Electronic supplementary information

Microwave-Synthesized Narrow Emitting Carbon Dots and Their Tunable Fluorescence for Sensing Application

Xiao-Lan Wei,*[a] Qin-Lin Shi,[a] Lan Jiang[a] and Yu Qing[a]

College of Environment and Resources, Chongqing Technology and Business University, Chongqing 400067, China. E-mail: weishine@ctbu.edu.cn

Table S1. Previous reports of solvothermal (ST) preparation of narrow emissive CDs and microwave-assisted solvothermal (MST) preparation of CDs

Precursor [a]	Synthetic method (solvent)	Purification	FWHM (nm)	λ_{em} (nm)	Refs
CA, DAN.	ST (EtOH)	Col. chromat.	35	433	1
p-PDA	ST (EtOH)	Dialysis	48	603	2
APTMs, EB	ST (H$_2$O)	Dialysis	38	516	3
PG	ST (1,2-PeD)	Dialysis	30	481	4
PG	ST (EtOH)	Col. chromat.	30	507	5
ATA[c], PEG	MST (80% H$_3$PO$_4$)	Dialysis	132	410	6
o-PDA, urea	MST (H$_2$O)	Filtration	85	570	7
Ascorbic acid	MST (H$_2$O)	None	90	437	8
CA, urea	MST (H$_2$O)	None	88	521	9
PG	MST (EDA)	None	104	480	10
PG	MST (EG)	None	62	537	11
PG	MH (EG+H$_2$O)	Precipitation	35	485	This work

[a] abbreviations of precursors:Citric acid (CA), Diaminonaphthalene (DAN), p-Phenylenediamine (p-PDA), (3-Aminopropyl) tri-Methoxysilane ethylenediamine (APTMs), Erythrosin B (EB), 2-Aminoterephthalic acid (ATA), o-Phenylenediamine (o-PDA), 1,2-Pentanediol (1,2-PeD)

Table S2. Proportions of various chemical bonding states in the two carbon dots

	C1s (CDs: 72.2%, S-CDs: 71.3%)			O1s (CDs: 27.8%, S-CDs: 25.5%)			S2p (S-CDs: 3.2%)	
	C=C/C-C	C-O/C-S	C=O	C-O	C=O	O-C=O	S2p1/2	S2p3/2
S-free CDs	68.8%	18.9 %	12.3%	63.4%	36.6%	—	—	—
S-CDs	67.2%	22.6 %	10.2%	64.6 %	28.4%	7%	28.5%	71.5 %

Table S3. Spiked recovery experiments for the detection of water in organic solvent samples by S-CDs (n = 5)

Sample	Detected (%)	Added (%)	Found (%)	Recovery (%)	RSD (%)
EG	2.58	2	4.77	104.15	1.42
		4	6.46	98.17	0.85
		8	10.80	102.08	0.61
DMF	—	2	2.15	107.50	2.33
		4	4.13	103.25	1.51
		8	7.74	96.75	1.40
DMSO	—	2	1.94	97.00	0.97
		4	4.22	105.50	1.71
		8	8.69	108.63	1.39

References

1. F. Yuan, Y. Wang, G. Sharma, Y. Dong, X. Zheng, P. Li, A. Johnston, G. Bappi, J. Z. Fan and H. Kung, *Nat. Photonics*, 2020, 14, 171-176.

2. Y. Liu, H. Gou, X. Huang, G. Zhang, K. Xi and X. Jia, *Nanoscale*, 2020, **12,** 1589-1601.

3. J. Chen, W. Liu, Y. Li, X. Zou, W. Li, J. Liang, H. Zhang, Y. Liu, X. Zhang and C. Hu, *Chem. Eng. J.*, 2022, **428**, 131168.

4. T. Yoshinaga, M. Shinoda, Y. Iso, T. Isobe, A. Ogura and K. Takao, *Acs omega*, 2021, **6**, 1741-1750.

5. F. Yuan, T. Yuan, L. Sui, Z. Wang, Z. Xi, Y. Li, X. Li, L. Fan, Z. A. Tan and A. Chen, *Nat. Commun.*, 2018, **9**, 1-11.

6. T. Vidya, M. Anupama, S. Muhammed, J. Joseph and A. A. Anappara, *Mater. Res. Bull.*, 2021, **138**, 111223.

7. O. Erguder, S. Şahin Keskin, I. Nar, L. Trabzon and C. Unlu, *Acs Omega*, 2022, **7**, 29297-29305.

8. R. Sofin, A. Issac, M. Al-Naabi, M. Z. Myint, H. H. Kyaw and O. K. Abou-Zied, *Spectrochim Acta. A.,* 2022, **266**, 120442.

9. I. Alkian, A. Prasetio, L. Anggara, M. H. Fonisyah, Z. M. Rizka and H. Widiyandari, *J. Phys. Conf. Ser.,* 2019, **p**. 12093.

10. K. R. Vijesh, T. Thomas, M. Vaishakh, V. Nampoori and S. Thomas, *Optik*, 2021, **248**, 168049.

11. X. L. Wei, Q. L. Shi, L. Jiang and Y. Qin, *Carbon Lett.*, 2023, **33**, 191-201.