

## Electronic Supplementary Information

### **A molecule light switch Ru complex and Quantum-dot for the label-free aptamer-based detection of thrombin**

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#### **Experimental Section**

##### ***Chemicals***

[Ru(bpy)<sub>2</sub>dppz]<sup>2+</sup> was prepared and characterized according to the literature.<sup>1</sup> All DNA synthesis reagents were ordered from Shanghai Sangon Biotechnology Co. Ltd. (Shanghai, China) and used without further purification. DNA stock solution was obtained by dissolving oligonucleotides in 10 mM Tris-HCl buffer (pH 7.4) and was stored at 4 °C before use. The concentration of oligonucleotide was determined using the absorbance at 260 nm. Thioglycolic acid (≥ 98%), CdCl<sub>2</sub> (99.99%), tellurium powder (99.99%), NaBH<sub>4</sub> (95%) were obtained from Sigma-Aldrich. All other reagents were of analytical grade.

##### ***Buffers***

All the experiments were carried out in Tris-HCl (10 mM, pH 7.4) buffer.

##### ***Apparatus***

Lambda Bio 40 UV/Vis Spectrophotometer (Perkin-Elmer, USA) was

used to quantify the oligonucleotides. The PL spectra were recorded at room temperature on an F-7000 fluorescence spectrophotometer (Hitachi) with a quartz cell (2 mm). The excitation and emission slit width were both 10 nm.

### ***Synthesis of CdTe QDs***

The synthesis of CdTe QDs was performed according to the reference with some modification. First, NaHTe was prepared by adding 40 mg NaBH<sub>4</sub> to a flask containing 46 mg tellurium powder and 2 ml Milli-Q water under nitrogen atmosphere. The reaction was kept on for several hours until all tellurium powder was dissolved.

0.092g (0.5 mmol) of CdCl<sub>2</sub> and 0.092 g (1 mmol) of thioglycolic acid were dissolved in 100 ml Milli-Q water, followed by adjusting pH to 8.2 by addition of 1M NaOH solution. The mixture was deaerated by N<sub>2</sub> bubbling for 30 min. Then NaHTe solution (0.062 mmol) was quickly injected into the mixture under vigorous stirring, followed by refluxing the mixture for 2 h under open-air conditions.

### ***Characterization of synthesized QDs***

The UV-vis spectra of TGA-capped CdTe QDs are obtained. According to the following empirical equations, the sizes and concentrations of QDs can be estimated from the adsorption peaks in UV-vis spectra.<sup>2</sup> The size of TGA-capped CdTe QDs is 2.97 nm diameter. The concentration of QDs is 8381.5 nM.

$$D \text{ (nm)} = (9.8127 \times 10^{-7})\lambda^3 - (1.7147 \times 10^{-3})\lambda^2 + (1.0064)\lambda - (194.84)$$

$$C \text{ (mol L}^{-1}\text{)} = A/[10043 (D)^{2.12}l]$$

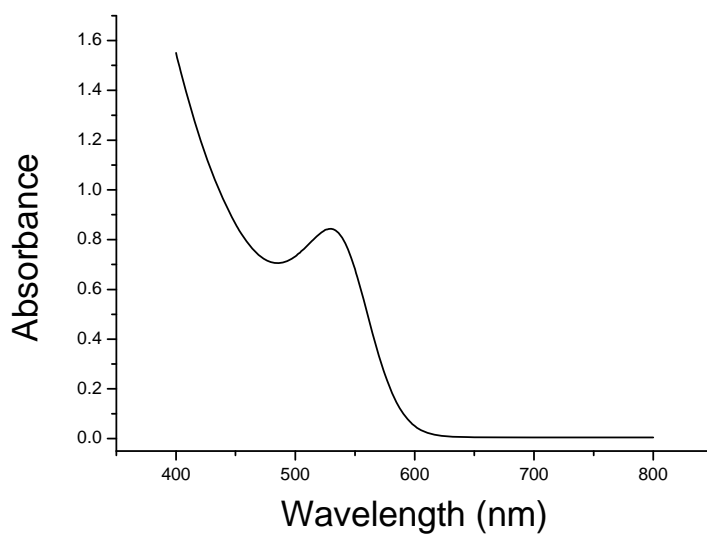


Fig. S1 UV-vis spectrum of CdTe QDs.

1. E. Amouyal, A. Homsı, J.-C. Chambron and J.-P. Sauvage, *J. Chem. Soc. Dalton. Trans.*, 1990, 1841-1845.
2. W. W. Yu, L. Qu, W. Guo and X. Peng, *Chem. Mater.*, 2003, **15**, 2854-2860.