

1 **Supporting Information**

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3 **“Red-to-blue” colorimetric detection for cysteine via anti-etching of silver**
4 **nanoprisms**

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2 Table S1. Comparison of various typical techniques for Cys analysis in solution

Method	Technique in detail	LOD (Naked eyes / UV-vis)	Selectivity	Linear range (nM)	Ref.
UV-vis	Cys inducing the self-assembly of gold nanorods	--/--	Not good	--	21
UV-vis	Cys inducing the end-to-end assembly of gold nanorods	--/10pM	--	10-1000	22
Colorimetry	Cys coordinated with Hg ²⁺ inducing melting transition of DNA linked AuNPs	100nM/--	Good	50-1000	23
Colorimetry	Cys inducing CTAB capped AuNPs aggregation	--/24nM	Good	82.5-330	24
Colorimetry	Cys inducing AgNPs aggregation in the presence of Cr ³⁺	--/1nM	Good	1-10 ⁶	25
Colorimetry	Cys etching the concer of AgNPRs	160nM/-	Good	--	26
Fluorescence	Cys quenching the emissive silver nanoclusrrs by thiol-adsorption-accelerated oxidation	-/20nM	Good	25-6000	27
Fluorescence	Cys quenching the fluorescence of glutathione-protected silver nanoclusrrs	--/<3nM	Good	0-500	28
Colorimetry	Cys protecting AgNPRs from I ⁻ attacked	25nM/10nM	Good	50-1000	This work

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2 **Table S2. Determination of Cys in rabbit body fluid samples (n=3)**

Sample	Added ^a (μ M)	Found ^b (μ M)	Recovery(%) ^c
1% FBS	0	0.388	--
	0.1	0.514	126
	0.5	0.959	114.2
1%Urine	0	0.416	--
	0.1	0.541	125
	0.5	1.058	128.4
0.1% Plasma	0	0.125	--
	0.1	0.242	117
	0.5	0.573	89.6
0.5% Plasma	0	0.475	--
	0.1	0.708	227
	0.5	1.154	135.8

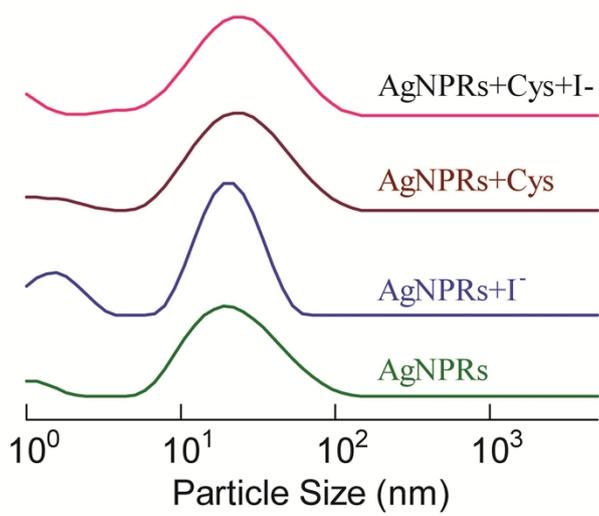
3 ^a The added amount of Cys in the real samples;

4 ^bThe Cys concentration in the bio-samples determined by our detection system using UV-vis
5 spectroscopy;

6 ^cCalculated from the equation: (Found value with Cys addition – Found value without Cys
7 addition)/Added value.

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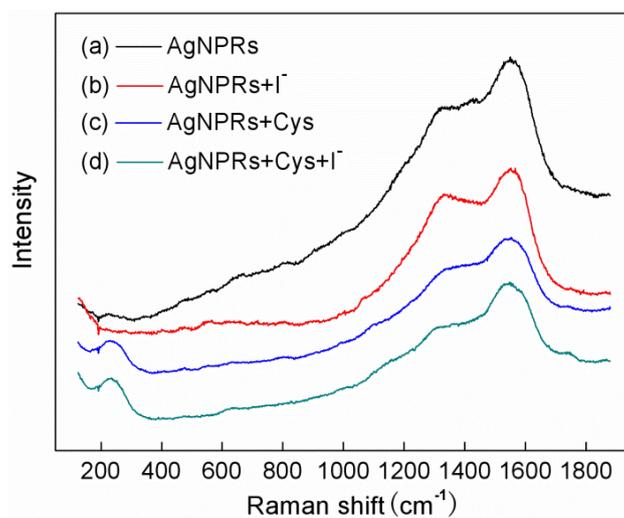
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12 **Figure S1.** Size distribution of AgNPRs without I^- and Cys (control), AgNPRs incubated with 5.0
13 μM of I^- , AgNPRs in the presence of Cys (5.0 μM), AgNPRs incubated with 5.0 μM of I^- in the
14 presence of Cys (5.0 μM).

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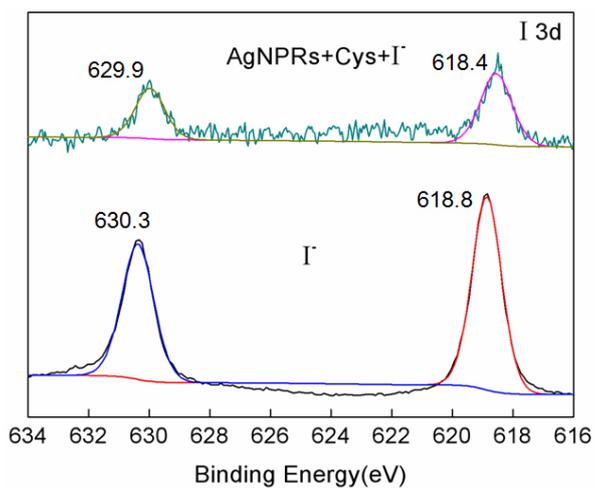
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5 **Figure S2.** Raman spectra of AgNPRs at different conditions. (a): AgNPRs; (b): AgNPRs incubated
6 with 5.0 μM of I^- ; (c): AgNPRs in the presence of Cys (5.0 μM); (d): AgNPRs incubated with 5.0
7 μM of I^- in the presence of Cys (5.0 μM).

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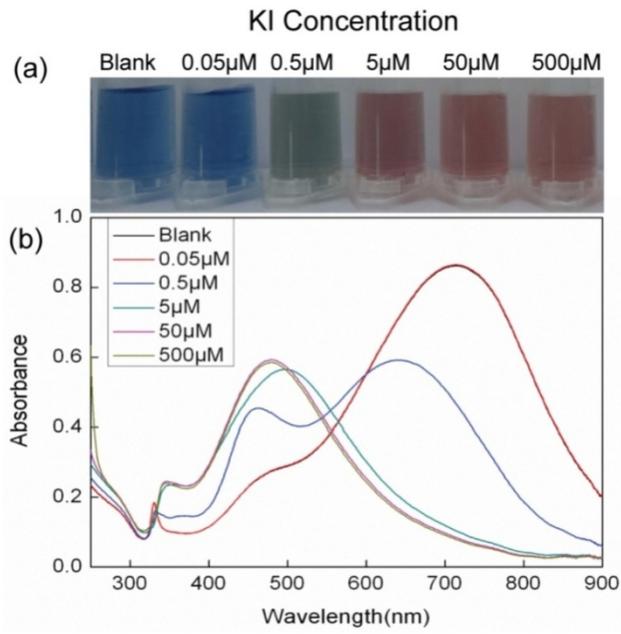
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4 **Figure S3.** XPS spectra of I 3d of KI and AgNPRs incubated with I⁻ in the presence of Cys.

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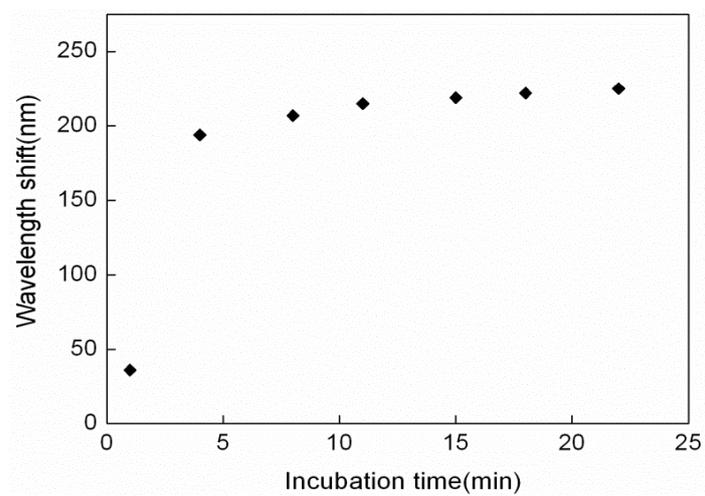
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12 **Figure S4.** Photographic image (a) and corresponding UV-vis spectra (b) of AgNPR dispersions in
13 the presence of various KI concentrations. The incubation time is 10 min.

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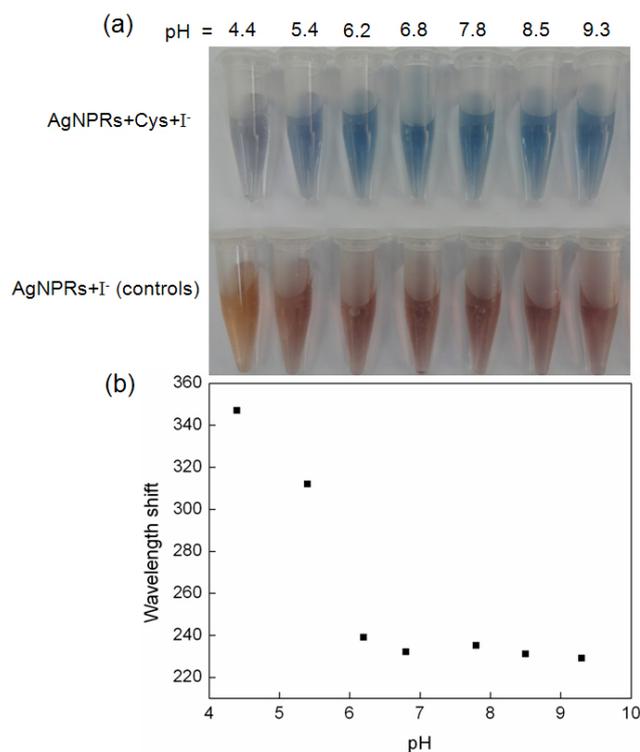


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5 **Figure S5.** Plot of wavelength shift versus incubation time of AgNPRs and I^- ($5.0 \mu M$) at room
6 temperature. The wavelength shift is calculated between the peak wavelengths of the AgNPR
7 dispersions incubated with I^- and that without I^- incubation.

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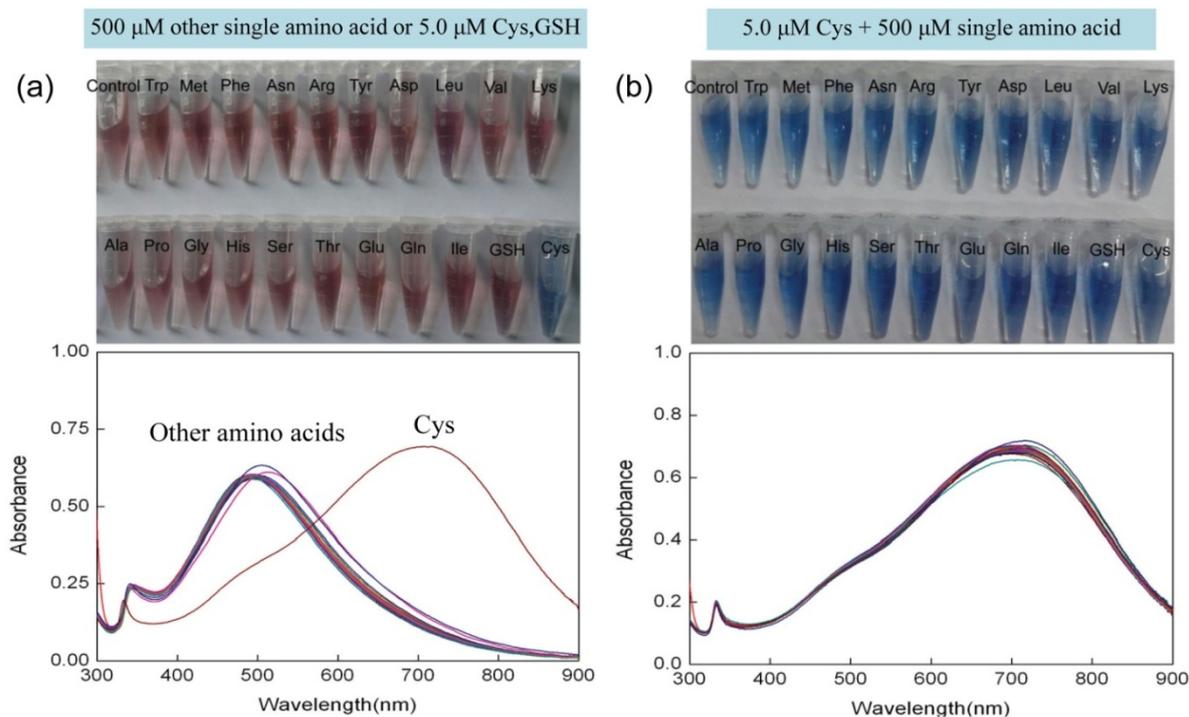


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4 **Figure S6.** Influence of pH value of AgNPR dispersions (incubated with 5.0 μM of I^- in the
5 presence of 5.0 μM of Cys) on the sensing effect of Cys: (a) Photographic image, (b) Plot of
6 wavelength shift, which is calculated between the peak wavelengths of the AgNPR dispersions
7 incubated with I^- (5.0 μM) in the presence of Cys and that in the absence of Cys, as a function of
8 pH. The AgNPR dispersions incubated with 5.0 μM of I^- in the absence of Cys are used as controls.
9 The incubation time is 10 min.

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3 **Figure S7.** Selectivity of the AgNPRs-based detection system for Cys compared with other amino
 4 acids. (a): Photographic image of and corresponding UV-vis spectra of the AgNPR dispersions
 5 incubated with 5.0 μM of I⁻ in the presence of single amino acid (the concentration is 5.0 μM for
 6 Cys, GSH, but 500 μM for other amino acids); the AgNPR dispersion incubated with 5.0 μM of I⁻
 7 in the absence of amino acid is used as a control. (b): Photographic image of and corresponding
 8 UV-vis spectra of the AgNPR dispersions incubated with 5.0 μM of I⁻ in the presence of 5.0 μM of
 9 Cys and 500 μM of single amino acid; the AgNPR dispersion incubated with 5.0 μM of I⁻ in the
 10 presence of 5.0 μM of Cys is used as a control.

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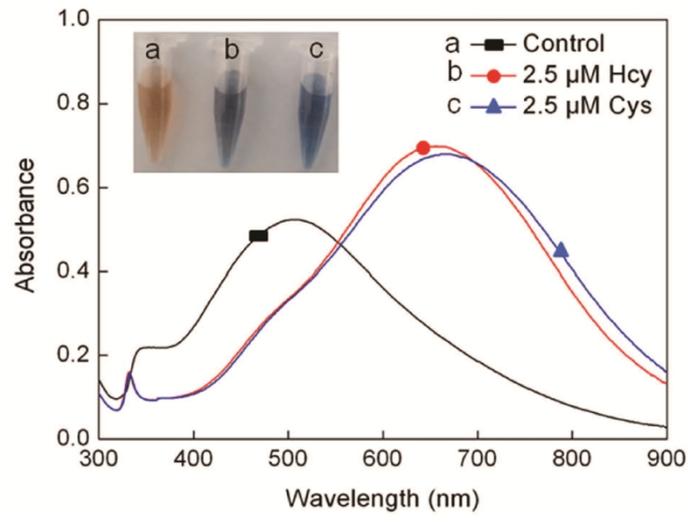
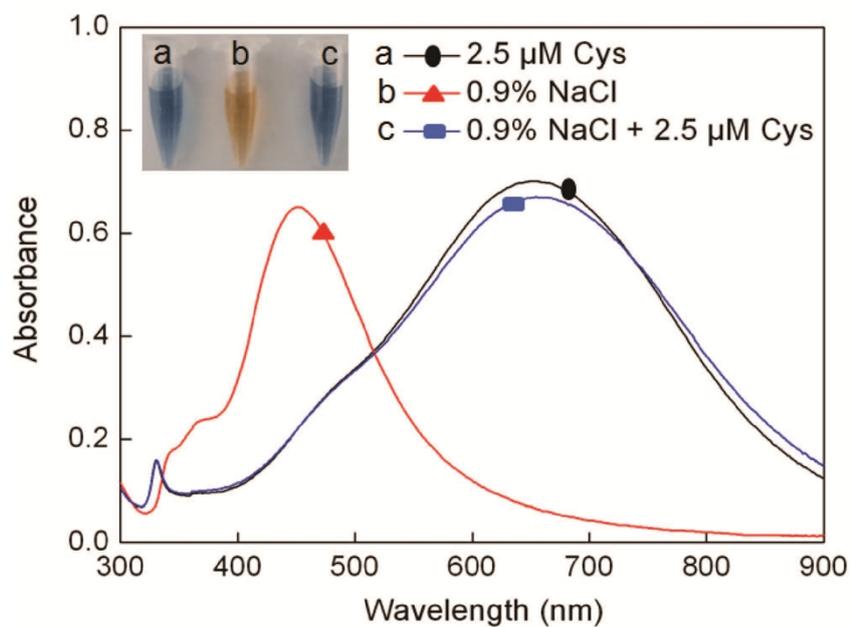


Figure S8. The UV-vis spectra of AgNPRs at the different conditions. (a) AgNPRs incubated with 5.0 μM of I^- (control); (b) AgNPRs incubated with 5.0 μM of I^- in the presence of stabilizer homocysteine (Hcy) (2.5 μM); (c) AgNPRs incubated with 5.0 μM of I^- in the presence of stabilizer Cys (2.5 μM). The inset image corresponds to the colorimetric response.



13 **Figure S9.** The UV-vis spectra of AgNPRs at the different conditions. (a) AgNPRs incubated with
 14 5.0 μM of I⁻ in the presence of 2.5 μM Cys (control); (b) AgNPRs incubated with 5.0 μM of I⁻ in
 15 the presence of NaCl (0.9 %); (c) AgNPRs incubated with 5.0 μM of I⁻ in the presence of NaCl (0.9
 16 %) and Cys (2.5 μM). The inset image corresponds to the colorimetric response.

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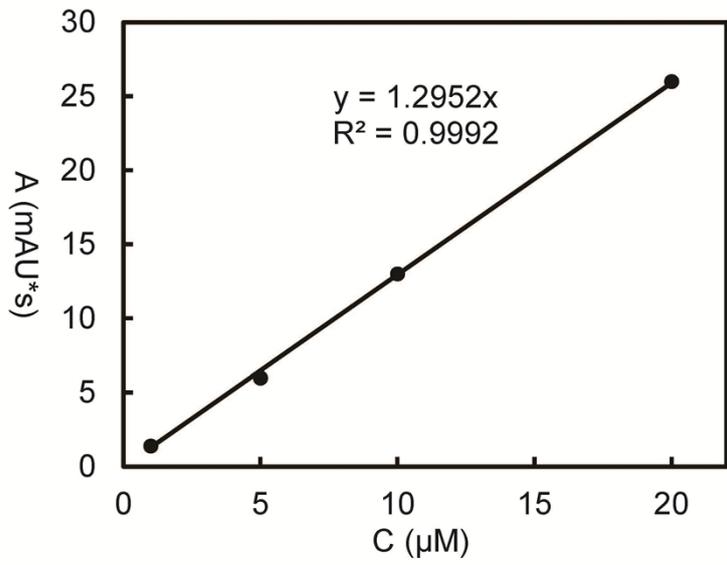


Figure S10. A calibration curve constructed with standard Cys solutions. The standard Cys solutions were determined by HPLC with a C18 column. The flow rate is 1.0 mL/min. The mobile phase is a mixture of water and acetonitrile (95:5).