Supporting Information for

Luminescent Carbon Nanoparticles as a Donor for the Detection of DNA Hybridization

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1. Materials

Phosphate Buffer Solution（PBS， pH7.4），KNO_3, and graphite rode were obtained from Alfa Aesar chemistry Co., Ltd. Poly(diallyldimethylammonium chloride) (PDADMAC) (very low molecular weight <100,000, 35 wt. % in H_2O) was purchased from Aladdin Chemistry Co., Ltd. The DNAs were purchased from Sangon Biotech., Shanghai and the sequences are as follows:

Probes (5' to 3'): Cy3-C6- CAGTGTACGGCCCTGAAGTACAGTC

complementary (5' to 3'): GACTGTACTTCAGGGCCGTACACTG

non-complementary (5' to 3'): CAGTGTACGGCCCTGAAGTACAGTC

A quartz cell with a volume of 300 μL was used for fluorescence measurement.

2. Synthesis of CNs :

The synthesis of CNs was performed according to the reference[1] with some modification. Cyclic voltammetry was performed to electrochemically oxidize graphite rods in 30 ml PBS buffer solution containing 1.0 g KNO_3 by using an electrochemical workstation（CHI601A. The working electrode and counter electrode were both graphite rods. The potential was in a range of -1.0 V to 3.0 V. The reaction was kept on for 4 hours and the solution became brown with some solid flaking. The representative cyclic voltammogram is shown in Fig. S1. After oxidation, the solution was sonicated for 30 min (KQ-250DE). Then the solution was centrifuged at 6000 rpm for 20 min to remove the large particles. The obtained clear solution was put into a dialysis bag and dialyzed for 2 days with distilled water.

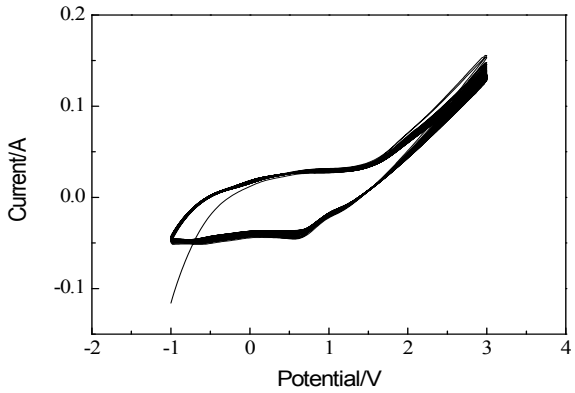

Fig. S1.Cyclic voltammogram of oxidation of the graphite rod.

3. Characterization

The FT-IR transmittance measurements were performed over the frequency range from 400 to 4000 cm^{-1} using a Fourier transform infrared spectrometer (Bruker Vertex 80 V) with the KBr pellet technique. The result is shown in Fig. S2

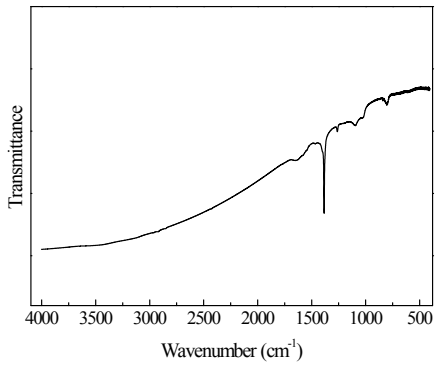

Fig. S2 FT-IR spectrum of prepared CNs

UV-visible absorption spectra and PL spectra were recorded at room temperature under ambient conditions on a TU-1901 UV-visible spectrophotometer and a Perkin Elmer LS55 fluorescence spectrometer, respectively. Fig. S3 gives the absorption spectrum and emission spectra of prepared CNs. The CNs shows an absorption band around 360 nm. With the excitation wavelength increasing, the emission peak was red- shifted.

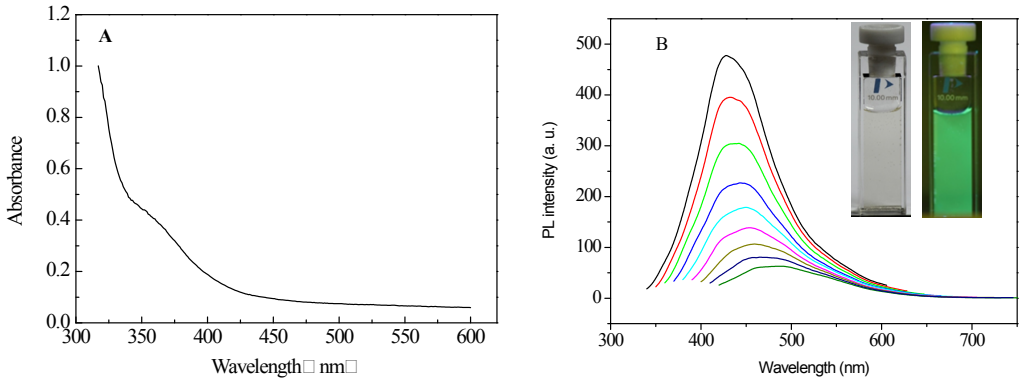

Fig. S3 (A) Absorption spectrum (B) Emission spectra of prepared CNs at different excitation wavelengths progressively increased from 320 nm (on the left) with a 10 nm increment. Inset: photo images of CNs under ambient light (left) and UV light (365 nm) (right).

Preparation of CNs / PDADMAC hybrid (CN^+):

40 µl the CNs (optical density (OD) at 360 nm is 0.02) solution was added into the dilluted PBS buffer. 4 µL of cationic polymer PDADMAC solution (11.42 %, w/w) was added into the prepared CNs solution. The diluted PBS buffer contains 68.5 mM NaCl, 1.3 mM KCl,5 mM Na_2HPO_4•2 H_2O and 1.0 mM KH_2PO_4 (pH7.4) and was used throughout. The emission spectra of CNs before and after the addition of PDADMAC is given if Fig. S4. After adding the cationic polymer, the peak height slightly increased.

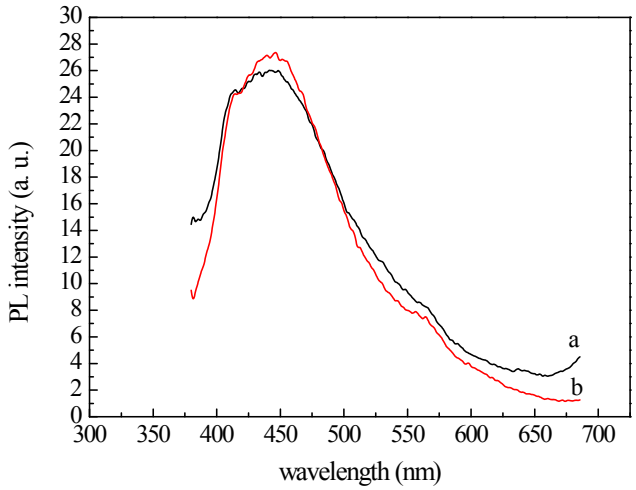

Fig. S4 The emission spectra of CNs before (a) and after (b) the addition of PDADMAC

Detection of DNA Hybridization：

30 μL of Cy3-DNA (1.42 μM) was added to 230 μL diluted PBS buffer containing 40 μL of CN^+ and the mixture was kept for 10 min before fluorescence measurement. For DNA sensing, DNA sample solutions with different concentrations were added to the solution containing Cy3-DNA/ CN^+ hybrid prepared as described above and kept for 10 min at room temperature.

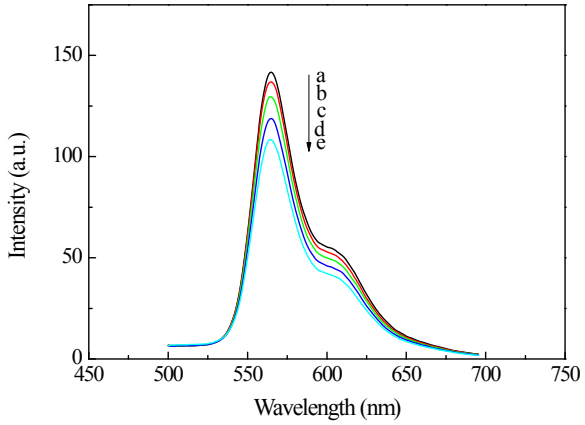

Fig. S5 The emission spectra of Cy3-DNA in the presence of different amount of CNs with an excitation wavelength of 460 nm. The volumes of CNs solution added (OD at 360 nm 0.04) were (a) 0 μL, (b) 15 μL, (c) 25 μL, (d) 35 μL and (e) 55 μL.

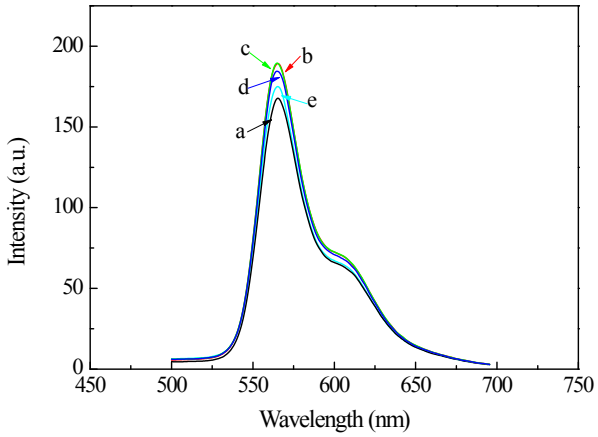

Fig. S6 The emission spectra of Cy3-DNA/ PDADMAC hybrid in the presence of different amount of CNs with an excitation wavelength of 460 nm. The volumes of CNs solution added (OD at 360 nm 0.04) were (a) 0 μL, (b) 15 μL, (c) 25 μL, (d) 35 μL and (e) 55 μL.

1. Li, H., *et al.*, *New Journal of Chemistry* (2011) **35** (11), 2666