Supplementary information

Photoluminescence mechanism of red emissive carbon dots from diaminobenzoic acid isomer

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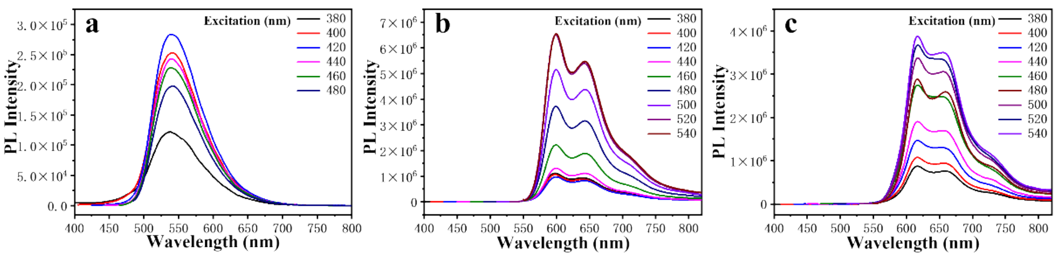

Figure S1. The emission spectra of as-prepared (a) GYCDs, (b) RCDs-1, and (c) RCDs-2 at different excitation wavelengths.

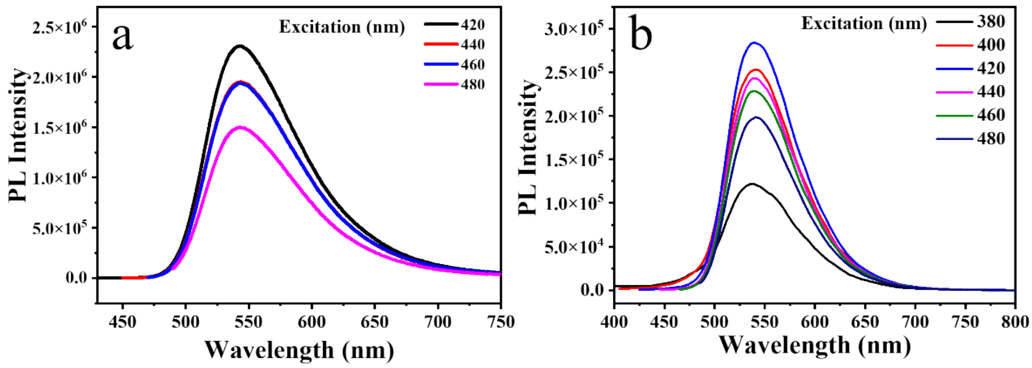

Figure S2. Emission spectra of (a) DAP and (b) as-prepared GYCDs at different excitation wavelengths

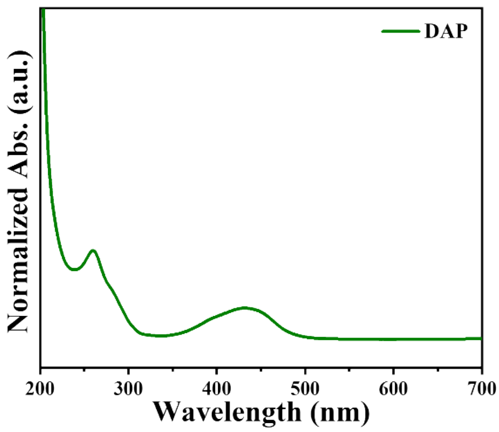

Figure S3. UV-vis absorption spectra of DAP.

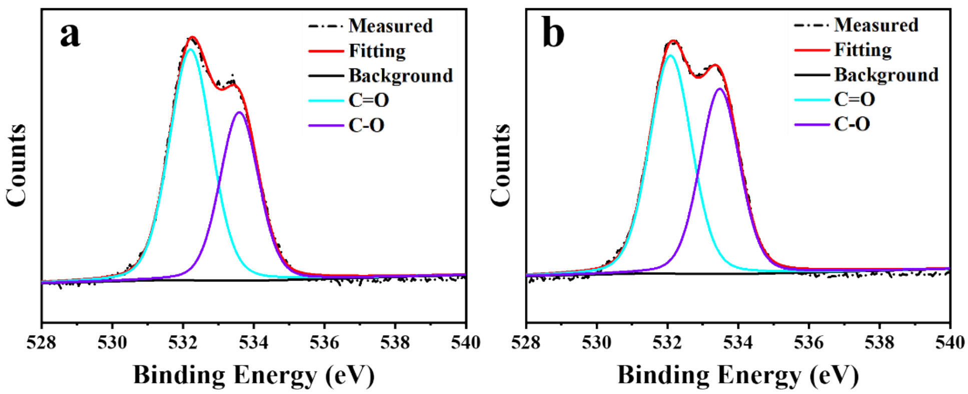

Figure S4. High-resolution O1s spectra of (a) RCDs-1 and (b) RCDs-2.

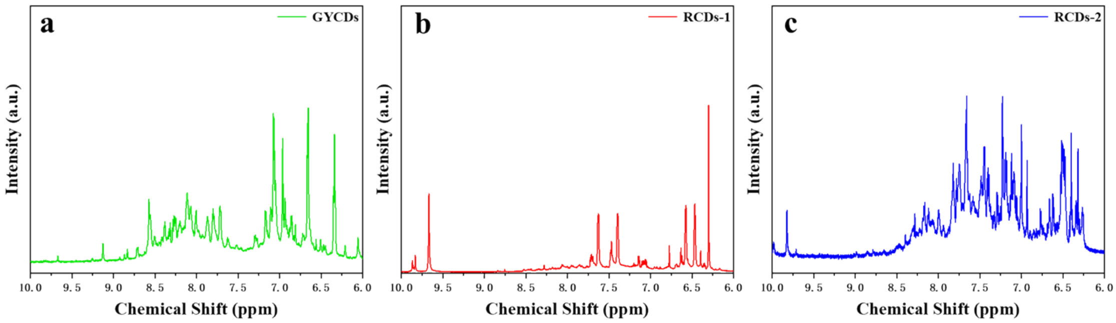

Figure S5. ^{1}H NMR spectra of (a) GYCDs, (b) RCDs-1 and (c) RCDs-2.

Table S1. The synthesis and PL properties of reported OPD-based CDs.

Precursor	Method	Wavelength (nm)	PLQY (%)	Reference
OPD	Solvothermal	570	10	1
OPD + Catechol	Solvothermal	650	3	2
OPD + Acidic (HCl)	Microwave solvothermal	606	25	3
OPD + 1,8-Diaminonaphthalene +boric acid	Solvothermal	587	12	4
OPD + 1-Butyl-3-methylimidazolium hexafluorophosphate	Solvothermal	600	34	5
OPD + Sodium sulfate	Solvothermal	620		6
OPD + Acidic (HCl)	Solvothermal	605	9	7
OPD + Catechol+ Phosphoric acid (H_3PO_4)	Solvothermal	620	14	8
OPD + Acidic (HCl)	Solid-state calcination	608	25	9
OPD + Sulfuric acid (H_2SO_4)	Room temperature	620	7	10
OPD	Self-precipitation hydrothermal	620	37	11
This work	Solvothermal	599/611	34/34	

Table S2. The fitted lifetimes for RCDs-1and RCDs-2 at different probe wavelengths.

Samples / Lifetimes	RCDs-1			RCDs-2		
	λem =599nm	λem =640nm	λem =709nm	λem =617nm	λem =658nm	λem =728nm
$\tau 1$	13.2ps	17.5ps	19.1ps	13.1ps	20.8ps	16.1ps
$\tau 2$	254.8ps	220.9ps	267.9ps	116.4ps	170.1ps	173.4ps
$\tau 3$	2.21ns	2.24ns	2.27ns	2.09ns	2.22ns	2.26ns

References

1. M. Righetto, F. Carraro, A. Privitera, G. Marafon, A. Moretto and C. Ferrante, The Journal of Physical Chemistry C, 2020, 124, 22314-22320.
2. P. Li, S. Xue, L. Sun, X. Zong, L. An, D. Qu, X. Wang and Z. Sun, Light: Science & Applications, 2022, 11.
3. C. Ji, Q. Han, Y. Zhou, J. Wu, W. Shi, L. Gao, R. M. Leblanc and Z. Peng, Carbon, 2022, 192, 198-208.
4. K. Yuan, X. Zhang, X. Li, R. Qin, Y. Cheng, L. Li, X. Yang, X. Yu, Z. Lu and H. Liu, Chemical Engineering Journal, 2020, 397.
5. B. Wang, Z. Wei, L. Sui, J. Yu, B. Zhang, X. Wang, S. Feng, H. Song, X. Yong, Y. Tian, B. Yang and S. Lu, Light: Science & Applications, 2022, 11.
6. Q. Zhang, R. Wang, B. Feng, X. Zhong and K. Ostrikov, Nature Communications, 2021, 12.
7. N. Soni, S. Singh, S. Sharma, G. Batra, K. Kaushik, C. Rao, N. C. Verma, B. Mondal, A. Yadav and C. K. Nandi, Chemical Science, 2021, 12, 3615-3626.
8. Y. Xu, C. Wang, L. Sui, G. Ran and Q. Song, Journal of Materials Chemistry C, 2023, 11, 2984-2994.
9. W. Xu, Q. Han, C. Ji, F. Zeng, X. Zhang, J. Deng, C. Shi and Z. Peng, Small, 2023, DOI: 10.1002/smll.202304123.
10. H. Sun, P. Xia, H. Shao, R. Zhang, C. Lu, S. Xu and C. Wang, Journal of Colloid and Interface Science, 2023, 646, 932-939.
11. X. Meng, Y. Song, Q. Jing and H. Zhao, The Journal of Physical Chemistry Letters, 2023, 14, 9176-9182.