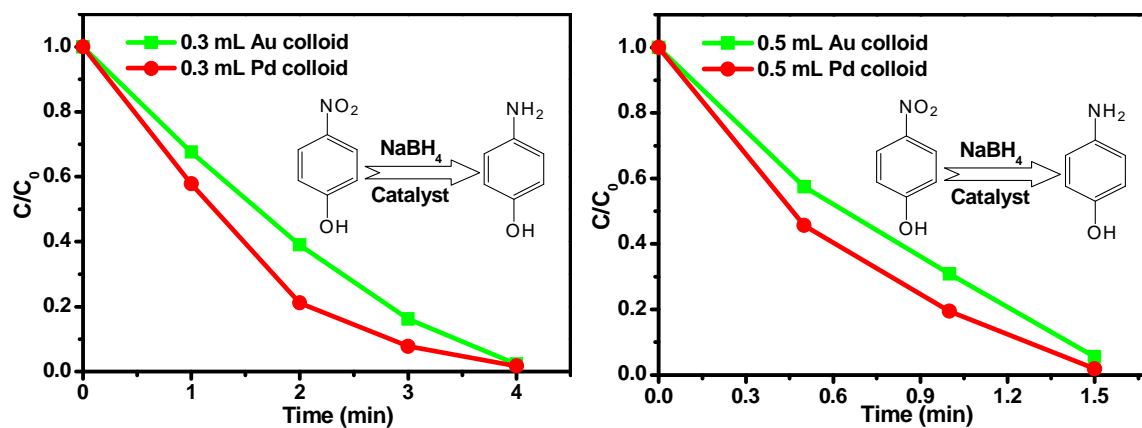
**Table S1:** Catalytic activities comparison of Au, Ag, Pd-PRGO for the reduction of 4-nitrophenol (4-NP) with other supported Au, Ag and Pd catalysts in literatures.

Samples	Catalyst (mg)	4-NP (mmol)	Metal	Main size distribution	$k/s^{-1}$	Reference
Au-PRGO	3	$3.0 \times 10^{-3}$	Au	1-30 nm	$8.77 \times 10^{-3}$	This work
Ag-PRGO	3	$3.0 \times 10^{-3}$	Ag	3-10 nm	$3.74 \times 10^{-2}$	This work
Pd-PRGO	3	$3.0 \times 10^{-3}$	Pd	0.5-3 nm	$2.4 \times 10^{-1}$	This work
Au/PMMA	3.5	$1.35 \times 10^{-3}$	Au	2-11 nm	$7.9 \times 10^{-3}$	Ref.S1
Spongy Au	6	$3.0 \times 10^{-4}$	Au	20-140 nm	$2.1 \times 10^{-3}$	Ref.S2
Ag/HLaNb <sub>2</sub> O <sub>7</sub>	3	$5.0 \times 10^{-3}$	Ag	10-40 nm	$3.01 \times 10^{-3}$	Ref.S3
Ag/Resin	1.5	$3.0 \times 10^{-4}$	Ag	25-35 nm	$5.27 \times 10^{-3}$	Ref.S4
Fe <sub>3</sub> O <sub>4</sub> @C/Pd	0.1	$1.4 \times 10^{-4}$	Pd	6-15 nm	$3.25 \times 10^{-3}$	Ref.S5
Fe <sub>x</sub> O <sub>y</sub> /Pd@mSiO <sub>2</sub>	0.1	$1.4 \times 10^{-4}$	Pd	12-21 nm	$1.6 \times 10^{-3}$	Ref.S5

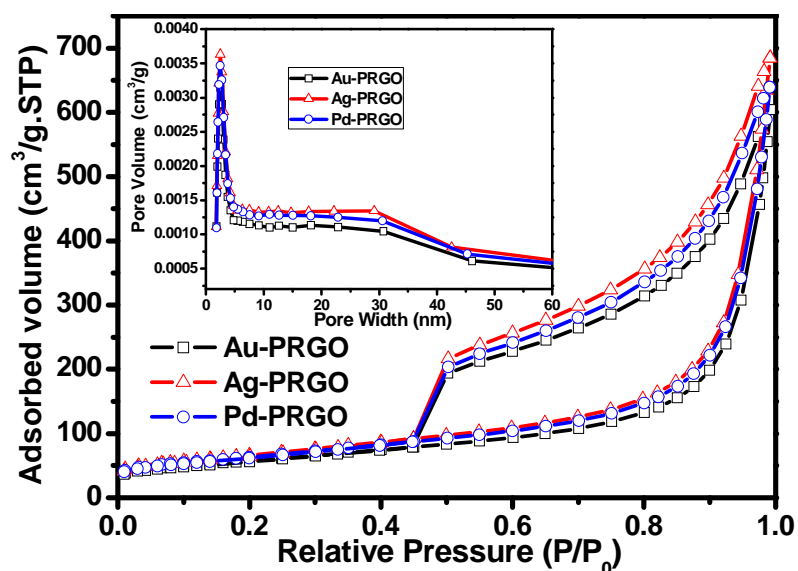
Note: PMMA is the support of poly (methyl methacrylate), mSiO<sub>2</sub> is mesoporous SiO<sub>2</sub>.



**Fig. S4** Typical TEM images and the statistic histograms of noble metal particles size distribution, Au colloid (a, c) and Pd colloid (b, d); the insets in (a) and (b) are the HR-TEM images of Au and Pd colloid nanoparticles.



**Fig. S5** Catalytic activity for reduction of 30 mL of 10 ppm 4-nitrophenol (4-NP) to 4-aminophenol (4-AP) over Au and Pd colloids with the addition of  $\text{NaBH}_4$  (15 mg) at room temperature.



Samples	BET surface area (m <sup>2</sup> g <sup>-1</sup> )	Pore volume (cm <sup>3</sup> g <sup>-1</sup> )
Au-PRGO	204	0.9377
Ag-PRGO	236	1.0632
Pd-PRGO	225	0.9926

**Fig. S6** The N<sub>2</sub> adsorption–desorption isotherms, and summary of BET surface area and pore volume of the Au-PRGO, Ag-PRGO and Pd-PRGO nanocomposites; inset figure is the corresponding pore size distribution.

## References

- S1. Kuroda, K.; Ishida, T.; Haruta, M. *J. Mol. Catal., A*, 2009, **298**, 7-11.  
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 S5. T. Yao, T. Cui, X. Fang, F. Cui and J. Wu, *Nanoscale*, 2013. DOI: 10.1039/C3NR01470C.