

## Supporting Information

### Self-Electrochemiluminescence of CdTe Nanocrystals Capped with

#### 2-Diethylaminoethanethiol

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### Experimental Section

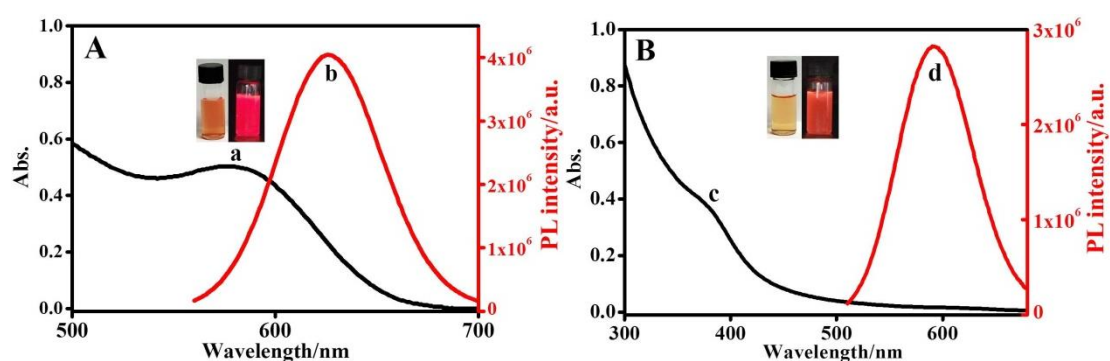
**Reagents.** 3-Mercaptopropionic acid (MPA) and 2-diethylaminoethanethiol hydrochloride (DEAET) were purchased from Sigma-Aldrich. Tellurium powder (Te) was obtained from XingTa Chemical Plant Co. Ltd, (Shanghai, China). Cadmium chloride hemipentahydrate ( $\text{CdCl}_2 \cdot 2.5\text{H}_2\text{O}$ ), Sodium borohydride ( $\text{NaBH}_4$ ) and methanol ( $\text{CH}_3\text{OH}$ ) were obtained from Sinopharm Chemical Reagents Co. Ltd, (Shanghai, China). 2-Dimethylaminoethanethiol hydrochloride (DAET) was obtained from Across. Phosphate buffer solutions (PBS, pH 6.0-11.0, 0.1M) were prepared by varying the ratio of  $\text{Na}_2\text{HPO}_4$  to  $\text{NaH}_2\text{PO}_4$ . All other reagents were of analytical grade and were used without further purification. Double-distilled water was used throughout.

**Apparatus.** All electrochemical and ECL experiments were carried out in a conventional three-electrode cell with a modified glassy carbon working electrode (GCE, diameter 3 mm), a Pt wire counter electrode and a saturated calomel electrode (SCE) as reference electrode. Cyclic voltammetric experiments were performed with a CHI 660E electrochemical workstation (Shanghai Chen Hua Instrument Co., Ltd.). The ECL intensities were measured with MPI-ECL Analyzer (Xi'an Remax Electronic High-Tech Ltd). The morphology of CdTe NCs was observed on a JEM-2100 transmission electron microscope (JEOL Ltd.). Energy-dispersive X-ray spectroscopy (EDX) was carried out using a FEI Sirion 200 scanning electron microscope (FEI). The photoluminescence spectra (PL) were obtained on a FluoroMax-4 fluorescence spectrophotometer (Horiba, USA). UV-Vis absorption spectra were recorded on a Shimadzu UV-2450 Spectrophotometer (Tokyo, Japan). A vortex mixer IKA MS3 digital was selected to mix the solution.

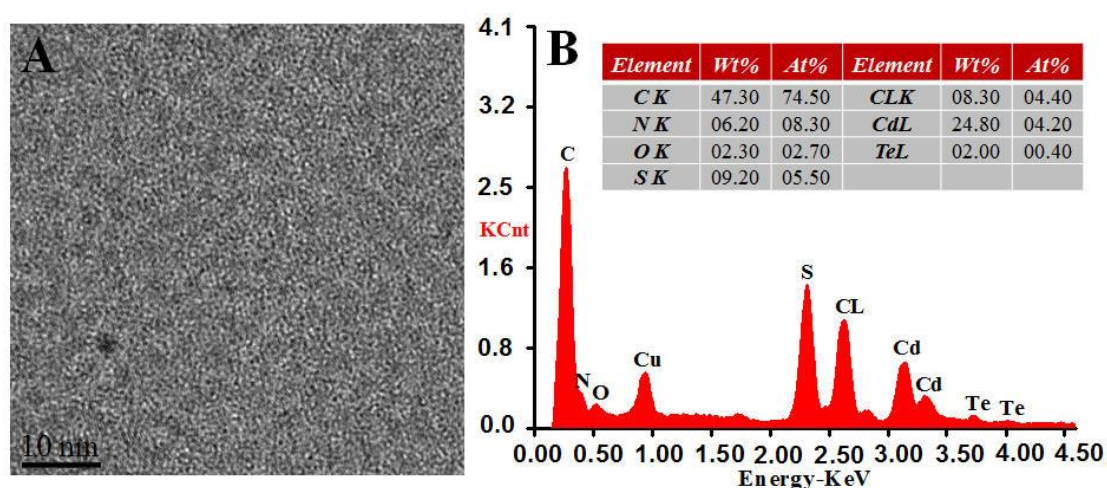
### Synthesis of CdTe-DEAET NCs by surface ligand exchange

The MPA-capped CdTe NCs were prepared in aqueous medium according to previously reported procedure<sup>1</sup>. Water-soluble CdTe NCs capped with DEAET were obtained from by ligand exchange. Briefly, 6 mg of prepared capped-MPA CdTe NCs

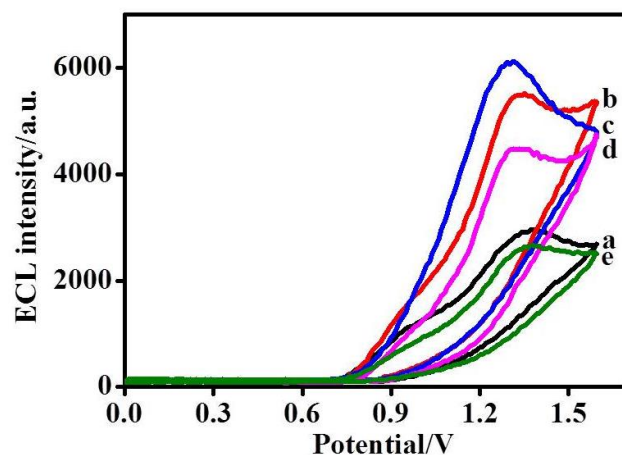
were dissolved in 3 mL methanol and subsequently 3 mL of 0.2M methanolic solutions of DEAET were added with stirring at room temperature. Directly after stirring for 30 minutes, 3mL of double-distilled water were added to the solutions and then stirred for 12 hours. After the reaction, the methanol was evaporated from the solution by rotary evaporation. Then, the unpurified CdTe NCs were placed into the dialysis tubing and then the solution was dialyzed against ultrapure water for 3 hours at room temperature. The final products were collected after the removal of solvent under vacuum at room temperature. The final precipitates were re-dissolved in double-distilled water as stock solution and then kept under dark at 4 °C. The DEAET-capped CdTe NCs were also prepared by exchanging its derivatives DEAET onto MPA-capped CdTe NCs in the same way.



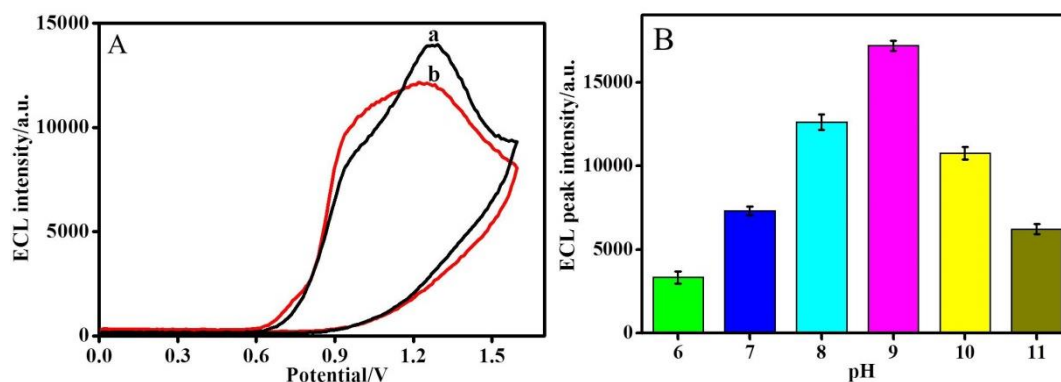
**Figure S1** The UV-vis absorption (a, c) and PL spectra (b, d) of (A) CdTe-MPA NCs and (B) CdTe-DEAET NCs. The inset shows photographs of (A) CdTe-MPA NCs and (B) CdTe-DEAET NCs taken under 365 nm UV light and visible light, respectively. The solution concentrations of NCs are 0.1 mg mL<sup>-1</sup> in the PL experiments. Excitation wavelength: 450 nm and 350 nm respectively and both the excitation and emission slit widths were 5 nm.



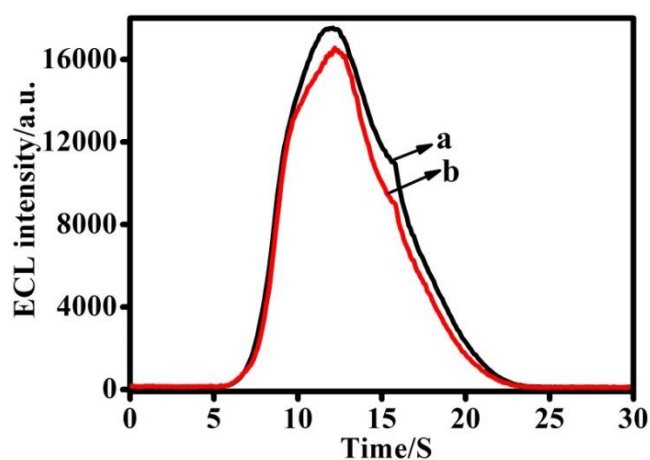
**Figure S2** (A) TEM image and (B) the relative EDX spectrum of CdTe-DEAET NCs. The inset shows the element concentrations of CdTe-DEAET NCs.



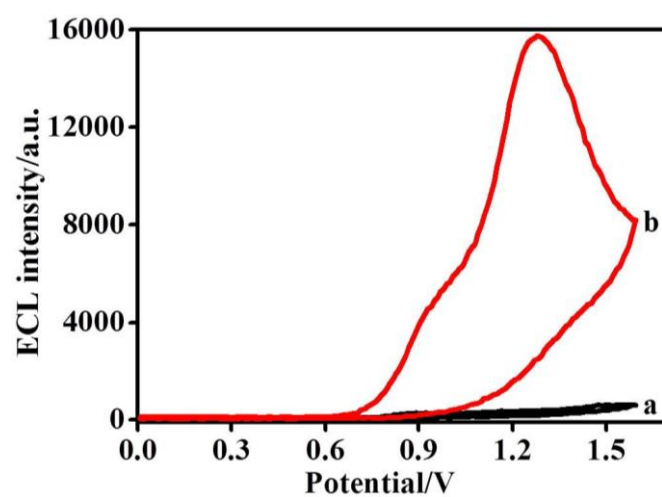
**Figure S3** ECL signals of CdTe-MPA NCs/GCE in 0.1 M PBS (pH 9.0) containing different concentrations of DEAET (a-e: 0.1mM, 1mM, 5mM, 10mM and 16mM). Scan rate:  $100 \text{ mV s}^{-1}$ .



**Figure S4** (A) Effect of atmosphere (a)  $\text{N}_2$  and (b) air on the ECL intensity of CdTe-DEAET NCs/GCE in 0.1 M PBS (pH 9.0). (B) Effect of pH on ECL responses of the CdTe-DEAET NCs /GCE in 0.10 M PBS. Scan rate:  $100 \text{ mV s}^{-1}$ .



**Figure S5** ECL signals of CdTe-DEAET NCs in 0.1 M PBS (pH 9.0) before (a) and (b) after two months storage. Scan rate:  $100 \text{ mV s}^{-1}$ .



**Figure S6** ECL signals of (a) CdTe-MPA NCs/GCE, (b) CdTe-DAET NCs/GCE in 0.1 M PBS (pH 9.0). Scan rate: 100 mV s<sup>-1</sup>.

### Notes and References

1. L. Zou, Z. Gu, N. Zhang, Y. Zhang, Z. Fang, W. Zhu and X. Zhong, *Journal of Materials Chemistry*, 2008, **18**, 2807.