

**Paper-based chemiluminescence detection device based on S, N-doped
carbon quantum dots for the selective and highly sensitive recognition of
bendiocarb**

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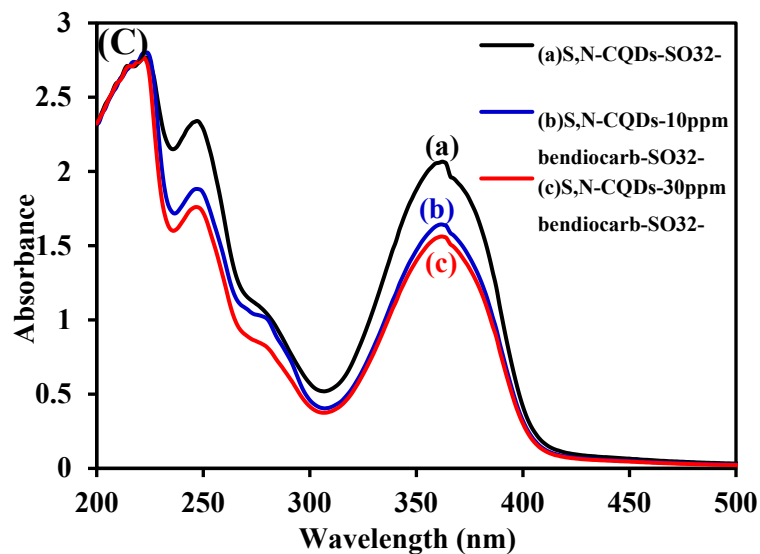
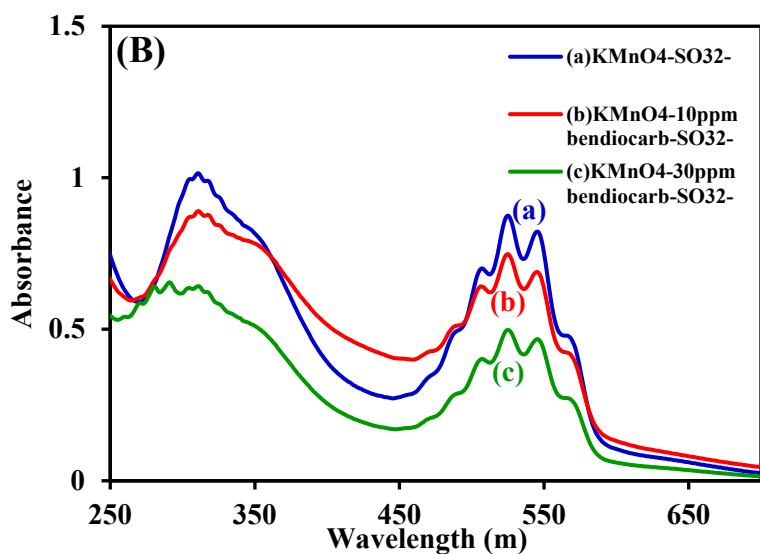
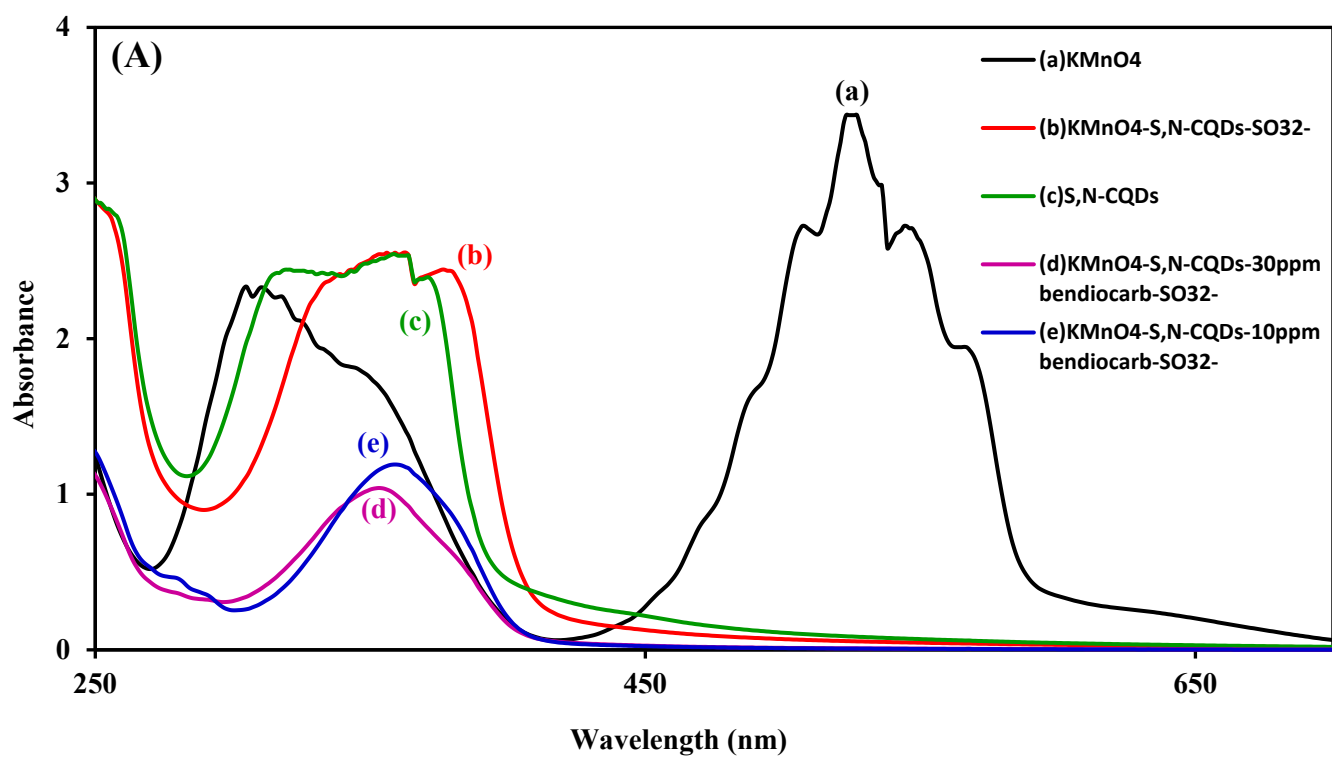


Fig. S1. (A) UV-vis absorbance spectra for different mixed solutions [$\text{H}_2\text{SO}_4=0.1 \text{ M}$, $\text{SO}_3^{2-}=0.01 \text{ M}$, S, N-CQDs=0.03 mg mL⁻¹, Bendiocarb=10 $\mu\text{g mL}^{-1}$]. (B&C) Bendiocarb effect on the UV-vis absorbance spectra of KMnO₄ and S, N-CQDs, respectively [$\text{H}_2\text{SO}_4=0.1 \text{ M}$, $\text{SO}_3^{2-}=0.01 \text{ M}$, KMnO₄=1 mM].

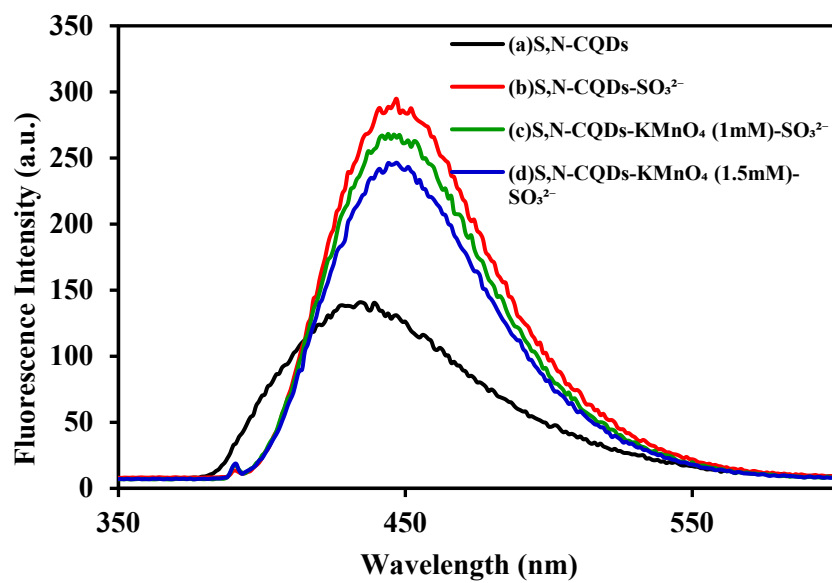
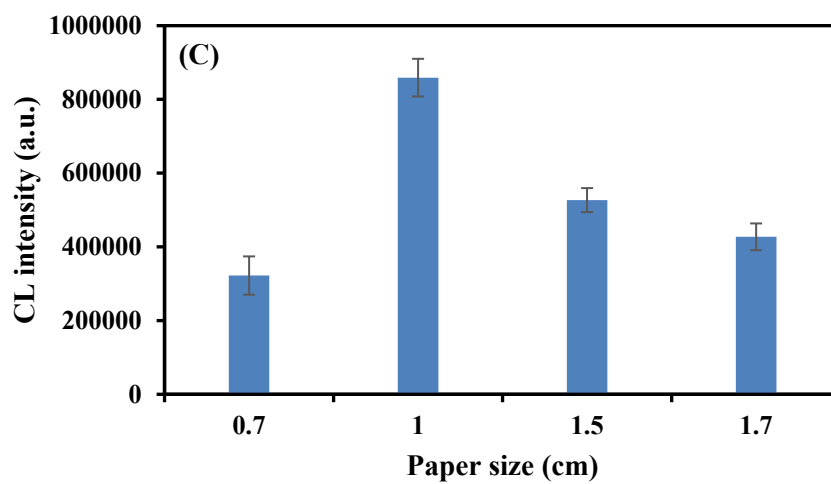
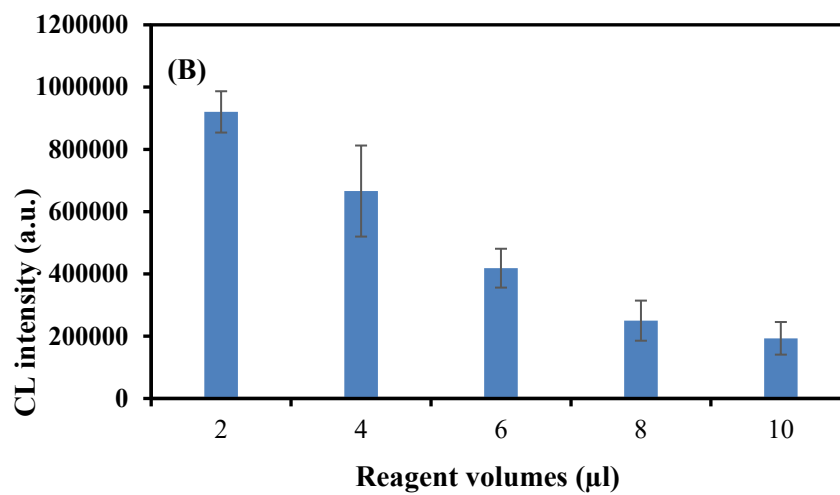
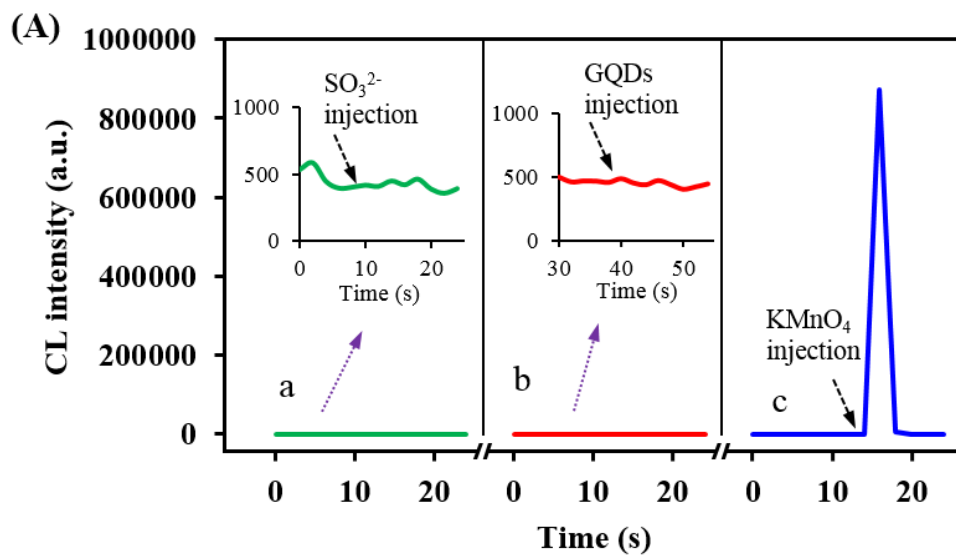
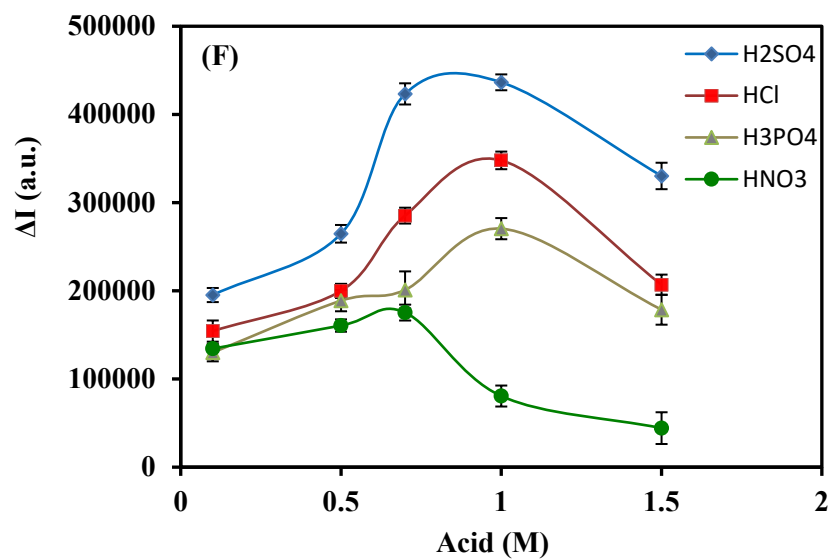
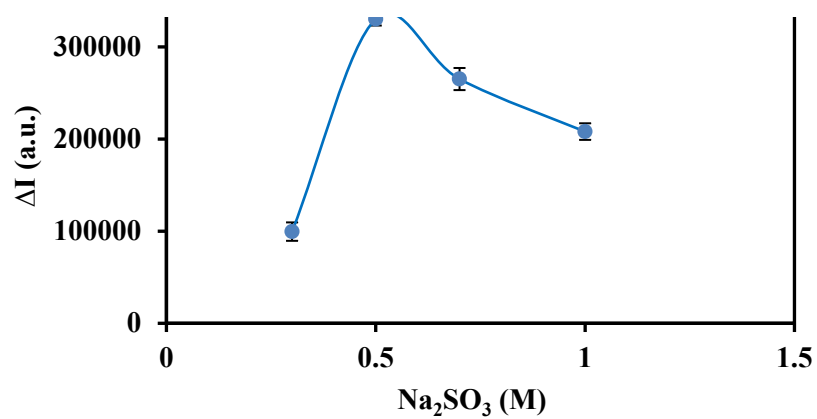
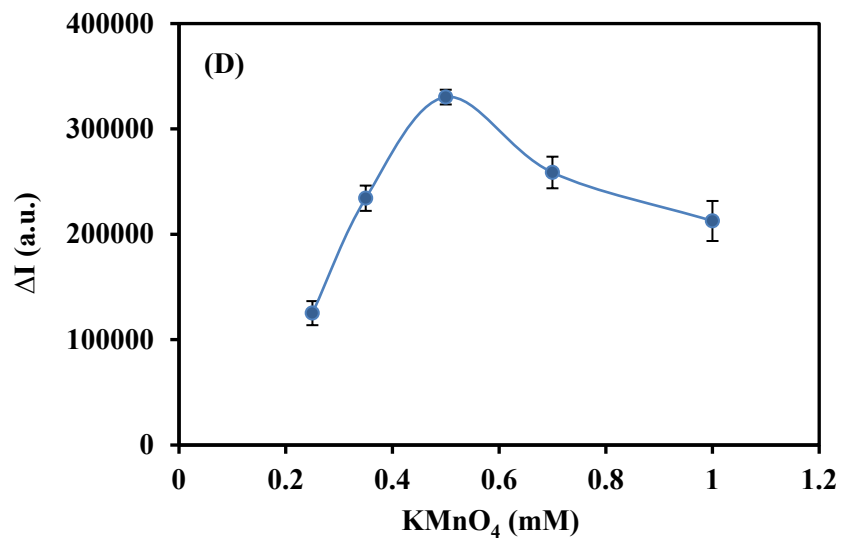


Fig. S2. Fluorescence spectra of 0.03 mg mL^{-1} S, N-CQDs in the presence of other reagents with an excitation wavelength of 390 nm [$\text{H}_2\text{SO}_4=0.1 \text{ M}$, $\text{SO}_3^{2-}=0.01 \text{ M}$, m/v, $\text{KMnO}_4=1 \text{ mM}$]





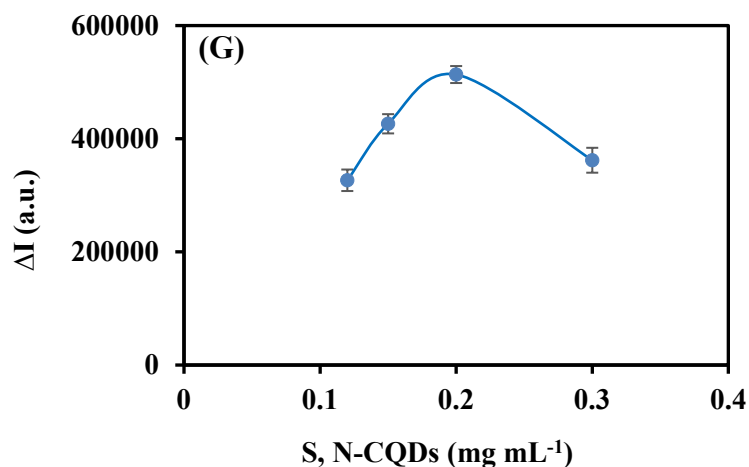


Fig. S3. Effects of different experimental factors on the CL response of the developed CL system: A) injection of different chemicals as the last reagent on the paper loaded by (a) H₂SO₄-KMnO₄-GQDs, (b) H₂SO₄-SO₃²⁻-KMnO₄, (c) H₂SO₄-SO₃²⁻-GQDs; B) volumes of reagents [1 mol L⁻¹ H₂SO₄, 0.5 mol L⁻¹ SO₃²⁻, 0.3 mg mL⁻¹ S, N-CQDs, 5 μg mL⁻¹ bendiocarb], C) paper size [conditions like B], D) KMnO₄ concentration [paper size 1 cm and other conditions like C], E) SO₃²⁻ concentration [0.5 mmol L⁻¹ KMnO₄ and other conditions like D], F) acid type and concentration [0.5 mol L⁻¹ SO₃²⁻ and other conditions like E], G) concentration of S, N-CQDs [1 mol L⁻¹ H₂SO₄ and other conditions like F].

Table S1. Comparison of the proposed method for the determination of bendiocarb with some reported analytical methods.

Method	Metrix	Linear range (μg mL ⁻¹)	Limit of detection (μg mL ⁻¹)	Reference
HPLC-PICL	Soils	0.1-3.4	0.09	1
LC-ESI-MS/MS	Water samples	0.015-0.09	0.005	2
RP-HPLC-UV	-	5-60	0.0650	3
μPAD/ CL	Fruit juices and environmental water sample	0.1-10	0.02	This work

(A) Abbreviations: (HPLC): high-performance liquid chromatography; (PICL): photo-induced chemiluminescence; (ESI): electrospray ionisation mass spectrometry; (MS/MS): Tandem mass spectrometry; (RP): Reversed phase

References

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- [2] D. Nartop, N. K. Yetim, E. H. Özkan and N. Sari, *J. Mol. Struct.*, 2020, **1200**, 127039-127046.
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Table S2 tolerable concentrations of some possible interfering compounds on the response of the developed paper-based CL device for bendiocarb ($5 \mu\text{g mL}^{-1}$)

Compounds	Tolerable concentration ($5 \mu\text{g mL}^{-1}$) with an error of less than 5%
Sugars (fructose, lactose, glucose and sucrose)	100
Vitamin C	50
Amino acids (histidine, l-cysteine, l-leucine)	50
Phenols (catechin, caffeic acid)	50
Ions (MgCl_2 , NaHCO_3)	500
Ions (KCl , Na_2SO_4 , $\text{Ca}(\text{NO}_3)_2$, $\text{Fe}(\text{NO}_3)_3$)	100
Pesticides (deltamethrin, carbaryl, carbofuran, propoxur)	10