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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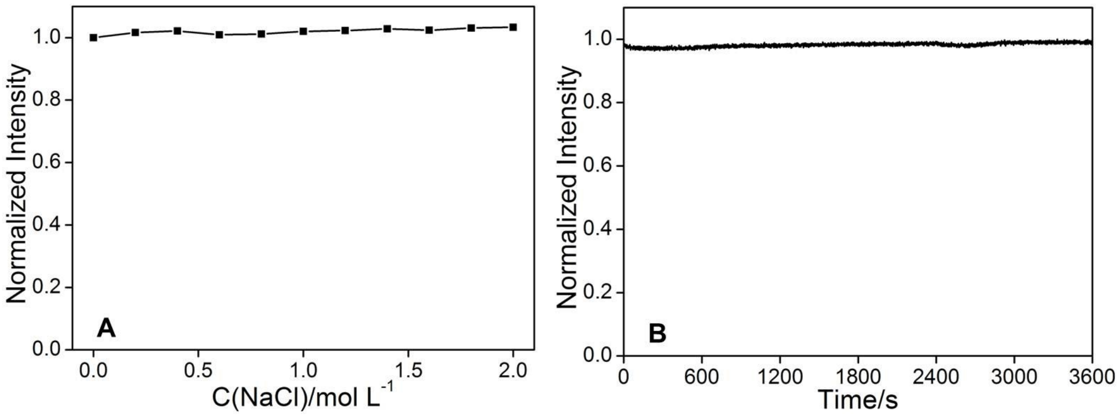


Fig. S1. The impact of ionic strength (A) and irradiation time (B) on the photoluminescence of CDs@NBD hybrid ($\lambda_{ex}/\lambda_{em}$=460/544 nm).

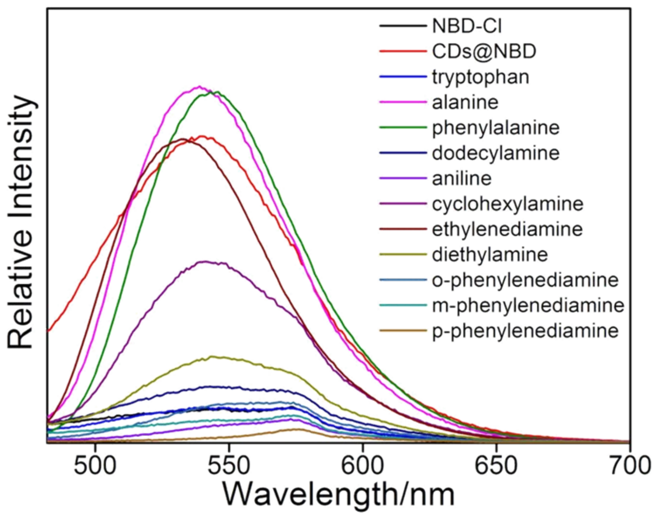


Fig. S2. The fluorescence spectra of the system after the reaction of NBD-Cl (at 0.5 mmol L^{-1}) with a variety of small molecular amines (at 1 mmol L^{-1}) and CDs.

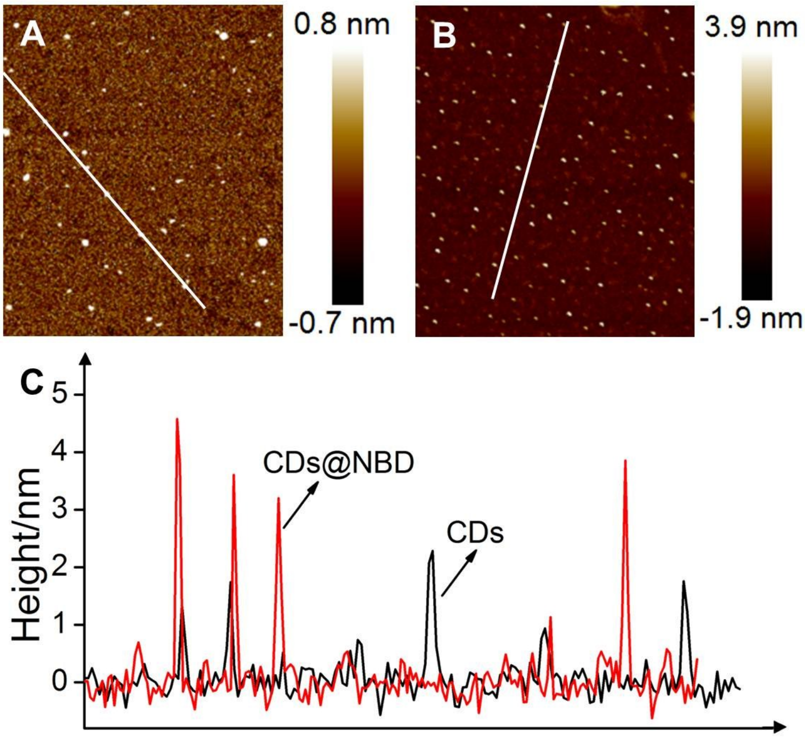


Fig. S3. AFM images of CDs (A) and CDs@NBD hybrid (B) on mica substrate with the height profiles along the lines (C).

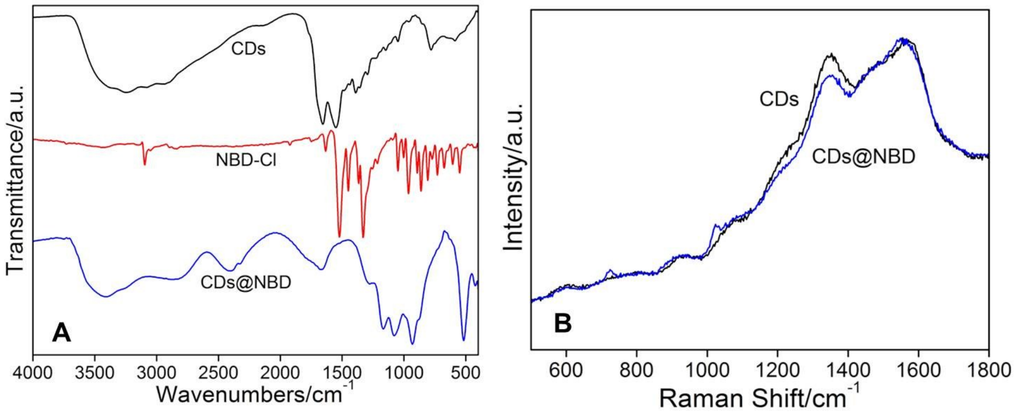


Fig. S4. FT-IR spectra of CDs, NBD-Cl and CDs@NBD hybrid (A). Raman spectra of CDs and CDs@NBD hybrid (B).

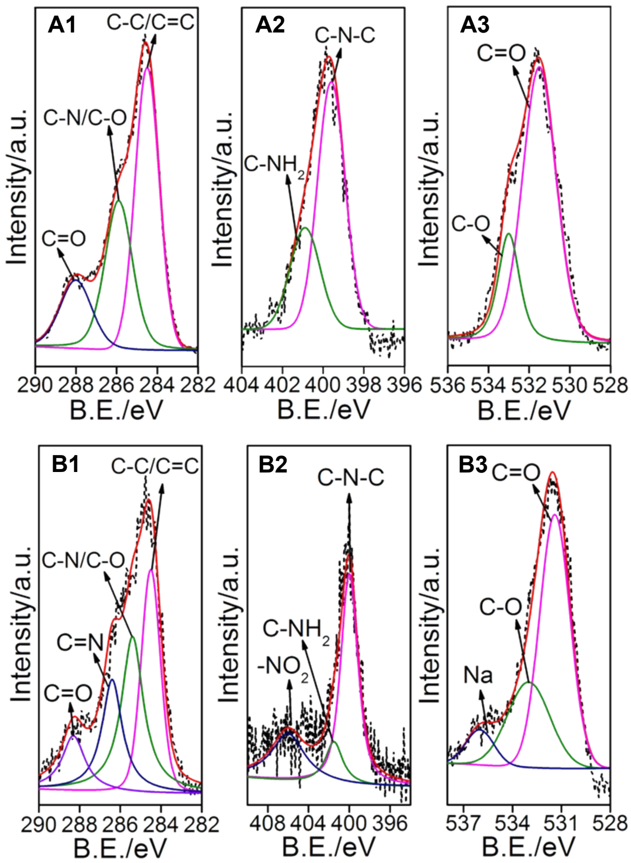


Fig. S5. High resolution XPS spectra of C_{1s}, N_{1s}, O_{1s} of CDs and CDs@NBD hybrid.

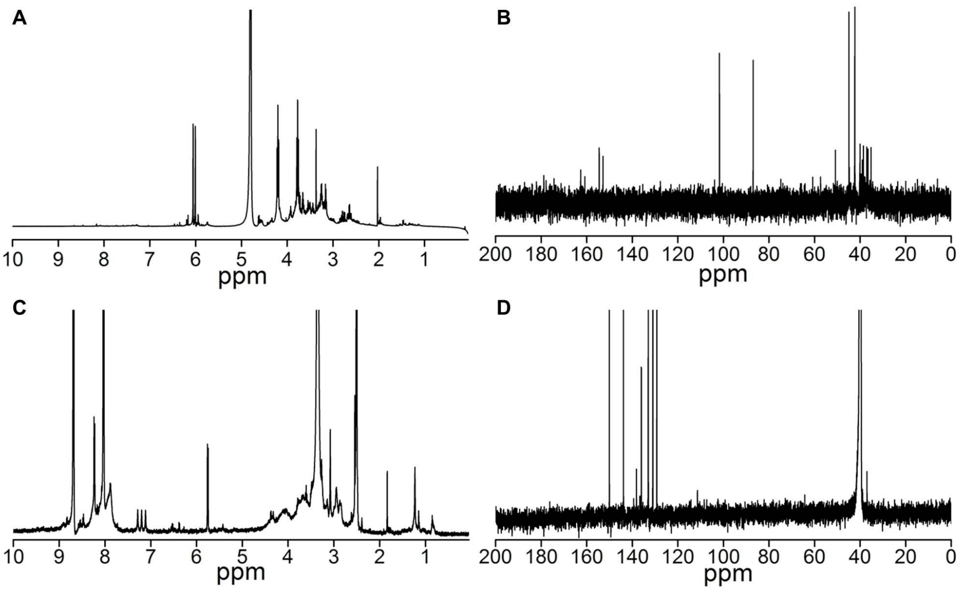


Fig. S6. [1]H NMR and [13]C NMR spectra of CDs (A, B) and CDs@NBD hybrid (C, D).

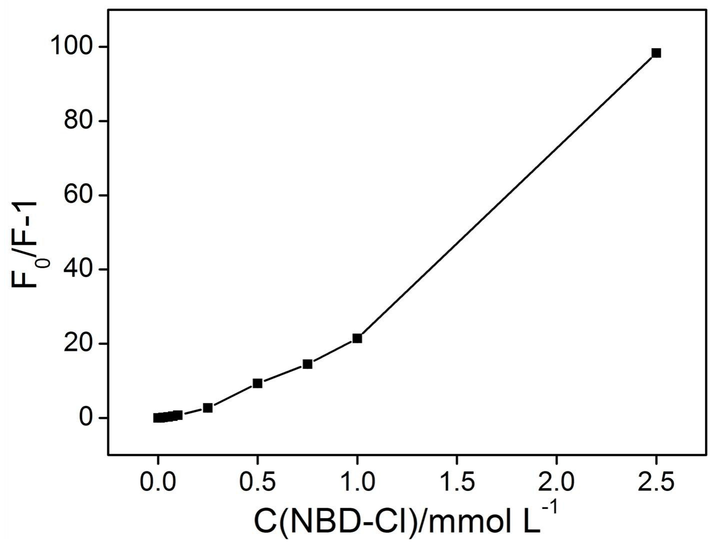


Fig. S7. The relationship between $F_0/F-1$ and NBD-Cl concentrations (0, 0.075, 0.1, 0.025, 0.5, 0.75, 1, 2.5 mmol L^{-1}).

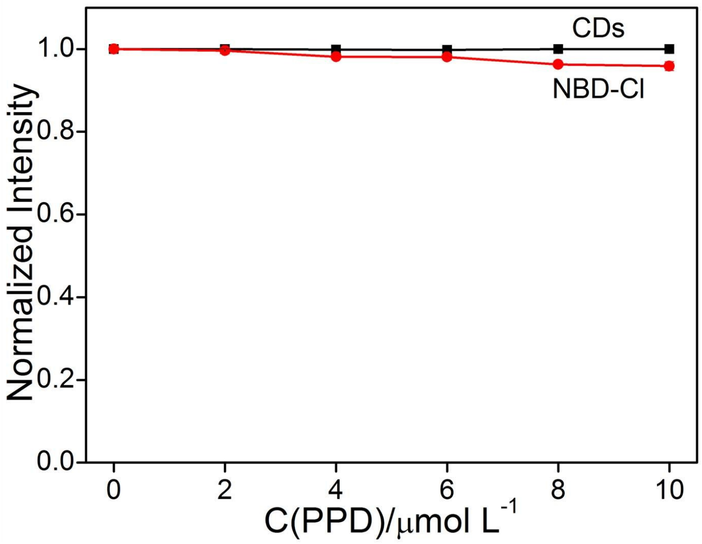
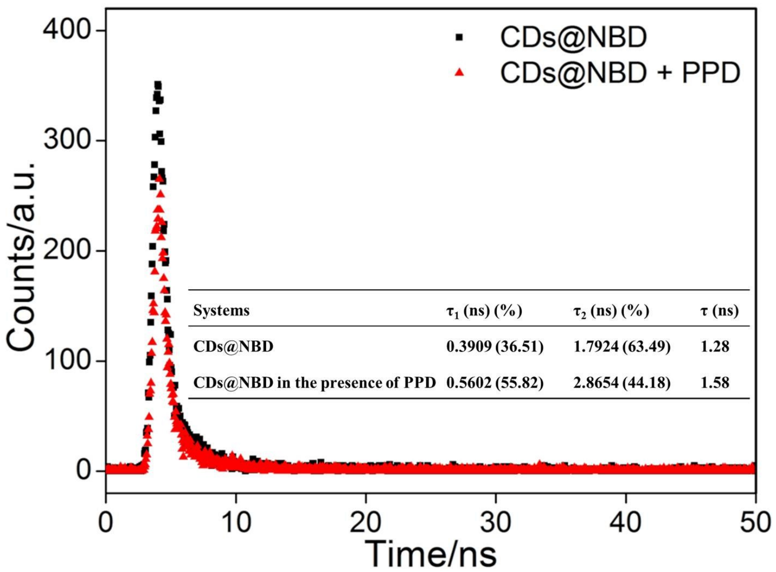


Fig. S8. The variation of fluorescence intensity of CDs and NBD-Cl versus PPD concentrations.



Systems	τ_1 (ns) (%)	τ_2 (ns) (%)	τ (ns)
CDs@NBD	0.3909 (36.51)	1.7924 (63.49)	1.28
CDs@NBD in the presence of PPD	0.5602 (55.82)	2.8654 (44.18)	1.58

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 ($\lambda_{ex}/\lambda_{em}$=460/544 nm).

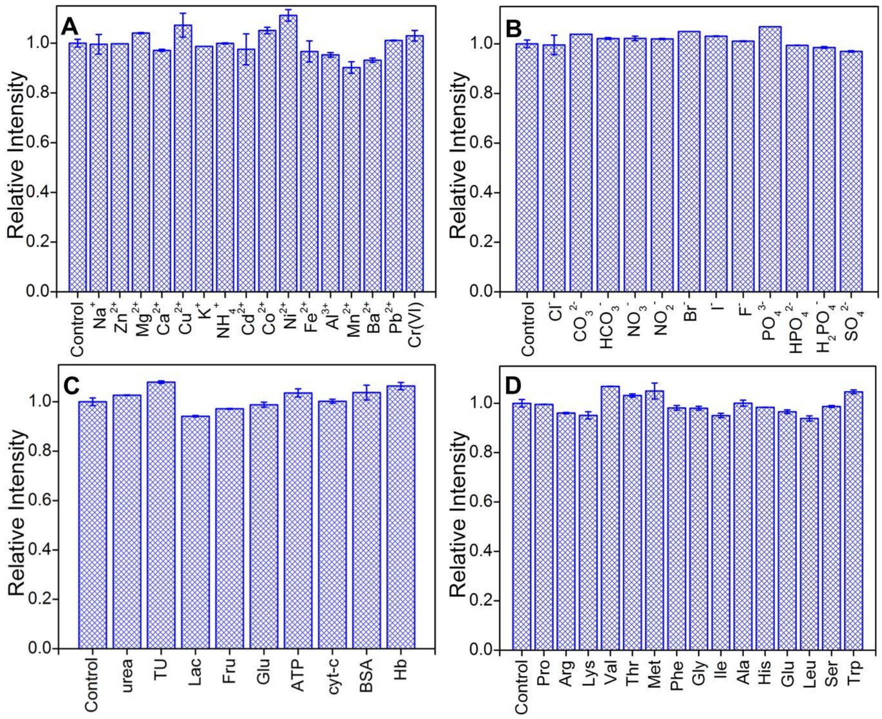


Fig. S10. The relative fluorescence intensities of CDs@NBD sensing system in the presence of 10 μmol L^{-1} PPD (control) and potential interferences from various coexisting species.

A. in the presence of metal cations: 1 mmol L^{-1} of Na^{+}, Zn^{2+}, Mg^{2+}, Ca^{2+}, Cu^{2+}, K^{+}, NH_4^{+}, Cd^{2+}, Co^{2+}, Ni^{2+}, Fe^{2+}, Al^{3+}, Mn^{2+}, Ba^{2+}, Pb^{2+}, Cr(VI)).

B. in the presence of anionic species: 1 mmol L^{-1} of Cl^{-}, CO_3^{2-}, HCO_3^{-}, NO_3^{-}, NO_2^{-}, Br^{-}, I^{-}, F^{-}, PO_4^{3-}, HPO_4^{2-}, $H_2PO_4^{-}$, SO_4^{2-}).

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).