Electronic Supplementary Information

Green synthesis of fluorescent Carbon dots as an effective fluorescence probe for morin detection

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Measurement of quantum yield

The quantum yield (Φ_S) of the as-prepared CDs sample was determined by comparing the integrated fluorescence intensities and absorbance of the as-prepared CDs with the reference quinine sulfate. Quinine sulfate ($\Phi_R = 0.54$) was dissolved in 0.10 M H_2SO_4 (refractive index, $\eta = 1.33$) while as-prepared CDs was dissolved in distilled water ($\eta = 1.33$) at different concentrations. A lambda 35 UV spectrometer was used to determine the absorbance of the solution at 320 nm. A Hitachi F-2500 spectrofluorometer was used to record their fluorescence spectra at an excitation wavelength of 320 nm. The integrated fluorescence intensity was the area under the fluorescence curve in the wavelength range 340-620 nm. Then, a graph of integrated fluorescence intensity against absorbance was plotted. The Φ_S of the as-prepared CDs was calculated using the equation:

$$\Phi_S = \Phi_R \, (Grad_S / Grad_R) \, (\eta^2_S / \eta^2_R)$$

Where the subscripts S and R refer to the sample CDs and reference, respectively. *Grad* is the gradient from the plot of integrated fluorescence intensity against absorbance, and η is the refractive index of the solvent. In order to minimize the self-absorption effect, the absorbance in the 10-mm path-length fluorescence cuvette was kept under 0.10 at the excitation wavelength [1,2].

References

[1] Y. Yang, J. Cui, M. Zheng, C. Hu, S. Tan, Y. Xiao, Q. Yang, Y. Liu, Chem. Commun. 48 (2012) 380-382.

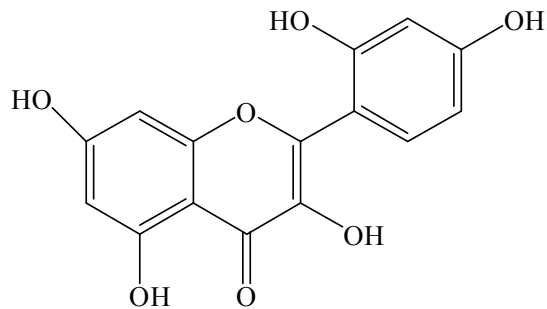[2] X. Zhai, P. Zhang, C. Liu, T. Bai, W. Li, L. Dai, W. Liu, Chem. Commun. 48 (2012) 7955-7957.
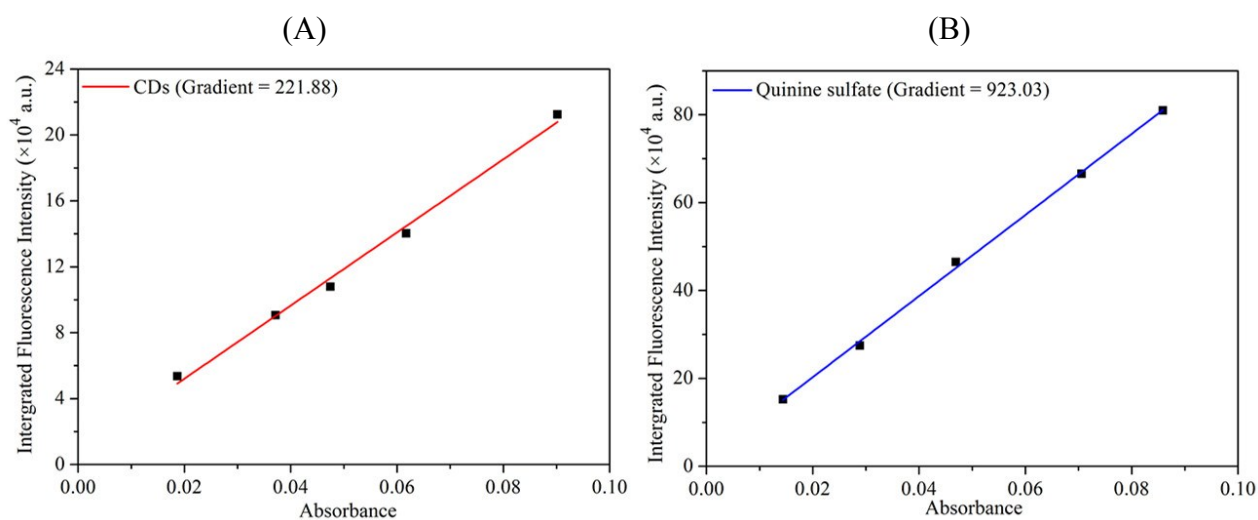
Fig. S1. Chemical structure of morin.

(A)　　　　　　　　　　　　　　　　　　(B)

Fig. S2. Plots of integrated PL intensity against the absorbance of (A) CDs and (B) quinine sulfate.
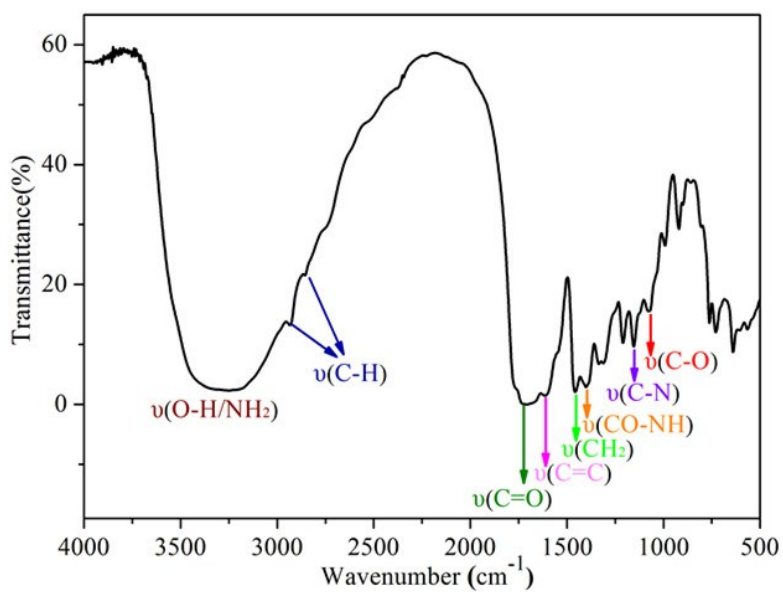

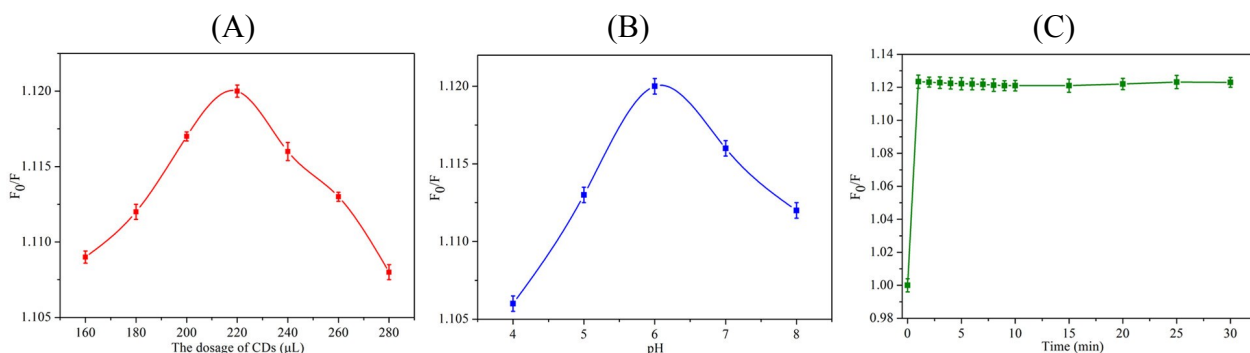
Fig. S3. IR spectrum of the CDs.

Fig. S4. Effect of (A) dosage of CDs, (B) pH and (C) reaction time on the relative fluorescence intensity (F_0/F). 10 µM morin and 0.01 M PBS solution are used for the experiments. The error bars represent the standard deviation of three measurements.
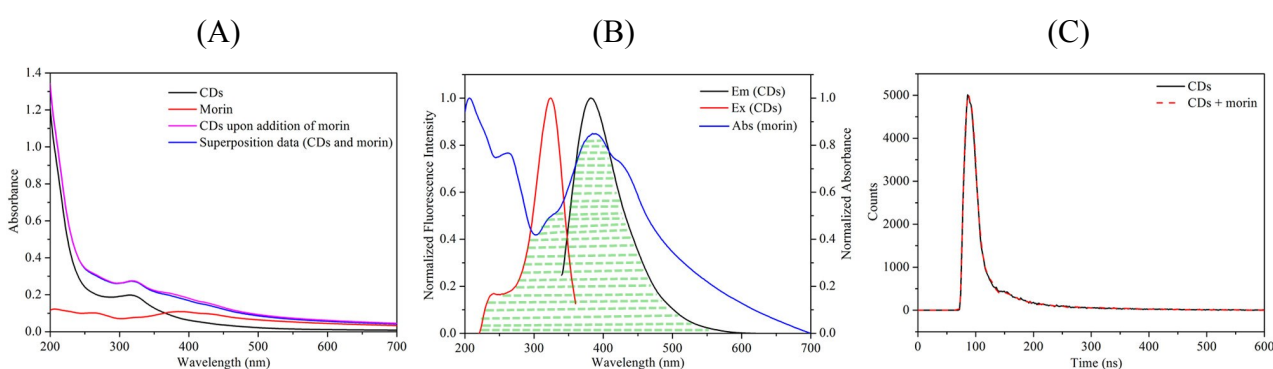

Fig. S5. (A) UV-vis absorption spectra of CDs, morin, CDs upon addition of morin and superposition data of CDs and morin. (B) The excitation and emission spectra of CDs and the UV-vis absorption spectra of morin. (C) Fluorescence decay curves of CDs in the absences and presence of morin under excitation wavelength of 320 nm.

Table S1
Comparison of the method with some reported methods for the determination of Morin.

Methods	Linear range (µM)	LOD (µM)	Reference
HPLC-UV	0.33–230	0.13	[6]
HPLC-DAD	0.3–156	0.066	[8]
HPLC-UV	24–377	0.76	[7]
Electrochemistry	4–1000	1	[9]
Electrochemistry	1–400	0.19	[10]
Fluorescence	0–300	0.6	[11]
Fluorescence	0.4–60	0.12	This work

Table S2

The results of the determination of morin sample by this method.

Morin sample	Added (μM)	Average found (μM)	Recovery (%)	RSD (%. n=5)
1	12	11.6	96.7	1.1
2	28	28.7	102.5	1.8
3	52	51.2	98.5	2.3

Morin sample	Added (μM)	Average found (μM)	Recovery (%)	RSD (%. n=5)
1	12	11.6	96.7	1.1