Supporting Information

Green synthesis of highly fluorescent AuNCs with red emission and their special sensing behavior for Al³⁺

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Experiment

Synthesis of other gold nanoclusters

The DPA-AuNCs, 11-MUA-AuNCs, BSA-AuNCs and GSH-AuNCs were prepared based on a previous reported procedures respectively. ¹⁻⁴ The as synthesized nanoclusters were investigated by similar sensing protocols like our system without and with the separation of the residual reducing reagents.



Fig. S1. Fluorescence emission spectra of the as synthesized water soluble L-Cysteine (0.1 M) protected AuNCs using various amounts of $HAuCl_4$ (1%). (Other conditions are same as described in the typical experiment procedure)



Fig. S2. Fluorescence emission spectra of the as synthesized water soluble L-Cysteine protected AuNCs using various concentration of L-cysteine. (Other conditions are same as described in the typical experiment procedure)



Fig. S3. Fluorescence emission spectra of the as synthesized water soluble L-Cysteine protected AuNCs using various amounts of THPC (80%). (Other conditions are same as described in the typical experiment procedure)



Fig. S4. Typical fluorescence emission spectra of the as prepared samples using N_2H_4 (80%, 100 μ L), NaBH₄ (1 mL, 100 mM) and L-ascrobic acid (1 mL, 0.1 M) as reducing reagents. (Other conditions are same as described in the typical experiment procedure)



Fig. S5. Photograph of the as obtained sample without the assistance of microwave heating under dark (a) and UV light (b); Photograph of the as obtained L-Cys-AuNCs-1 colloid under dark (c) and UV light (d) (365 nm) by the assistance of microwave heating.



Fig. S6. Absorbance spectrum (a), and fluorescence excitation, emission spectra (b) of L-CYs-AuNCs-1.



Fig. S7. XPS analysis (Au4f) of L-CYs-AuNCs-1 (a) and XPS survey of the L-CYs-AuNCs-1 film (b)



Fig. S8. Fluorescence emission spectra of L-Cys-AuNCs sensor (S0) in the presence of various metal ions (a) and the corresponding selectivity of the sensor (b). (F and F0 are the fluorescence measured in the presence and absence of the metal ions respectively; Herein, Fe indicates Fe^{3+}).



Fig. S9. Fluorescence emission spectra of L-Cys-AuNCs-1 sensor in the presence of various metal ions (a) and the corresponding selectivity of the sensor (b). (F and F0 are the fluorescence measured in the presence and absence of the metal ions respectively; Herein, Fe indicates Fe^{2+}).



Fig. S10. Fluorescence emission spectra of L-Cys-AuNCs-2 sensor (S0) in the presence of various metal ions (a) and the corresponding selectivity of the sensor (b). (F and F0 are the fluorescence measured in the presence and absence of the metal ions respectively; S1 indicates S0 sensor in the presence of Pb²⁺; 3 μ L of THPC (80%) has been used for synthesis of L-Cys-AuNCs-2; Herein, Fe indicates Fe²⁺).



Fig. S11. Fluorescence emission spectra of L-Cys-AuNCs sensor before (a) and after (b) the separation of THPC in the absence and presence of various metal ions such as Pb^{2+} the mixture of Pb^{2+} and Al^{3+} , and Al^{3+} .



Fig. S12. Fluorescence spectra of DPA-AuNCs sensor before (a) and after (b) the separation of THPC in the absence and presence of various metal ions such as Pb^{2+} the mixture of Pb^{2+} and Al^{3+} , and Al^{3+} .



Fig. S13. Fluorescence spectra of 11-MUA-AuNCs sensor before (a) and after (b) the separation of THPC in the absence and presence of various metal ions such as Pb^{2+} the mixture of Pb^{2+} and Al^{3+} , and Al^{3+} .



Fig. S14. BSA-AuNCs (a) and GSH-AuNCs (b) based sensor in the absence and presence of various metal ions such as Pb^{2+} the mixture of Pb^{2+} and Al^{3+} , and Al^{3+} .



Fig. S15. Fluorescence spectra (a) of L-Cys-AuNCs-Pb²⁺ sensor (S1) in the presence of various metal ions and the corresponding selectivity (b) of the S1 sensor (Herein, Fe indicates Fe^{3+} .).

Dark



Fig. S16. Pictures of L-Cys-AuNCs-Pb²⁺(S1) sensor in the presence of various metal ions under dark and a 365 nm UV lamp.



Fig. S17. Selectivity of the S1 sensor to Al^{3+} with different pH values including pH4 (a), pH6 (b), pH8 (c) and pH10 (d) (Herein, Fe and Fe1 indicate Fe²⁺ and Fe³⁺ respectively).

References

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