Support Information

Self-Quenching-Resistant Carbon Dot with Tunable Solid-State Fluorescence

Songlin Wang[a], Chunyu Lv[a], Kang Yuan[a]*, Xiran Xu[a], Ying Zhou[a], Lele Wang[a], Zeyu Liu[a], Jinli Li[b], Qile Li[a]*

[a] School of Science, Jiangsu Ocean University, Lianyungang 222005, China, E-mail: yuankang0706@163.com;

[b] Jiangsu Province Engineering Research Center of Electrode Materials for Lithium Batteries, Lianyungang Normal College, Lianyungang, 222006, China;

* Corresponding authors.

E-mail addresses: yuankang0706@163.com (K. Yuan), 2017000021@jou.edu.cn (Q. Li).

Experimental section

Chemicals and Materials

All chemicals were employed without additional purification. Anhydrous ethanol and sodium chloride were purchased from Tianjin Yongda Chemical Reagent Co., Ltd. o-Phenylenediamine (analytical grade) and Polyvinyl alcohol were supplied by Shanghai Aladdin Reagent Co. All aqueous solutions were prepared using ultrapure water (18.25 MΩ·cm at 25°C) produced by a Milli-Q system.

Instruments and Measurements

High-resolution transmission electron microscopy (HR-TEM) was performed using a JEOL JEM-2100Plus system. Photoluminescence (PL) spectra were recorded on a WFY-28 fluorescence spectrophotometer (Tianjin Top Instrument Co.). UV-vis absorption spectra were acquired with a Shimadzu UV-2550PC spectrophotometer. Fourier transform infrared (FT-IR) spectroscopy measurements were conducted on a Thermo Fisher Nicolet iS10 spectrometer. Surface chemical composition was analyzed using X-ray photoelectron spectroscopy (XPS) with a Thermo Fisher Nexsa G2 system.

Synthesis of CDs

A homogeneous precursor solution was prepared by mixing anhydrous ethanol and ultrapure water (1:1 v/v, 60 mL total volume). To this mixed solvent, sodium chloride (2000 mg), o-phenylenediamine (90 mg), and D-arginine (500 mg) were added sequentially under magnetic stirring at 600 rpm for 30 minutes. The resulting solution was transferred into an electrochemical cell, wherein two graphite rods were immersed as the working and counter electrodes. Electrosynthesis was conducted at a constant voltage of 60 V and a constant current of 0.03 A for a duration of 2 hours. Post-electrolysis, the crude product was filtered through a microporous membrane and subsequently dried in a vacuum oven at 80 °C for 6 hours. The final solid CDs with red (R-CD) and yellow (Y-CD) emission were obtained by grinding the dried material into a fine powder.

Supplementary Figures

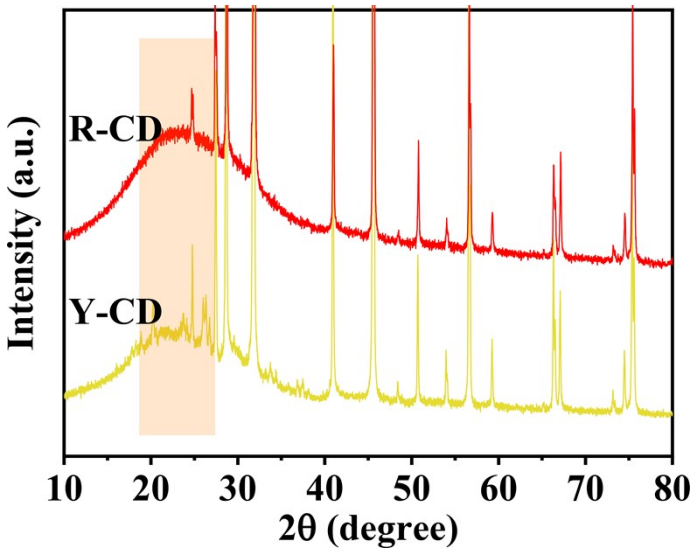

Figure S1. XRD patterns of Y-CD and R-CD.

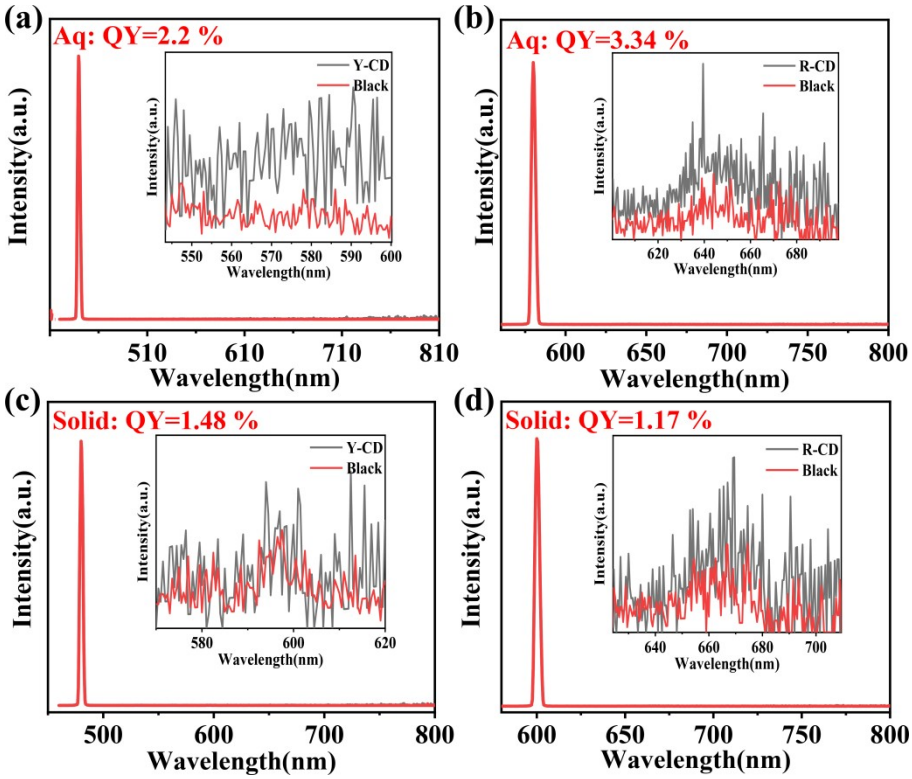

Figure S2. PLQY of liquid and solid CDs.

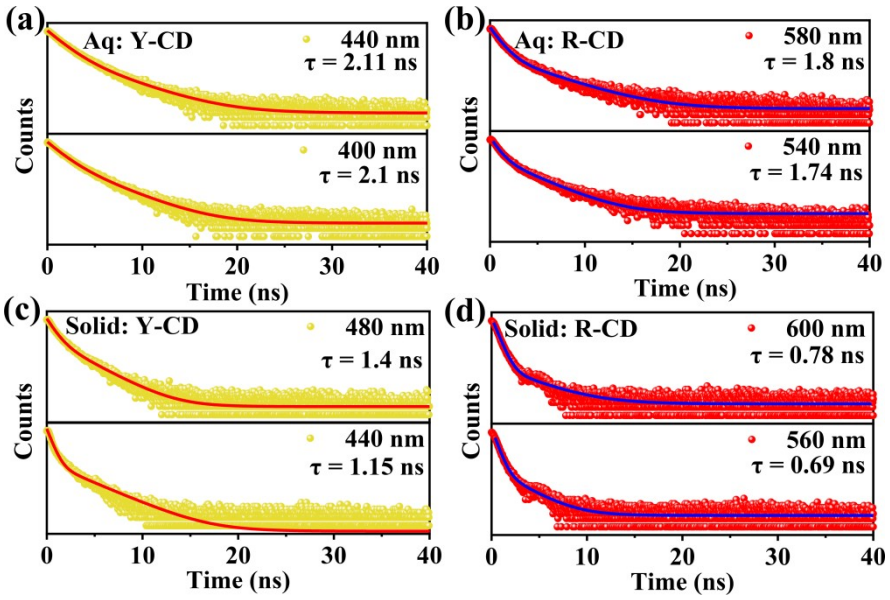

Figure S3. Lifetimes of liquid and solid CDs.

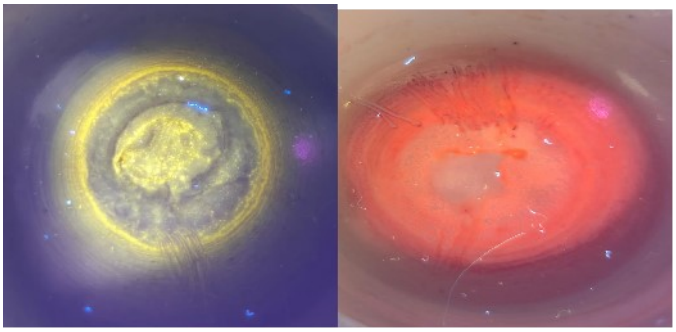

Figure S4. Obtained CDs powder removing sodium chloride by fluorescent light irradiation support information.

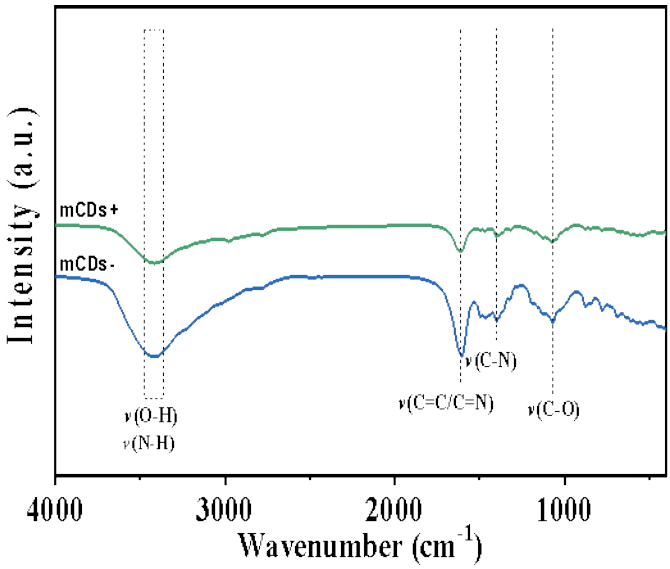

Fig. S5. FTIR support information without the addition of D-arginine.

Figure S6. (a) Support information for CDs obtained by replacing D-arginine with glycine.

Supplementary Tables

Table S1. Elemental content of the CDs obtained from the reaction without adding D-arginine.

Samples	Y-CD	R-CD
C	68.88	78.94
N	2.72	12.14
O	30.4	8.92

Table S2. Elemental content of the CDs obtained from the reaction with D-arginine.

Samples	Y-CD	R-CD
C	59.18	62.87
N	17.89	23.35
O	22.93	13.78