Visual and fluorescent detection of pyrogallol based on a ratiometric fluorescence-enzyme system

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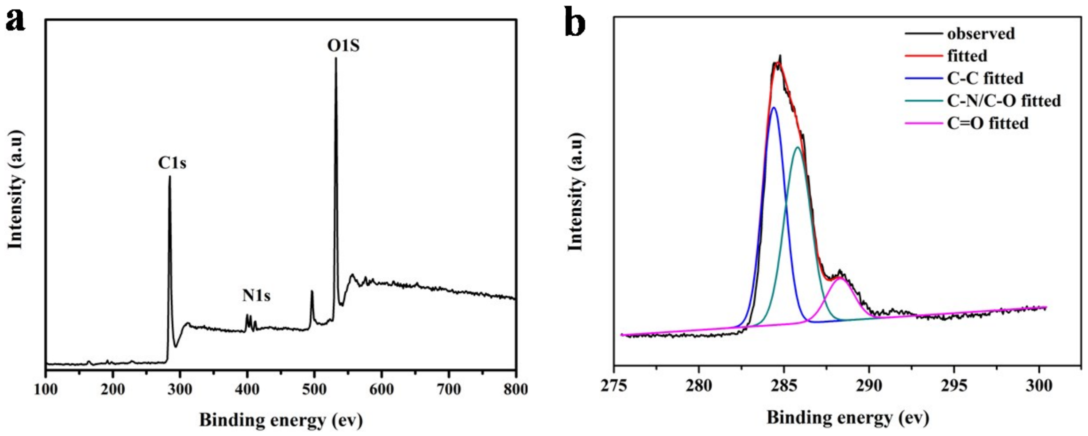

Fig. S1 (a) XPS survey spectrum of CQDs, (b) the high-resolution C1s peaks and the fitting curves.

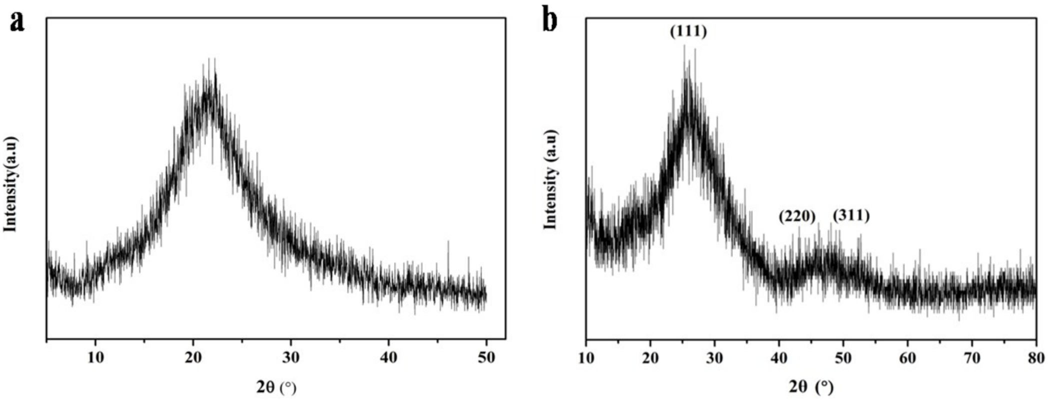

Fig. S2. XRD pattern of CQDs (a) and GSH-CdTe QDs (b).

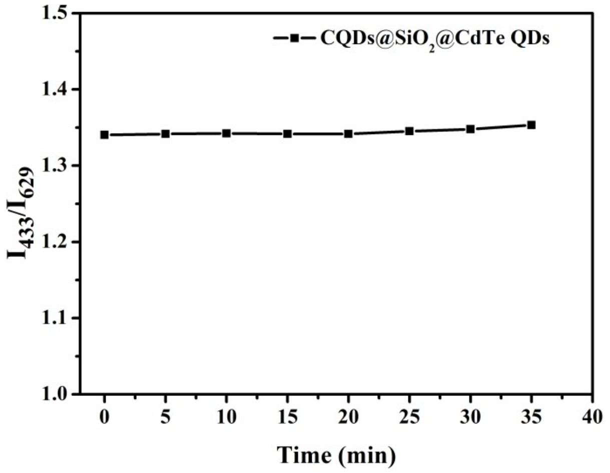

Fig. S3 Fluorescence stability of CQDs@SiO$_2$@CdTe QDs under UV illumination

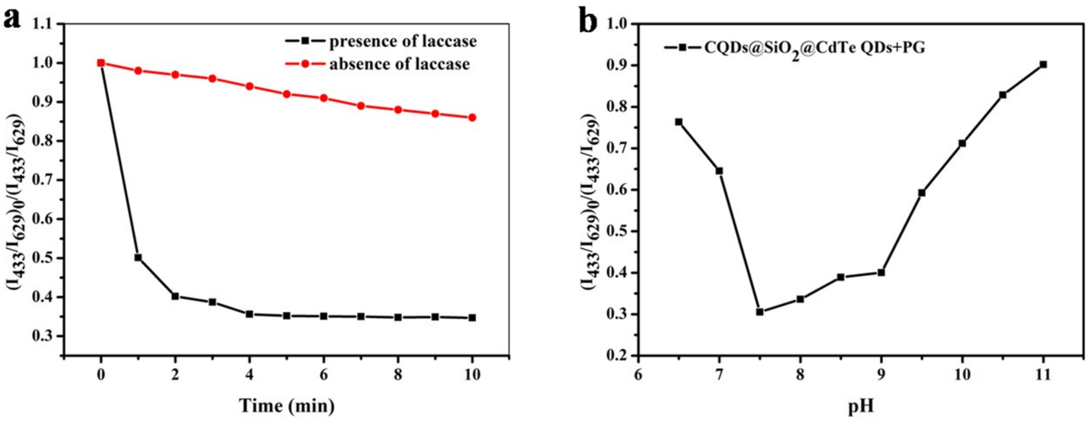

Fig. S4 (a) Kinetic study of fluorescence quenching by PG in the absence/presence of laccase, (b) effect of pH on the fluorescence intensity ratio $(I_{433}/I_{629})_0/(I_{433}/I_{629})$ of the CQDs@SiO$_2$@CdTe QDs-PG

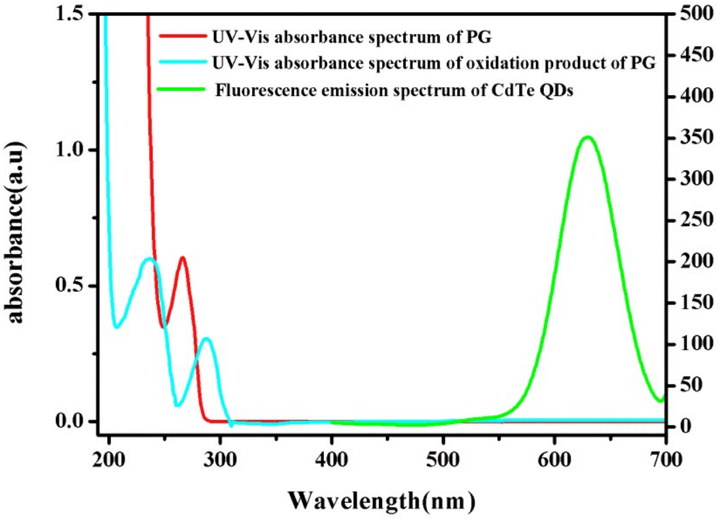

Fig. S5 Fluorescence emission spectrum of the CdTe QDs and the UV-Vis absorption spectrum of PG and oxidation product of PG.

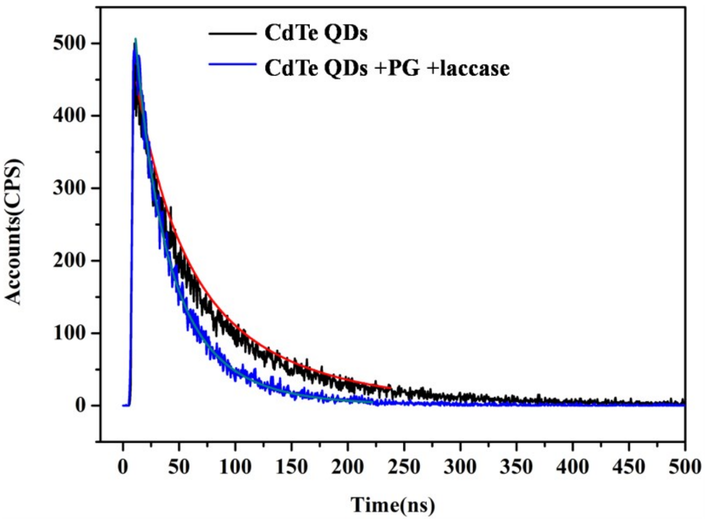

Fig. S6 Fluorescence decays of CdTe QDs and CdTe+PG+laccase

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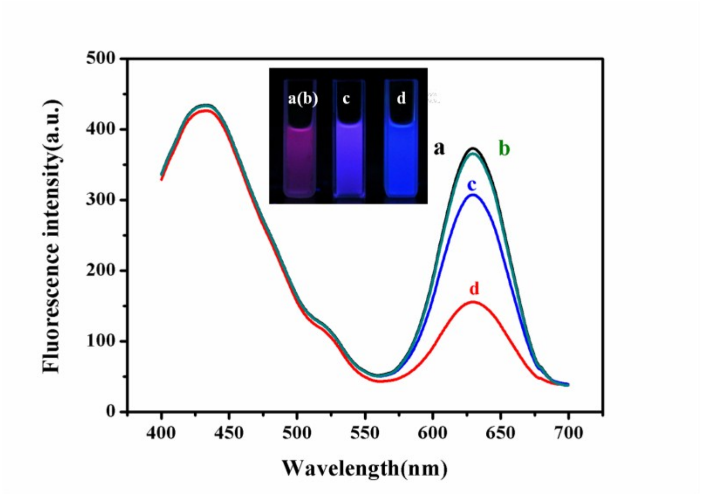

Fig. S7 The fluorescence spectrum of (a) CQDs@SiO_2@CdTe QDs; (b) CQDs@SiO_2@CdTe QDs with 50 μL of a 0.2 mg/mL laccase solution; (c) CQDs@SiO_2@CdTe QDs with 50 μL of a 0.2 mg/mL laccase solution and 1.5 μM PG; (d) CQDs@SiO_2@CdTe QDs with 50 μL of a 0.2 mg/mL laccase solution, 1.5 μM PG and 5 μM AA. The inset is the optical photo of the above solutions taken under sunlight and 365 nm UV light.

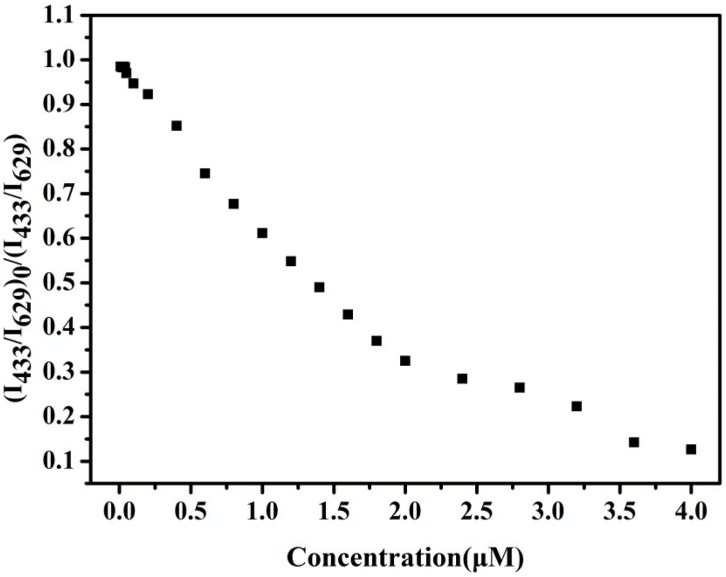

Fig. S8 The relationship between the fluorescence intensity of CQDs@SiO_2@CdTe QDs and the concentration of PG.

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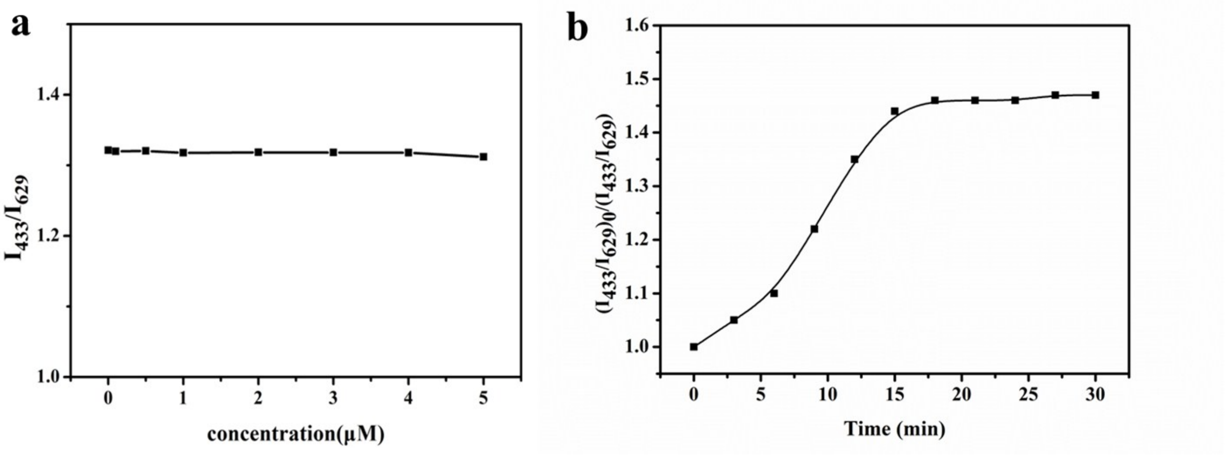

Fig. S9 (a) The fluorescence intensity ratio (I_{433}/I_{629}) of CQDs@SiO_2@CdTe QDs in the presence of different concentration of AA.(b) The kinetics of fluorescence restoration by AA.

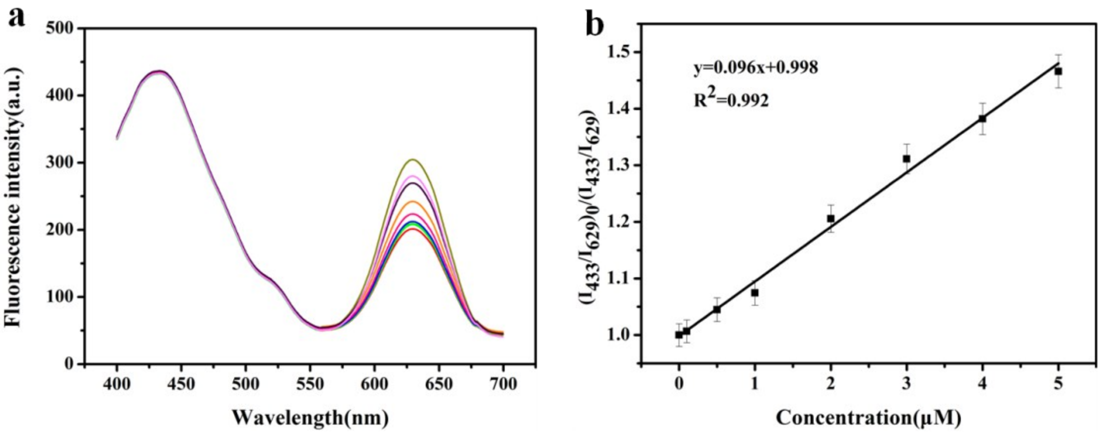

Fig. S10 (a) Fluorescence spectra of CQDs@SiO_2@CdTe QDs-PG system with different concentrations of AA.The concentrations of AA were 0,0.1,0.5, 1.0, 2.0, 3.0, 4.0, and 5.0μM, respectively. (b) Plot of the fluorescence intensity ratio $(I_{433}/I_{629})_0/(I_{433}/I_{629})$ versus the concentration of AA. $(I_{433}/I_{629})_0$ and (I_{443}/I_{629}) are the fluorescence intensity ratios of the CQDs @SiO_2@ CdTe QDs-PG system in the absence and presence of AA, respectively.

Table. S1 Nanosecond time-resolved luminescence transients of CdTe QDs in different systems..

system	τ_1 (ns)	Rel %	τ_2 (ns)	Rel %	τ (ns)
CdTe QDs	24.8397	18.02	85.5643	81.98	74.62172
CdTe QDs+PG+laccase	19.5617	24.45	47.5954	75.55	40.7412

Table. S2 Comparison of PG the determination methods.

Method	Linear detection range	Detection limit	Reference
Langmuir–Blodgett films	up to 400μM	4.87×10^{-8} M	1
Chemiluminescence	1.0×10^{-7}-1.0×10^{-4}M	4.6×10^{-8}M	2
Electrochemical methods	1.0×10^{-6}- 1.0×10^{-3}M	6.3×10^{-7}M	3
Kinetic determination	1.5×10^{-6}- 1.0×10^{-4} M	-	4
Ratiometricfluorescence detection	5.0×10^{-8}-2.0×10^{-6} M	4.2×10^{-8} M	this work

References

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