

Supporting Informations

One-step Synthesis of Noble Metal/ Oxide Nanocomposites with Tunable Size of Noble Metal Particles and Their Size- dependent Catalytic Activity

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Additional results:

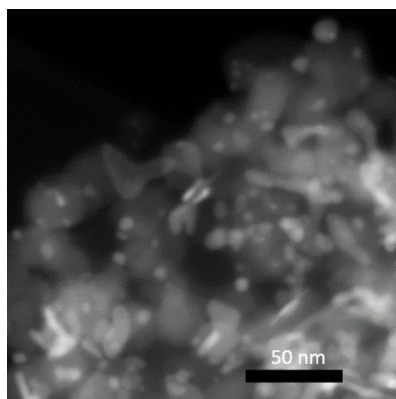
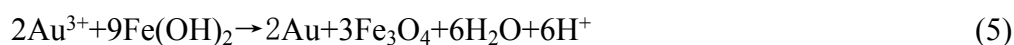
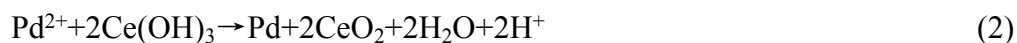


Figure S1. HAADF-STEM image of Au-Fe1 nanocomposites.

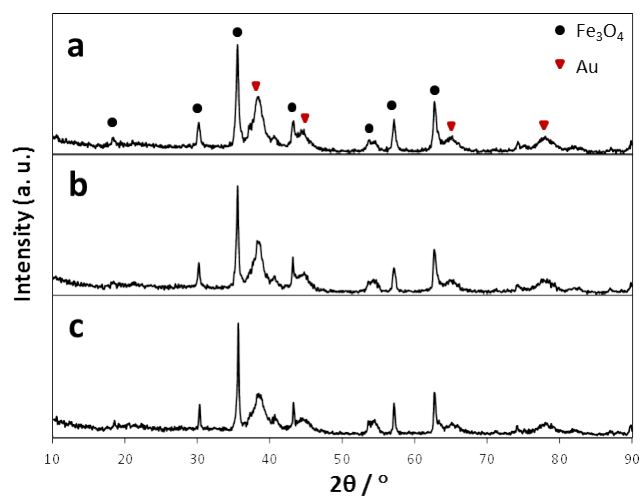


Figure S2. XRD pattern of the synthesized Au-Fe₃O₄ nanocomposites: (a) Au-Fe1, (b) Au-Fe5 and (c) Au-Fe30.

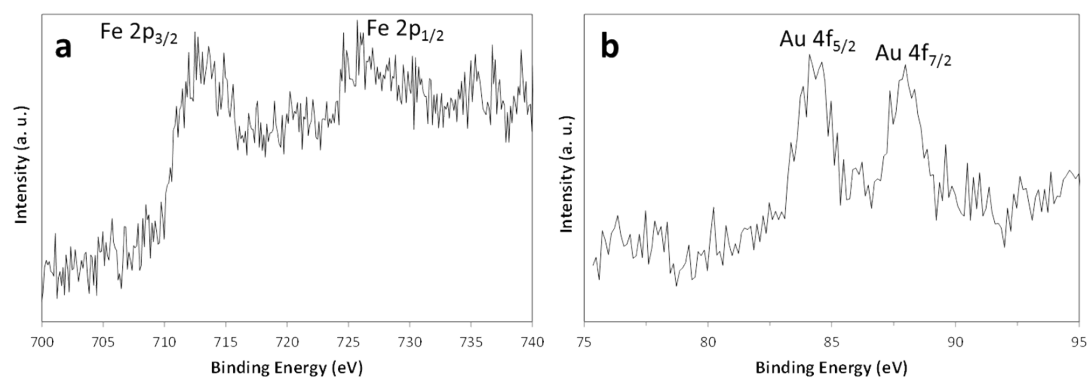


Figure S3. XPS spectra for (a) Fe 2p (b) Au 4f of Au-Fe30.

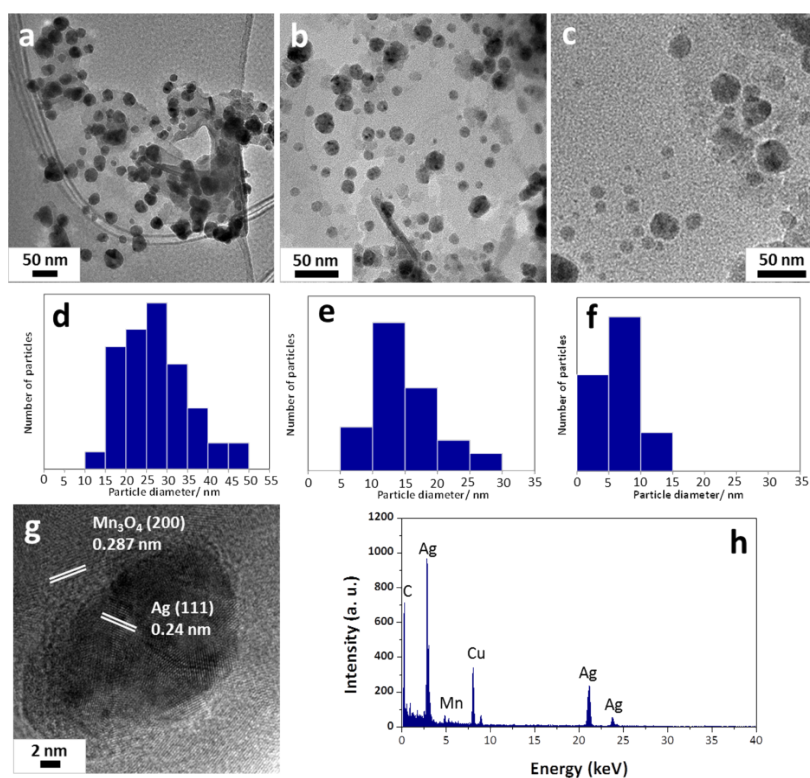


Figure S4. TEM images of the synthesized Ag-Mn₃O₄ nanocomposites: (a) Ag-Mn1, (b) Ag-Mn5 and (c) Ag-Mn30. Histogram analysis of Ag particle size in (d) Ag-Mn1, (e) Ag-Mn5 and (f) Ag-Mn30. (g) HRTEM and (h) EDAX spectrum of the Ag-Mn30. The volume of the all Ag⁺ solution is 30 mL.

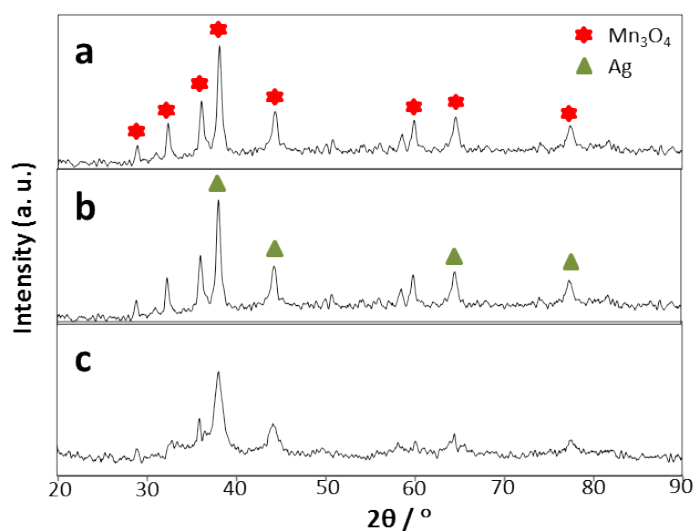


Figure S5. XRD pattern of the synthesized (a) Ag-Mn1, (b) Ag-Mn5 and (c) Ag-Mn30.

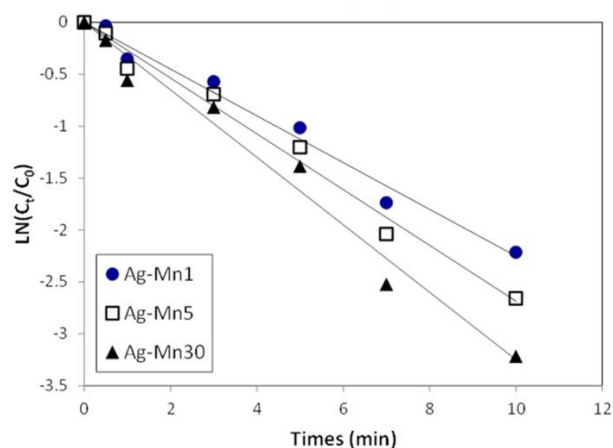


Figure S6. Linear relationship of $\ln(C_t/C_0)$ as a function of time for 4-nitrophenol reduction catalyzed by Ag-Mn₃O₄ nanocomposites.

Table S1. Weight ratio of noble metal on oxides

catalyst	Weight ratio
Pd-Ce	17.04%
Au-Fe	20.30%
Ag-Mn	22.06%

Table S2. Summary of reaction rate constants of all catalysts

catalyst	Reaction rate constants (min ⁻¹)	R^2
Pd-Ce1	0.80	0.945
Pd-Ce5	0.91	0.940
Pd-Ce30	1.04	0.952
Au-Fe1	0.12	0.989
Au-Fe5	0.14	0.993
Au-Fe30	0.19	0.976
Ag-Mn1	0.23	0.983
Ag-Mn5	0.27	0.985
Ag-Mn30	0.33	0.977

Table S3. Comparison of kinetic constant (k) of NaBH₄ reducing 4-NP reported in recent literatures using different catalysts

Catalyst Type	Amount of catalyst	Weight ratio of noble metal / 4- NP	Rate constant (min ⁻¹)	Reference s
Au-Fe ₃ O ₄	2 mg (0.96 mg-Au)	16.9	0.38	1

Fe ₃ O ₄ -Au composite	0.09-0.49 mg-Au	—	0.01-0.313	2
Ag@Pd/Fe ₃ O ₄	0.019 mg-Pd and 0.015 mg-Ag	6.1	1.98	3
Pd/Ag dendrites	0.04 mg-Pd and 0.96 mg-Ag	36.1	2.34	4
TAC-Ag-1.4	4 mg-Ag	9.6	0.099	5
Pd-Ce50	0.05 mg (0.0087 mg-Pd)	0.48	1.03	In this work
Au-Fe30	0.05 mg (0.01 mg-Au)	0.48	0.19	In this work
Ag-Mn30	0.05 mg (0.011 mg-Ag)	0.48	0.33	In this work

1. Lin, F.-h.; Doong, R.-a., Bifunctional Au-Fe₃O₄ Heterostructures for Magnetically Recyclable Catalysis of Nitrophenol Reduction. *J. Phys. Chem. C* **2011**, 115, 6591.
2. Chang, Y.-C.; Chen, D.-H., Catalytic reduction of 4-nitrophenol by magnetically recoverable Au nanocatalyst. *J. Hazard. Mater.* **2009**, 165, 664.
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