Supporting Information for

Ultrafast, Sensitive and Visual Sensing of Copper Ions by a Dual-Fluorescent Film Based on Quantum Dots

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Experimental section

Synthesis of QDs_g ($CdSe/Cd_xZn_{1-x}S$ QDs): QDs_g were obtained according to a typical synthetic procedure.[1] Briefly, 0.2 mmol of CdO, 4 mmol of zinc acetate, 5 mL oleic acid, and 15 mL 1-octadecne were loaded into a 100 mL three-neck flask, and heated to 150 °C, degassed under 100 mTorr pressure for 30 min, filled with N_2 gas, and further heated to 310°C under nitrogen flow to form a clear solution of $Cd(OA)_2$ and $Zn(OA)_2$. At this temperature, 0.1 mmol of Se powder and 4.0 mmol of S powder both dissolved in 2.0 mL of TOP (trioctylphosphine) were quickly injected into the reaction flask. After injection, the temperature was reduced to 300 °C for the growth of QDs, and it was then cooled to room temperature to stop the growth, QDs_g were obtained.

Synthesis of QDs_r (CdSe/CdS/ZnS QDs): QDs_r were prepared by following a previounsly reported work.[2] Briefly, Cd-SA stock solutions were heated and pumped vacuum and purged with nitrogen gas. Then injected TBP-Se (tributylphosphine-selenium) precursor pre-calculated into the Cd-SA (stearic acid) stock solutions. After getting CdSe-core particles, the successive ion layer adsorption and reaction (SILAR) technique was used to grow complex shells. A calculated amount of a given precursor solution was injected using standard air-free procedures, QDs_r were obtained.

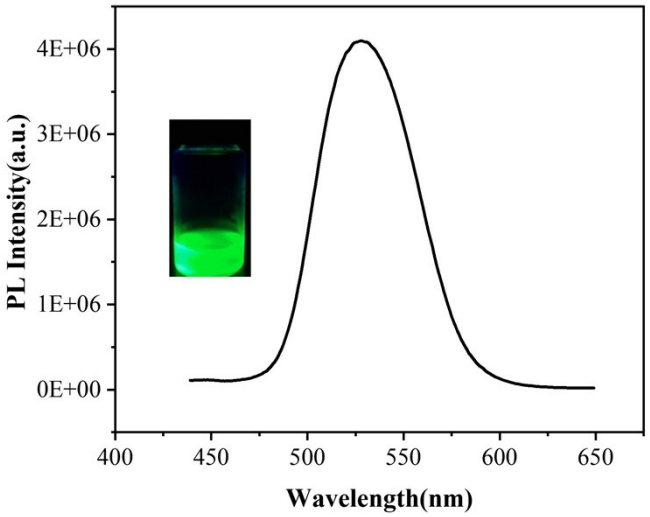

Fig. S1. Fluorescence spectra of QDs_g. The inset is digital photo of QDs_g dispersed in chloroform

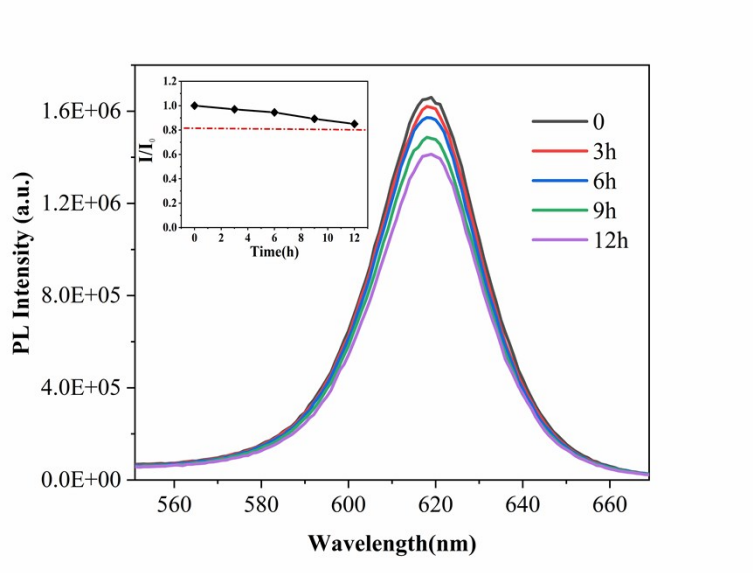

Fig. S2. Fluorescence spectra of QDs_r-PEI in aqueous dispersion at 60℃ for different time. The inset is the ratio of PL intensity with time. I_0 and I represent the PL intensity of the original QDs_r-PEI and QDs_r-PEI with treatment, respectively.

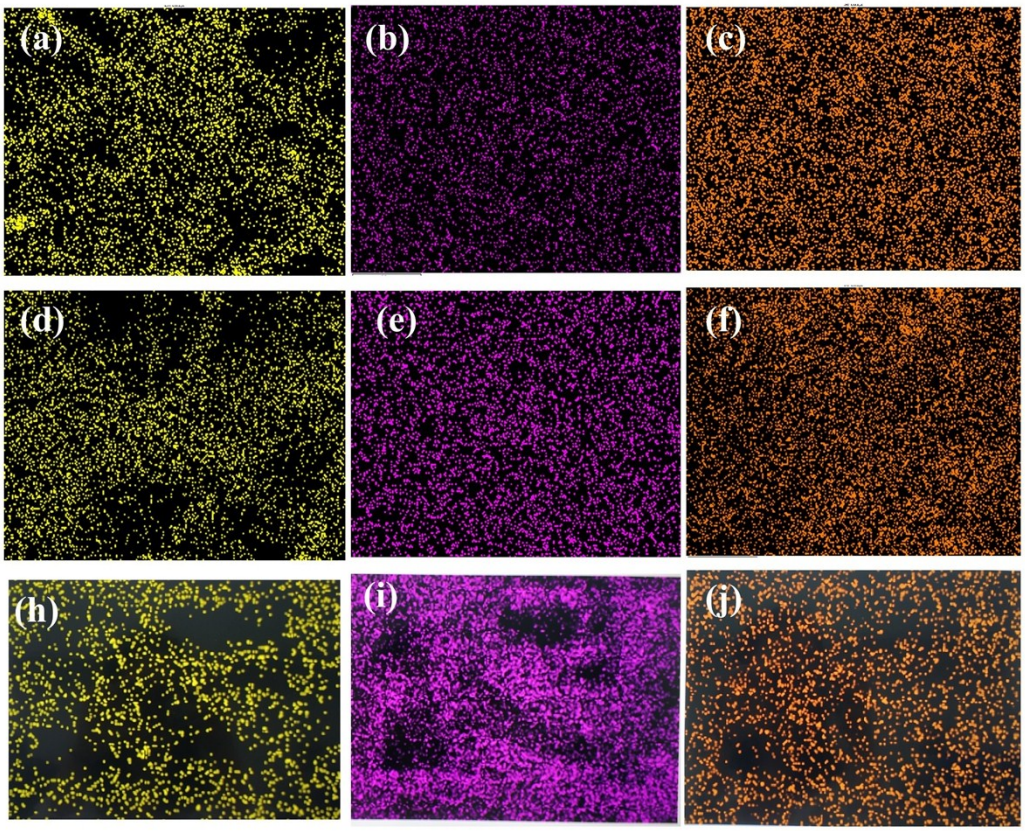

Fig. S3. (a)~(c) EDS mapping of Zn, Cd and Se element in QDs_g/PVDF. (d)~(f) EDS mapping of Zn, Cd and Se element in (QDsg/PVDF)@QDsr. (h)~(f) EDS mapping of Zn, Cd and Se element in (QDs_g/PVDF)@QDs_r-PEI.

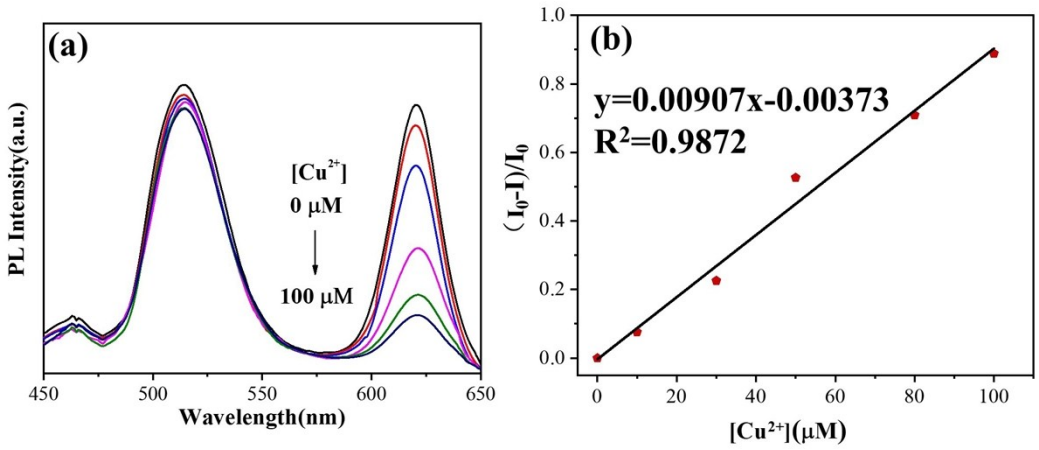

Fig. S4. (a) Fluorescence spectrum of (QDs_g/PVDF)@QDs_r film toward Cu^{2+} at different concentration. (b) the concentration dependence for the fluorescence quenching of fluorescent films by Cu^{2+}.

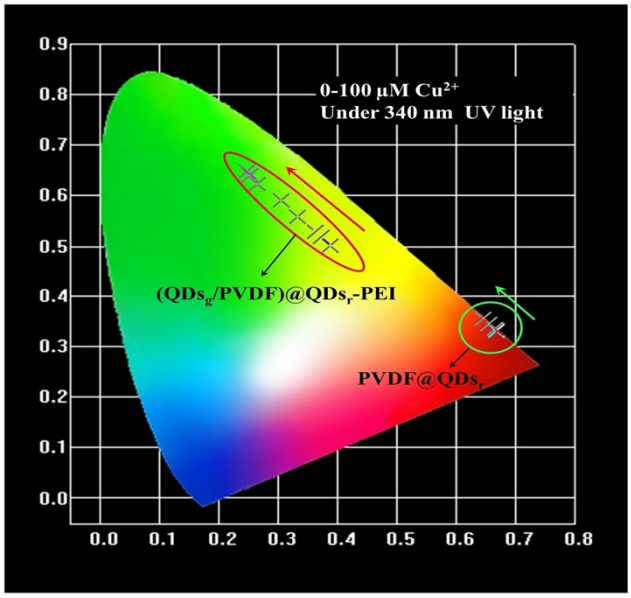

Fig. S5. CIE 1931 diagram of PVDF@QDs_r and (QDs_g/PVDF)@QDs_r-PEI film toward Cu^{2+} at different concentration excited at 340 nm.

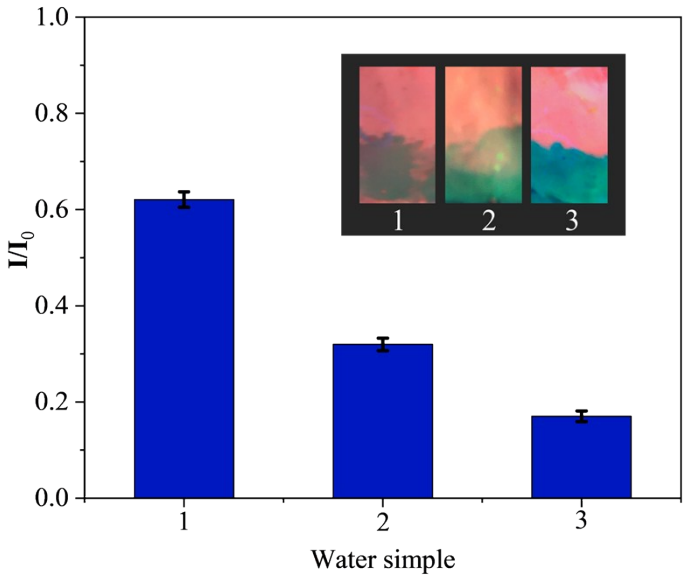

Fig. S6. The ratio of PL intensity at 620 nm of fluorescent films toward different water simples and the original fluorescent film. Simple 1-3 are 3.18 μM, 6.40 μM and 7.72 μM Cu^{2+} in river water, respectively. The inset is digital photos of fluorescent films toward different water simples under 365 nm UV light

1 Q. Feng, L. Dong, J. Huang, Q. Li, Y. Fan, J. Xiong, C Xiong, Angew. Chem. Int. Ed. 2010, 49, 9943-9946.

2 W.K. Bea, K. Char, H. Hur, S. Lee, Chem.Mater. 2008, 20, 531.