

Supporting information

Composite Quantum Dots Detect Cd(II) in Living Cells in a Fluorescence “Turning On” Mode

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Page 2. Fig. S1: FT-IR spectra of (a) CdSe@SiO₂-propyne, (b) 2-(2-(2- azidoethoxy) ethoxy) ethanol, and (c) CdSe@SiO₂-TGT.

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Page 8. Fig. S7: Effect of relevant metal ions on the fluorescence of CdSe@SiO₂-propyne as a control experiment.

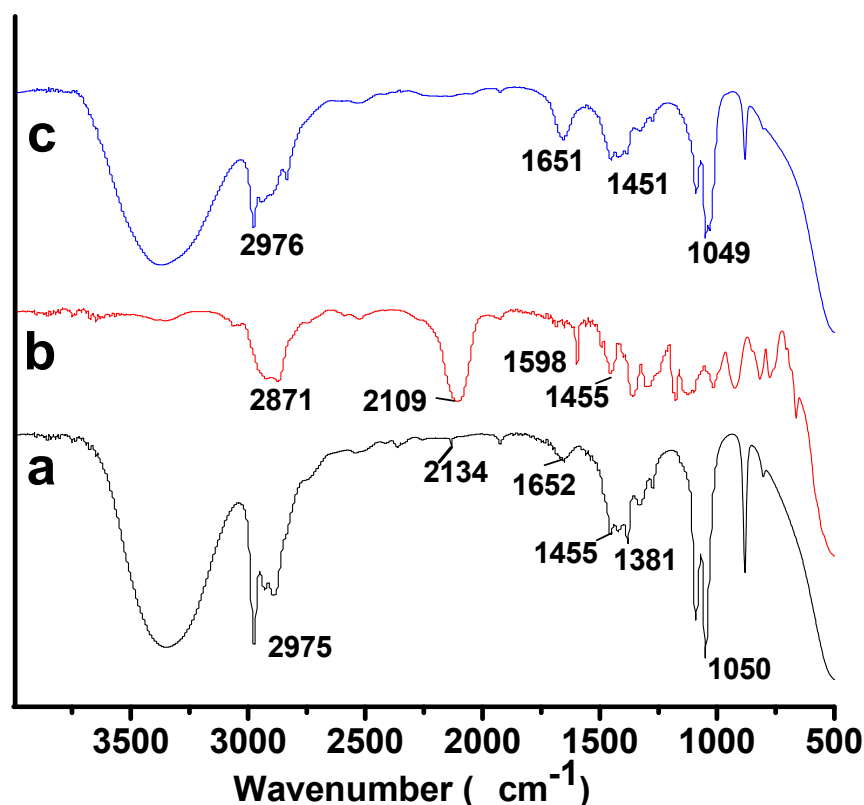


Fig. S1 FT-IR spectra of (a) CdSe@SiO₂-propyne, (b) 2-(2-(2-azidoethoxy)ethoxy)ethanol, and (c) CdSe@SiO₂-TGT. By comparison b and c, the obvious disappearing of characteristic peaks of azide (2109 cm^{-1}) indicated the successful click reaction.

The IR spectra of CdSe@SiO₂-propyne and CdSe@SiO₂-TGT can further confirm the successful linking of triazole to the surface of silica. The IR data contain features identified on CdSe@SiO₂-propyne, as shown in Figure S1a: the peaks at 2134 cm^{-1} arising from the alkyne stretching modes. The width peak from around 1050 cm^{-1} is the characteristic peaks of Si-O-Si. Figure S1b shows the features identified on azide-terminated ligands: the peaks of azide at 2109 cm^{-1} , the benzene ring stretching region at 1598 cm^{-1} and 1455 cm^{-1} . After the clicking reaction, the characteristic peaks of alkyne and azide disappeared, accompanying by the peaks of triazole around 1651 cm^{-1} increased (Figure S1c). The absence of an alkyne and azide peak suggests that all of the alkyne groups are involved in click reaction, and also confirmed the successful bonding of the triazole to the surface of CdSe@SiO₂-TGT.

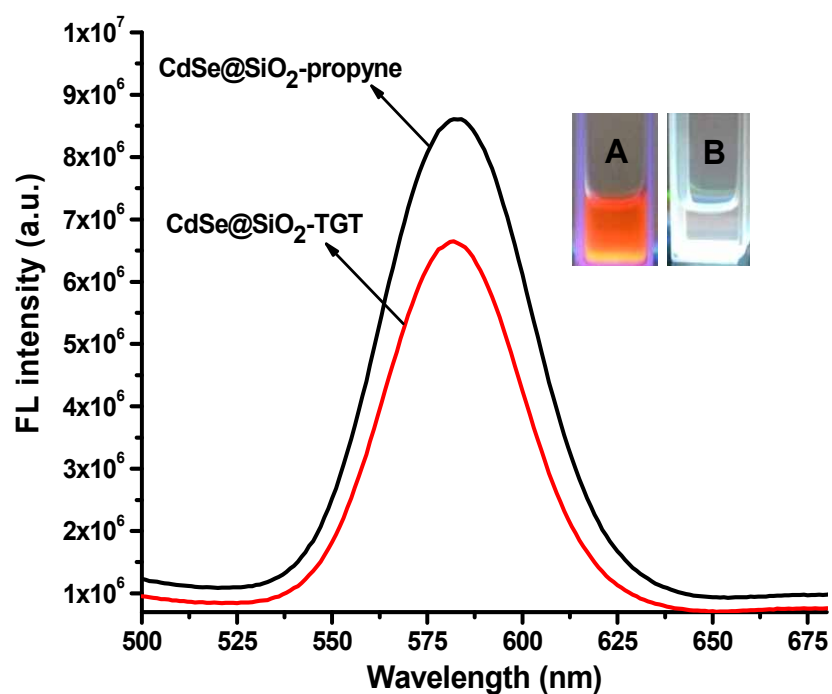


Fig. S2 FL spectra of CdSe@SiO₂-propyne and CdSe@SiO₂-TGT. Inset: (A) fluorescence photographs of CdSe@SiO₂-TGT under UV light irradiation (Excitation= 365 nm), and (B) under white light.

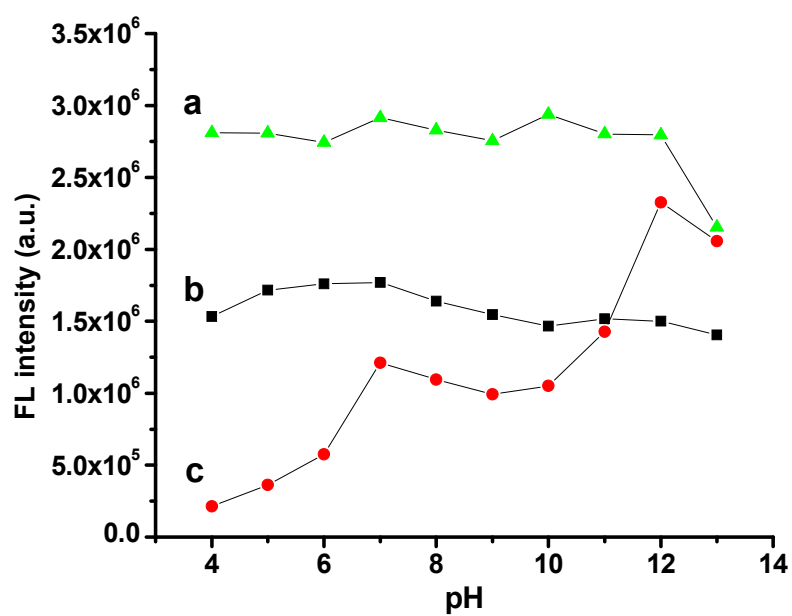


Fig. S3 The effect of pH on luminescence response of (a) CdSe@SiO₂, (b) CdSe@SiO₂-propyne and (c) CdSe@SiO₂-TGT.

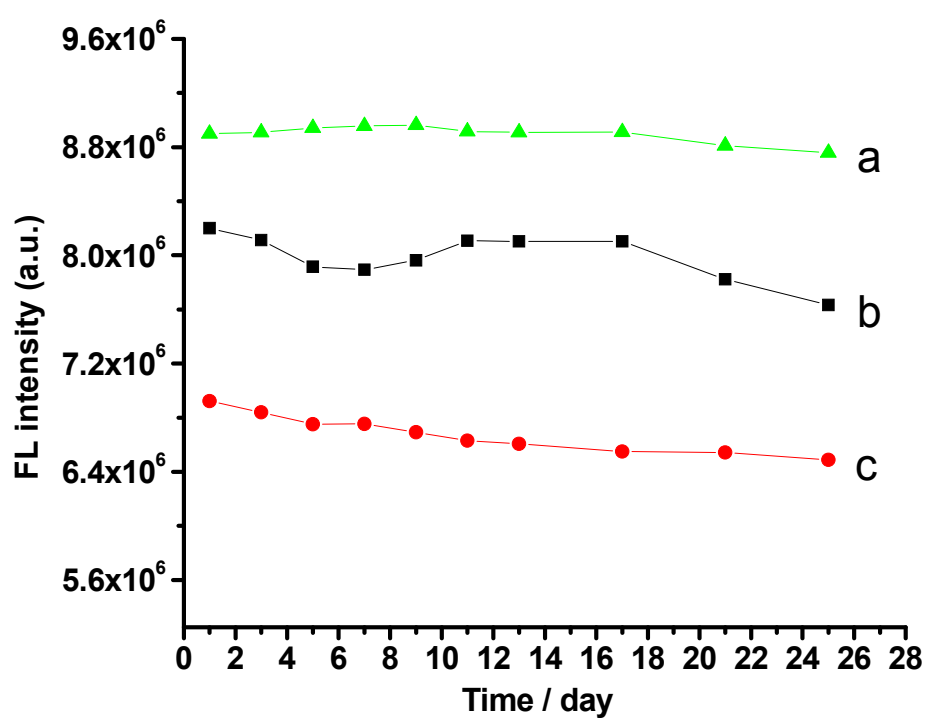


Fig. S4 The photostability of (a) CdSe@SiO₂, (b) CdSe@SiO₂-propyne and (c) CdSe@SiO₂-TGT.

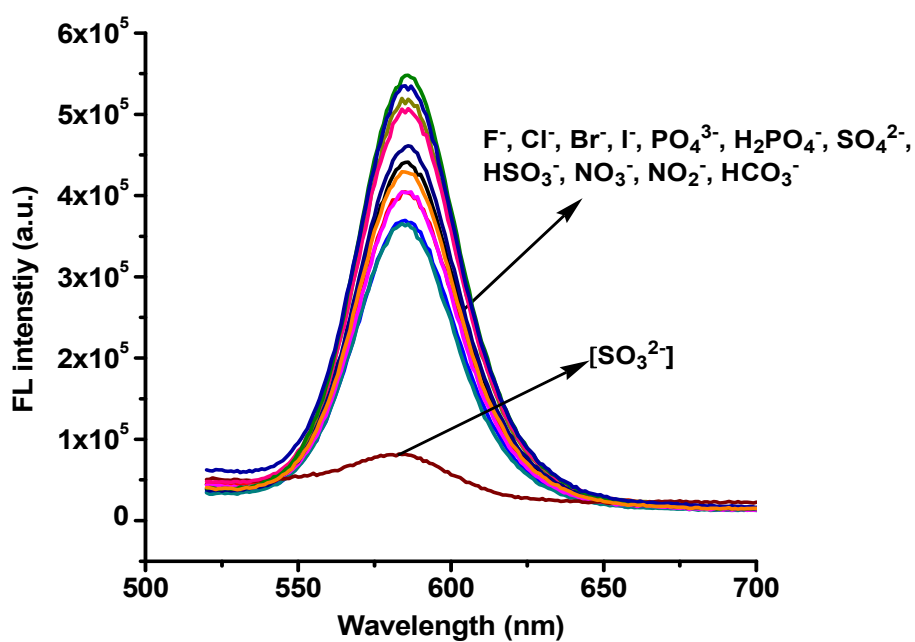


Fig. S5 FL spectra of CdSe@SiO₂-TGT reposed to different anions (1×10^{-4} M) including F^- , Cl^- , Br^- , I^- , PO_4^{3-} , H_2PO_4^- , SO_4^{2-} , HSO_3^- , NO_3^- , NO_2^- , and HCO_3^- . The combined interaction through hydrogen bonding makes CdSe@SiO₂-TGT show a prominent fluorescence quenching towards SO_3^{2-} over other anions.

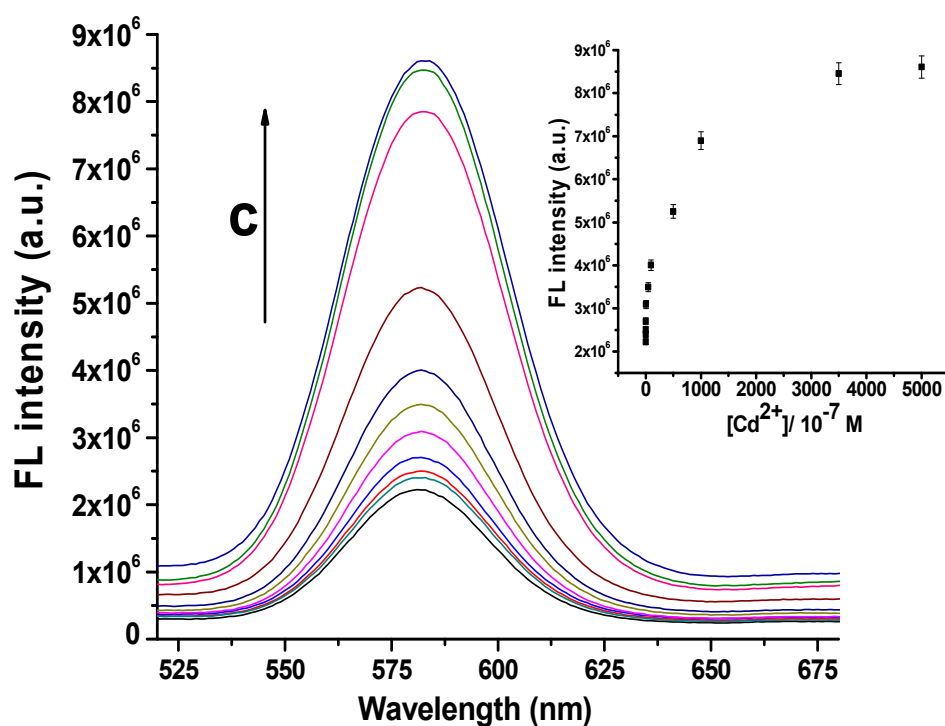


Fig. S6 Concentration effects of Cd^{2+} on the FL intensity of $\text{CdSe@SiO}_2\text{-TGT}$, which shows FL enhancing with Cd^{2+} concentration increasing. Inset: Langmuir binding isotherm description of the data showing a linear fit throughout the Cd^{2+} concentration range, with a binding constant of 0.52 and a correlation coefficient >0.999 .

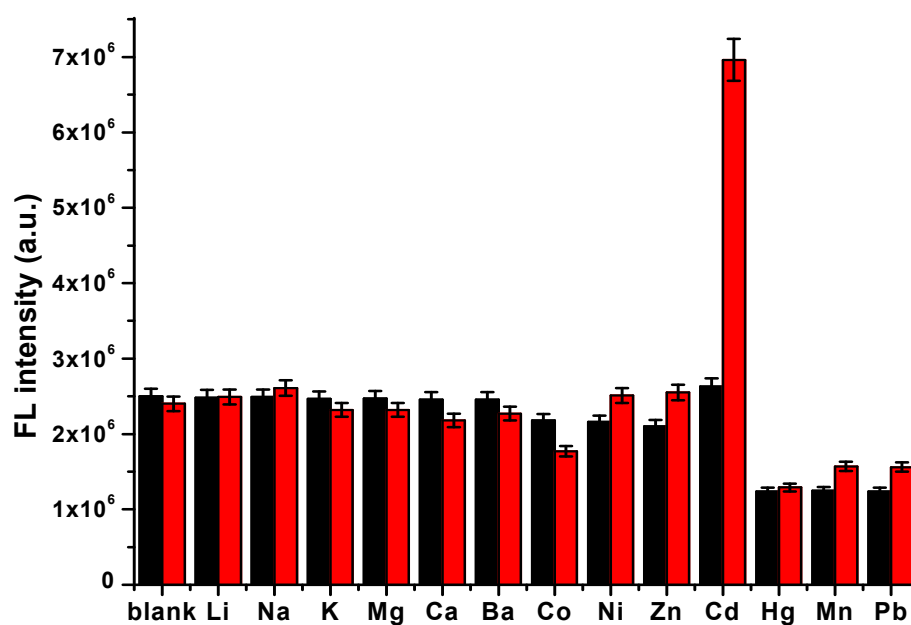


Fig. S7 Effect of 1×10^{-4} M relevant metal ions on the fluorescence of CdSe@SiO₂-propyne (black) and CdSe@SiO₂-TGT (red). Metal ions including Li⁺, Na⁺, K⁺, Mg²⁺, Ca²⁺, Ba²⁺, Co²⁺, Ni²⁺, Zn²⁺, Cd²⁺, Hg²⁺, Mn²⁺, Pb²⁺.