Supplementary Material (ESI) for The Analyst

Electronic Supplementary Information

Aqueous synthesis of type-II core/shell CdTe/CdSe quantum dots for near-infrared fluorescent sensing copper (II)

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Experimental Procedures

Analytical Applications

The proposed method was applied to the determination of Cu (II) ions in tea and fountain water samples. Tea samples were processed according to the method reported previously.[1] Briefly, tea samples were washed sequentially with water, acetone, and 1.0 % (w/v) sodium dodecyl sulfate solution and then immersed for 30 min to remove excess contamination. This washing procedure was repeated twice. Then, they were dried at 50 □.1.000 g and 10.000 g of tea were weighted and placed into a muffle, respectively, and heated at 500 □ for 1.5 h. The obtained residue was cooled to room temperature. After adding a little water and HNO_3, it was moved into 25-mL volumetric flask and made up to the mark with DDW. Fountain water samples were filtered three times through qualitative filter paper before detection.

Supporting Results

Table S1. The fit results of fluorescence decays and fluorescence quantum yields of CdTe/CdSe QDs with the increasing of CdSe shell.

Emission peak (nm)	A	B_1	τ_1	B_2	τ_2	B_3	τ_3	χ^2	FL QY (%)
640.7	1.43	947.4	7.80	1693	22.34	265.4	56.89	1.093	18.5
680.3	1.96	472.4	16.50	2079	41.89	388.5	99.33	1.165	17.3
703.4	1.43	639.4	24.55	2137	60.48	148.7	162.6	1.063	15.2
732.6	1.93	432.8	31.23	2302	78.38	208.1	201.6	1.060	13.8
752.2	3.96	467.9	45.70	2132	91.93	333.8	204.3	1.071	11.4

Table S2 Test of the interference of different ions with the fluorescence intensity of CdTe/CdSe QDs (λ_{Em} = 752.2 nm).

Coexisting substances	Coexisting concentration (μM)	Change of fluorescence intensity (%)
K^+(*)	50.0	-1.8
Na^+(*)	50.0	-1.5
Mg^{2+}(*)	30.0	-2.1
Co^{2+}(*)	18.5	-2.4
Fe^{3+}(*)	14.2	-3.2
Mn^{2+}(*)	24.0	+4.0
Ca^{2+}(*)	20.0	+3.8
Zn^{2+}(*)	12.5	+4.0
Hg^{2+}	0.20	-3.7
Ag^+	0.30	-3.4
SO_4^{2-}	10.0	+1.8
CO_3^{2-}	12.0	+2.4
F^-	12.0	-1.5
Br^-	12.0	-2.0
I^-	10.0	-2.2

Concentration of Cu^{2+}: 0.5 μM. Other conditions are the same as those described in the procedure. "*" represents physiologically relevant cations.[5, 6]

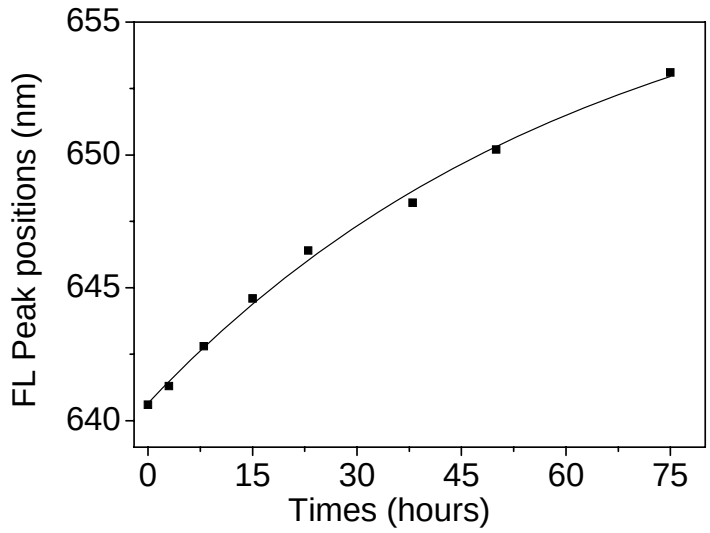

Fig. S1 Temporal fluorescence peak positions evolution of CdTe QD cores obtained during reflux of the colloidal solution at 78 °C.

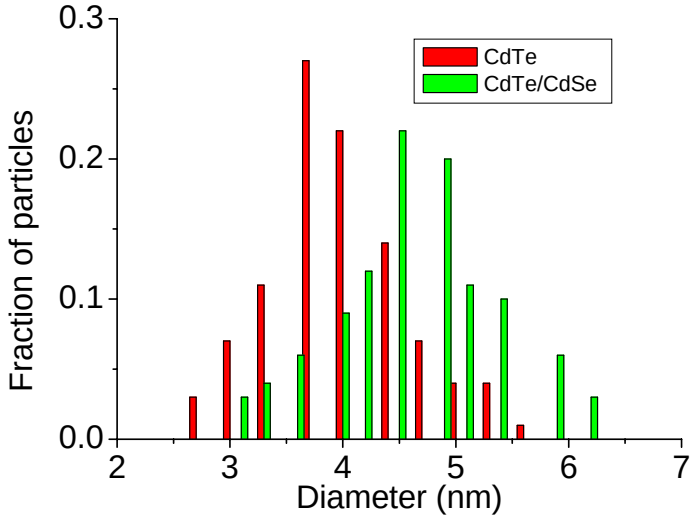

Fig. S2 Size histogram of CdTe QD and CdTe/CdSe QDs. The TEM images are shown in Fig. 1.

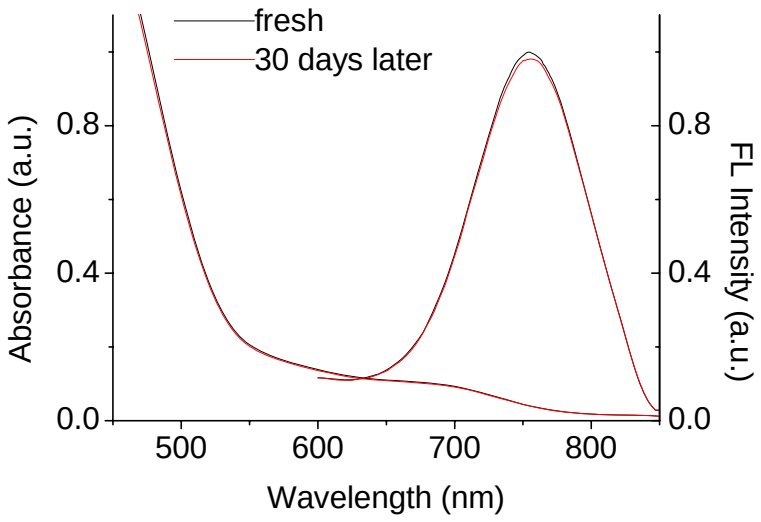

Fig. S3 The stability of CdTe/CdSe QDs.

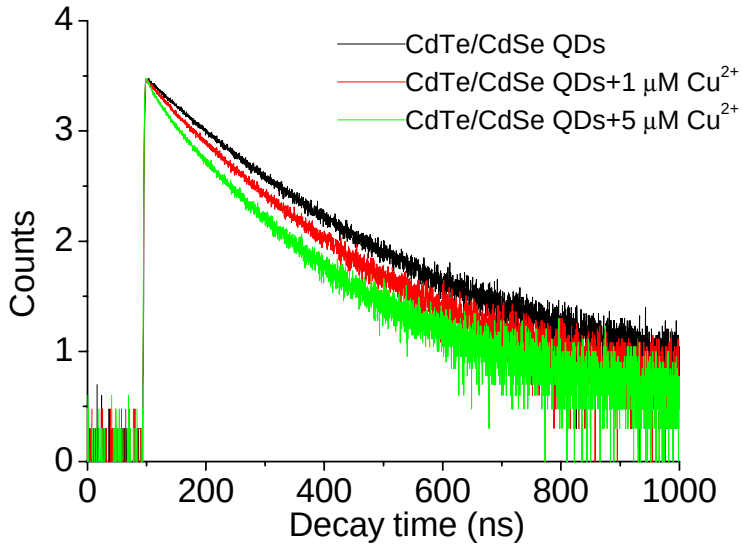

Fig. S4 Fluorescence decay curves of CdTe/CdSe QDs in the absence and presence of Cu (II) ions, which were recorded at the 752.2 nm with the excitation wavelength of 400 nm.

References

1. Y. Lai, Y. Yu, P. Zhong and J. Wu, *Anal. Lett.*, 2006, **39**, 1201.
2. Y. Chen and Z. Rosenzweig, *Anal. Chem.*, 2002, **74**, 5132.
3. B. Tang, J. Niu, C.Yu, L. Zhuo and J. Ge, *Chem. Commun.*, 2005, 4184.