

Electronic Supplementary Material

Increment of FRET efficiency between carbon dots and photosensitizer for enhanced photodynamic therapy

Kun Yang, Fan Li, Wangyuan Che, Xiao Hu, Changjun Liu** and Feng Tian*

Institute of Medical Equipment, Academy of Military Medical Sciences, Tianjin, 300161, PR China. E-mail: tianfeng62037@163.com; hunterlej@163.com

FRET measurements and analysis

$$R_0^6 = \frac{9000 \ln 10 k_p^2 Q_D}{128 \pi^5 n_D^4 N_A} I$$

$$I = \int_0^\infty f_D(\lambda) \epsilon_A \lambda^4 d\lambda$$

$$f_D(\lambda) = \frac{F_{D\lambda}(\lambda)}{\int_0^\infty F_{D\lambda}(\lambda) d\lambda}$$

$$\epsilon_A = 9.76 \times 10^4 \text{ M}^{-1} \cdot \text{cm}^{-1}$$

$$I = 2.97 \times 10^{-28} \text{ M}^{-1} \cdot \text{cm}^{-1} \cdot \text{nm}^4$$

$$Q_D = 0.846$$

$$k_p^2 = 2/3, \text{ a value for randomly oriented dipoles}$$

$$n_D = 1.33$$

$$R_0^6 = (9000 \ln 10 \times 2/3 \times 0.846 \times 2.97 \times 10^{-28}) / (128 \times 3.14^5 \times 1.33^4 \times 6.023 \times 10^{23})$$

$$R_0 = 19 \text{ \AA}$$

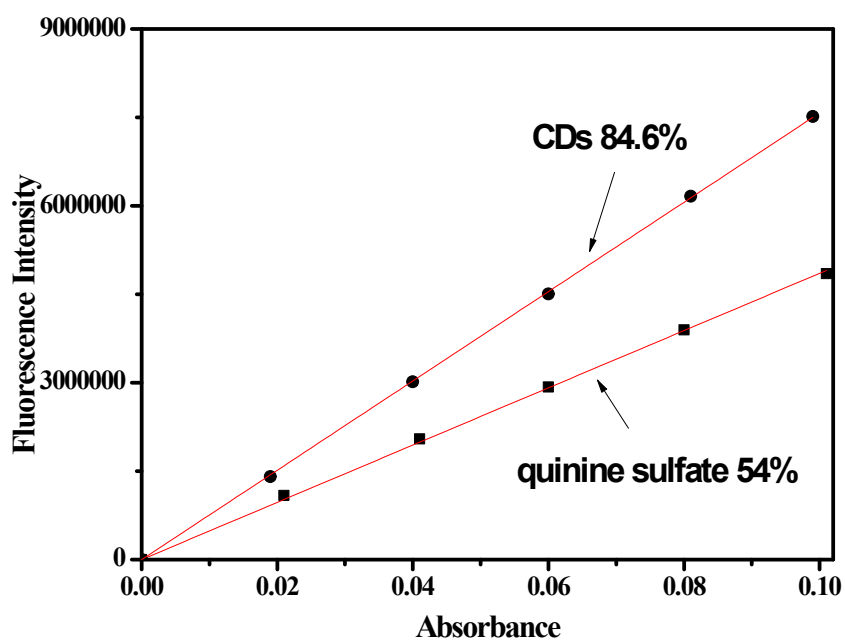


Fig.S1 Fluorescence quantum yields calculation of CDs

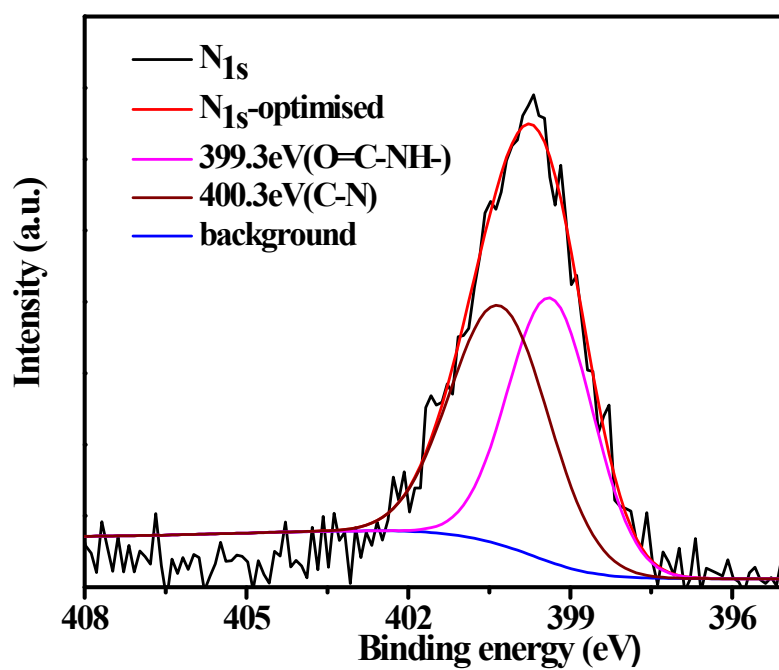


Fig.S2 XPS N1s spectra of CDs

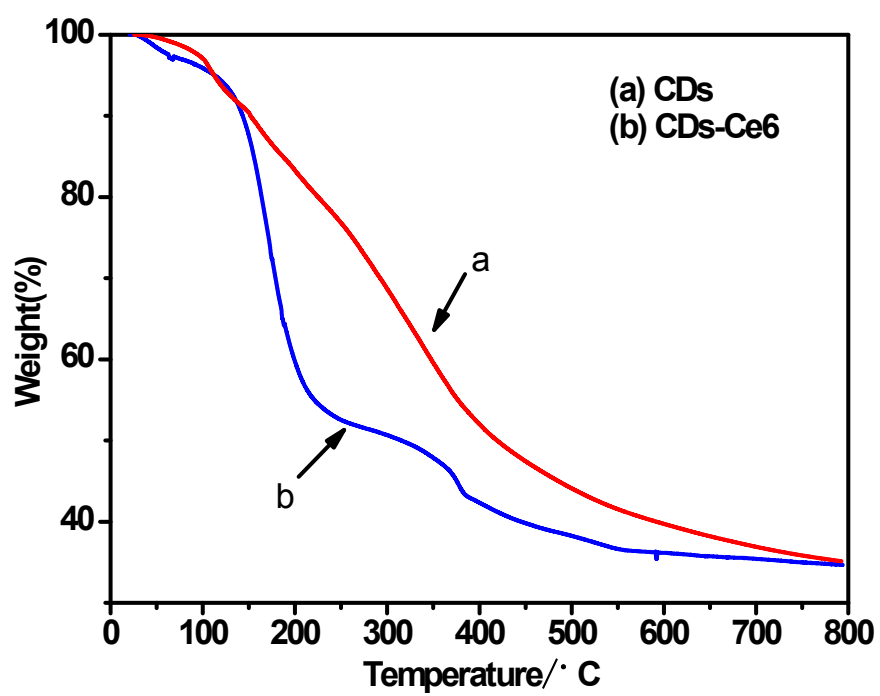


Fig.S3 TG curves of CDs and CDs-Ce6

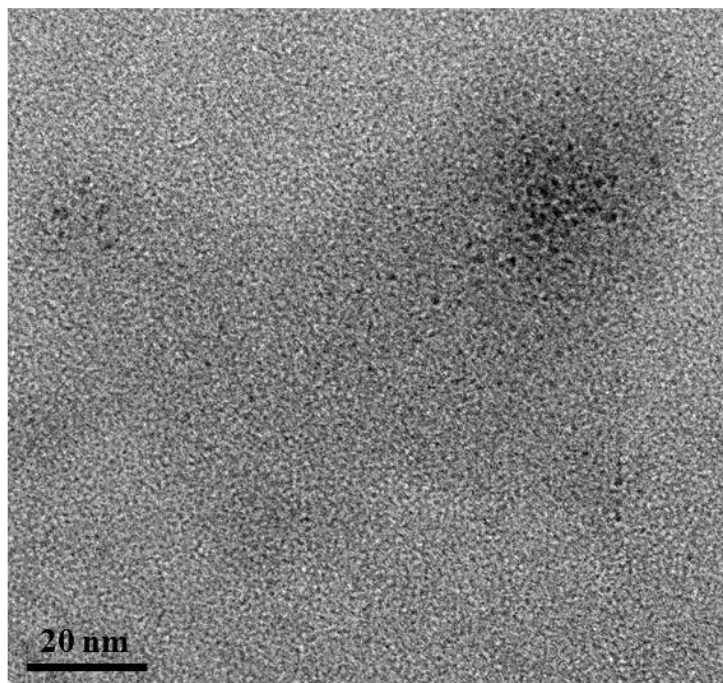


Fig.S4 TEM image of CDs-Ce6 (scale bar:20 nm)

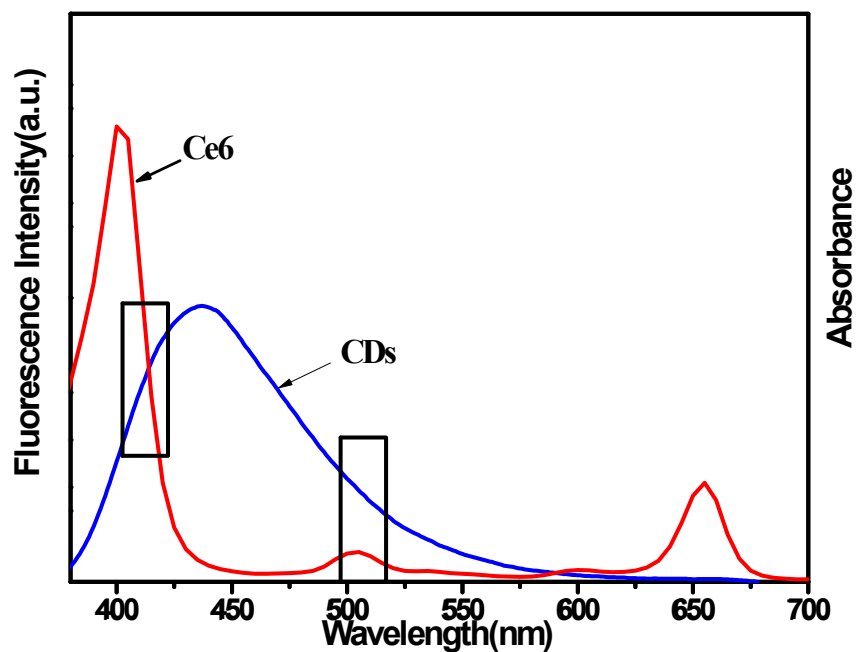


Fig.S5 The spectral overlap between absorption spectrum of Ce6 and emission spectrum of CDs ($\lambda_{ex}=380$ nm)

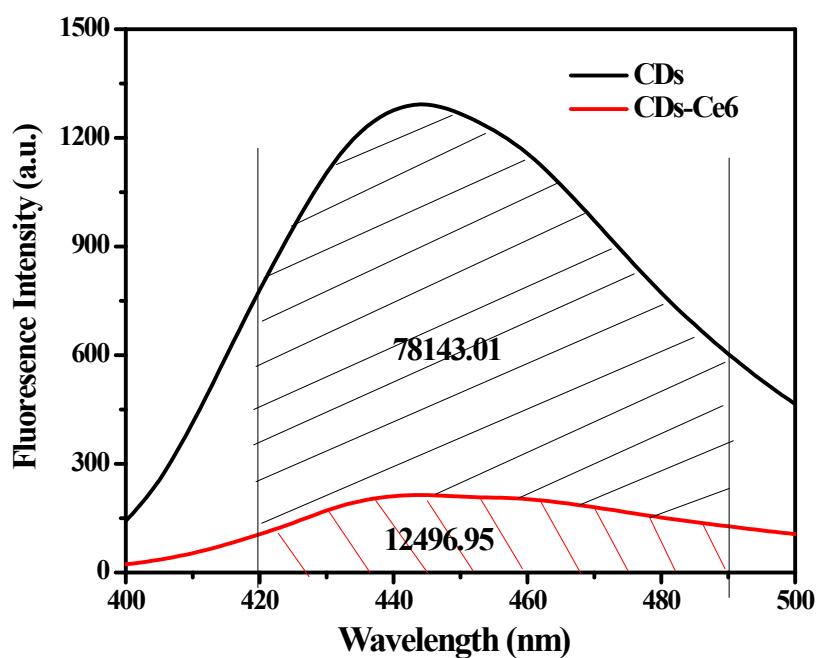


Fig.S6 FRET measurement according to the equation $E=1-F_D/F_D'$, the excitation wavelength is 380 nm, the fluorescence integrated intensity is calculated from 420 nm to 490 nm

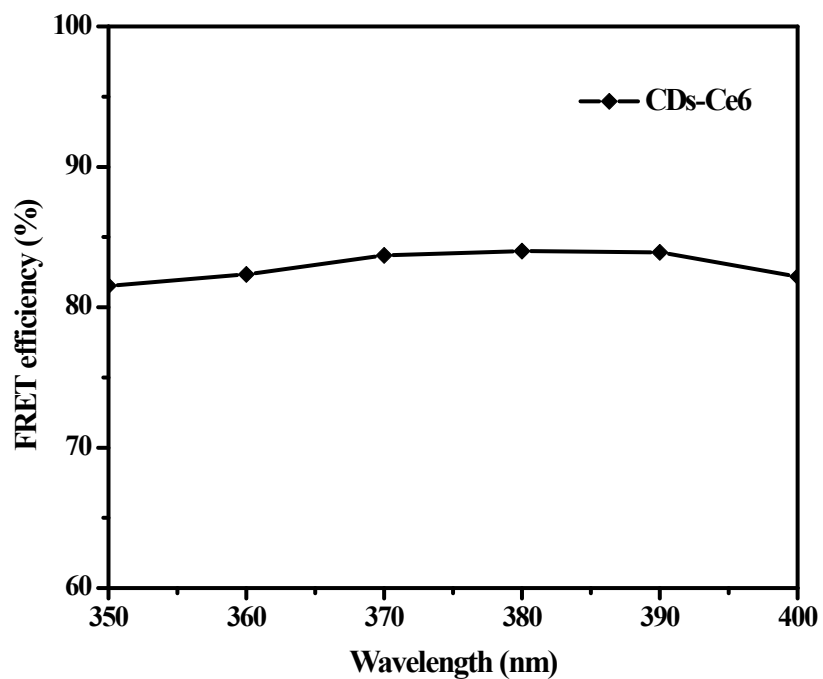


Fig.S7 The effect of excitation wavelength on the FRET efficiency in the range of 350-400 nm

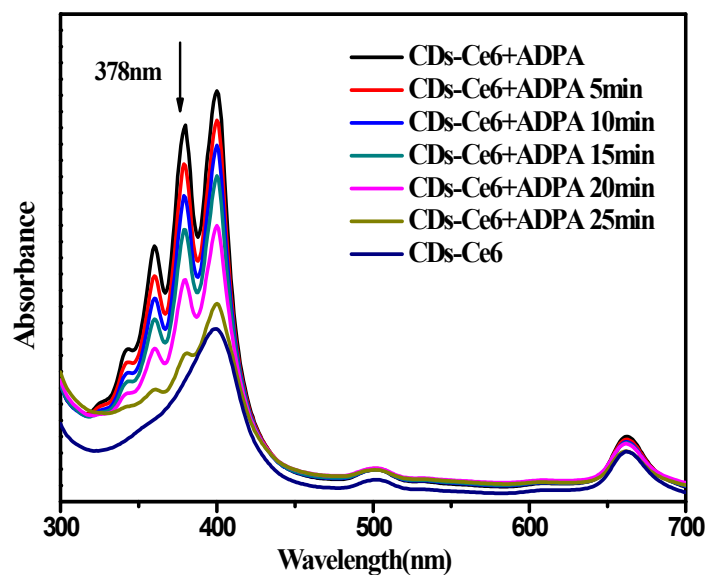


Fig.S8 UV/vis absorption spectra of CDs-Ce6 incubated with 9, 10-Anthracenedipropionic acid, irradiated at 380 nm for various time intervals.

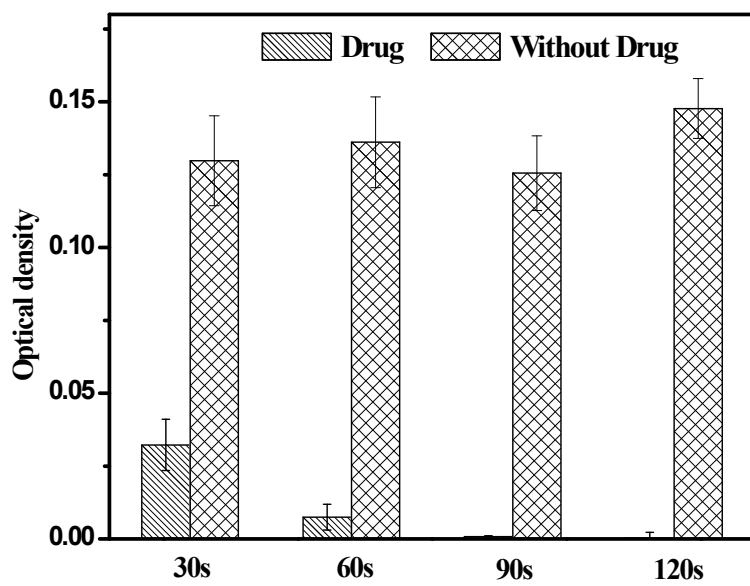


Fig.S9 Two groups were rinsed with and without CDs-Ce6 at a concentration of 15 μ M irradiated for various times with 660 nm laser.