Supplementary material (ESI) for Journal of Materials Chemistry C
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Electronic Supporting Information

for

Synthesis of highly fluorescent Lysine-stabilized Au nanoclusters for sensitive and selective detection of Cu^{2+} ion

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Experimental Details

Apparatus

All fluorescence measurements were performed on a Hitachi F-7000 fluorescence spectrophotometer (Tokyo, Japan) with excitation slit set at 10 nm band pass and emission at 10 nm band pass in 1 cm × 1 cm quartz cells. Meanwhile, UV/Vis absorption spectra were recorded by a Shimadzu UV-2450 spectrophotometer (Tokyo, Japan). Fourier transform infrared (FT-IR) spectra were recorded on a SHIMADZU IRprestige-21 spectrometer. The high-resolution transmission electron microscopy (HR-TEM) images were taken using a TECNAI G^2 F20 microscope (FEI, America) at 200 KV. Photographs were taken with an Olympus E-510 digital camera (Tokyo, Japan). A Fangzhong pHS-3C digital pH meter (Chengdu, China) was used to measure the pH values of the aqueous solutions and a vortex mixer QL-901 (Haimen, China) was used to blend the solution.

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Reagents

Hydrogen tetrachloroaurate trihydrate, lysine, bovine serum albumin, hydrazine hydrate and metal ions (Cu^{2+}, Fe^{2+}, Mg^{2+}, Mn^{2+}, Hg^{2+}, Zn^{2+}, Ni^{2+}, Co^{2+}, Pb^{2+}, Ba^{2+}, Ca^{2+}, Cd^{2+}, Fe^{3+}, Na^{+} and K^{+}) were obtained from Sigma-Aldrich (Milwaukee, WI). Disodium hydrogen phosphate (Na_2HPO_4), sodium dihydrogen phosphate anhydrous (NaH_2PO_4) and sodium chloride (NaCl) used for preparing phosphate buffered saline (PBS) buffer were purchased from Shanghai Sangon Biotechnology Co. Ltd. (Shanghai, China). Ultrapure water, 18.25 MΩ.cm, produced with an Aquapro AWL-0502-P ultrapure water system (Chongqing, China) was employed for all experiments.

Purification

As-prepared AuNCs@Lys were purified by triple centrifugation filtration, using Nanosep filters (Pall Nanosep, Ann Arbor, MI) with a molecular weight cut-off of 3 kDa to remove impurities, and then the yellowish AuNCs@Lys remaining on the filter could be re-suspended readily in water.

Procedure

Firstly, 100 μl AuNCs@Lys, 100 μl AuNCs@BSA and 50 μl PBS buffer (pH 4) were pipetted into a 1.5-ml vial. Subsequently, an appropriate volume of Cu^{2+} working solution or sample solution was added, diluted to 500 μl with Milli-Q purified water and vortex-mixed thoroughly. The mixture was then left to react at 45 ℃ for 15 min and transferred for fluorescence measurements.

The real samples including lake water, running water and human urine, were sampled from Chongde Lake, laboratory of college of pharmacy and Southwest University Hospital of Southwest University, respectively, and filtered with 0.22 μm microporous membrane. Then the filtrate was used for the detection of Cu^{2+} according to the general procedure without additional special treatment.

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Figures

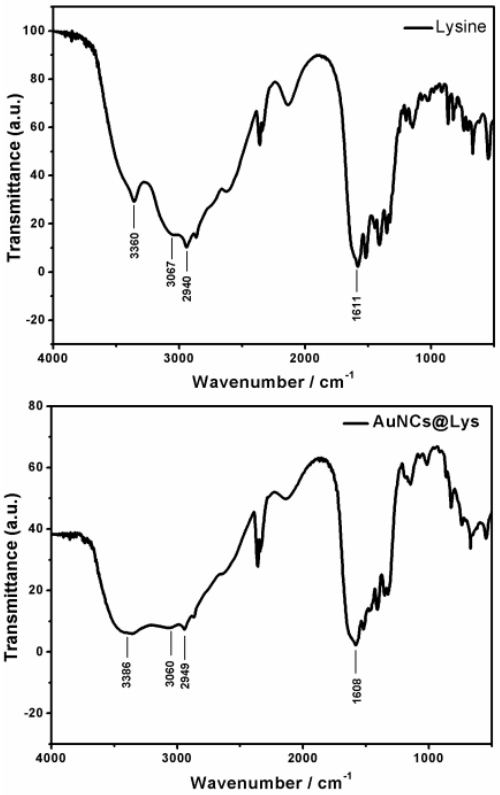

Figure S1 FTIR spectra of Lysine and AuNCs@Lys.

Table S1 Recoveries of Cu^{2+} in supplemented samples detected by the proposed method.

Samples	Spiked (μM)	Measured (μM)	Recovery (%)	RSD (%, n=6)
Lake water	0	15.2	—	2.5
	5	20.6	108	2.7
Running water	0	0	—	—
	2.5	2.3	92	2.5
Human urine	0	0.19	—	3.0
	1	1.14	95	3.1