

Electronic Supplementary Information

Water-Soluble Au Nanocages for Enzyme-Free H₂O₂ Sensor and 4-Nitrophenol Reduction

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Synthesis of Quasi-Spherical Au NCs in aqueous solution

The quasi-spherical Au NCs were synthesized by our method.¹ The size of Au NCs is 24 nm, which is similar to the size of Ag NCs. 0.75 mL of the aqueous solution of sodium citrate (1 wt %), 0.75 mL of the aqueous solution of HAuCl₄ (1 wt %) and 42.5 μL of the aqueous solution of AgNO₃ (0.1 wt %) were consecutively added to 1.0 mL water under stirring at room temperature. The total volume of mixture solution was almost 2.5 mL. After 5 min incubation at the room temperature, the mixture solution was injected to 47.5 mL boiling water. The color of the reaction solution quickly changed from colorless to red. The transparent and red reaction solution was further boiled for 30 min under stirring to warrant formation of uniform quasi-spherical Au NCs.

References

1 H. B. Xia, S. Bai, J. Hartmann and D. Y. Wang, *Langmuir*, 2010, **26**, 3585–3589.

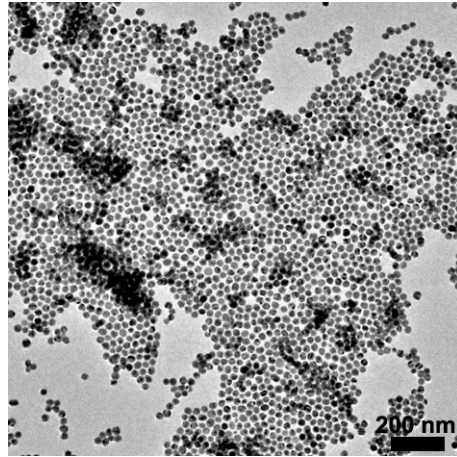


Fig. S1 Low magnification TEM image of monodispersed, quasi-spherical Ag NCs.

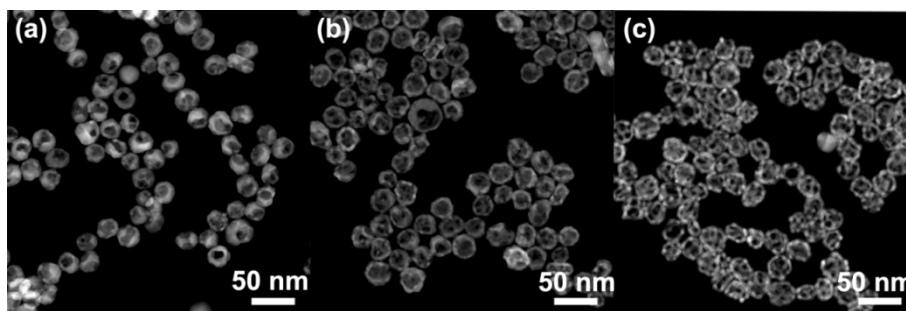


Fig. S2 STEM images of (a) hollow Au NCs, (b) porous Au NCs and (c) Au nanocages.

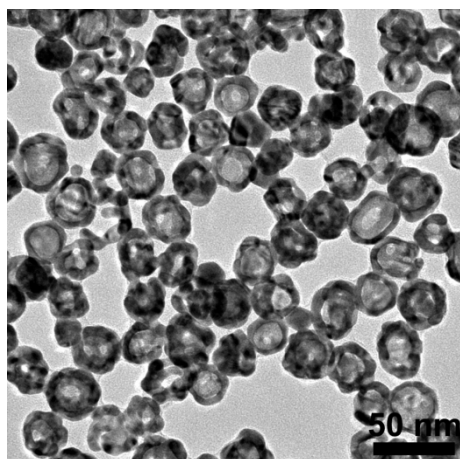


Fig. S3 TEM image of NCs synthesized at boiling temperature.

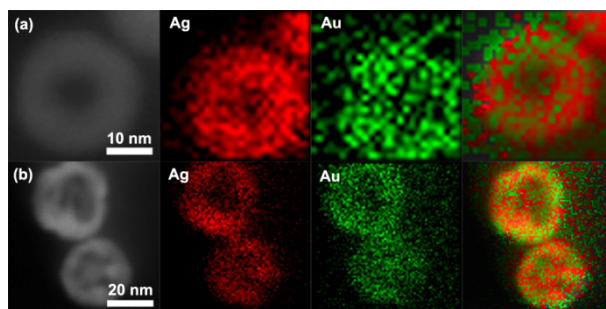


Fig. S4 Elemental mapping of (a) hollow Au NCs and (b) porous Au NCs.

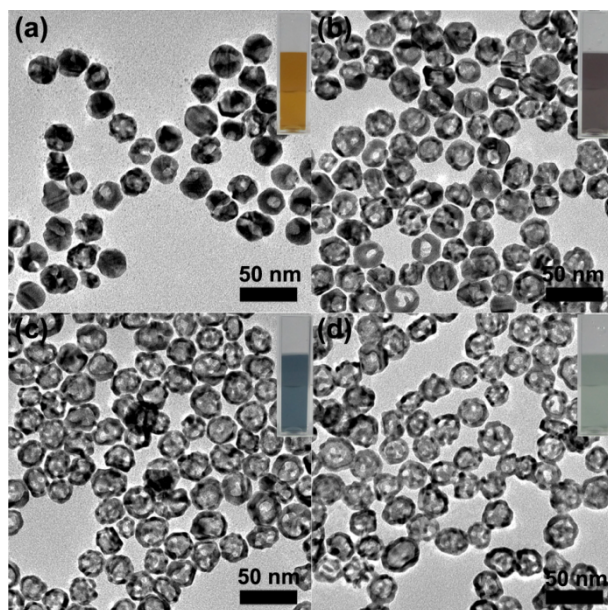


Fig. S5 TEM images for the evolution of Au nanocages at different time: (a) 2 min, (5) 5 min, (c) 7 min, (d) 9 min. The insert is corresponding optical photographs.

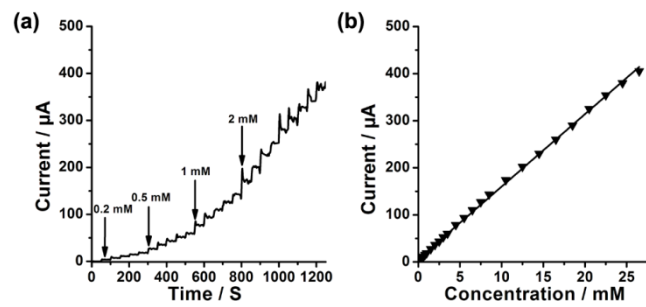


Fig. S6 (a) Amperometric responses of Au nanocages modified GCEs on successive addition of a given concentration of H₂O₂ in 0.1 M PBS solution, (b) plots of current vs H₂O₂ concentration.

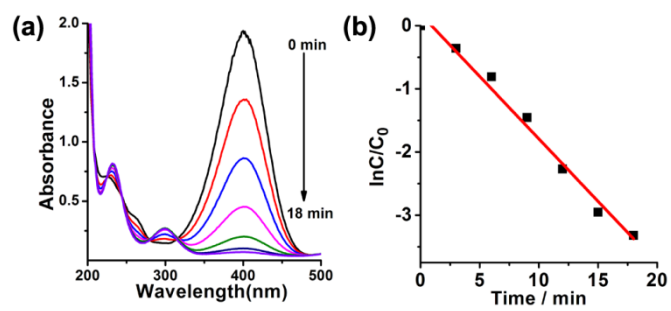


Fig. S7 Time-dependent UV-vis spectra of the catalytic reduction of 4-NP to 4-AP with (a) solid Au NCs. (b) Plot of $\ln(A/A_0)$ against the reaction time of solid AuNCs.

Tab. S1 Reduction time (t), reaction rate constant (k), mass (m) and activity parameter (κ) of solid Au NCs.

Sample	Reduction time (min)	k (s^{-1})	m (μg)	κ ($s^{-1} \text{g}^{-1}$)
Solid Au NCs	18	3.33×10^{-3}	11.45	283