SUPPORTING INFORMATION

Exigent carbon nanodots for trapping 6-thioguanine to resist fire blight caused by *Erwinia amylovora* in an orchard

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Number of Tables: 3

Number of Figures: 10

Table S1. Performance comparison of existing methods and present method for detection of 6-Thioguanine using nanosensors

Methods	Methods/Material applied	Linear Range	Limit of Detection	Application	References
Droplet-based microfluidic SERS technique (Surface-enhanced Raman scattering)	Au nanoparticles QY= Not available	0.010 µM-10µM	0.032 µM	Detection in human serum	Zhang *et. al.* 2019 [1]
Fluorimetry	CQD–AgNP CQD–AuNP QY= ~ 6%	0.03-1.0 µM	0.01 µM	Detection in human plasma samples	Amjadi *et.al.* 2017 [2]
Free-standing liquid membrane SERS substrate	$Ag_{core}Au_{shell}$ NPs QY= Not available	10 ~ 100 µg kg^{-1}	5 µg kg^{-1}	Detection in human body fluids	Liu *et.al.* 2022 [3]
Fluorimetry	SNCQDs QY= 23%	0.005-80 µM	0.0016 µM	Detection in plasma and urine of leukemia patient	Yu *et.al.* 2019 [4]
Fluorimetry	NCQDs QY= 19.45%	4.8-55.2 µM	0.0113 µM	Detection and trapping of 6TG in plants to resist fire blight	**This Work**

Plant Treatment:

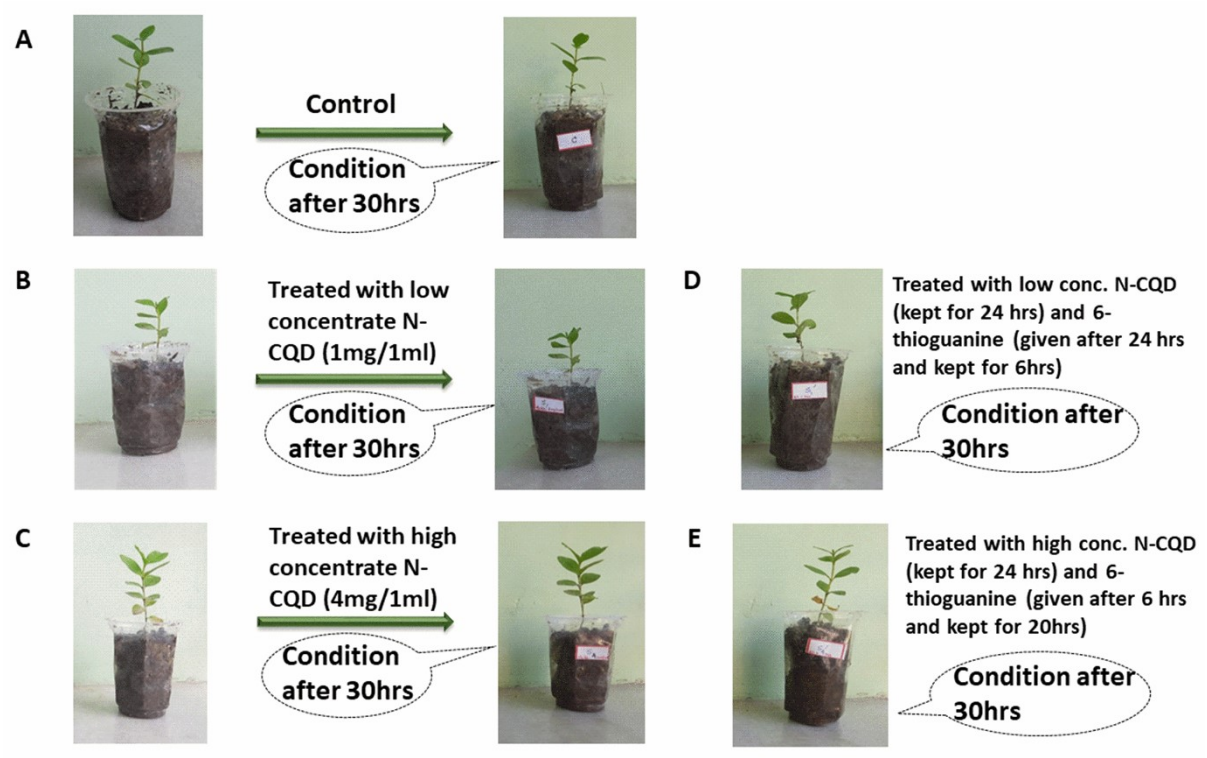


Fig. S1 (A). Control: No treatment was given to the plant and monitor for 30hrs. (B). S_1: Treated with low concentrate N-CQD (1mg/1ml) and kept in observation for 30hrs. (C). S_4: Treated with high concentrate N-CQD (4mg/1ml) and kept in observation for 30hrs. (D) S_1': Treated another plant with low concentrate N-CQD (1mg/1ml) as S_1 (monitor for 24hrs) and after 24hrs, again treated with 6-thioguanine (monitor for 6hrs). Kept under surveillance for a total of 30 hours. (E) S_4': Treated another plant with high concentrate N-CQD (4mg/1ml) as S_4 (monitor for 24hrs) and after 24hrs, again treated with 6-thioguanine (monitor for 6hrs). Kept under surveillance for a total of 30 hours.

TEM and HRTEM images of the N-CQDs:

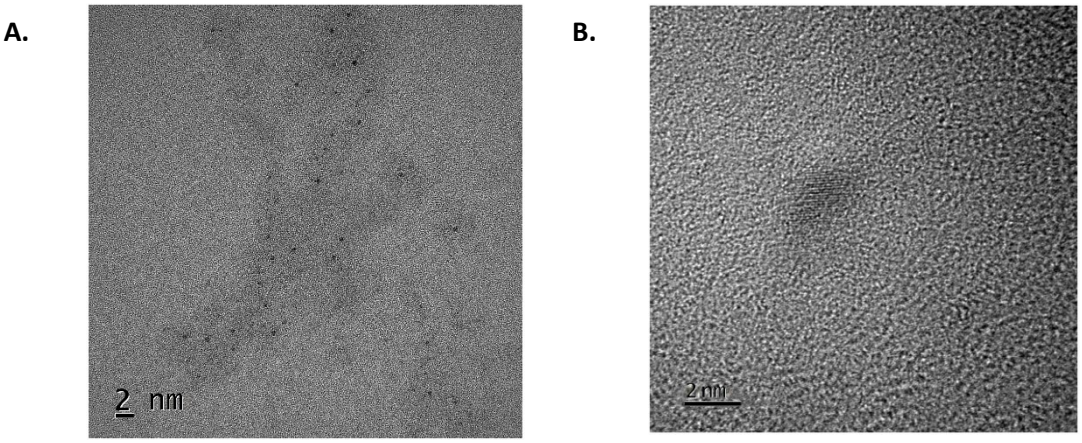


Fig. S2 A) TEM and B) HRTEM images of the N-CQDs.

EI (electronic image) and EDX images of the N-CQDs:

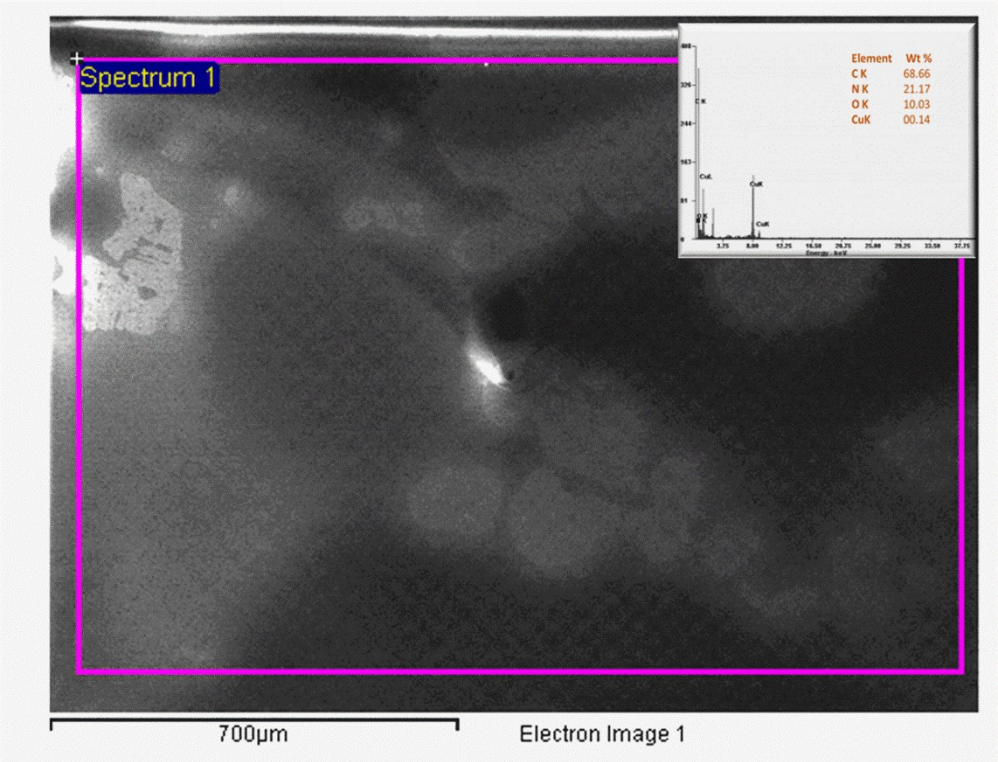


Fig. S3 EDX pattern of the N-CQDs.

XPS image of the N-CQDs:

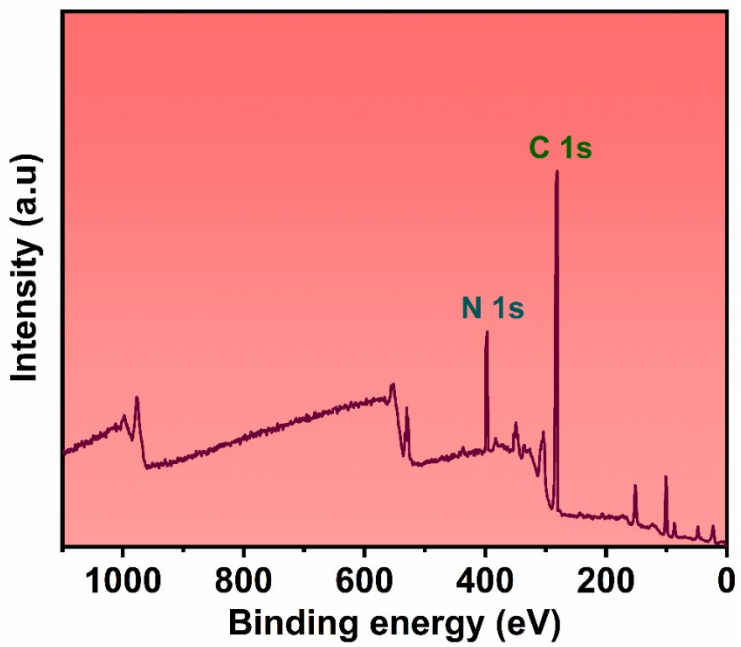


Fig. S4 XPS spectrum of N-CQDs.

Photostability:

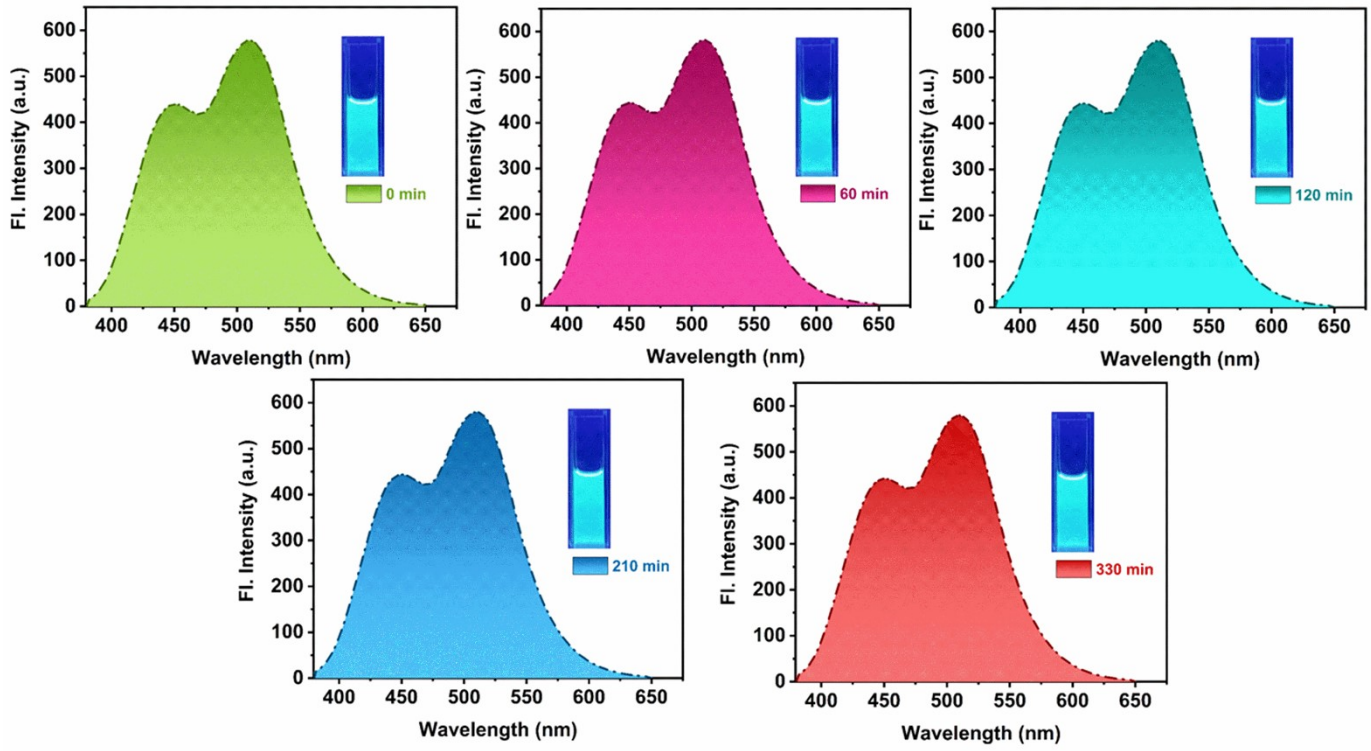
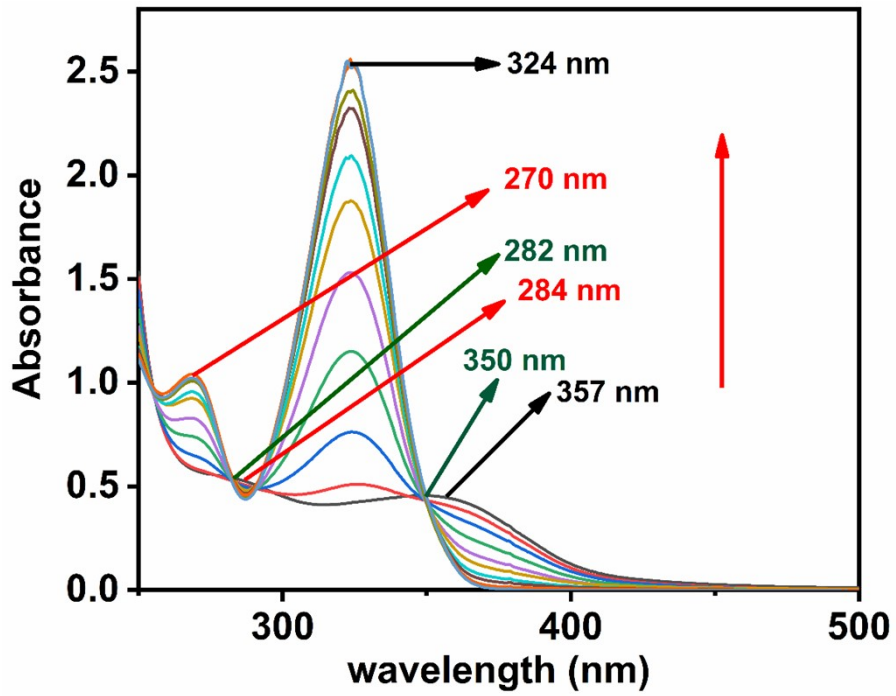


Fig. S5 Photostability test and fluorescence response of N-CQDs under continuous 365 nm UV light irradiation.



UV-Titration:

Fig. S6 UV-vis absorption spectra of N-CQDs upon addition of 6-thioguanine (10^{-4} M) at p^H 7.4 PBS buffer.

Binding constant calculation graph (Fluorescence method):

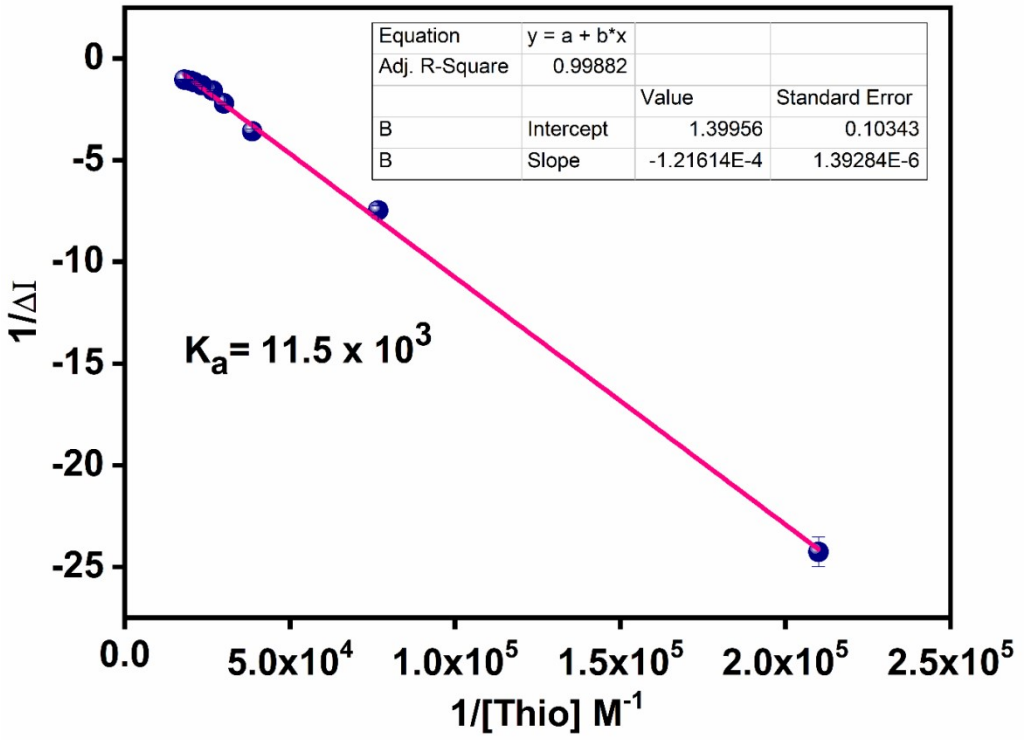


Fig. S7 Linear regression analysis for the calculation of association constant value by fluorescence titration method.

The association const. (K_a) of N-CQDs for sensing 6-thioguanine was determined from the equation: K_a = intercept/slope. From the linear fit graph, we get intercept=1.39956, slope =1.21614 $\times 10^{-4}$. Thus, we get $\mathbf{K_a}$= (1.39956) / (1.21614 $\times 10^{-4}$) = $\mathbf{11.5 \times 10^3\ M^{-1}}$

Table S2. Calculation of Standard Deviation and Limit of Detection (LOD) for 6-thioguanine

Blank Reading (N-CQDs)	**Fluorescence Intensities at 430 nm (X)**	**Mean ($\bar{X}$)**	**Standard Deviation (σ) = $\sqrt{\frac{\sum\|X-x\|^2}{N}}$**
Reading 1	3106.00	3105.95	0.2391
Reading 2	3105.82		
Reading 3	3106.14		
Reading 4	3105.56		
Reading 5	3106.23		

Slope, m for 6-thioguanine = 6.3313×10^7
LOD for 6-thioguanine = 3σ/m = (3 × 0.2391)/ (6.3313×10^7) = 0.0113×10^{-6} M = 0.0113 μM = 11.29 nM

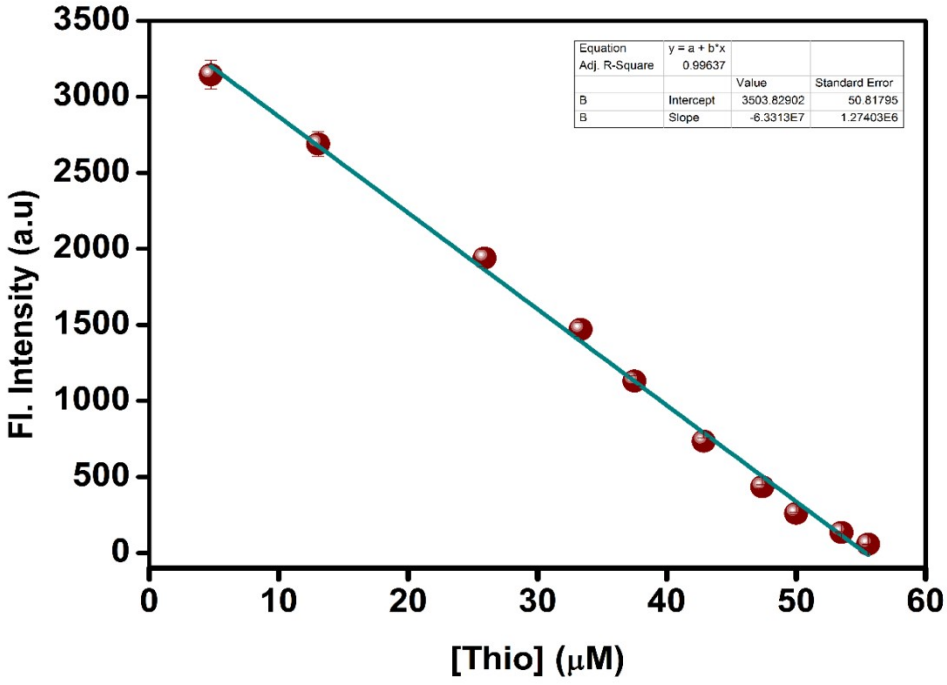


Fig. S8 Linear fit curve of N-CQDs at 450 nm with respect to 6-thioguanine concentration.

Selectivity:

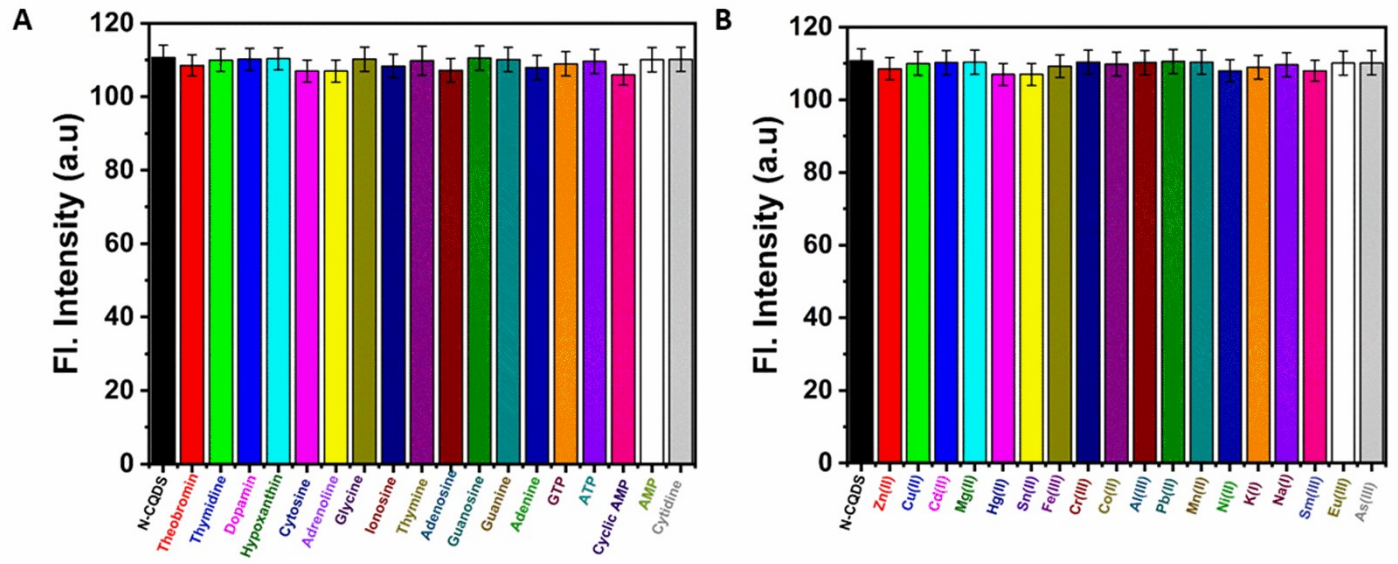


Fig. S9 (A) Competitive fluorescence spectra of N-CQDs with different biomolecules and (B) metals at 450 nm (λex = 360 nm).

Fluorescence lifetime decay:

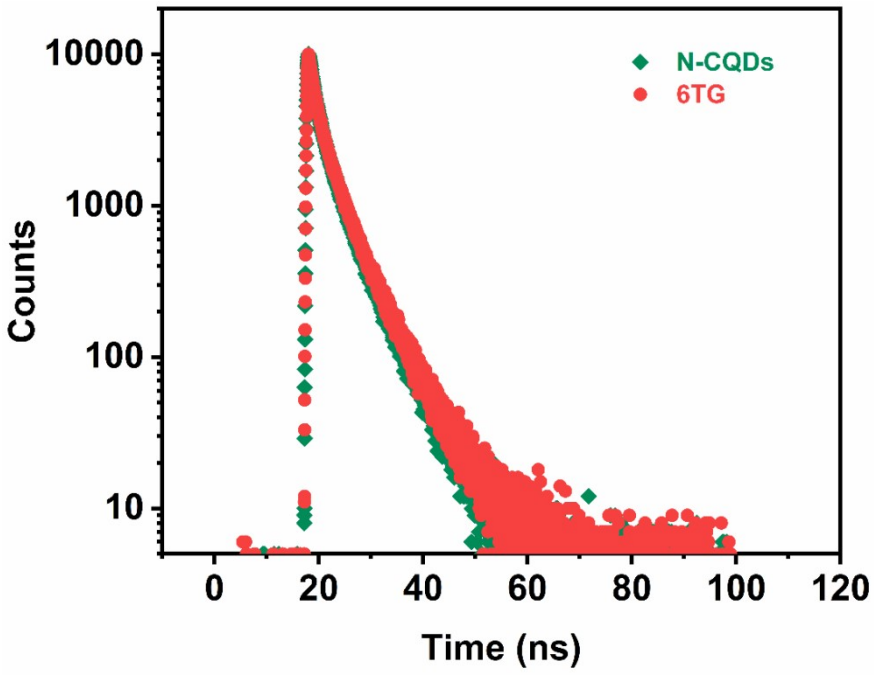


Fig. S10 The fluorescence lifetime of the N-CQDs before (green) and after the addition of 6TG (red).

Table S3. Decay time components of N-CQDs, N-CQDs + 6TG

System	b_1	τ_1	b_2	τ_2	b_3	τ_3	b_4	τ_4	$<\tau>=b_1\tau_1+b_2\tau_2+b_3\tau_3+b_4\tau_4$
N-CQDs	2.189236E-02	1.222263E-09	1.942766E-02	3.632971E-09	3.50052E-03	8.061795E-09	4.436611E-02	2.642987E-10	0.14ns
N-CQDs + 6TG	2.445279E-02	8.854746E-10	1.927459E-02	3.072705E-09	7.71994E-03	6.731814E-09	9.588196E-02	1.036529E-10	0.14ns

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1. W. S. Zhang, Y. N. Wang, Y. Wang, Z. R. Xu *Sens. Actuators B Chem.* 2019, **283**, 532–537.
2. M. Amjadi, R. Shokri, T. Hallaj. *Luminescence*, 2017, **32(3)**, 292-297.
3. W. Liu, S. Zhou, J. Liu, X. Zhao, Z. Feng, D. Wang, Z. Gong, M. Fan. *Anal Bioanal Chem.* 2022, **414(4)**, 1663-1670.
4. C. Yu, X. Jiang, D. Qin, G. Mo. *ACS Sustainable Chem. Eng.* 2019, **7 (19)**, 16112–16120**.**