

Supplementary data

Gold nanoclusters Cys-Au NCs as Selective fluorescent probes for "On-Off-On" detection of Fe³⁺ and Ascorbic Acid

Wenjie Luo^{a,1}, Changxu Wang^{b,1}, Jieshu Min^a, Huiyu Luo^{c,*}

^a Department of Pharmacy, Xiangyang No.1 People's Hospital, Hubei University of Medicine, Xiangyang, 441000, China

^b Department of Pharmacy, Taihe Hospital, Hubei University of Medicine, Shiyan, 442000, China

^c Department of Anesthesiology, Xiangyang Key Laboratory of Movement Disorders, Xiangyang No.1 People's Hospital, Hubei University of Medicine, Xiangyang, 441000, China

* Corresponding author.

E-mail address: 603983267@qq.com (H. Luo).

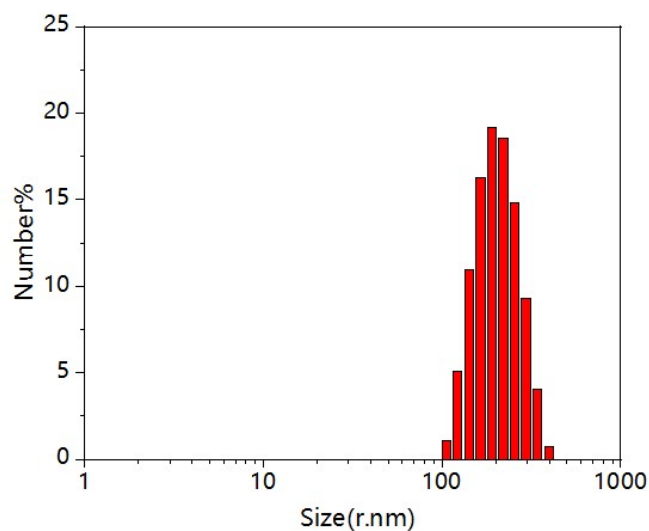


Fig. S1. Size distribution of fluorescent Au nanoclusters in aqueous solution determined by DLS.

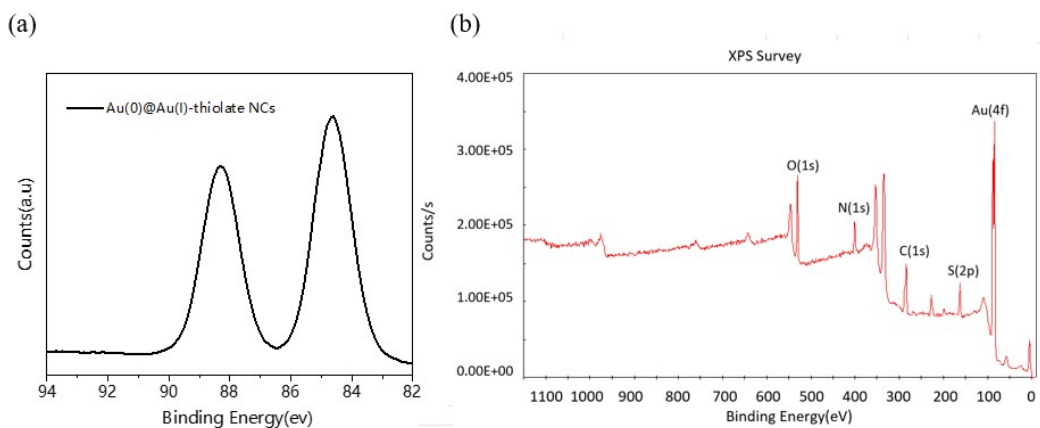


Fig. S2. (a) Au 4f X-ray photoelectron spectra of Cys-Au NCs. (b) The whole XPS spectrum of Cys-Au NCs.

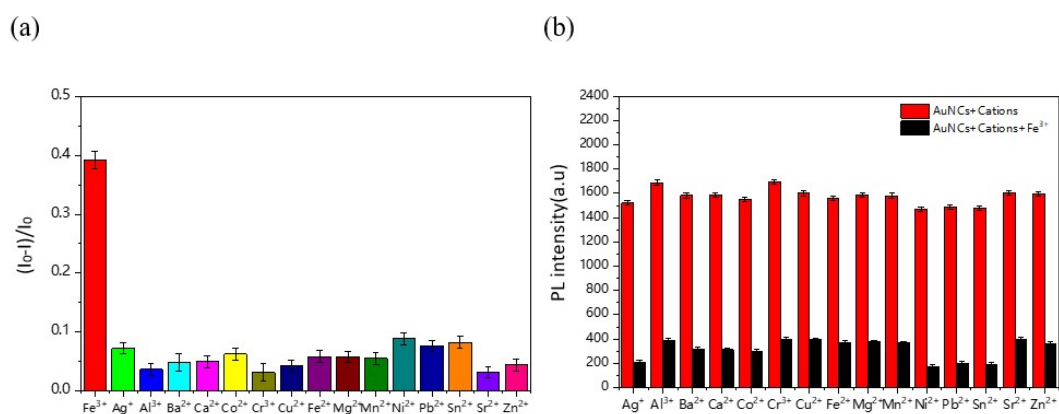


Fig. S3. (a) Selectivity investigation of Cys-Au NCs fluorescent probes towards Fe³⁺ against other 15 kinds of metal ions. (Each sample was spiked with 10 μ L of various metal ions at 100 μ mol \diamond L⁻¹). (b) Fluorescence intensity in response to Fe³⁺ after the addition of other metal cations (ten-fold concentration) to the fluorescent probe Cys-Au NCs.

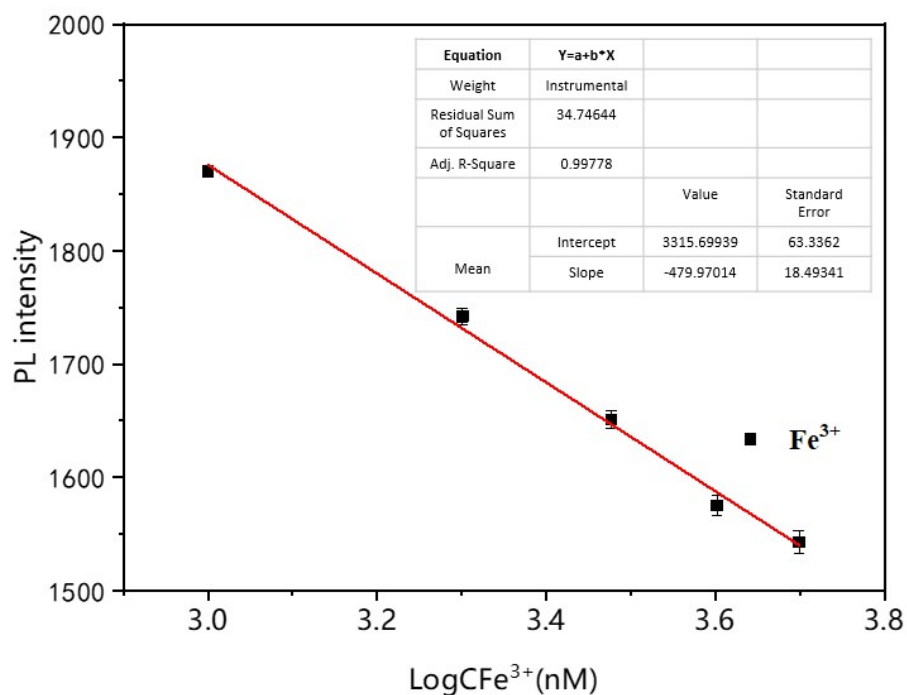


Fig. S4. The linear region of PL intensity of Cys-Au NCs upon the addition of different amounts of Fe³⁺.

Standard deviation (σ)	1.788
Slope (m)	4.8×10^8
LOD	11 nM
LOQ	37 nM

Tab. S1. LOD and LOQ of Cys-Au NCs for Fe³⁺.

Nanosensors	Linear range	Detection limit
Au NCs@PTMP-PMAA[1]	5-160 μM	3.0 μM
Au NCs@L-tryptophan[2]	1-500 μM	0.16 μM
Au NCs @GHRP- 6 2-[3]	2-1000 μM	1.4 μM
Au NCs @11-MUA[4]	0.8-11 μM	0.5 μM
Au NCs @L-histidine-[5]	1-1000 μM	0.6 μM
Cys-Au NCs	0.1-2000 μM	0.01 μM

Tab. S2. Performance comparison of gold nanoclusters luminescent nanosensors for the detection of Fe^{3+} .

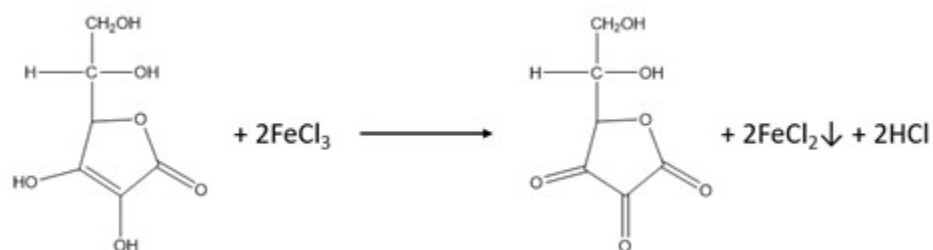


Fig. S5. Reaction equation for the oxidation of ascorbic acid with Fe^{3+} .

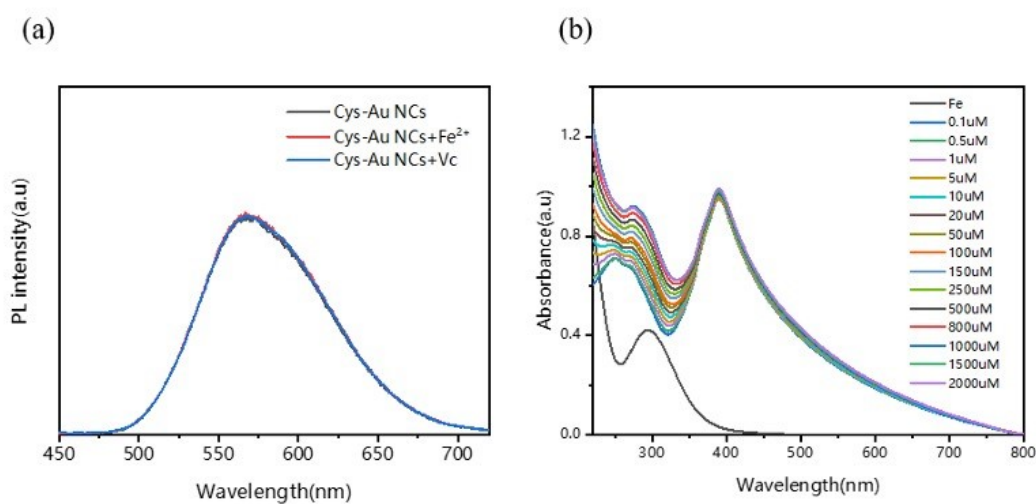


Fig. S6. (a) Fluorescence emission spectra of Cys-Au NCs (black line) in the presence of 1 mM Fe²⁺ (red line) and 1 mM ascorbic acid (blue line). (b) UV-Vis absorption spectra of Cys-Au NCs with addition of Fe³⁺.

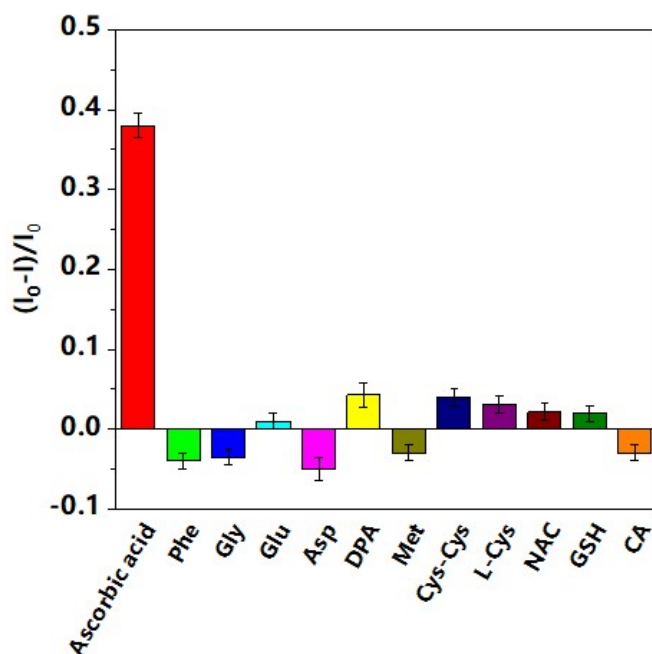


Fig. S7. Selectivity of the fluorescent probe Cys-Au NCs/Fe³⁺ for ascorbic acid. (The addition concentration of each sample was 100 μmol L⁻¹.)

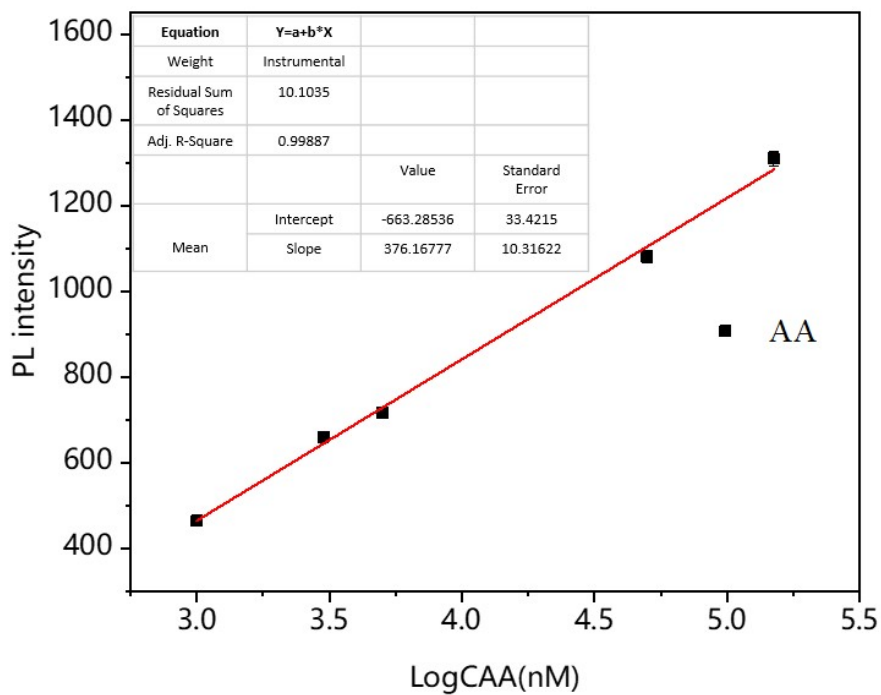


Fig. S8. The linear region of PL intensity of Cys-Au NCs/Fe³⁺ with the addition of different amounts of AA.

Standard deviation (σ)	1.788
Slope (m)	3.8×10^8
LOD	14 nM
LOQ	47 nM

Table S3. LOD and LOQ of Cys-Au NCs/ Fe³⁺ for AA

Method	Linear range	Detection limit
CQDs-MnO ₂ [6]	0.18–90 μ M	42 nM
CQDs/AuNCs/Cd ²⁺ [7]	0.15–15 μ M	0.105 μ M
MOF-5/3D-KSC electrodes[8]	0.7 μ M–115 mM	0.24 μ M
GSH-AuNCs/H ₂ O ₂ /Fe ²⁺ [9]	5–100 μ M	5 μ M
BSA-AuNCs [10]	1.5–10 μ M	0.2 μ M
AuNCs-PbS-QDs [11]	3–40 μ M	1.5 μ M
MnO ₂ -Modified GCPE[12]	2.64–1500 μ M	0.8 μ M
CoOOH-Modified TPNPs[13]	1–20 μ M	170 nM
Colorimetry[14]	0.25–50.0 M	79.2 nM.
BSA–AgNCs[15]	2.0–50.0 μ M	0.16 μ M
CuNCs[16]	0.5–10 μ M	0.11 μ M.
PSS-rGO[17]	0.8–60 μ M	0.15 μ M
Ag-CDs[18]	0.2–60 μ M	0.25 μ M
Au nanoparticles-DNA[19]	1–15 μ M	0.3 μ M
Fe ³⁺ @TPN-AuAg NCs[20]	0.2–80 μ M	0.06 μ M
Cys-Au NCs/Fe ³⁺	0.2-1000 μ M	0.01 μ M

Tab. S4. Comparison of the performances of different ascorbic acid detections.

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