Electronic Supplementary Material (ESI) for New Journal of Chemistry.

SUPPORTING INFORMATION

Green Synthesis of Nitrogen and Sulfur Co-doped Carbon Quantum Dots for Dual Sensing Brilliant green dye and Cu^{2+} ions in environmental samples

CONTENTS

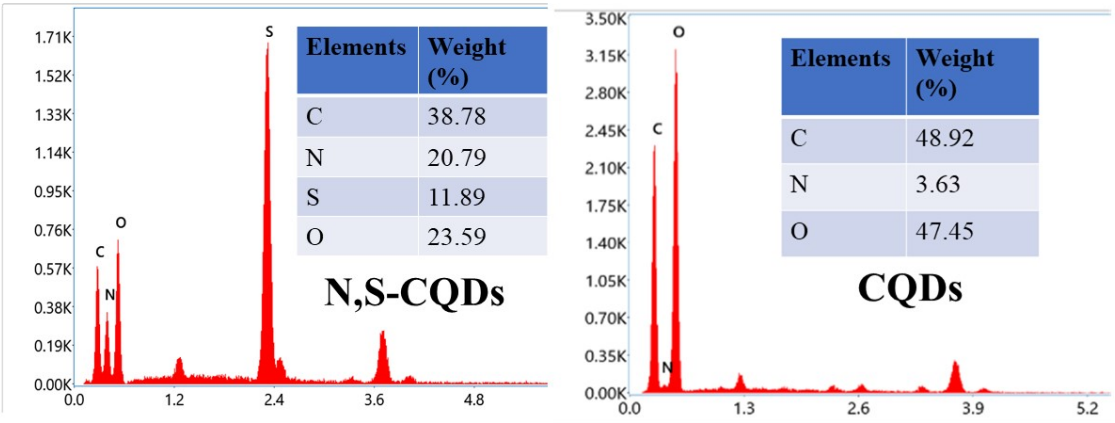

Fig. S1. EDX analysis of N,S-CQDs and CQDs.

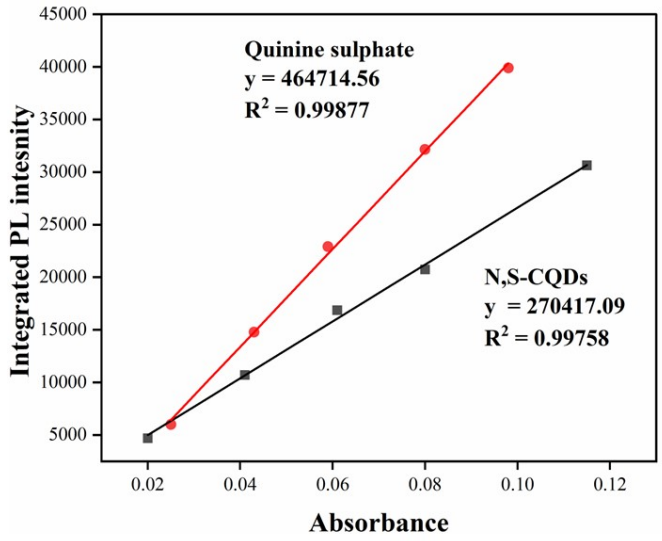

Fig. S2. The quantum yield of the synthesized N,S-CQDs

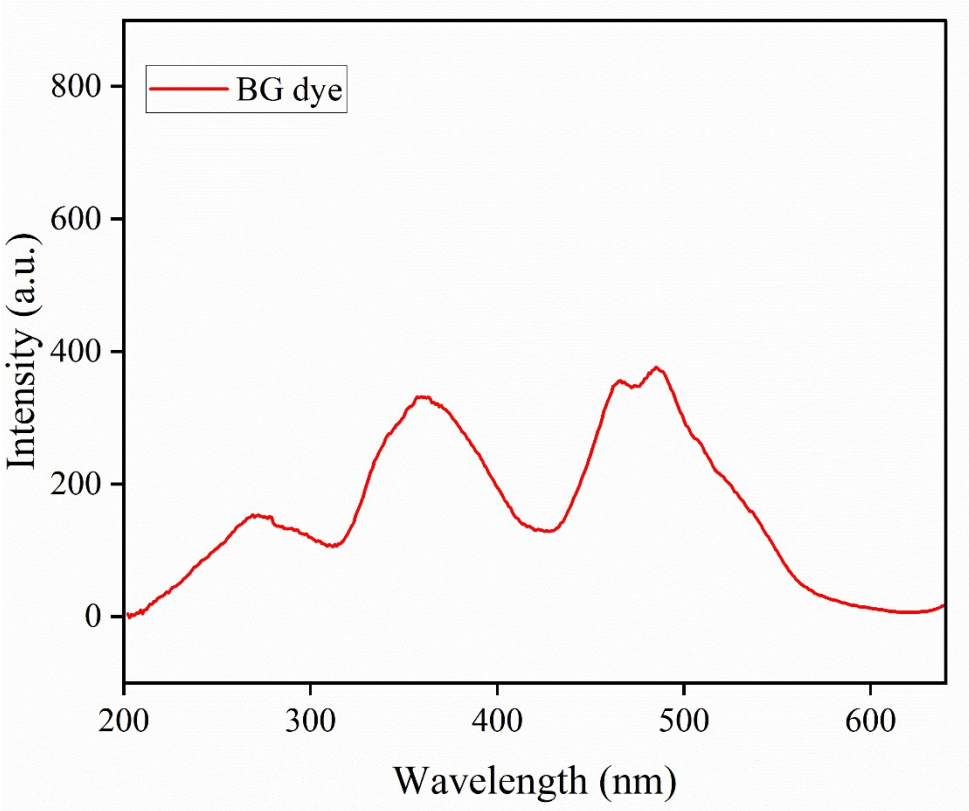

Fig. S3. The fluorescence excitation and emission spectra of BG dye

The fluorescence excitation and emission spectra of BG dye reveal two peaks. The first peak, at 358 nm, is linked to electronic transitions within the molecule, potentially involving lower energy levels. This could signify n-π^* transitions, where an electron shifts from a non-bonding orbital (n) to an antibonding π^* orbital. The second peak, at 471 nm, corresponds to longer-wavelength emission and is also associated with electronic transitions involving lower

energy levels within the molecule, possibly through n-π* transitions from a non-bonding orbital (n) to an antibonding π* orbital.

Table S1. Details of fluorescence lifetime measurement with different concentration of Cu^{2+} ions and BG dye.

	A_1 (ns)	A_2 (ns)	T_1 (ns)	T_2 (ns)	T_{avg} (ns)
N,S-CQD	40.961	14.27	5.37	1.26	5.07
N,S-CQD + Cu^{2+}	41.672	15.48	6.42	1.34	6.05
N,S-CQD + BG dye	38.072	13.28	5.11	1.27	4.8

Fitted the double exponential function y (t) to get the lifetime decay curve, and calculate the average life accordingly.

$y(t) = A_1 e^{-t/T_1} + A_2 e^{-t/T_2}$

$T_{avg} = (A_1(T_1)^2 + A_2(T_2)^2)/(A_1 T_1 + A_2 T_2)$