

Supplementary Information

Blue Fluorescent Carbon Thin Films Fabricated from Dodecylamine-capped Carbon Nanoparticles

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1. Preparation of the hydrophilic CNPs

The hydrophilic CNPs were prepared by a pyrolytic method from EDTA-2Na·2H₂O. In a typical procedure, a quartz boat filled with EDTA-2Na·2H₂O (AR, 1.0 g) was thrust into a quartz tube and calcined in a tube furnace for 2 h at a heating rate of 10 °C /min and a N₂ flow rate of 0.1 L/min. After cooled down, a black product was collected with a yield of ~40%. The product was annealed at 400 °C in air for 20 min. Then the product was dissolved in DI water (40 mL) and centrifuged at a high speed (19000 rpm) for ten minutes. The upper yellow solution was collected and evaporated in a rotary evaporator at 50 °C. Pure luminescent CNP powder was obtained by drying the concentrated solution at 70 °C for 15 h.

2. Preparation of the hydrophobic CNPs

10 mg hydrophilic CNPs were dispersed in 20 mL distilled water and the pH of the solution was tuned to 5~6 with acetic acid. 20 mL of toluene and 0.2 g DDA were added to the solution. The suspension was then transferred to a Teflon-lined autoclave (50 mL) and heated at 150 °C for 6 h. After cooling, excess DDA in the upper solution was removed in a vacuum drying oven at 80 °C.

3. Preparation of CNP films

CNP films were prepared by spin-coating purified hydrophobic CNP toluene solution on various substrates (PET substrates, quartz plates, Si wafers and Ti plates). First, the substrates were washed with ethanol and acetone for several times. Then, the purified hydrophobic CNPs in toluene were spin-coated on substrates at 300 rpm for 30 min. The hydrophobic CNP films were dried in a drying oven at 80 °C.

4. Characterization

Atomic force microscopic (AFM) images were taken using a SPM-9600 atomic force microscope. Transmission electron microscopy (TEM) observation was performed on a JEOL JEM-2010F electron microscope operating at 200 kV. Absorption and fluorescence spectra were recorded at room temperature on a Hitachi 3100 spectrophotometer and a

Hitachi 7000 fluorescence spectrophotometer, respectively. Fourier transform infrared (FTIR) spectra were recorded with a Bio-Rad FTIR spectrometer FTS165.

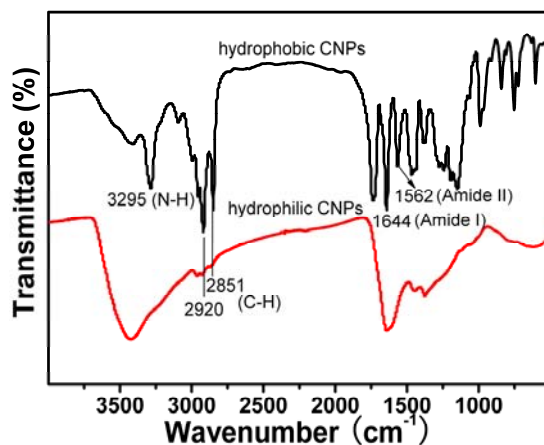


Fig. S1 FTIR spectra of the hydrophobic and hydrophilic CNPs. IR Amide I and Amide II bands at 1644 and 1562 cm^{-1} , respectively.

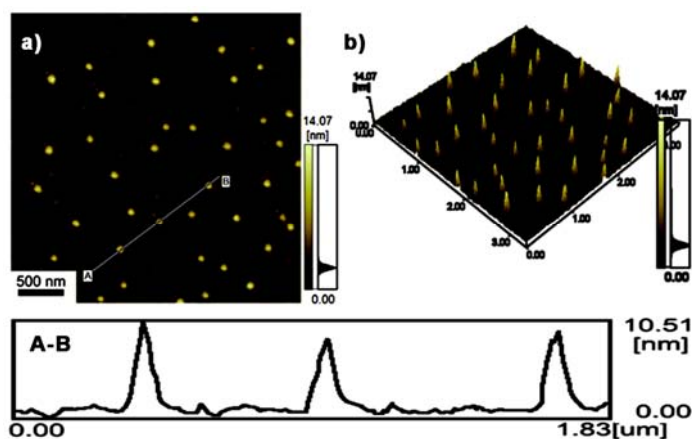


Fig. S2 (a) AFM image of the hydrophobic CNPs with the height profile along the line A-B (below). (b) 3D height distribution of the CNPs.

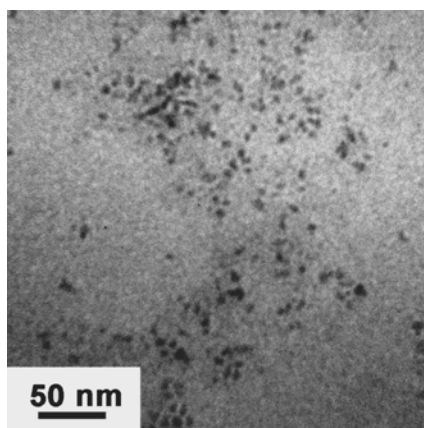


Fig. S3 TEM image of the hydrophobic CNPs.

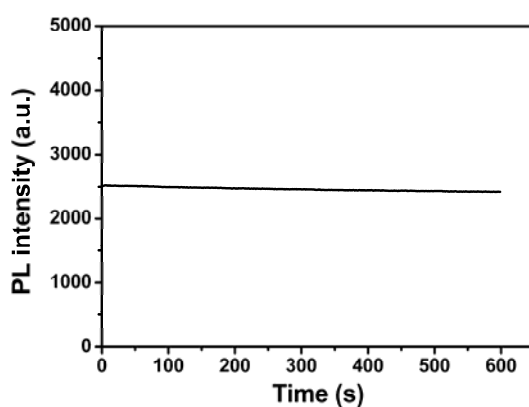


Fig. S4 Photostability test of the hydrophobic CNPs in a fluorescence spectrophotometer using a 360 nm excitation.

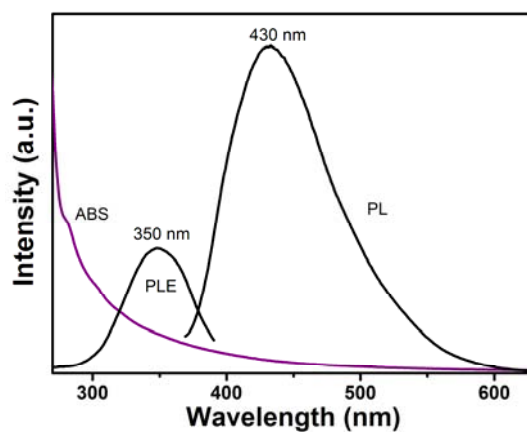


Fig. S5. UV-vis absorption, PL and PLE spectra of the hydrophobic CNPs dissolved in methylene chloride (the PL spectrum is excited at 350 nm and the PLE spectrum is recorded at 430 nm).