

Supplementary material (ESI) for Analytical Methods
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Electronic Supporting Information

for

**“Turn-off-on” fluorescence switching of cadmium telluride
quantum dots for rapid and selective analysis of heparin sodium
and lysine**

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Figures

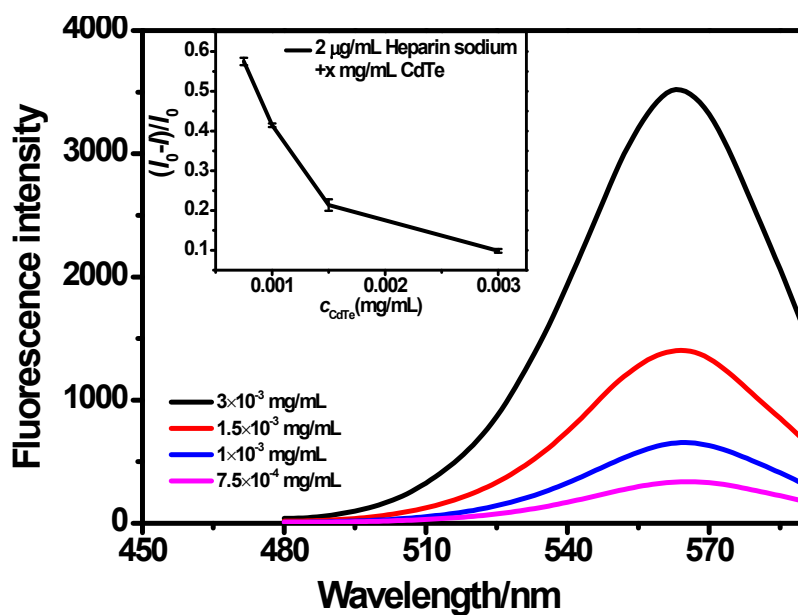


Fig. S1 Effect of CdTe QDs concentrations on heparin sodium analysis. The inset presents the changes of fluorescence intensity ratio. The ratio of $(I_0 - I)/I_0$, the fluorescence quenching of CdTe QDs in the presence of heparin sodium; I_0 , the fluorescence intensity of CdTe QDs; I , the fluorescence intensity of CdTe QDs/heparin sodium mixture. Conditions: heparin sodium, 2 µg/mL; λ_{em} , 565 nm; λ_{ex} , 300 nm; t , 3min.

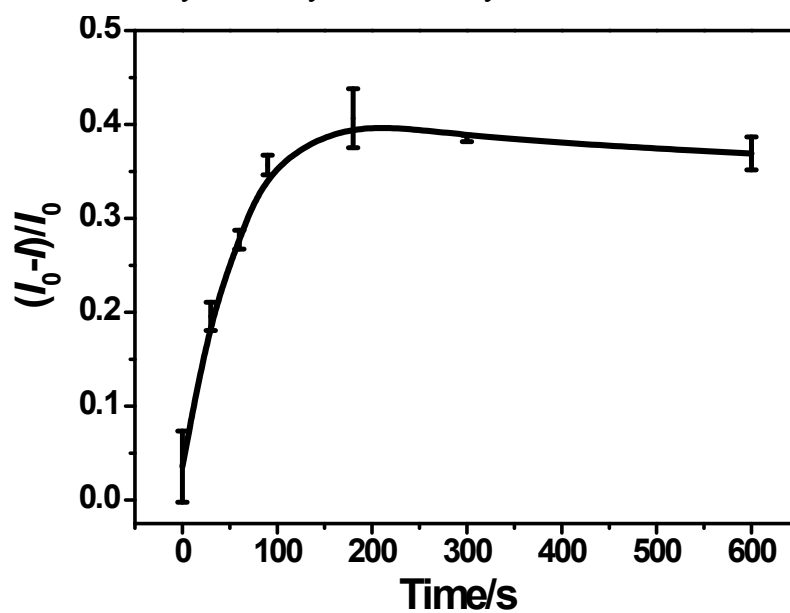


Fig. S2 Effect of reaction time on the determination of heparin sodium. The ratio of $(I_0 - I)/I_0$, the fluorescence quenching of CdTe QDs in the presence of heparin sodium; I_0 , the fluorescence intensity of CdTe QDs; I , the fluorescence intensity of CdTe QDs/heparin sodium mixture. Conditions: CdTe QDs, 1 $\mu\text{g}/\text{mL}$; λ_{em} , 565 nm; λ_{ex} , 300 nm; t , 3min.

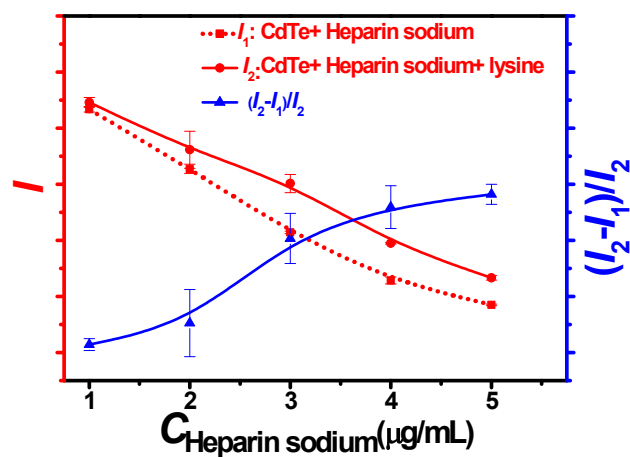


Fig. S3 Effect of concentrations of heparin sodium on the determination of lysine. Conditions: CdTe QDs, 1 $\mu\text{g/mL}$; lysine: 1×10^{-5} mol/mL; λ_{em} , 565 nm; λ_{ex} , 300 nm; t , 3min. the ratio of $(I_2 - I_1)/I_2$, the fluorescence recovery of CdTe QDs /heparin sodium in the presence of lysine.

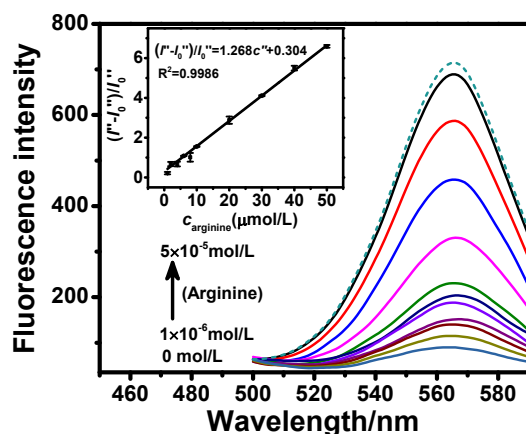


Fig. S4 The fluorescence recovery of TGA-capped CdTe QDs in the presence of heparin sodium with the addition of different concentrations of arginine. The inset displays the linear plot of fluorescence intensity recovery versus arginine concentration. Conditions: CdTe QDs: 1 $\mu\text{g/mL}$; heparin sodium, 5 $\mu\text{g/mL}$. λ_{em} , 565 nm; λ_{ex} , 300 nm; t, 3 min.

The inset of **Fig. S5** shows the linear plot of fluorescence recovery versus arginine concentrations, which could be expressed as $(I'' - I_0'')/I_0'' = 0.304 + 1.268 c''$ ($R^2 = 0.9986$), wherein I_0'' is the fluorescence intensity of CdTe QDs in the presence of 5 $\mu\text{g/mL}$ heparin sodium, I'' is the fluorescence intensity of CdTe QDs/heparin sodium in the presence of arginine and c'' is the concentrations of lysine. The linear response toward lysine concentrations ranged from 1 $\mu\text{mol/L}$ to 50 $\mu\text{mol/L}$ with a detection limit of 0.053 $\mu\text{mol/L}$.

The fluorescence recovery of TGA-capped CdTe QDs in the presence of heparin sodium with the addition of different concentrations of arginine.

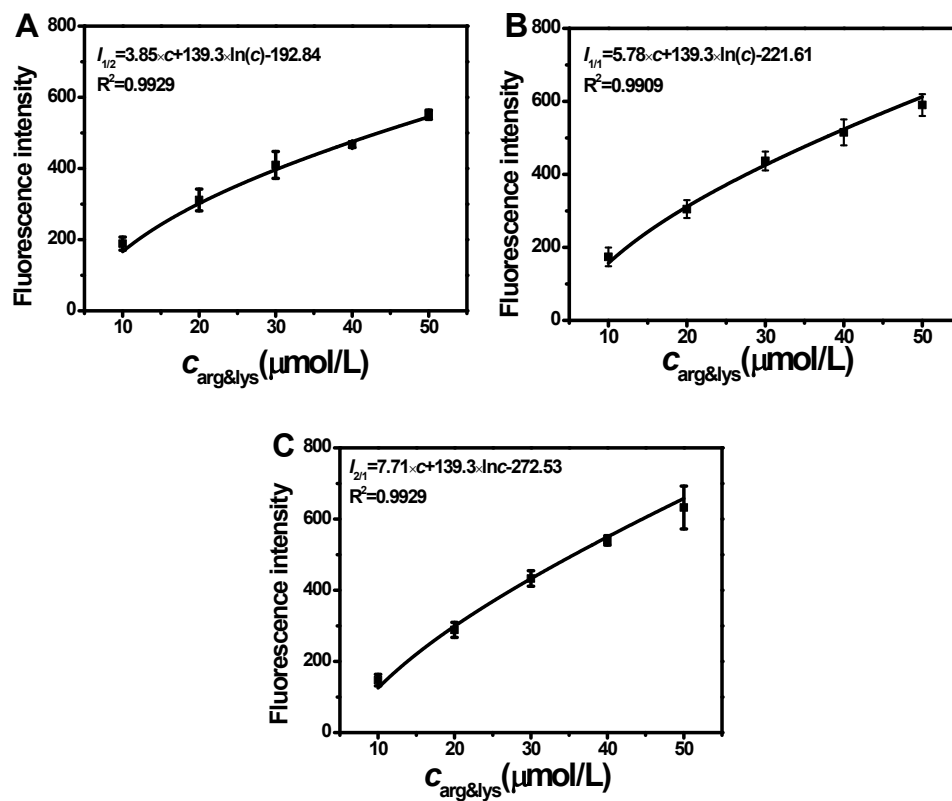


Fig. S5 The linear plot of fluorescence intensity recovery versus the concentration ratio of arginine and lysine at (A) 1:2, (B) 1: 1 and (C) 2:1. Conditions: CdTe QDs: 1 $\mu\text{g/mL}$; heparin sodium, 5 $\mu\text{g/mL}$. λ_{em} , 565 nm; λ_{ex} , 300 nm; t , 3min.

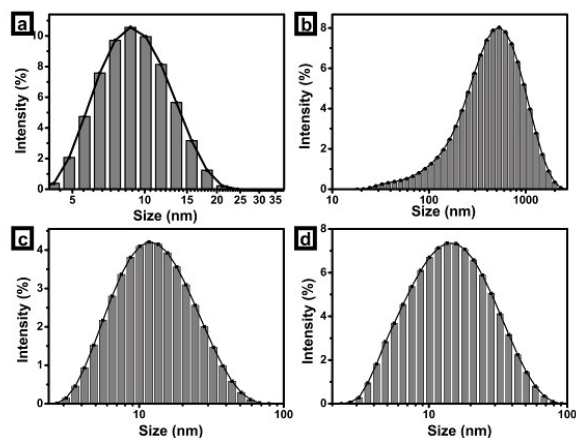


Fig. S6 Particle size distribution of CdTe QDs, CdTe QDs-Heparin sodium, CdTe QDs-Heparin sodium in the presence of lysine and CdTe QDs-Heparin sodium in the presence of arginine measured by DLS.

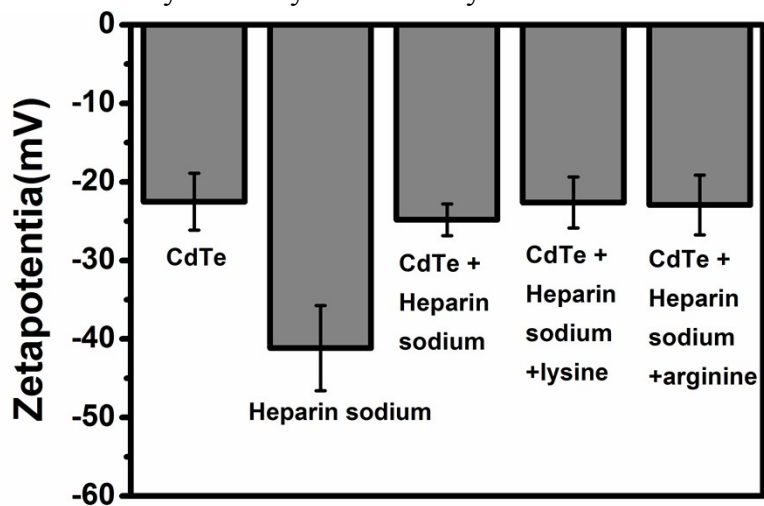


Fig. S7 Zeta-potential of CdTe QDs, CdTe QDs-Heparin sodium, CdTe QDs in the presence of Heparin sodium and lysine and CdTe QDs in the presence of Heparin sodium and arginine.

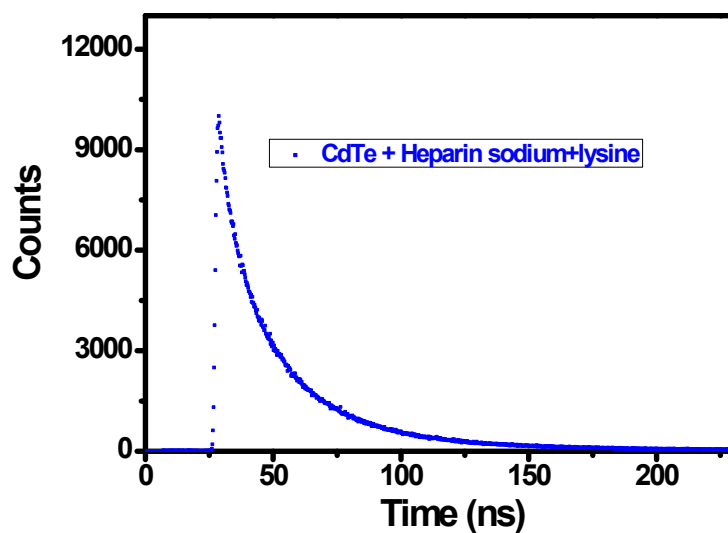


Fig. S8 Lifetime of steady-state fluorescence of CdTe QDs/heparin sodium/lysine mixture. Concentrations: CdTe QDs, 1 $\mu\text{g}/\text{mL}$; heparin sodium, 2 $\mu\text{g}/\text{mL}$; lysine, 100 $\mu\text{mol}/\text{L}$.

Tables

Table S1 Comparison of the performances towards heparin sodium with different assays

Analytical method	Linear range(U/mL)	LOD(U/mL)	Ref.
Fluorescent	0.06-32.5	0.0575	1
Fluorescent	0.075-0.55	0.075	2
Fluorescent	0.2-1.2	0.2	3
Fluorescent	0.0011-4.625	0.0011	4
Fluorescent	0.296-0.74	0.00024	5
Colorimetric	0.0033-5	0.0033	6
Colorimetric	0-6.7	0.01	7
Fluorescent	0.037-0.925	0.0060	this work

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Table S2 Comparison of the performances towards lysine with different assays

Analytical method	Linear range($\mu\text{mol/L}$)	LOD($\mu\text{mol/L}$)	Reference
Colorimetric	5-100	1.6	1
Colorimetric	1-1000	0.02	2
Colorimetric	1-100	1.0	3
Amperometric	50-1100	8.6	4
Spectrophotometric	15 - 95	0.78	5
Potentiometric	30-1000	6.0	6
Electrochemical	0.5-5.5	0.39	7
Fluorescent	2-200	0.146	this work

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