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Simple One-step Synthesis of Water-soluble Fluorescent Carbon Dots Derived from Paper Ash

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Electronic Supplementary Information

Characterization

The particle size and the lattice fringes were examined with Tecnai-G^2 F30 Transmission Electron Microscopy (TEM) at 300 kV. UV-Vis spectroscopic studies were performed with a TU-1901 dual beam UV-Vis spectrophotometer. Photoluminescence and fluorescence decay measurements were carried out with FLs920 steadystate/transientstate spectro xsort with xenon lamp of 450 watt. The Fourier transform infrared spectroscopy (FTIR) spectra were measured by a Thermo Nicolet Nexus FTIR model 670 spectrometer with the KBr pellet technique ranging from 400 to 4000 cm -1. X-ray photoelectron spectroscopy (XPS) analysis was carried on ESCALAB 250xi photoelectron spectrometer. Zeta potential was measured after suitable dilution of the CDs solution, by dynamic laser light scattering using a particle size analyzer (Nano ZS 3600, Malvern). The cellular image was obtained with a laser scanning confocal microscope (LSCM, ZEISS, LSM 510 Meta).

In Vitro Cytotoxicity Study

The cytotoxicity of CDs was assessed by using the MTT assay. L02 human hepatocyta cells (1×10^4 cells/well) were grown at 37 °C and under 5% CO_2

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atmosphere in RPMI-1640 medium in a 96-well plate, supplemented with calf serum (10%) and 1% penicillin−streptomycin in a fully humidified incubator. Then, the CDs solutions with a concentration of 10, 20, 40, 80, 160, 320, and 640 μg/mL were added to cell dishes, respectively, and then these cell dishes were put into incubators at 37 °C for 12 h. After incubation for a defined time, the culture medium was removed and 20 μL of MTT reagent (diluted in culture medium, 0.5 mg/mL) was added, followed by incubating for another 2 h. The MTT/medium was removed carefully and DMSO (150 μL) was added to each well to dissolve the formazan crystals. Absorbance of the colored solution was measured at 570 nm using a microplate reader.

Cell Imaging

After confirming the fluorescence from CDs and no distinct autofluorescence from the cell itself under similar conditions, the cellular image was obtained with a laser scanning confocal microscope (LSCM, ZEISS, LSM 510 Meta, Germany). A549 cells (6×10^4 cells/well) were seeded on a 6-well plate at 37 °C for 24 h. After that, the CDs solution with a concentration of 200 μg/mL was added to the cell dishes. After a further 2 h incubation, these CDs-loaded cells were washed with PBS three times to remove the free CDs attached on the outer surface of cell membrane. Cell luminescence imaging was detected on LSCM under excitation wavelength of 457 nm. The experiment was performed in triplicate.

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Figure S1

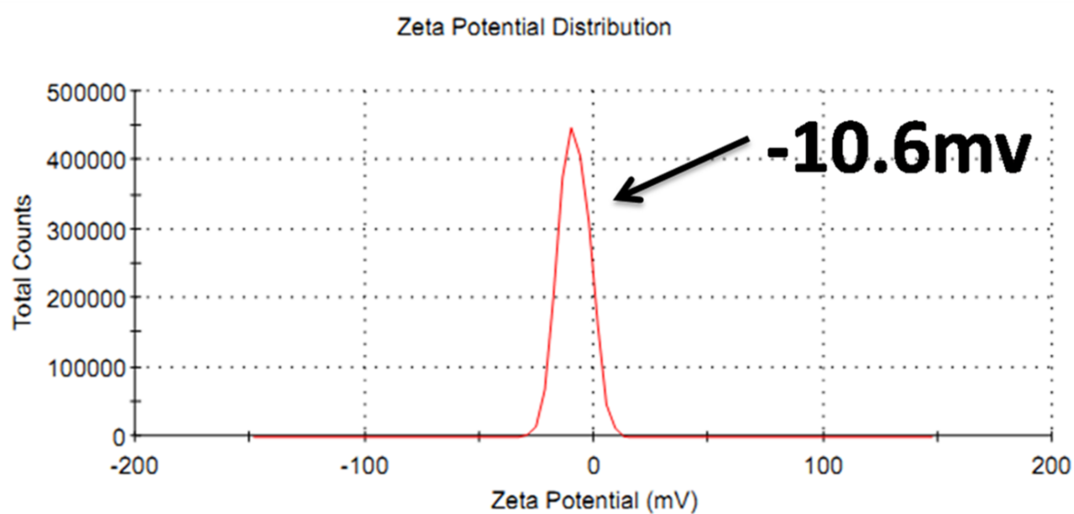

Figure S1. Zeta potential of CDs.

Figure S2

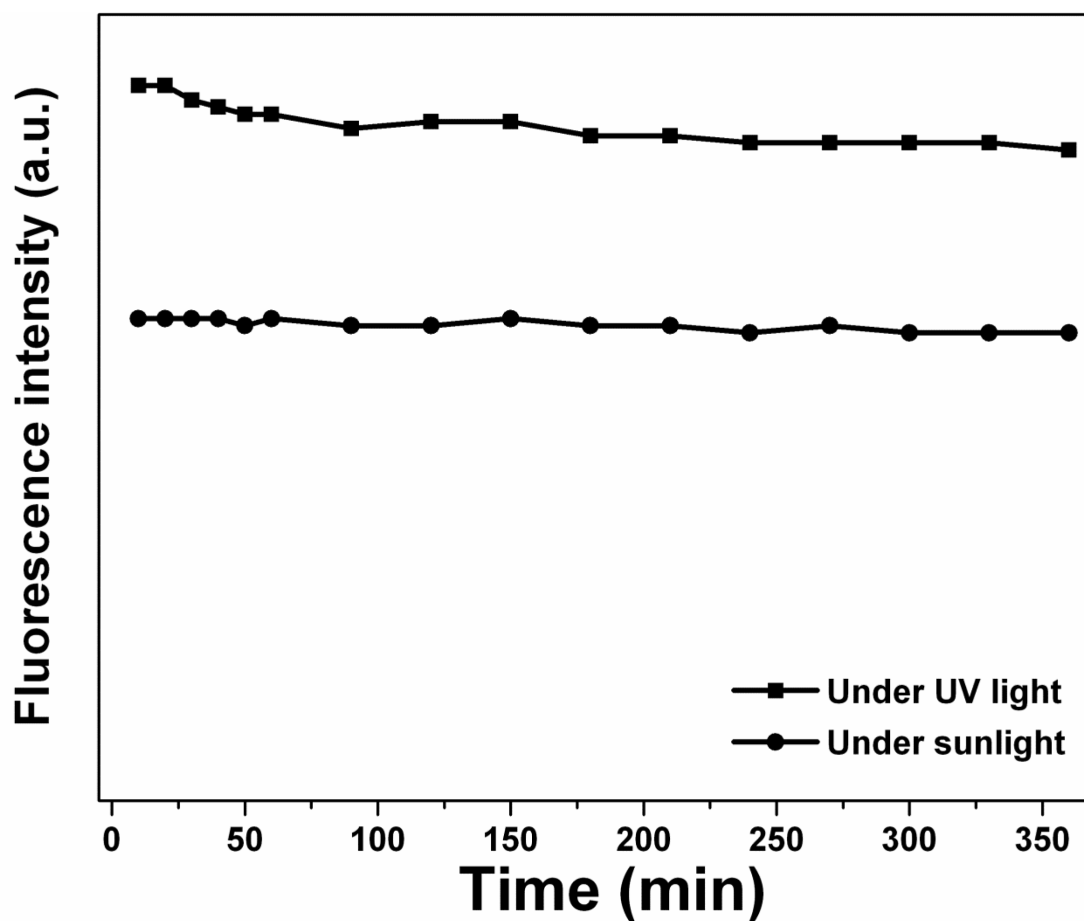

Figure S2. The photostability of CDs under UV light and sunlight.

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Figure S3

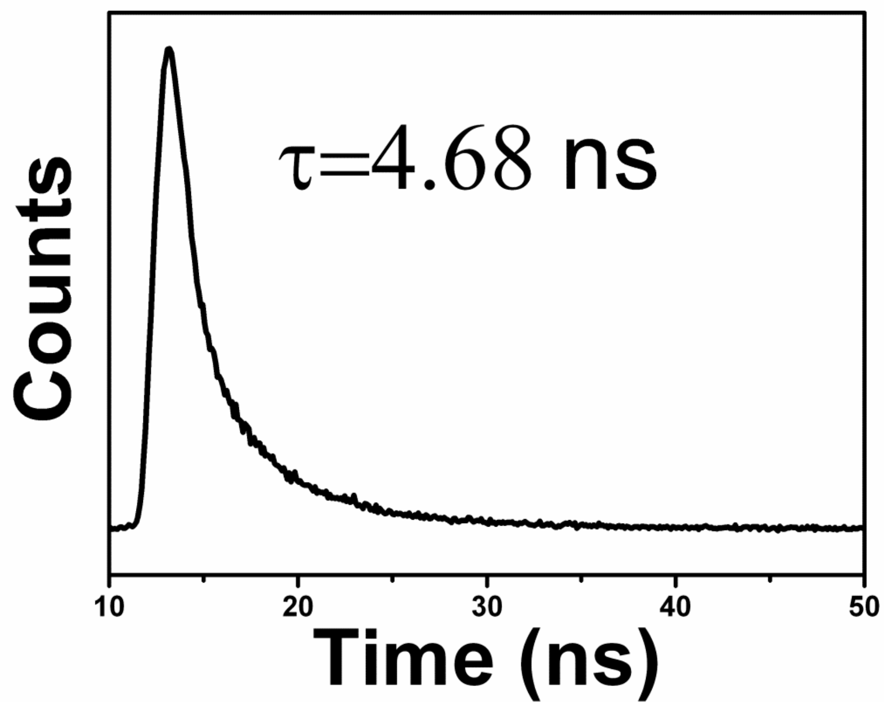

Figure S3. PL decay curve of CDs.