Supporting Information

A Hybrid of Carbon Dots with 4-Chloro-7-Nitro-2,1,3-Benzoxadiazole for Selective Detection of p-Phenylenediamine

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Fig. S1. The impact of ionic strength (A) and irradiation time (B) on the photoluminescence of CDs@NBD hybrid ($\lambda_{ex}/\lambda_{em} = 460/544$ nm).
Fig. S2. The fluorescence spectra of the system after the reaction of NBD-Cl (at 0.5 mmol L\(^{-1}\)) with a variety of small molecular amines (at 1 mmol L\(^{-1}\)) and CDs.
Fig. S3. AFM images of CDs (A) and CDs@NBD hybrid (B) on mica substrate with the height profiles along the lines (C).
Fig. S4. FT-IR spectra of CDs, NBD-Cl and CDs@NBD hybrid (A). Raman spectra of CDs and CDs@NBD hybrid (B).
Fig. S5. High resolution XPS spectra of C\textsubscript{1s}, N\textsubscript{1s}, O\textsubscript{1s} of CDs and CDs@NBD hybrid.
Fig. S6. $^1$H NMR and $^{13}$C NMR spectra of CDs (A, B) and CDs@NBD hybrid (C, D).
Fig. S7. The relationship between $F_0/F-1$ and NBD-Cl concentrations (0, 0.075, 0.1, 0.025, 0.5, 0.75, 1, 2.5 mmol L$^{-1}$).
Fig. S8. The variation of fluorescence intensity of CDs and NBD-Cl versus PPD concentrations.
Fig. S9. Fluorescence decay curves of CDs@NBD hybrid in the absence and presence of PPD at a level of 10 μmol L⁻¹. Inset: Fluorescence lifetimes of CDs@NBD hybrid in the absence and presence of PPD (λ_{ex}/λ_{em}=460/544 nm).
Fig. S10. The relative fluorescence intensities of CDs@NBD sensing system in the presence of 10 μmol L⁻¹ PPD (control) and potential interferences from various coexisting species.

A. in the presence of metal cations: 1 mmol L⁻¹ of Na⁺, Zn²⁺, Ca²⁺, Mg²⁺, K⁺, NH₄⁺, Cd²⁺, Co²⁺, Ni²⁺, Fe²⁺, Al³⁺, Mn²⁺, Ba²⁺, Pb²⁺, Cr(VI)).

B. in the presence of anionic species: 1 mmol L⁻¹ of Cl⁻, CO₃²⁻, HCO₃⁻, NO₃⁻, NO₂⁻, Br⁻, I⁻, F⁻, PO₄³⁻, HPO₄²⁻, H₂PO₄⁻, SO₄²⁻).

C. In the presence of proteins and other biomolecules: 1 mmol L⁻¹ of urea, thiourea (TU), lactose (Lac), fructose (Fru), glucose (Glu), ATP and 10 mg L⁻¹ of cytochrome c (cyt-c), albumin bovine serum (BSA), hemoglobin (Hb)).

D. In the presence of amino acids: 100 μmol L⁻¹ of proline (Pro), arginine (Arg), lysine (Lys), valine (Val), Threonine (Thr), Methionine (Met), phenylalanine (Phe), glycine (Gly), isoleucine (Ile), 1 mmol L⁻¹ of alanine (Ala), histidine (His), glutamic acid (Glu), leucine (Leu), serine (Ser), tryptophan (Trp).