

## Electronic Supplementary Information

# Carbon dots-based frequency-doubling scattering probes for ultrasensitive and highly selective determination of hemoglobin

**Shan Huang<sup>a,b,c,d</sup>, Erli Yang<sup>a,b</sup>, Lumin Wang<sup>a,b</sup>, Yi Liu<sup>a,b,c</sup>, Jiangning Xie<sup>a,b</sup>,  
Baoqing Hu<sup>d</sup>, Qi Xiao<sup>a,b,c,d\*</sup>**

<sup>a</sup> *College of Chemistry and Materials Science, Guangxi Colleges and Universities Key Laboratory of Synthetic and Natural Functional Molecular Chemistry, Guangxi Teachers Education University, Nanning 530001, P. R. China*

<sup>b</sup> *Guangxi Key Laboratory of Natural Polymer Chemistry and Physics (Guangxi Teachers Education University), Nanning, 530001, P. R. China*

<sup>c</sup> *College of Chemistry and Molecular Sciences, Wuhan University, Wuhan 430072, P. R. China*

<sup>d</sup> *Key Laboratory of Beibu Gulf Environment Change and Resources Utilization (Guangxi Teachers Education University) Ministry of Education, Nanning, 530001, P. R. China*

\* Corresponding author. Tel.: +86 771 3908065; Fax: +86 771 3908065;  
E-mail address: [qi.xiao@whu.edu.cn](mailto:qi.xiao@whu.edu.cn)

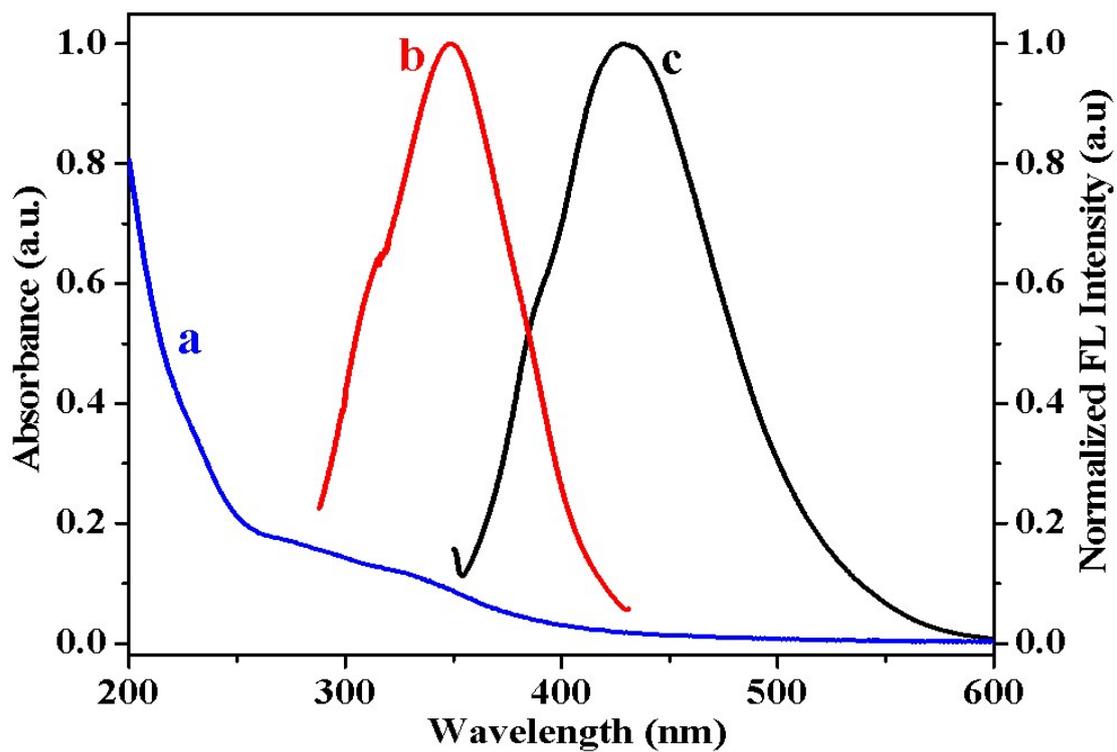


Fig. S1. UV-vis absorption spectrum of CDs (a), excitation spectrum of CDs at  $\lambda_{em} = 430$  nm (b) and emission spectrum of CDs at  $\lambda_{ex} = 340$  nm (c).

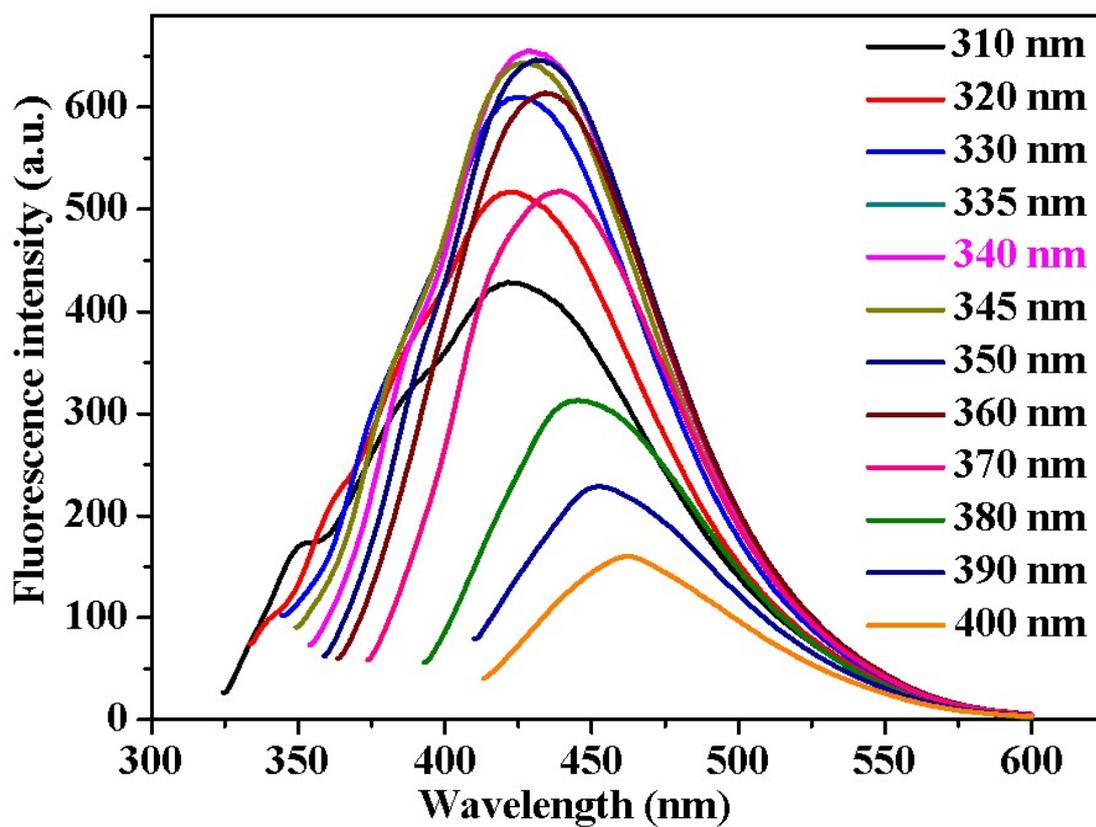


Fig. S2. Fluorescence spectra of CDs at different excitation wavelength.

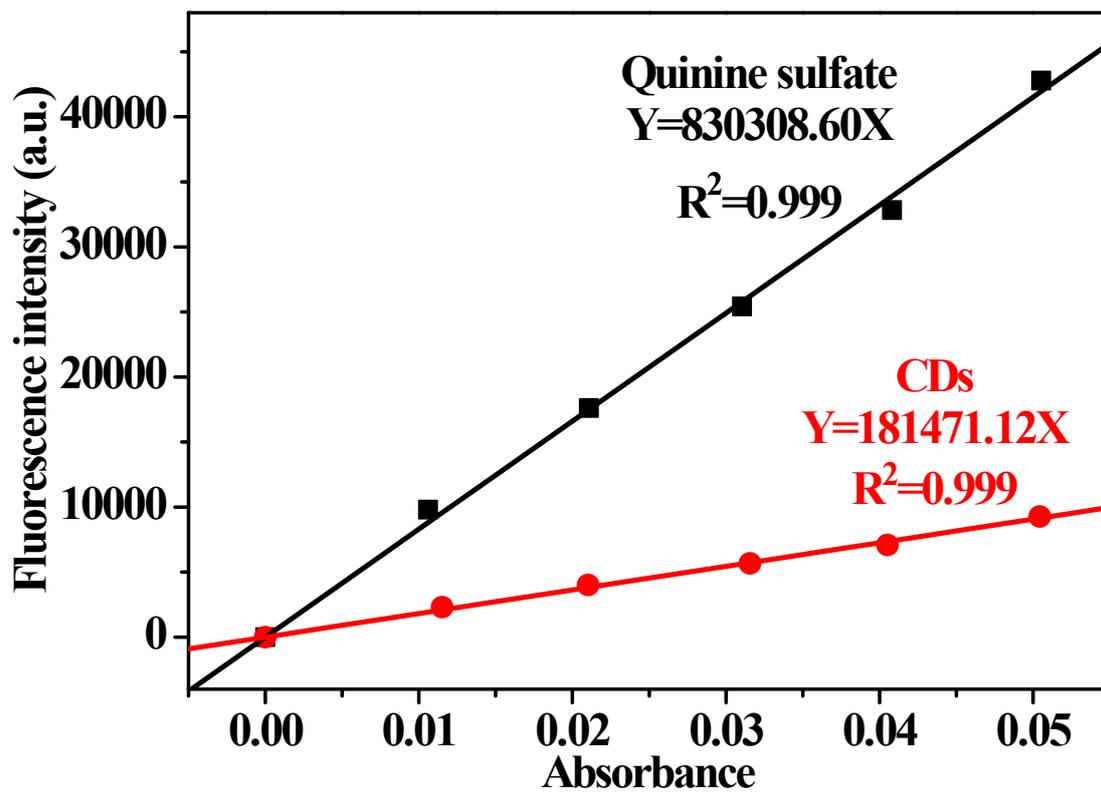


Fig. S3. The relative quantum yield of CDs.

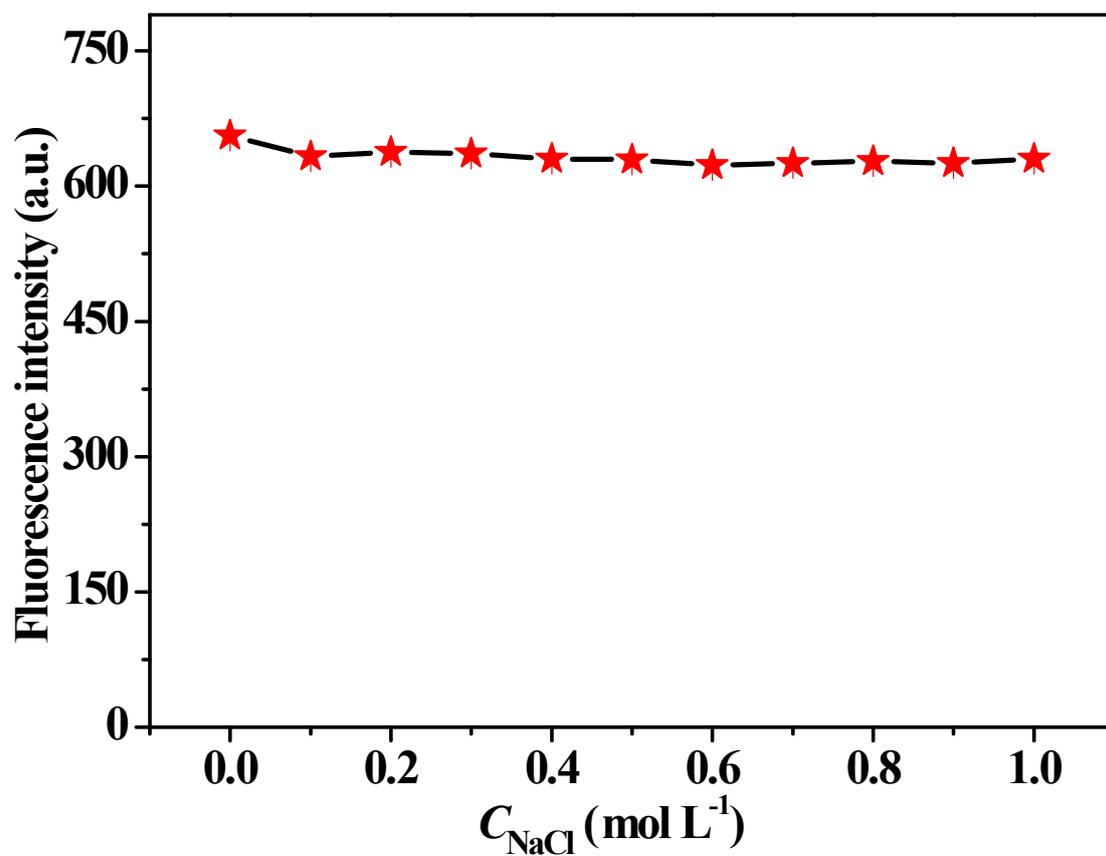


Fig. S4. Influence of concentration of NaCl on the fluorescence property of CDs.

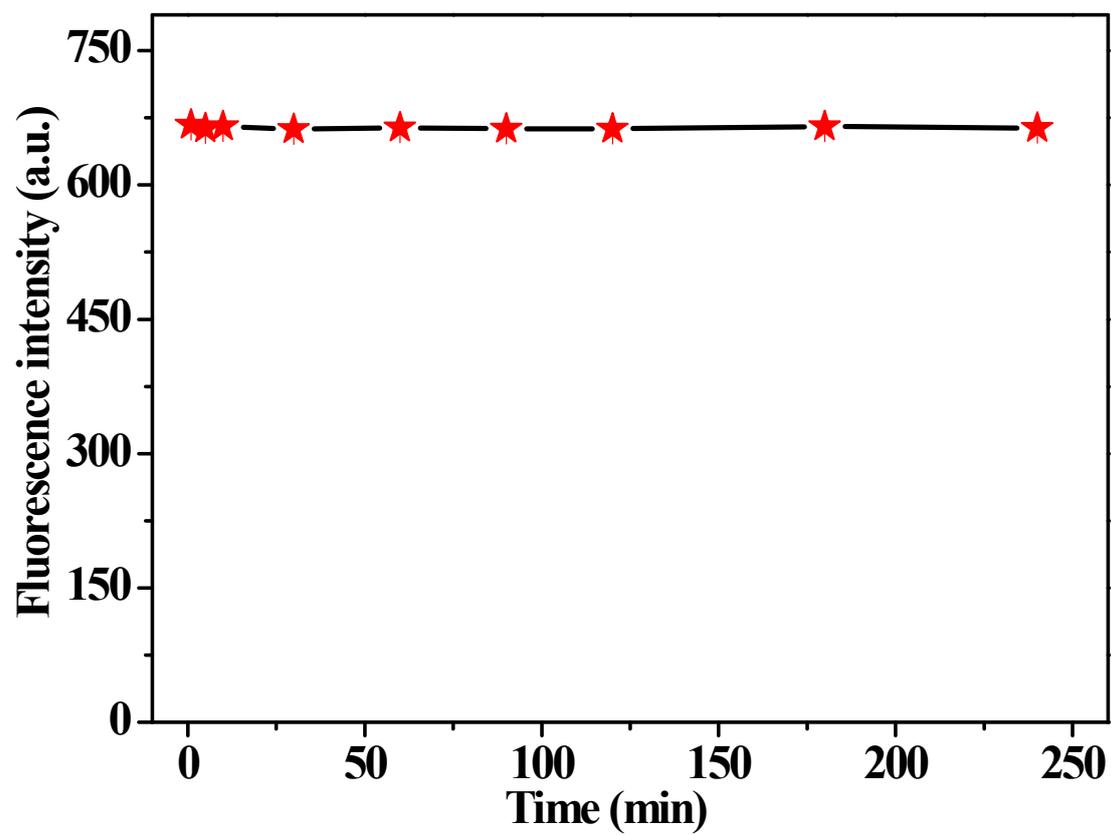


Fig. S5. The stability of CDs.

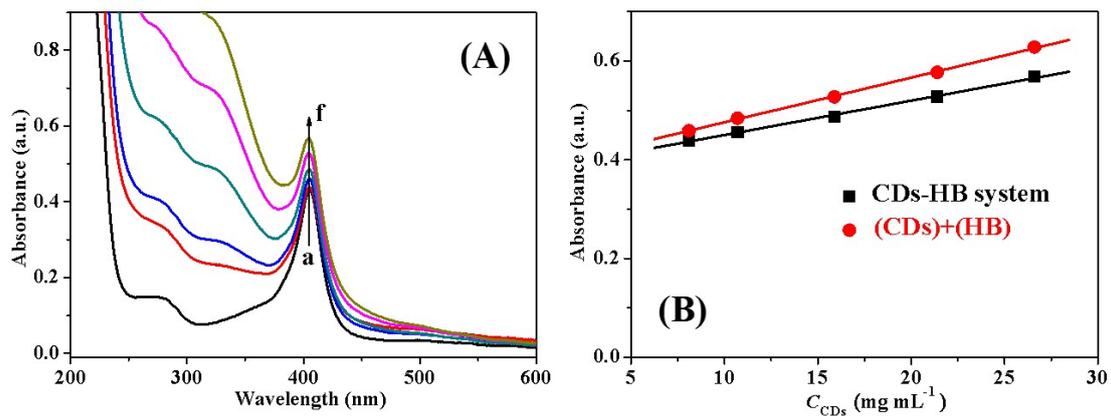


Fig. S6. (A) UV-vis absorption spectra of HB (20 μM) with different concentrations of CDs (a ~ f): 0, 8.1, 10.7, 15.9, 21.4, and 26.6 mg mL<sup>-1</sup>. (B) UV-vis absorption spectra of CDs-HB system, and the sum absorption spectrum between CDs and HB, respectively. Conditions: HB: 20 μM; CDs: 0, 8.1, 10.7, 15.9, 21.4, and 26.6 mg mL<sup>-1</sup>.

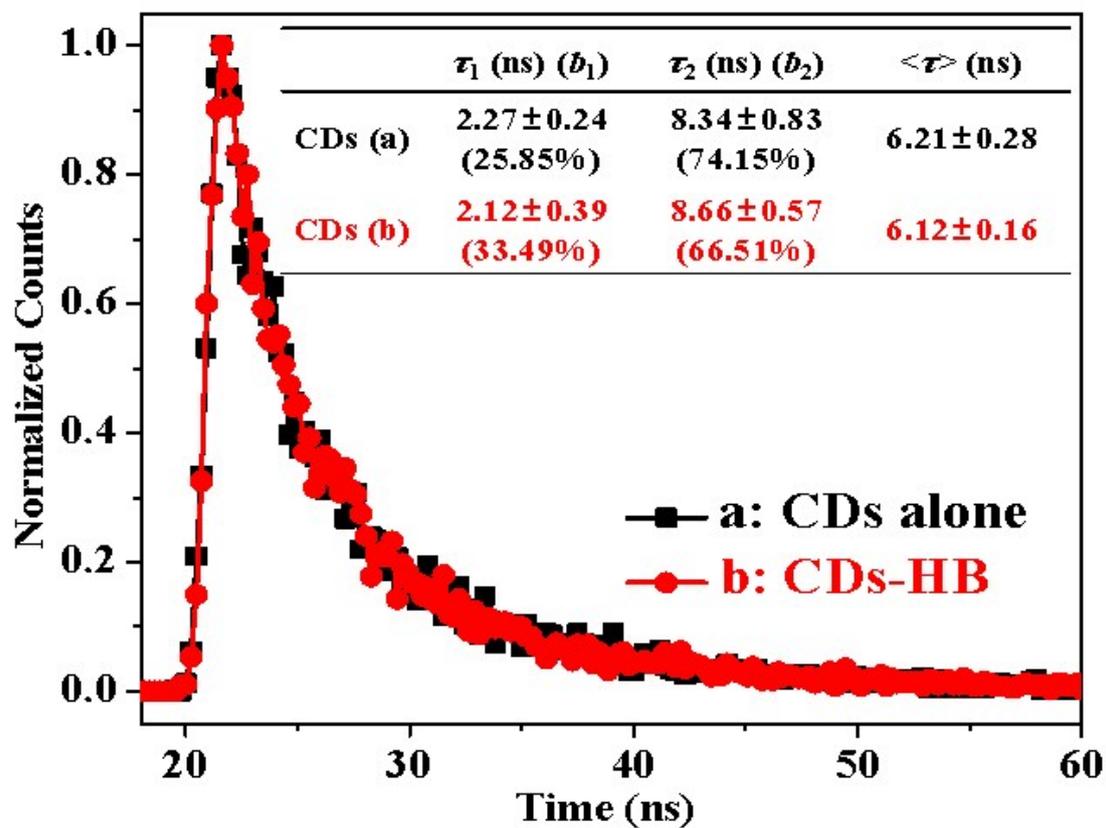


Fig. S7. Fluorescence decay traces of CDs and CDs-HB system. All measurements were made at  $\lambda_{em} = 430$  nm.  $\tau$  is the fluorescence decay time of CDs, and  $b$  is the normalized preexponential factor, respectively. Conditions: CDs:  $10.7 \text{ mg mL}^{-1}$ ; HB:  $20 \text{ }\mu\text{M}$ .

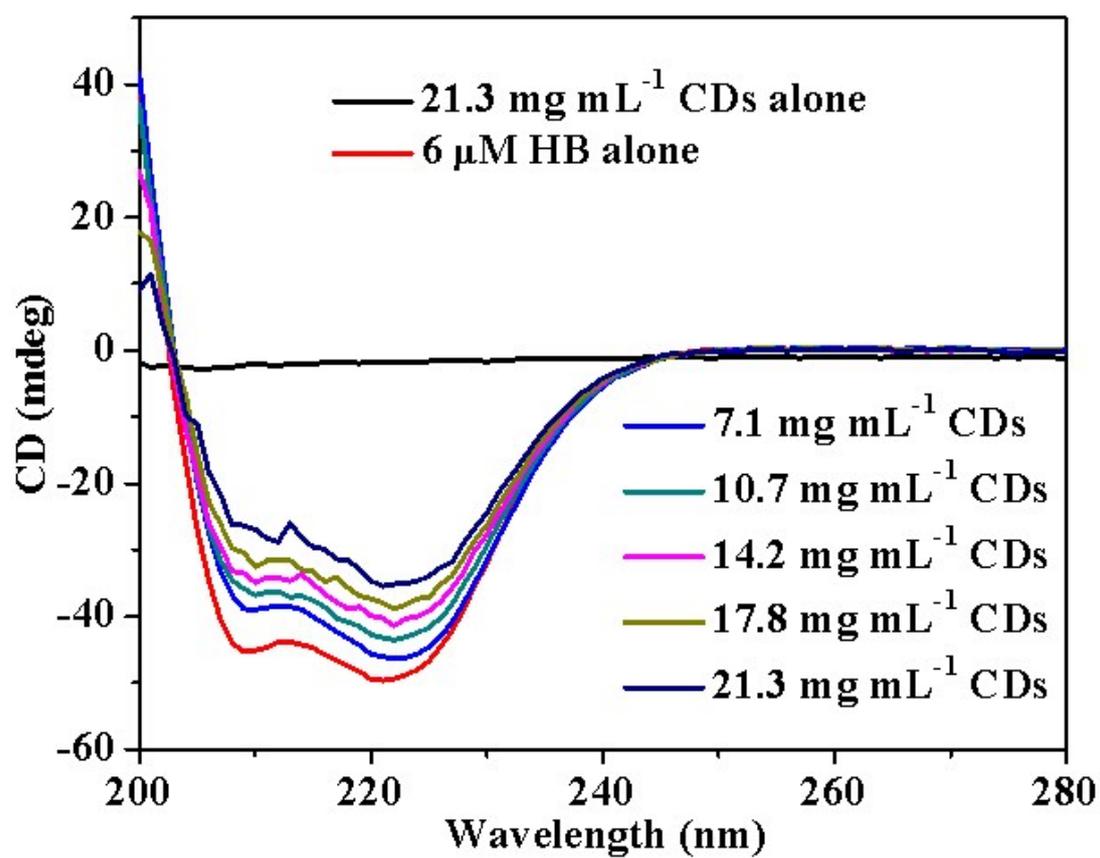


Fig. S8. CD spectra of CDs, HB, and CDs-HB system.

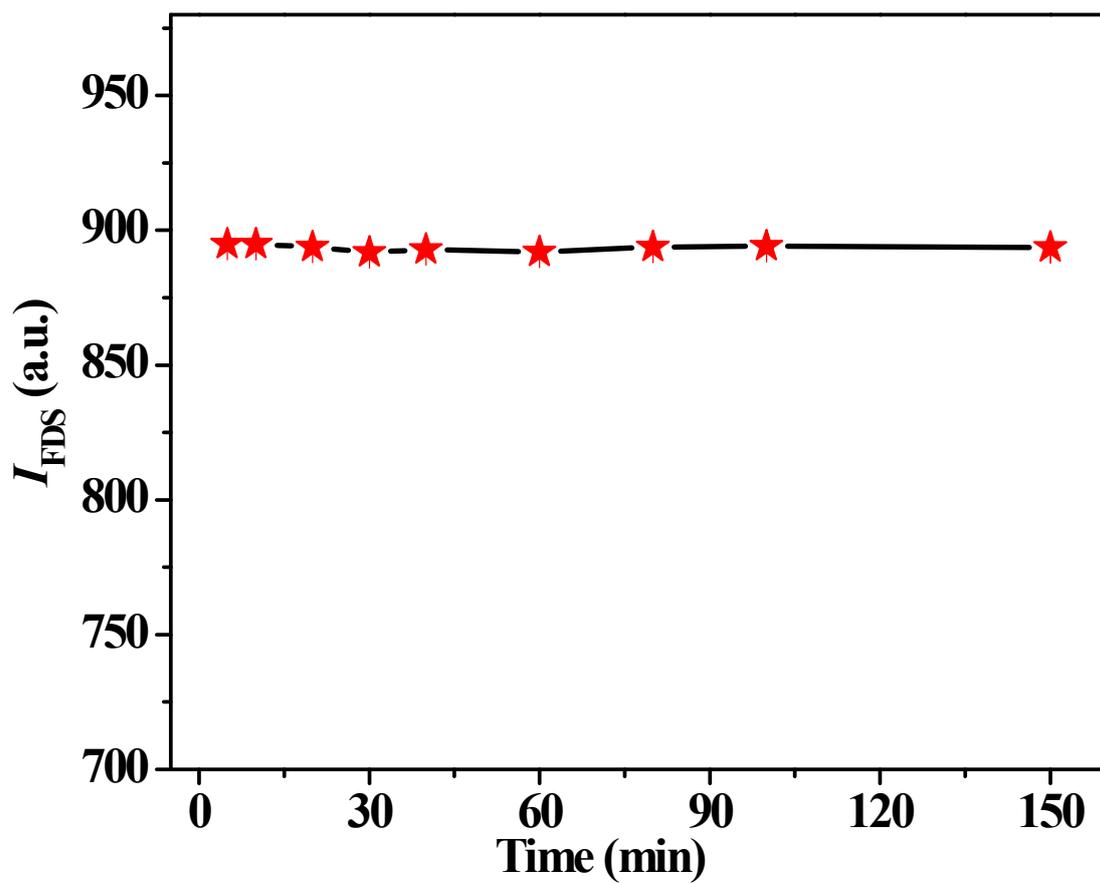


Fig. S9. Influence of reaction time on CDs-HB system.