Supporting information for

High Sensitivity Cysteine Detection Using a Novel Fluorescent Ag Nanocluster

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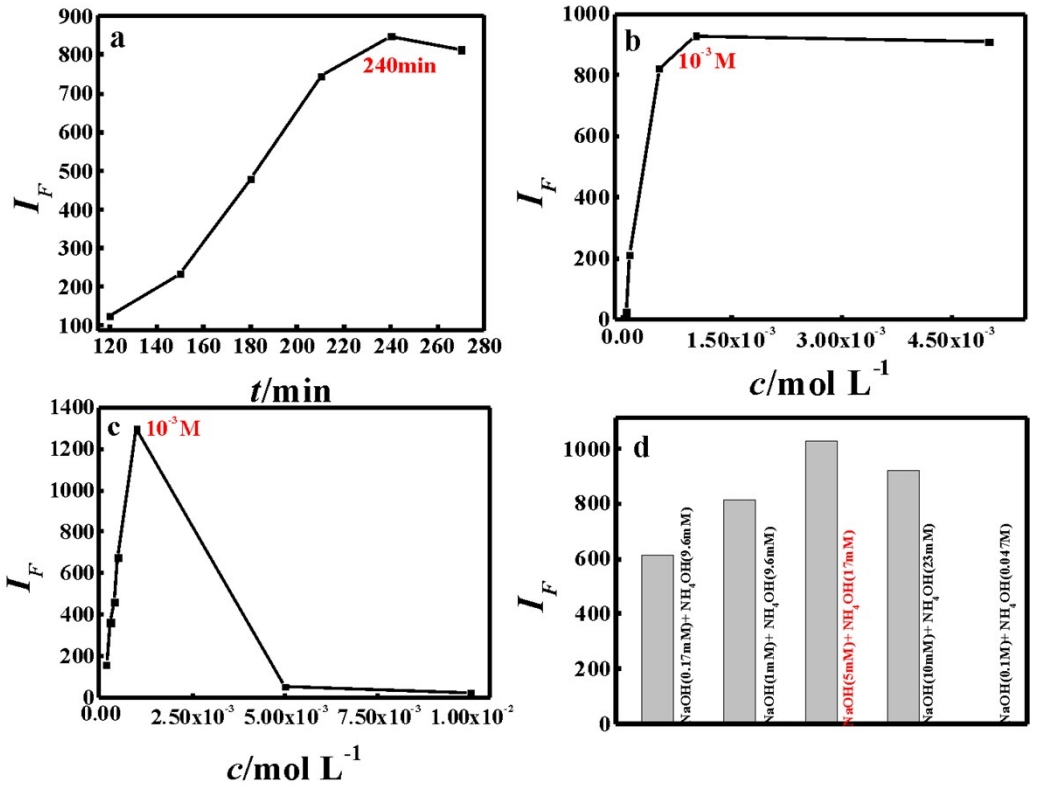

Fig.S1. The optimizing experiments of synthesis LSPR-AgNCs. (a) The fluorescence intensity of LSPR-AgNCs (diluted 50-fold)in different irradiation time (120 min, 150 min, 180 min, 210 min, 240 min and 70 min). (b) Different carboxymethyl dextran concentrations (5.0×10^{-5}, 1.0×10^{-4}, 5.0×10^{-4}, 1.0×10^{-3}, 5.0×10^{-5}M). (c) Different Ag^+ concentrations (2.0×10^{-4}, 3.0×10^{-4}, 4.0×10^{-4}, 5.0×10^{-4}, 1.0×10^{-3}, 5.0×10^{-3}, 1.0×10^{-2} M). (d) The degree of acid/alkali of solution was adjusted by NaOH and $NH_3\cdot H_2O$. We study different concentrations NaOH and $NH_3\cdot H_2O$ (shown in d, Fig. S1).The optimizing conditions of synthesis LSPR-AgNCs was presented, i.e., irradiation time (240 min), carboxymethyl dextran(1.0×10^{-3} M), Ag^+(1.0×10^{-3} M), and the ratio of NaOH to $NH_3\cdot H_2O$ (NaOH(5 mM)+ $NH_3\cdot H_2O$(17 mM)).

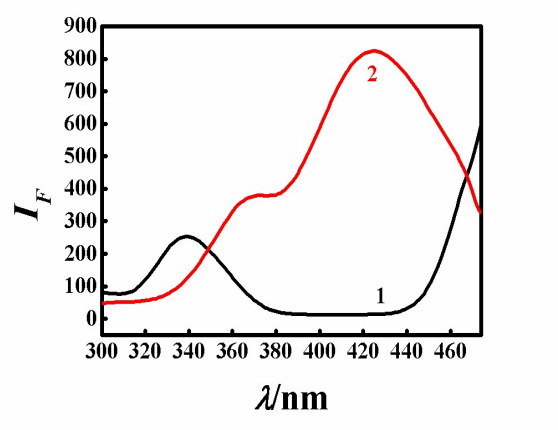

Fig. S2. The emission fluorescence spectra of as- prepared Ag nanoclusters (spectrum 1) and the diluted 50-fold Ag nanoclusters (spectrum 2).

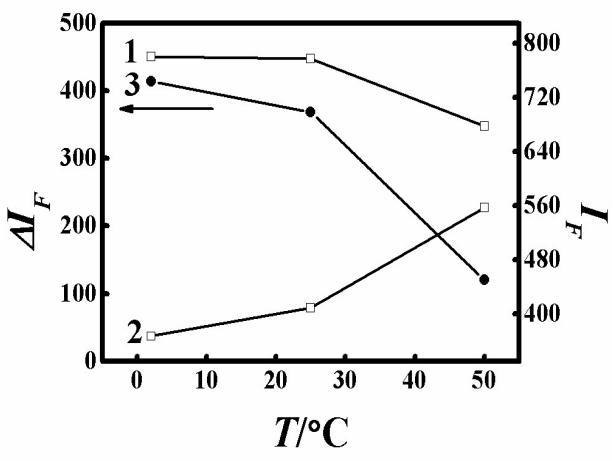

Fig. S3. The fluorescence intensity of LSPR-AgNCs (diluted 50-fold) in the absence (curve 1) and presence (curve 2) of Cys (1×10^{-7} mol·L^{-1}) with different temperature including 0 °C, 25 °C and 50 °C. The curve 3 represented the change of ΔI with different temperature.

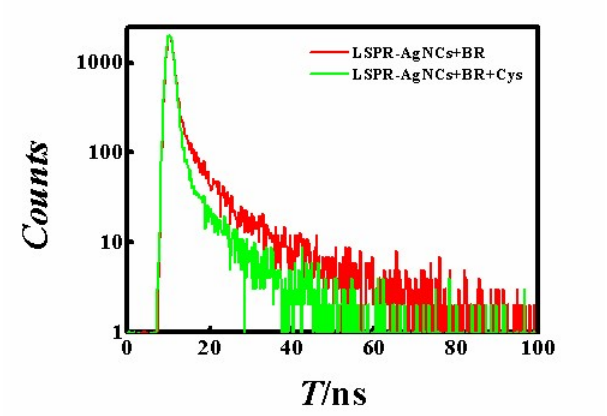

Fig. S4. Fluorescence decay as a function of time of LSPR-AgNCs, LSPR-AgNCs+BR and LSPR-AgNCs+BR+Cys.((BR=6.80, c_{Cys}= 1.0×10^{-7} mol·L^{-1}).

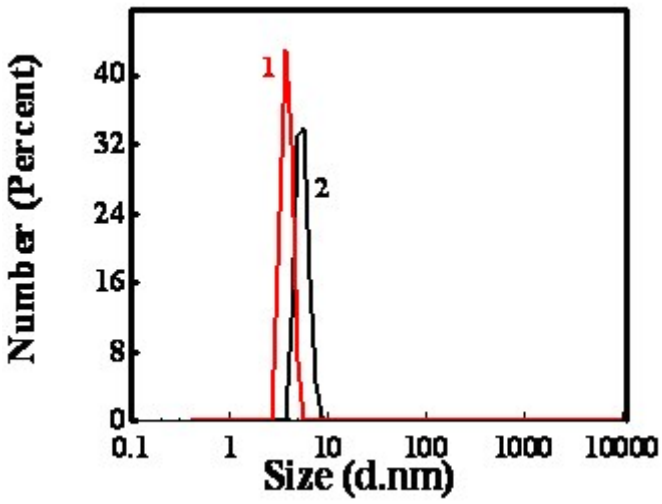

Fig. S5. The DLS spectra of the Ag NCs. Curve 1 is DLS spectra of the Ag NCs without Cys. Curve 2 is the DLS spectra of the Ag NCs after adding Cys.

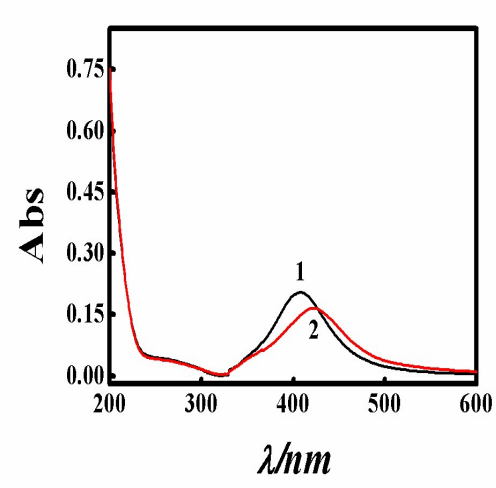

Fig. S6. The UV-Vis spectra of the Ag NCs. Curve 1 is the absorption spectrum of the Ag NCs without Cys. Curve 2 is the absorption spectrum of the Ag NCs mixture with Cys.

Table S1. The fluorescence lifetimes of LSPR-AgNCs+BR and LSPR-AgNCs+BR+Cys.

Sample	τ_1, B_1	τ_2, B_2	Lifetime (ns)
LSPR-AgNCs+BR	2.1896, 33.60%	10.5884, 66.40%	7.7664
LSPR-AgNCs+BR+Cys	1.1585, 21.81%	6.2982, 78.19%	5.1772

B_1, B_2 are the relative amplitude of τ_1, τ_2.

Table S2 Zeta Potential measurements data of LSPR-AgNCs, LSPR-AgNCS-BR and LSPR-

AgNCS-BR-Cys

Sample	T (°C)	Average ZP (mV)
LSPR-AgNCs+BR	25	-14 mV
LSPR-AgNCs+BR+Cys	25	-14.2 mV

Table S3. Determination results of Cys in Compound amino acid injection.

Sample number	Detection value (mol/L)	Average value (mol/L)	Specified (mol/L)	RE (%)
1	3.33×10^{-3}; 2.86×10^{-3}; 3.57×10^{-3}	3.25×10^{-3}	3.30×10^{-3}	1.51

Table S4 Comparison with other sensors for Cys detection

Method	Probe	Linear range	Detection limit	Ref.
Photoluminescence	NC-dots/AuNPs	0.01-2.0 μM	4.00 nM	[1]
Absorbance	NC-dots/AuNPs	0.02-2.0 μM	8.00 nM	[1]
Absorbance	N-butyl-4-bromo-3-nitro-1,8-naphthalimide	0.1-0.9 mM	-	[2]
Absorbance	di-N-methyl-N-hydroxyethylaniline squaraine(SQ)	10-700 nM	3.90 nM	[3]
Fluorescence	Acrylic acid 3-acetyl-2-oxo-2 H-chromen-7-ylester(ACA)	0-40 μM	0.65μM	[4]
Fluorescence	Thiol-disulfide	0-10 μM	0.80 μM	[5]
Fluorescence	Ag clusters	0.025-6.0 μM	20 nM	[6]
Fluorescence	AgNCs	0-1 μM	3 nM	[7]
Fluorescence	LSPR-AgNCs	0.5-100 nM	0.32 nM	This work

References

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