Supporting Information

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1. M-CD optimization process.

In the optimization process, the fluorescence intensity and emission wavelength of Y-CDs are affected by the amount of raw materials, temperature and synthesized time.

1) Ratio of raw materials

We optimized the amount of raw materials step by step (Fig. S1), because of two raw materials participated in preparation. Firstly, when the amount of EY keeps constant, the amount of EDA mainly affects the FLQY and whether the two peaks are obvious. As shown in Fig.S1A, 300 μL of EDA was the best volume for the FL property. This volume provides the suitable contents of N. Then, keeps the volume of EDA constantly, the mass of EY also affects the relative intensity of two peaks and the FL intensity. When the dosage of substance (EY) is 10 mg, two emission peak intensities are the nearest, which benefits the analysis application of Y-CDs.

Finally, 10 mg EY and 300 μL EDA were chosen for the preparation of Y-CDs.

2) Temperature

In order to obtain good optical property, the temperature was also considered (Fig. S1C). The experimental results demonstrate that the dual-emission of Y-CDs prepared at 200℃ is the most obvious and their FL intensities are the highest. Synthesized temperature can influence the FLQY of Y-CDs via the FL competition of fluorophores, such as crosslinked polymer backbone and carbogenic core. So 200℃ was selected as the optimum synthesis temperature.

3) Time

The reaction time plays a vital role in the formation of Y-CDs. And the optimized results are shown in Fig. S1D. When the time is 4 h and 6 h, the highest emission at 520 nm is obtained, For energy saving considerations, 6h was chosen as the optimized reaction time. The synthesized time

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can affect the degree of carbonization which further can influence the fluorescence intensity of M-CDs.

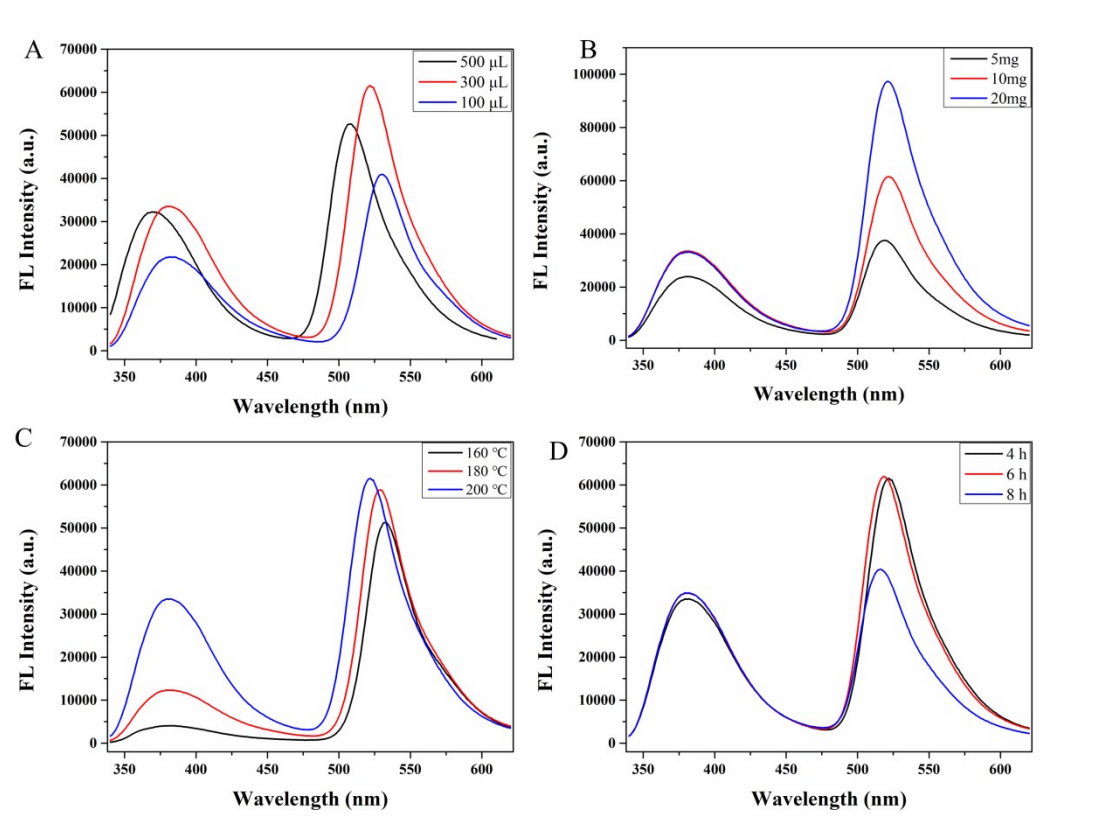


Fig. S1 Effect of (A) the volume of EDA, (B) the amount of EY, (C) synthesis temperature and (D) synthesis time on FL spectra. (The FL spectra were all excited at 320 nm and the concentrations of CDs are same).

2. Pretreatment of real samples

Toner, cream and essence are the most common cosmetics in real life, so they are the best choices to determinate PA and own different shapes, toner is like water, essence is more viscous than toner and can flow, cream is thick and has poor fluidity. In this work, we made some improvements in pretreatment comparison with reference method. For cream, 10.0 g sample was weighed and dissolved in 100 mL 80% MeOH, and 10.0 g NaCl added into the suspension to break emulsion. The mixture was under Ultrasonication for 50 min and centrifuged at 6500 rpm for 15 min, then removed MeOH via rotary evaporation (to eliminate the effect of methanol on the fluorescence of Y-CDs). Next, a small amount of DDI dissolved the precipitation, the supernatant was filtrated by 0.22 μm filter membrane. DDI was added to the volume to reserve in a 100mL volumetric flask. 3 mL sample from toner was dissolved by 10 mL DDI, and centrifuged at 8000

rpm for 10 min and then the supernatant filtrated by 0.22 μm filter membrane to remove insoluble. Operations of essence were the same as the toner.

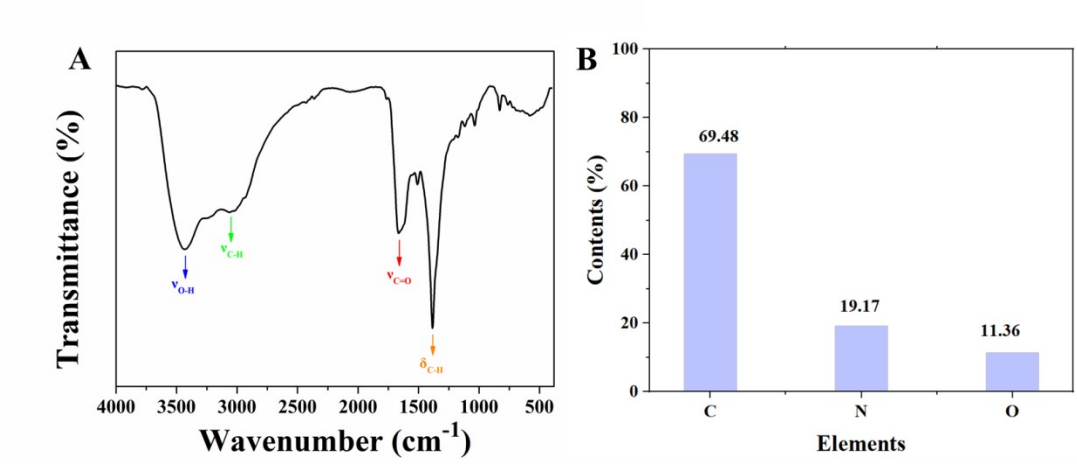


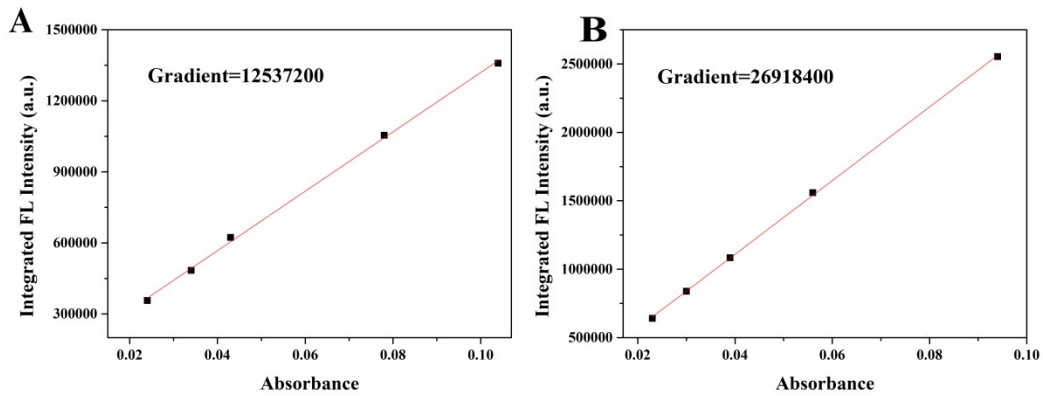
Fig. S2 (A) FT-IR spectrum of Y-CDs; (B) elements content survey of Y-CDs

3. Measurement of quantum yield (Φs)

The Φs of the CDs were determined by a comparative method as follows:

$$\Phi X = \Phi_{ST} (Grad_X/Grad_{ST}) (\eta^2_X/\eta^2_{ST})$$

where the subscripts X and ST denote CDs and the reference (Quinine sulfate in sulphuric acid). Grad is the gradient from the plot of integrated fluorescence intensity against absorbance and η is the refractive index of the solvent. To prevent the re-absorption effect, a series of solutions of Y-CDs and referenced fluorescence dyes were prepared with concentrations adjusted such that the optical absorbance values were between 0-0.1 at 320 nm. The integrated fluorescence intensity was the area under the PL curve in the wavelength range 475-620 nm.



	Quinine Sulfate					Y-CDs				
Abs	0.023	0.030	0.039	0.056	0.094	0.024	0.034	0.043	0.059	0.104
Integrated FL	1558657	838732.3	1083407.8	1558657	2553334.4	356510.4	483619.2	622979.6	1054459.1	1358973.3
Slope	26918400					12537200				
QY	54%					25.2%				

Fig. S3 Plots of integrated PL intensity against absorbance of (A) Y-CDs and (B) Quinine sulfate at λex of 320 nm and relevant data

4. Experiment of selectivity and anti-interference

The detection of selectivity and anti-interference was implemented in Britton-Robinson (BR) buffer at room temperature. Specifically, for selectivity, 120 μL Y-CDs (5.5 mg·mL^{-1}) and 400 μL BR buffer (pH=7.8) were mixed by 100μM PA solutions or other ions, biomolecules. Then the mixture was diluted with DDI to 4 mL. For anti-interference, other ions and biomolecules were added into the mixed solution of Y-CDs, buffer and 100μM PA.

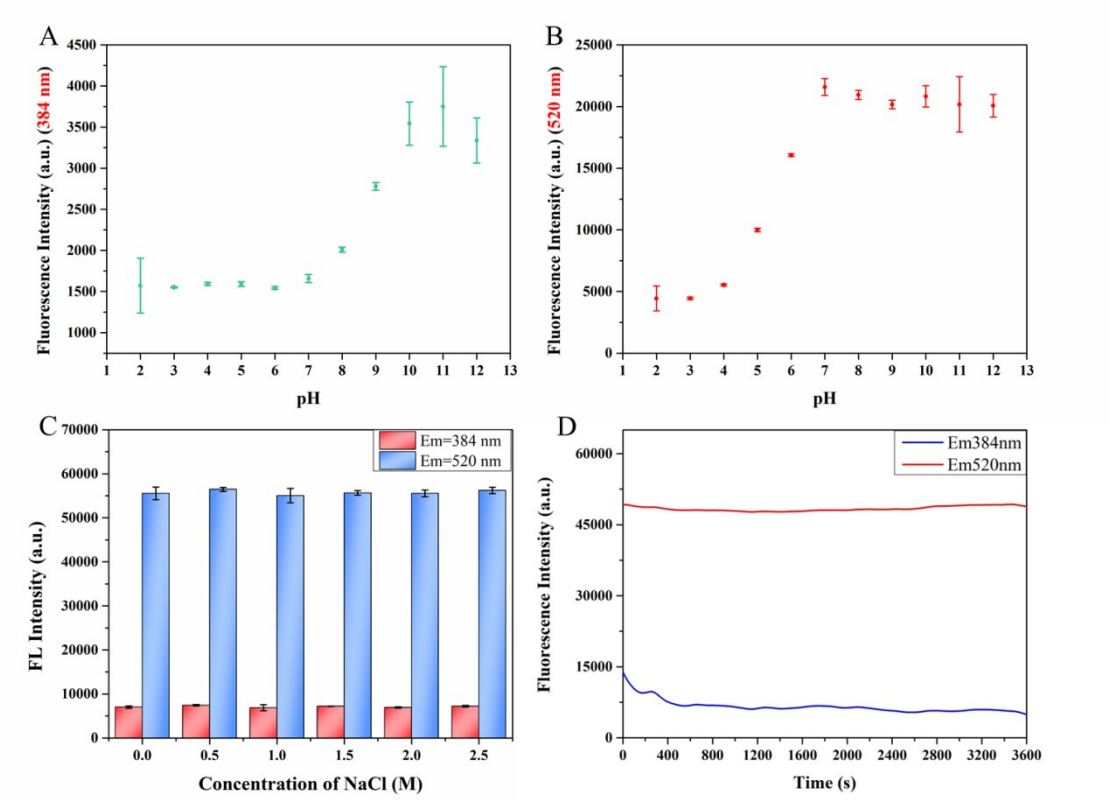


Fig. S4 Effect of pH on Y-CDs fluorescence intensity at (A) 384 nm and (B) 520 nm. (C) ionic strength on fluorescence intensity of Y-CDs. (D) time intervals of irradiation with xenon arc light on fluorescence intensity of Y-CDs. The fluorescent intensity of Y-CDs was measured under

continuous irradiation with a xenon arc lamp for 3600 s and collected once every other second, λex = 320 nm.

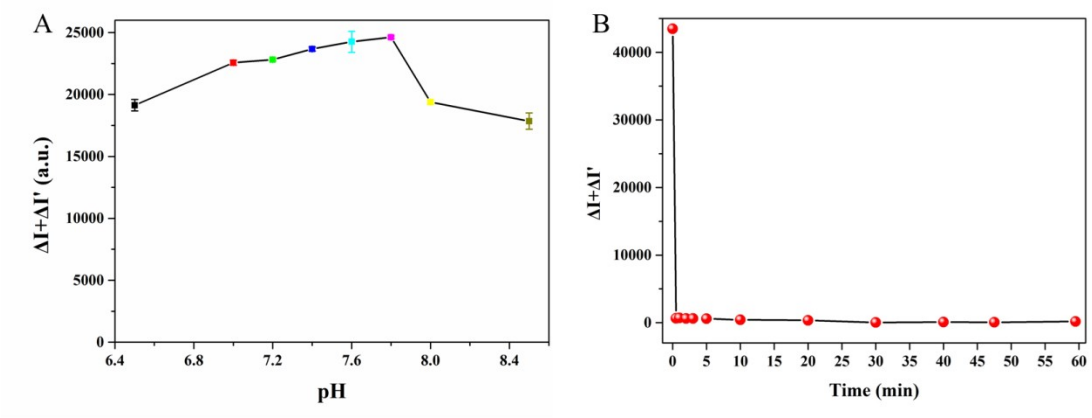


Fig. S5 (A) Effect of pH value on the system. (B) Effect of reaction time on the system.

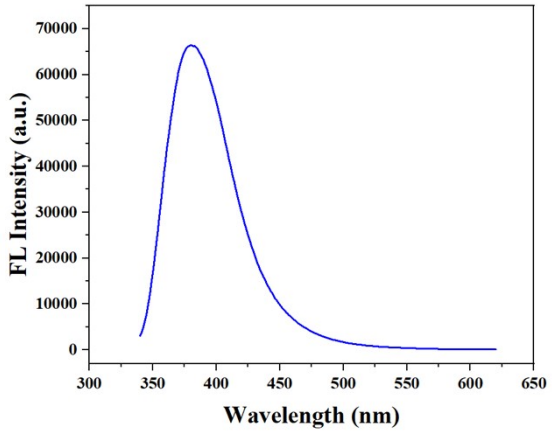


Fig. S6 FL spectra of E-CDs.

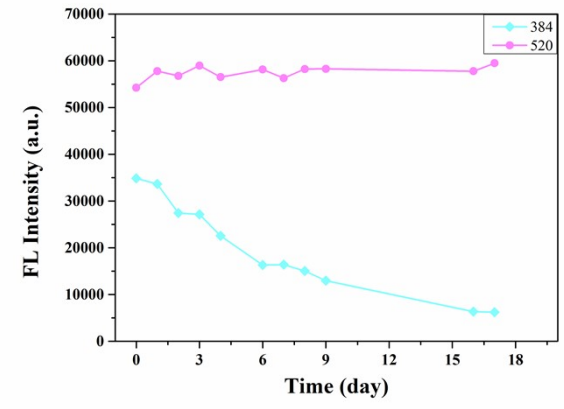


Fig. S7 Storage time of Y-CDs.