

*Supplementary Materials*

# **A novel and sensitive fluorescent probe for glyphosate detection based on Cu<sup>2+</sup> modulated polydihydroxyphenylalanine nanoparticles**

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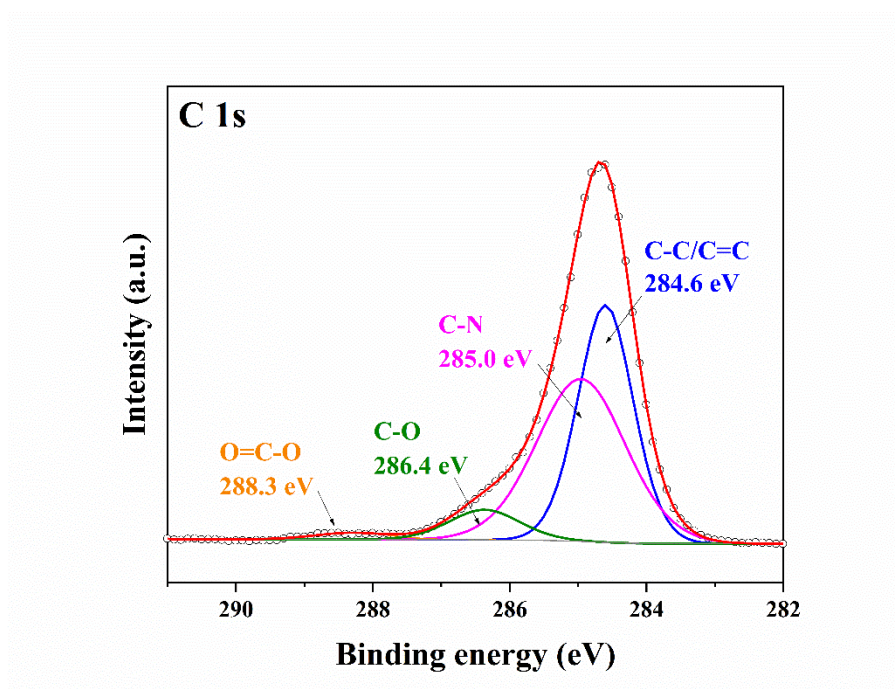
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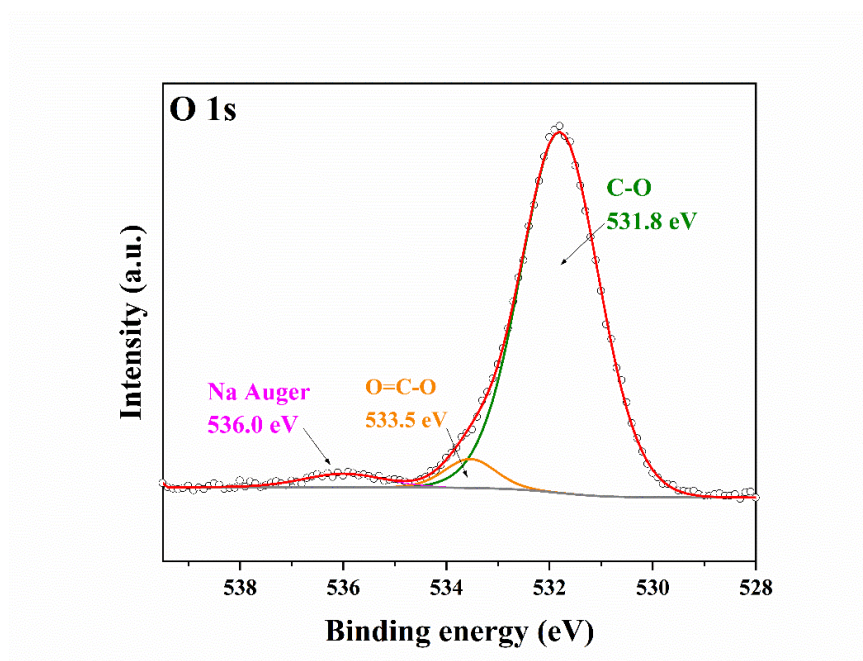
## **Concentration Determination of PDOA nanoparticles**

After dialysis, the as-prepared PDOAs solution (20 mL) was concentrated and freeze-dried to afford the desired PDOAs as a solid powder (0.068 g). Thus, the concentration of PDOAs matrix solution was determinate to be 3.4 mg/mL.<sup>1-2</sup> In the following experiments, the PDOAs solution was diluted 10 times to 0.34 mg/mL for all the spectrometric analysis and glyphosate detection.

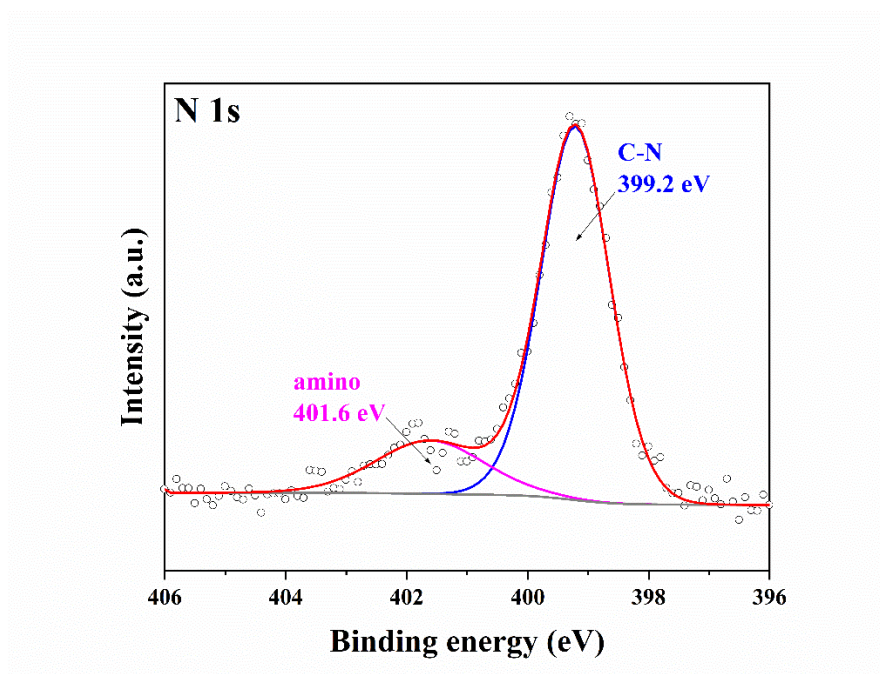
## XPS Spectrum of the PDOAs



**Figure S1.** The high-resolution C1s spectrum of PDOAs.

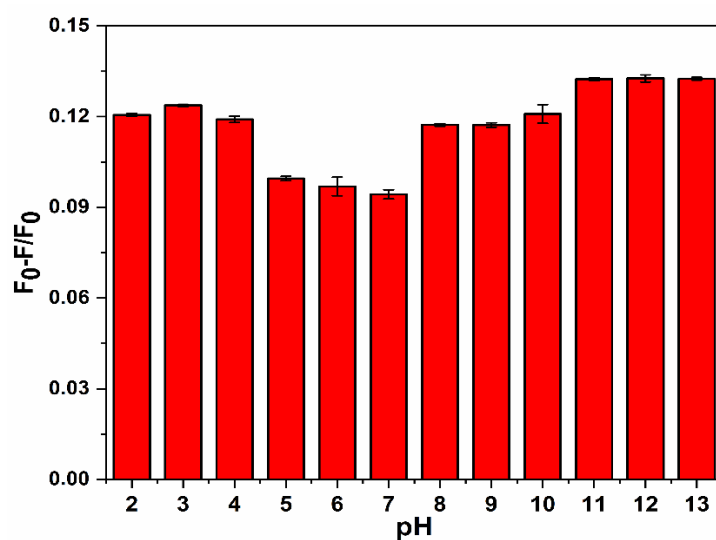


**Figure S2.** The high-resolution O1s spectrum of PDOAs.

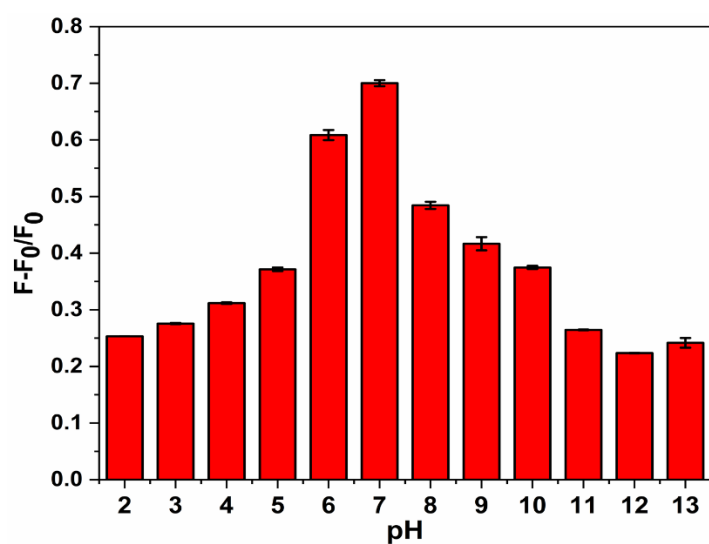


**Figure S3.** The high-resolution N1s spectrum of PDOAs.

## Effects of pH



**Figure S4.** The fluorescence intensity ratio histogram of 0.34 mg/mL PDOAs in the presence of 3.6  $\mu\text{M}$   $\text{Cu}^{2+}$  with different pH values.



**Figure S5.** The fluorescence intensity ratio histogram of PDOAs- $\text{Cu}^{2+}$  system in the presence of 1.5  $\mu\text{M}$  glyphosate with different pH values.

**Table S1**

Comparison of various glyphosate probes.

Method/ probe	Response time (min)	Detection limit ( $\mu\text{M}$ )	Reference
Coumarin derivative/ $\text{Cu}^{2+}$	5	0.11	<i>Anal. Methods</i> , 2020, 12, 520.
AuNPs/ $\text{Pb}^{2+}$	15	$2.4 \times 10^{-3}$	<i>Anal. Methods</i> , 2017, 9, 2890.
DNA-AgNCs/ $\text{Cu}^{2+}$	1	$3 \times 10^{-2}$	<i>Food Chem</i> , 2022, 367, 130617.
Rhodamine B/AuNPs	5	$5.9 \times 10^{-4}$	<i>Anal. Chem.</i> , 2012, 84, 4185.
AuNPs/Cys	15	5.9	<i>Analyst</i> , 2019, 144, 2017.
Rhodamine/ $\text{Cu}^{2+}$	2	$4.1 \times 10^{-3}$	<i>Talanta</i> , 2021, 224, 121834.
CDs/ $\text{Cu}^{2+}$	12	0.095	<i>RSC Adv</i> , 2016, 6, 85820.
IgG-CDs	120	0.047	<i>J. Agric. Food. Chem.</i> , 2016, 64, 6042.
GMP/Tb@GMP/Eu/DPA	30	41	<i>Food Chem</i> , 2020, 323, 126815.
PDOAs/ $\text{Cu}^{2+}$	30	$1.8 \times 10^{-3}$	this work

**Table S2**

Fitting parameters for time-resolved fluorescence decay assay.

Sample	$\alpha_1$	$T_1$	$\alpha_2$	$T_2$	$\tau(\text{ns})$	Fit	$\bar{\tau}(\text{ns})$
PDOAs	8606.5325	5.0349	2047.2495	17.0621	10.4029	0.9965	10.5804
	8869.6384	5.3429	1907.7200	17.6871	10.4768	0.9957	
	8778.6384	5.2429	1978.7200	18.0871	10.8615	0.9904	
PDOAs+ $\text{Cu}^{2+}$	10292.8837	3.3920	773.0701	21.1665	7.2390	0.9962	7.4040
	1915.1589	14.0577	8354.2452	2.5173	7.4383	0.9957	
	1872.3141	13.9476	8390.9496	2.4453	7.5347	0.9952	
PDOAs+ $\text{Cu}^{2+}$ + Glyphosate	8476.1712	4.6468	2197.1833	16.3567	9.0641	0.9832	8.9824
	2105.8856	12.0988	8639.4700	3.4230	8.9966	0.9977	
	8842.6799	4.9726	1965.1560	17.6361	8.8866	0.9976	

$T$ -Fluorescence lifetime component;  $\alpha$ -The amplitude of the fluorescence lifetime component; **Fit**-Fitting parameters;  $\tau$ -mean fluorescence lifetime.

## Reference

- (1) Qu, Z.; Na, W.; Nie, Y.; Su, X. *Anal. Chim. Acta.* **2018**, *1039*, 74-81.
- (2) Zhang, L.; Zhang, X.; Hu, B.; Shen, L.; Chen, X.; Wang, J. *Analyst* **2012**, *137*, 4974-4980.