

A novel method to decorate Au cluster onto graphene via mild co-reduction process for ultrahigh catalytic activity

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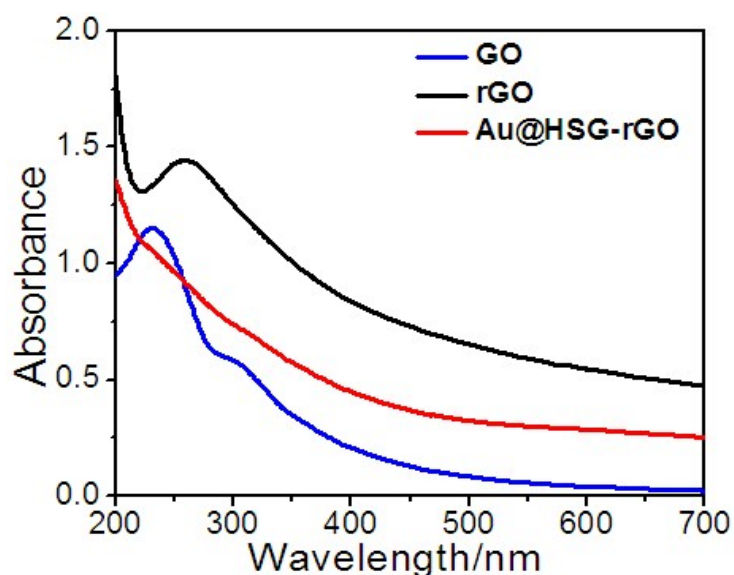


Figure S1. UV-vis absorbance spectra of GO, rGO and Au@HSG-rGO.

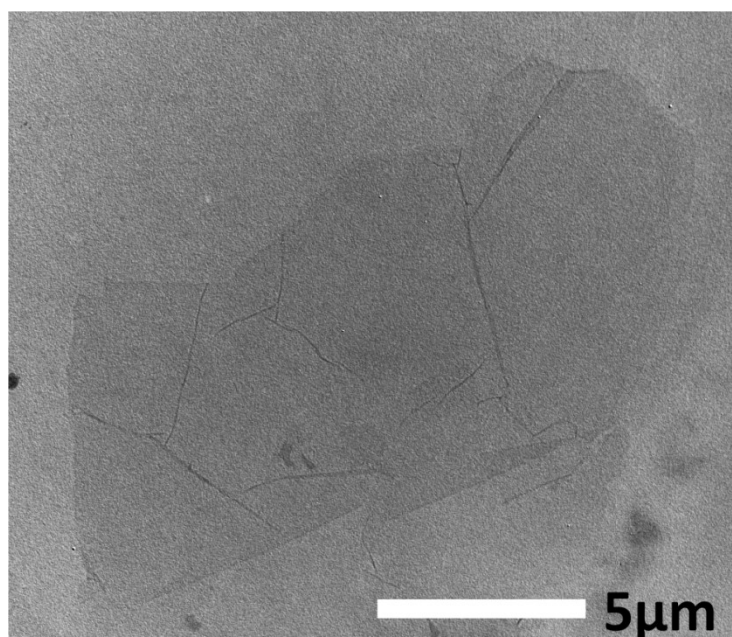


Figure S2. TEM image of GO synthesized via our modified Hummers' method.

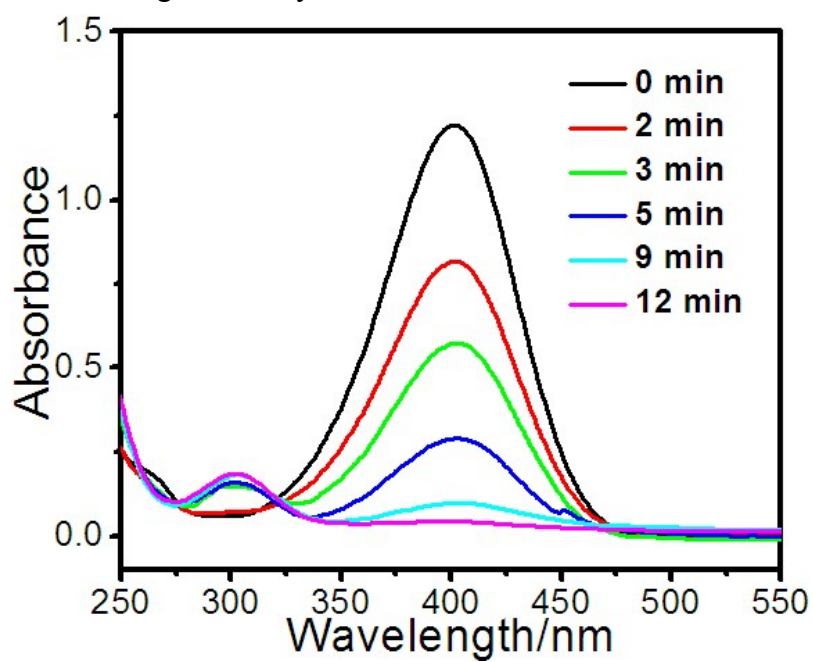
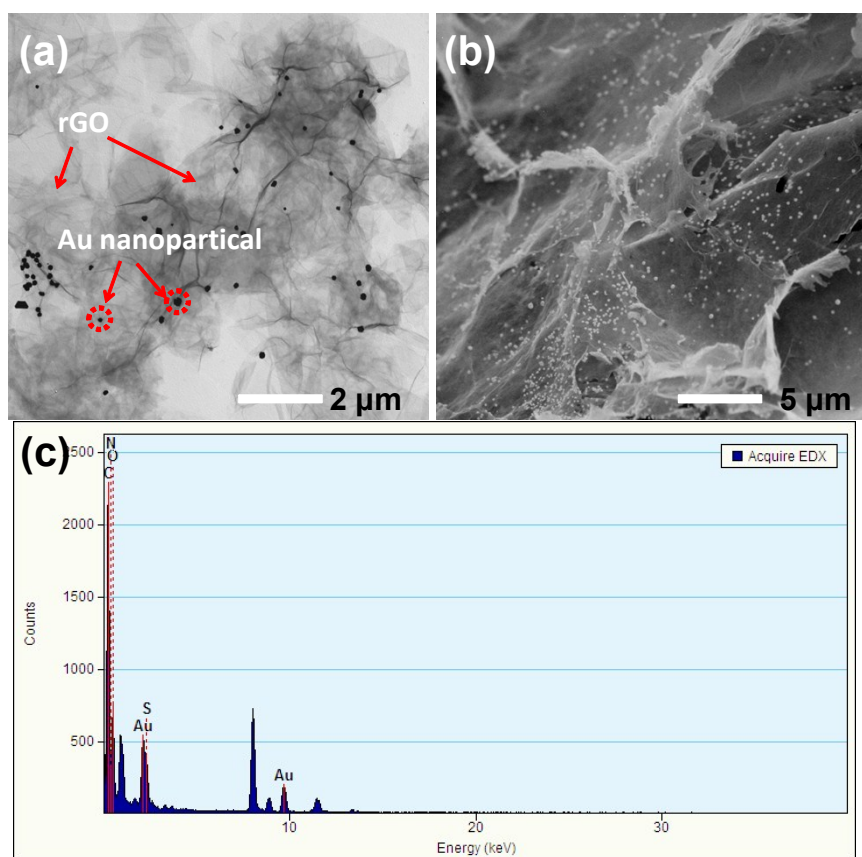
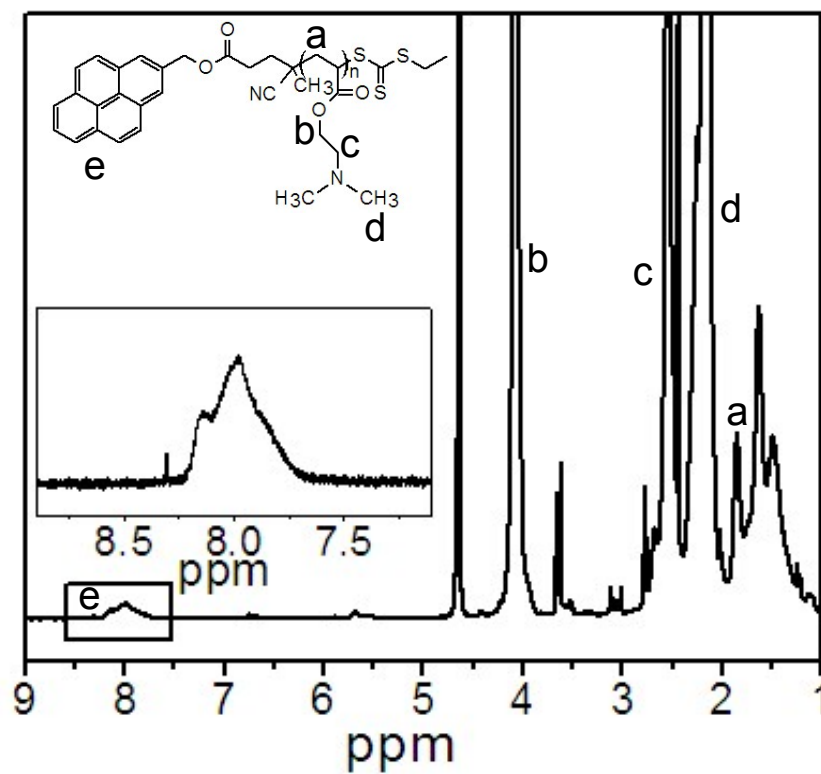


Figure S3. Time-dependent UV-vis absorption spectra of the 4-nitrophenol reduced by NaBH₄ catalyzed by Au/rGO.



FigureS4 (a) TEM image and (b)SEM image and (c) EDX spectrum of Au/rGO.



FigureS5. ^1H NMR spectrum of PDMAEA.

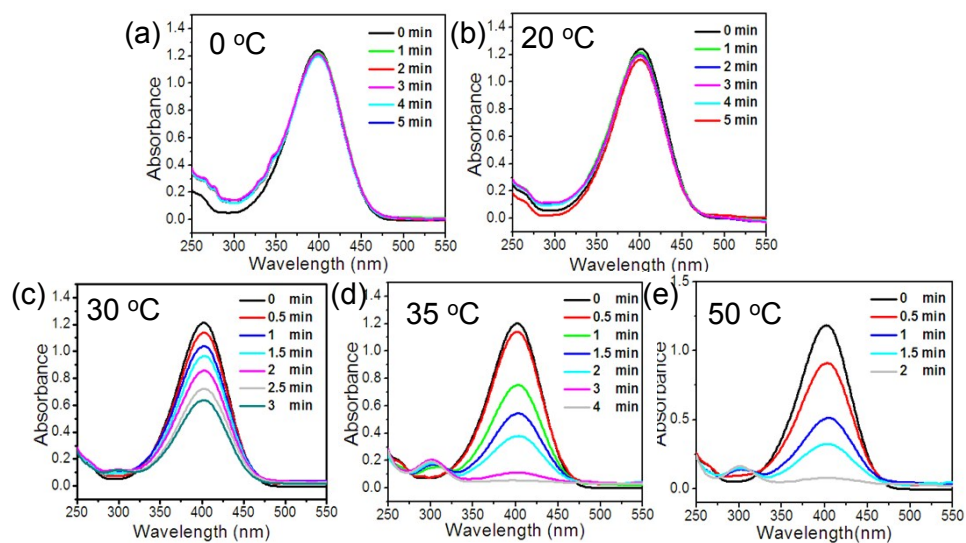


Figure S6. Time-dependent UV-vis absorption spectra of the 4-nitrophenol reduced by NaBH_4 catalyzed by Au@HSG-rGO-PDMAEA at 0, 20, 30, 35, 50 °C.

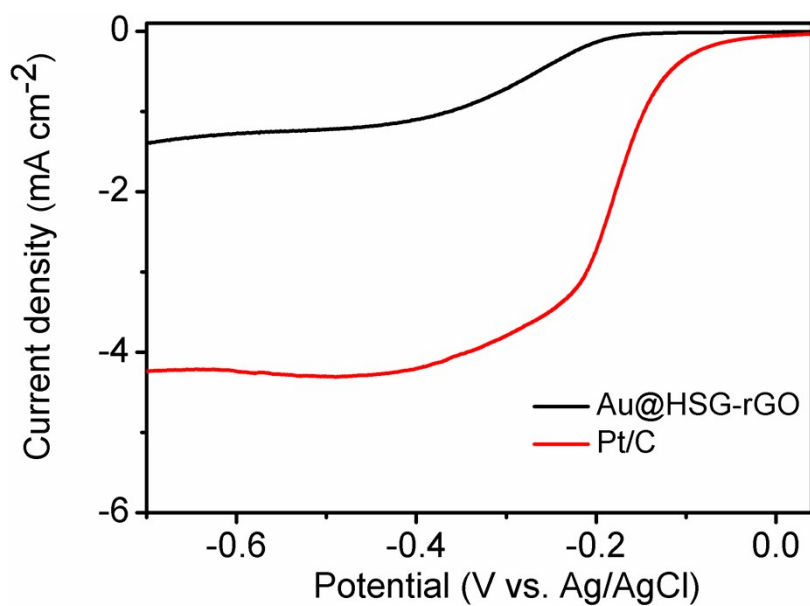
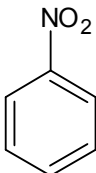
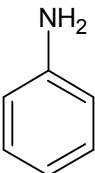
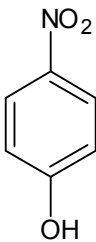
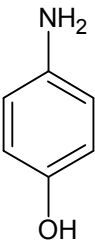
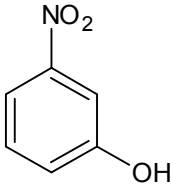
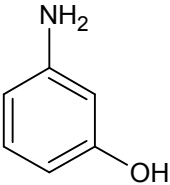
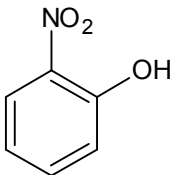
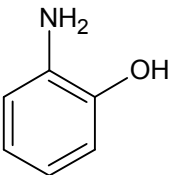
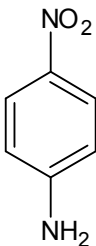
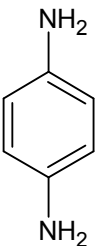


Figure S7. LSVs of Au@HSG-rGO and Pt/C in O_2 -saturated 0.1 M KOH at a scan rate of 10 mV s^{-1} at 1600 rpm rotation rate.

Table S1 Reduction of other relevant nitro derivatives catalyzed by Au@HSG-rGO and Au@HSG-rGO-PDMAEA^a

Entry	Substrate	Product	Au@HSG-rGO [Time, min; TOF/s ⁻¹]	Au@HSG-rGO-PDMAEA [Time/min; TOF/s ⁻¹]
1			4.9; 233	24; 47.6
2			0.6; 1902.6	2.9; 393.6
3			0.1; 11415.6	0.5; 2283.1
4			0.3; 3805.2	1.6; 713.5
5			6.7; 170.4	32; 35.7

^a Reaction condition: 2 mL aqueous solution (0.2 mM) of nitro derivatives, 25 μ L of Au@HSG-rGO and Au@HSG-rGO-PDMAEA aqueous suspension (10 mg/mL), 1 mL of fresh NaBH₄ aqueous solution (0.02 M).

Table S2 Electrochemical parameters for ORR estimated from CVs and LSVs curves in 0.1 M KOH solution

Catalysts	E _{peak} (V)	E _{onset} (V)	j (mA cm ⁻²) at -0.5 V	E _{1/2} (V)	Ref
Au@Pd/rGO	NA	0.05	NA	-0.25	1
Fe ₃ O ₄ /N-GAs	0.34	-0.19	-2.7	NA	2
Co(OH) ₂ /graphene	-0.2	-0.19	NA	-0.19	3
Graphene-Porphyrin-MOF	-0.23	-0.094	NA	NA	4
Co-N-C900 (1)	-0.2	-0.113	-3.837	-0.168	5
Co-N-C900 (2)	-0.2	-0.157	-2.783	-0.247	5
Au@HSG-rGO	-0.29	-0.15	-1.222	-0.285	This work

Reference

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