Supporting Information

Postmodification Strategy to Modulate the Photoluminescence of Carbon Dots from Blue to Green and Red: Synthesis and Applications

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Experimental Section

Materials. All reagents were purchased from commercial sources and used without further treatment.

Characterizations.

Transmission electron microscope (TEM) images were carried out on a JEOL JEM–1011 (Japan) at the accelerating voltage of 100 kV. High-resolution TEM (HR-TEM) images were recorded with a FEI-TECNAI G2 transmission electron microscope operating at 200 kV. X-Ray photoelectron spectra (XPS) were obtained on a Thermo Scientific ESCALAB 250 Multitechnique Surface Analysis. Fourier Transform Infrared (FT-IR) spectra were recorded on a Bruker Vertex 70 spectrometer. Fluorescence emission spectra were recorded on a PerkinElmer LS-55 phosphorescence spectrophotometer. UV-Vis absorption spectra were conducted on Shimadzu UV-2450 spectrophotometer. The Edinburgh FLS 920 spectrometer with a calibrated integrating sphere was used to measure absolute Quantum Yield.

MTT [3-(4,5-dmethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide] assay cell lines and cell culture

HeLa cell lines were purchased from the Institute of Biochemistry and Cell Biology, Chinese Academy of Sciences, Shanghai, China. HeLa cells were grown in Dulbecco's modified Eagle's medium (DMEM, GIBCO) supplemented with 10% heat-inactivated fetal bovine serum (GIBCO), 100 U/mL penicillin and 100 μg/mL streptomycin (Sigma), and the culture medium was replaced once very day.

Cellular uptake

Cellular uptake by HeLa cells was examined using a confocal laser scanning microscope. HeLa cells were seeded in 6-well culture plates (a sterile cover slip was put in each well) with a density of 5 x 10^4 cells per well and allowed to adhere for 24

h. After that, the cells were treated with CD-B, CD-V and CD-A (2 mg/mL) for 1 h at 37 °C, respectively. After that, the supernatant was carefully removed and the cells were washed three times with PBS. Subsequently, the cells were fixed with 800 μL of 4% formaldehyde in each well for 20 min at room temperature and washed twice with PBS again. The slides were mounted and observed with a confocal laser scanning microscope imaging system (Zeiss LSM 780).

In vivo fluorescence imaging.

Kunming male mice were obtained from Jilin University, China (56–84 days, 20–25 g) and maintained under required conditions. Their use for this study was approved by the Animal Ethics Committee of Jilin University. Before the subcutaneous injection, the back area of the mouse was shaved to minimize autofluorescence. The mouse were subcutaneously injected with CD-V and CD-A (2 mg/mL, 25 μL) on their back after being anesthetized by intraperitoneal injection of 1% pentobarbital. The mouse was imaged by using a Maestro in vivo optical imaging system (Cambridge Research & Instrumentation, Inc., Woburn, Massachusetts). Various excitations including green (503–555 nm) and yellow (575–605 nm) light were applied during imaging.

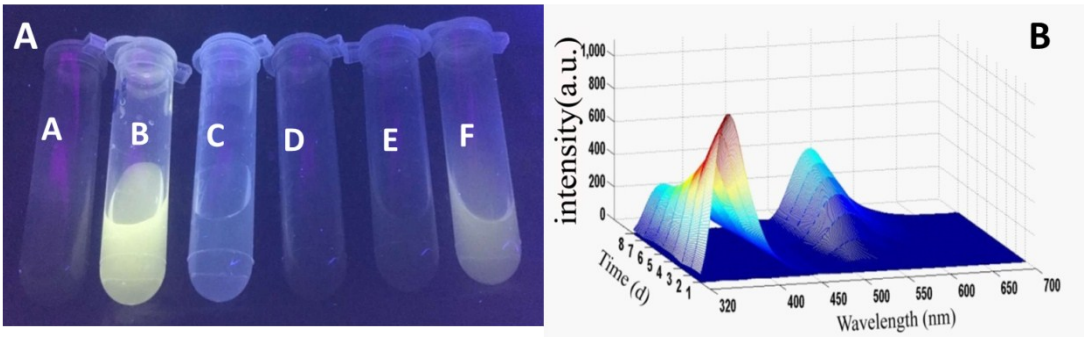

Fig. S1 (A) The photo of the six samples under UV light on the eighth day. (B) 3D PL spectra of B vs time.

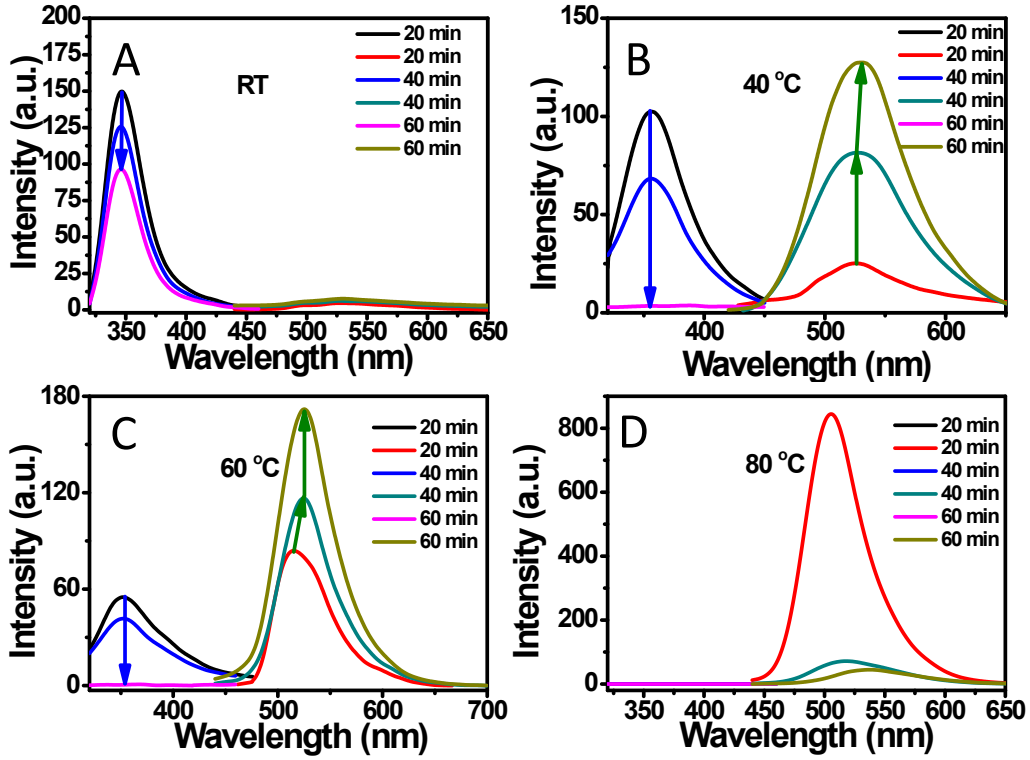

Fig. S2 PL spectra changes of the reaction mixtures of CD-B with VC at RT (A), 40 °C (B), 60 °C (C), and 80 °C (D), the emissions were excited at 300 nm and 440 nm, respectively.

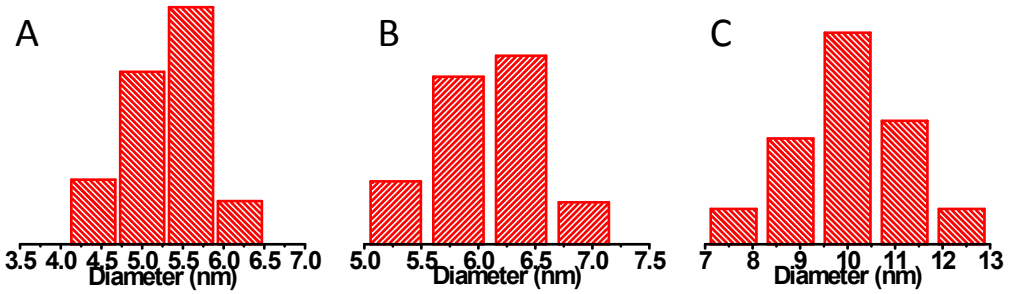

Fig. S3 Size distribution of CD-B (A), CD-V (B) and CD-A (C) determined by TEM images.

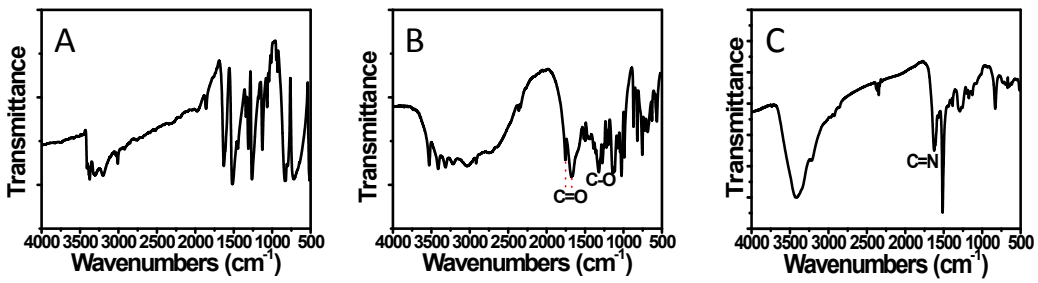

Fig. S4 FT-IR spectrum of CD-B (A), CD-V (B) and CD-A (C).

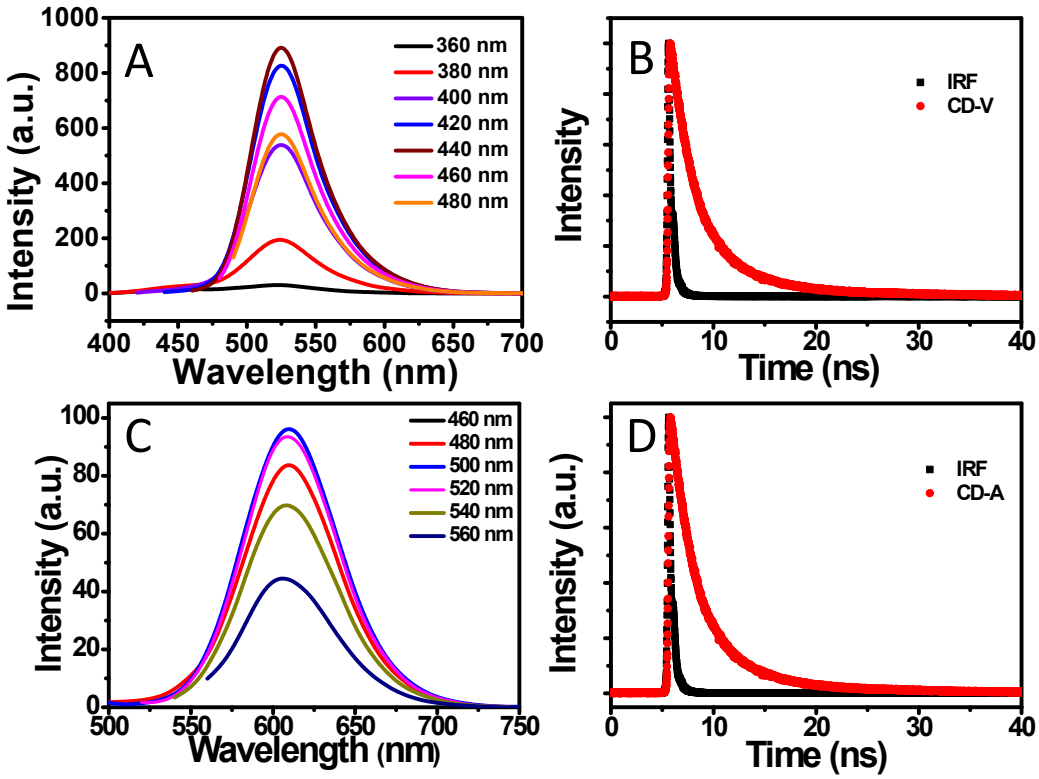

Fig. S5 (A) PL spectra of CD-V under the excitation of 360-480 nm. (B) PL decay curve of CD-V. (C) PL spectra of CD-A under the excitation of 460-560 nm. (D) PL decay curve of CD-A.

Table S1 A series of control experiments of CD-B with VC.

Samples	CD-B (mg/mL)	VC (mg/mL)
A	0.5	0.5
B	0.05	0.5
C	0.005	0.5
D	0.1	0.1
E	0.1	0.25
F	0.1	0.5