Electronic Supplementary Material

For

P-doped carbon dots act as nanosensor for trace 2,4,6-trinitrophenol detection and fluorescent reagent for biological imaging

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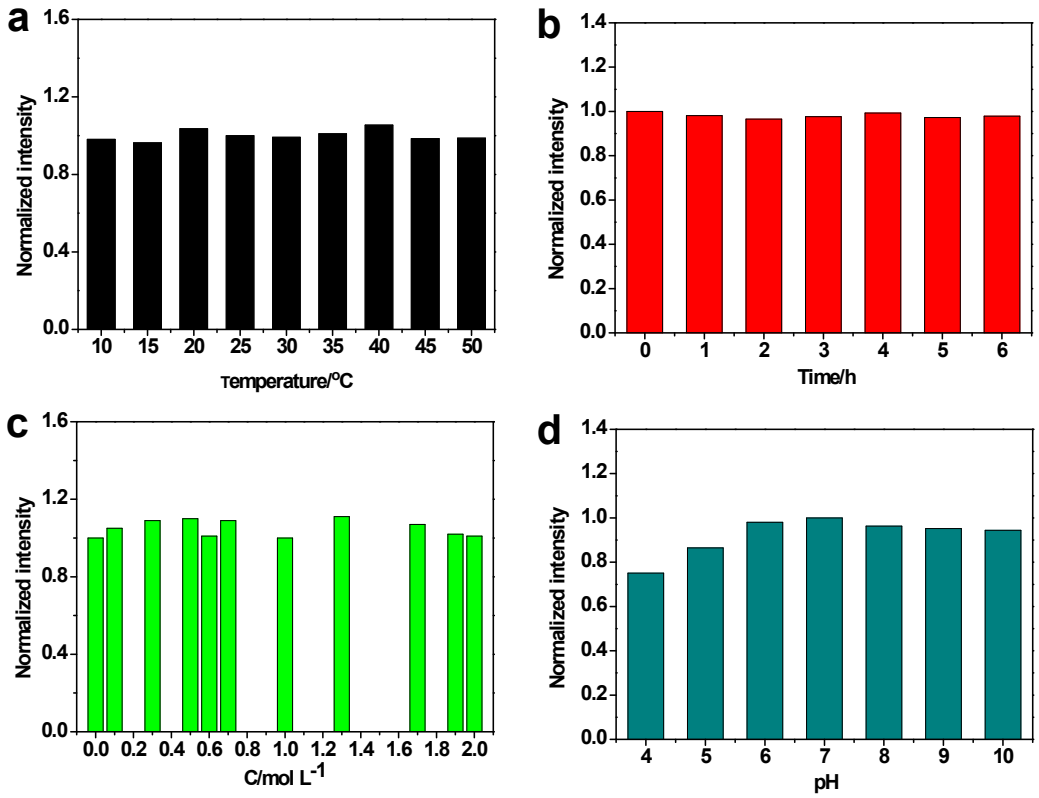

Fig. S1. Fluorescence intensity of CDs (0.05 mg mL^{-1}) against: (a) temperature, (b) irradiation time, (c) ionic strength, (d) pH.

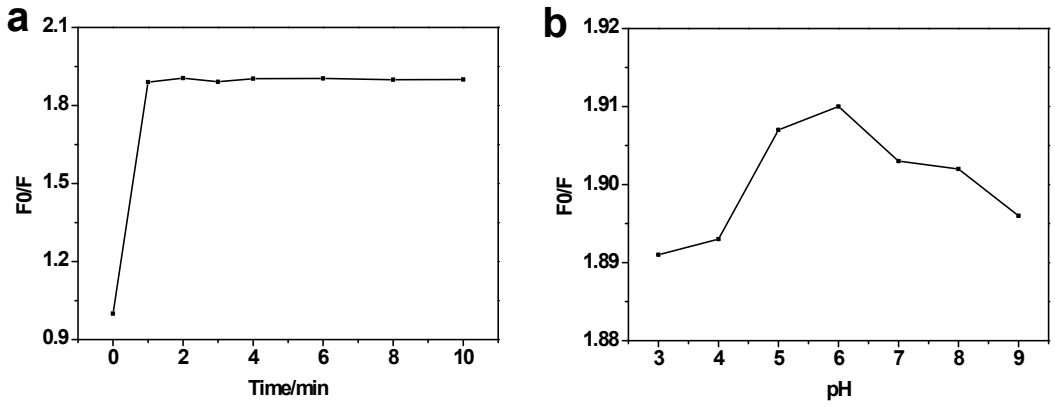

Fig. S2. (a) Time-dependent fluorescence response (0-10 min) of CDs (0.05 mg mL^{-1}) in the presence of TNP (10 μM) in pH=7; (b) fluorescence response of CDs (0.05 mg mL^{-1}) in the presence of TNP (10 μM) at different pH values.

Quantum Yield of CDs

The fluorescence quantum yield was determined by slope method with quinine sulfate as standard: compared the integrated fluorescence intensity (λ_{ex}=310 nm) and the absorbance value [several values gave the curve] of the CDs samples with that of the references. Then used the equation:

$$\varphi_x=\varphi_{st}(K_x/K_{st})(\eta_x/\eta_{st})^2$$

Where φ is the quantum yield, K is the slope determined by the curves and η is the refractive index. The subscript "st" refers to quinine sulfate and "x" refers to the CDs. For these aqueous solutions, η_x/η_{st}=1. So the equation was simplified to:

$$\varphi_x=\varphi_{st}(K_x/K_{st})$$

The results were shown in Table S1.

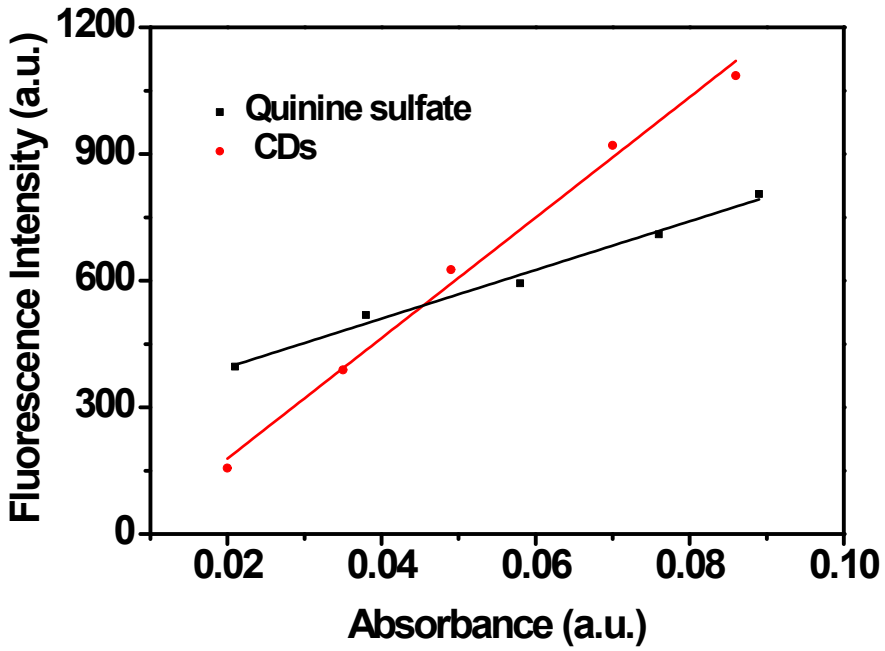

Fig. S3. The fluorescence intensity (λ_{ex}=310 nm) of CDs and quinine sulfate as a function of the absorbance at 310 nm.

Table S1
Quantum yield of CDs.

Serial	Quinine sulfate	CDs
K	14269.486	5760.646
φ (%)	54	21.8

Bacterial growth and labelling

The bacteria used in this study were Escherichia coli MG1655 wild type. The bacteria were grown aerobically at 37 °C in a sterilized solid LB medium composed of 13.5% yeast extract, 27% peptone, 27% NaCl, and 32.5% agar at pH 7.4. After overnight growth, a colony from bacterial strain was placed into 10 mL falcon tubes and centrifuged for 20 min at 2300 rcf, washed twice with the sterilized PBS (pH 7.4). Under gentle vortexing, the bacteria pellet was re-suspended in 5 mL solution of CDs (1 mg mL^{-1}) dissolved in PBS buffer. The resulting suspensions were kept at 37 ^{o}C for 2 h with gentle shaking. Bacteria pellet was washed with PBS buffer three times to remove all unbound CDs. Finally, the bacteria pellets was resuspended in PBS and transferred separately into 96-well microtiter plates and subjected to fluorescence study. Fluorescence microscopy experiments were carried out on an OlympusIX71 inverted fluorescence microscope with a 20× objectivelens.

Experimental details for cell imaging experiments

NIH-3T3 cells were cultured in (Invitrogen) supplemented with 10% Fetal

Bovine Serum (FBS, Invitrogen) in an atmosphere of 5% CO_2 at 37 ^{o}C. One day before imaging, cells were place in 6-well flat-bottomed plates. The culture medium was replaced by 2.5 mL fresh medium containing 0.01 $mg \cdot mL^{-1}$ CDs and the cells were incubated for another 24 h. After being washed with fresh 1×PBS (pH = 7.0) three times, the cells were imaged on the inverted fluorescence microscope. Then, the cells were exposed to 10 μM TNP for 30 min. The cells were imaged after washing the culture medium three times with PBS.