

Supporting information for

Carbon dots based turn-on fluorescent probes for the sensitive determination of glyphosate in environment water samples

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Quantum yield measurement

The quantum yield of the as-prepared CDs was determined by the following equation:

$$Q=Q_R \frac{I}{I_R} \frac{A_R}{A} \frac{n^2}{n_R^2}$$

where Q is the quantum yield, I is the measured integrated emission intensity, n is the refractive index, and A represents UV–vis absorbance at 360 nm which was kept under 0.1 in the 10 mm fluorescence cuvette to minimize re-absorption effects. The subscript R refers to the reference fluorophore of known quantum yield. Quinine

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sulfate in 0.1 M H₂SO₄ (QY=0.54 at 360 nm) was chose as the reference.

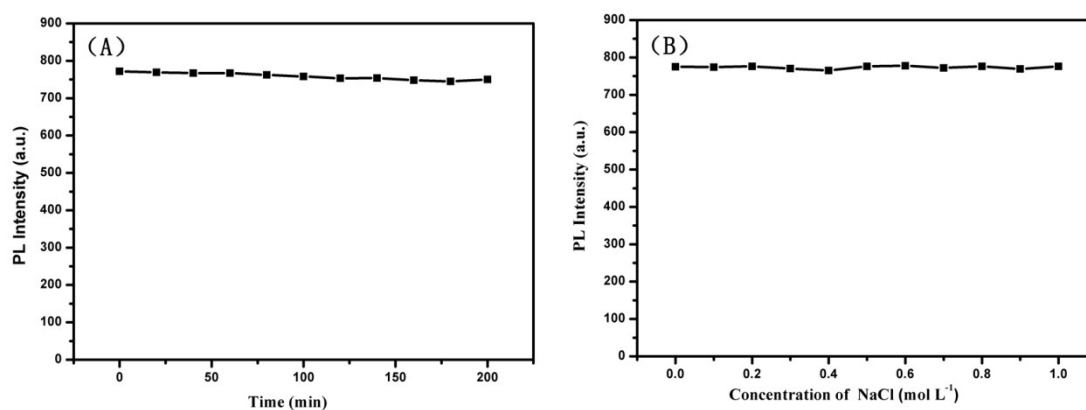


Fig. S1 (A) PL intensity of the CDs during continuous excitation at 365 nm with a UV beam. (B) PL intensities of the CDs after adding various concentrations of NaCl solutions. Excitation wavelength: 360 nm; Emission wavelength: 437 nm.

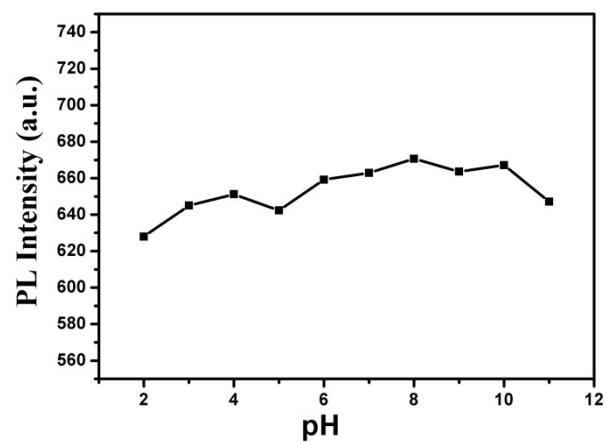


Fig. S2 Effect of pH on the fluorescence intensity of the CDs.

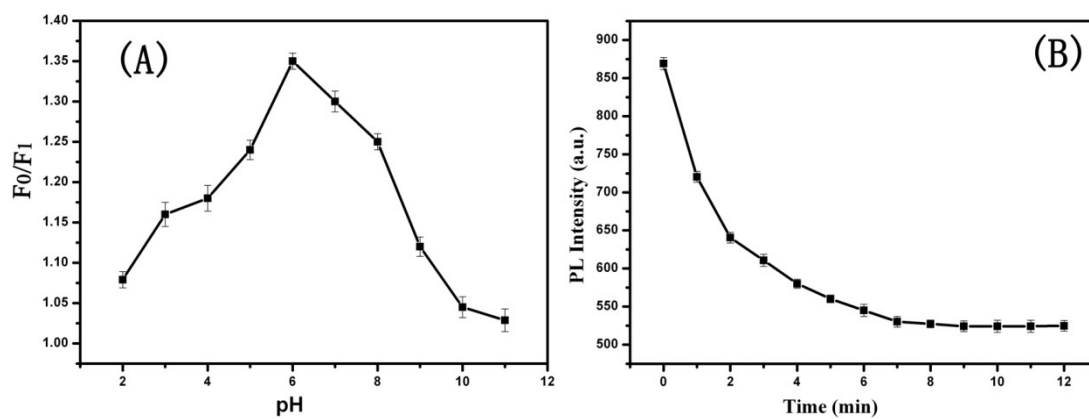


Fig. S3 (A) The optimization of pH and incubation time for Cu²⁺ detection. F_0 and F_1 are the fluorescence intensities of CDs in the absence and presence of Cu²⁺ respectively.

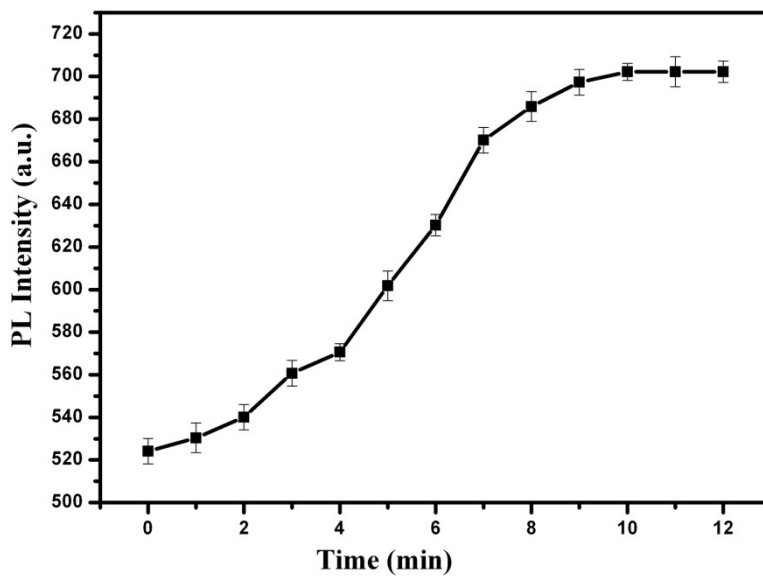


Fig. S4 The optimization of the incubation time for glyphosate detection. pH=6.0, 2 $\mu\text{g mL}^{-1}$ glyphosate, 25 $\mu\text{M Cu}^{2+}$.

Table S1 Comparison of different methods for determination of glyphosate.

Methods	Linear	Detection	References
	range	Limit	
	($\mu\text{g mL}^{-1}$)	($\mu\text{g mL}^{-1}$)	
HPLC with UV detector (derivatization)	0.3-48.5	0.009	6
Anion-exchange chromatography	0.0-16.9	0.038	3
Spectrophotometric (derivatization)	0.1-3.5	0.04	55
Colorimetric sensor	0.1-500	0.1	56
Hydrophilic interaction Chromatography	0.1-34	0.1	57
Diffuse reflectance spectroscopy	50-500	7.28	58
Fluorescence	0.03-10	0.016	This work

Table S2 Analytical results for the determination of glyphosate in environmental water samples.

Sample	Concentration of glyphosate ($\mu\text{g mL}^{-1}$)		Recovery (%)	RSD (n = 3, %)
	Amount added	Amount found		
		0	Not detectable	/
Qing Lake	0.3	0.28	93.3	1.51
	2.5	2.47	98.8	3.27
	0	Not detectable	/	/
Yan Lake	0.3	0.29	96.7	2.36
	2.5	2.52	100.8	4.61
	0	Not detectable	/	/
Guanlan Lake	0.3	0.32	106.7	3.43
	2.5	2.49	99.6	1.67