Support Information

Highly fluorescent Zn-doped carbon dots as Fenton reaction-based bio-sensor: An integrative experimental-theoretical consideration

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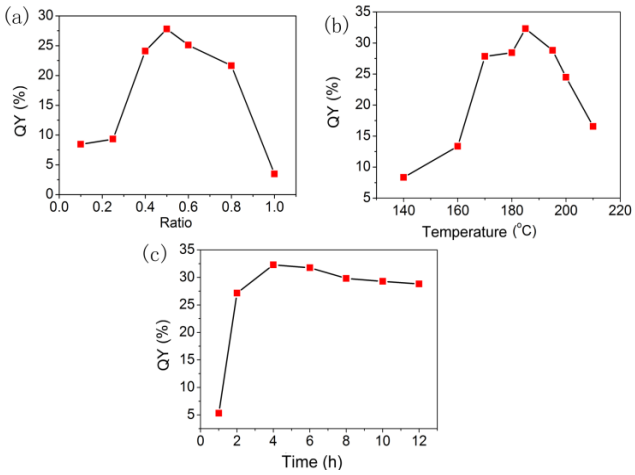

Figure S1. The quantum yield results by (a) ratio of zinc chloride to sodium citrate; (b) temperature of the hydrothermal reaction (from 140 to 210℃);(c) time of hydrothermal reaction.

The quantum yield of PLQY was determined in a standard method.[1] And the absolute PLQY value of CDs was calculated by the following formula:

$$\phi_X = \phi_{ST}\left(\frac{Grad_X}{Grad_{ST}}\right)\left(\frac{\eta_X^2}{\eta_{ST}^2}\right)$$

Where the subscripts ST and X denote standard and test, respectively. Φ is the fluorescence quantum yield. Grad is the gradient from the plot of integrated fluorescence intensity vs absorbance. And η is the refractive index of the solvent.

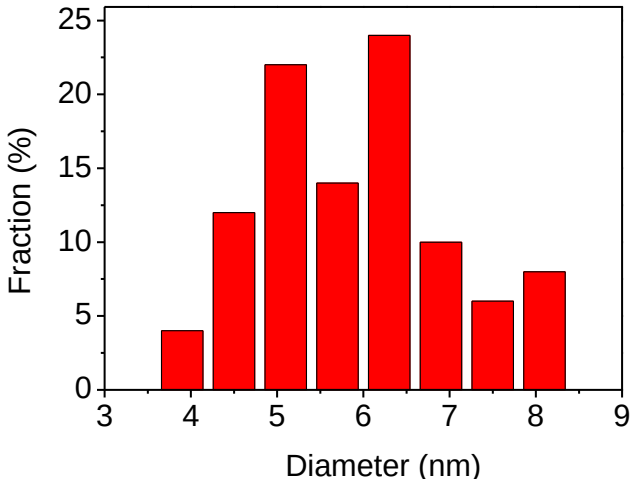

Figure S2. The diameter of the Zn-CDs

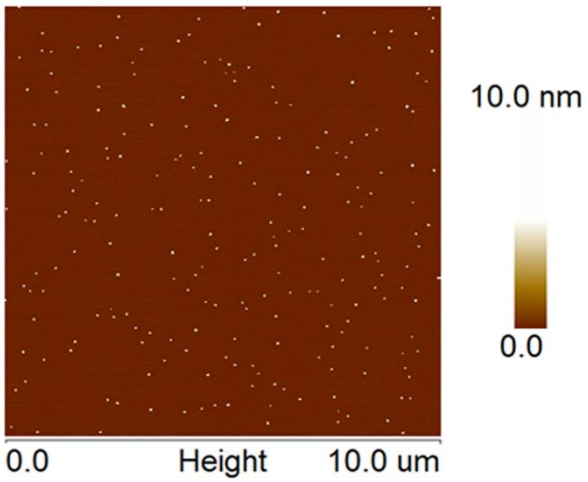

Figure S3. AFM picture of Zn-CDs

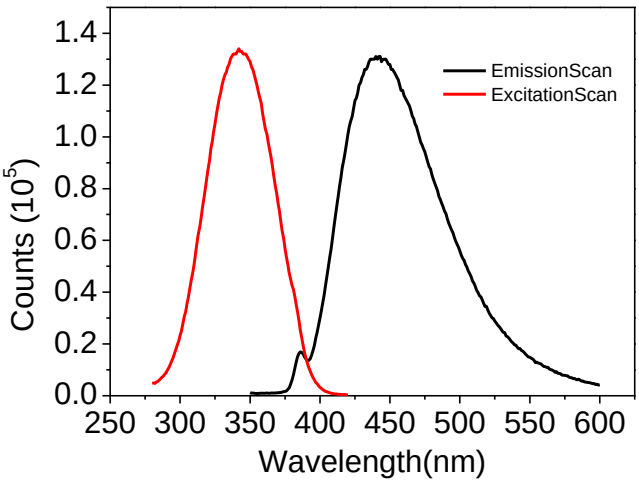

Figure S4. Photoluminescence spectrum of the Zn-CDs

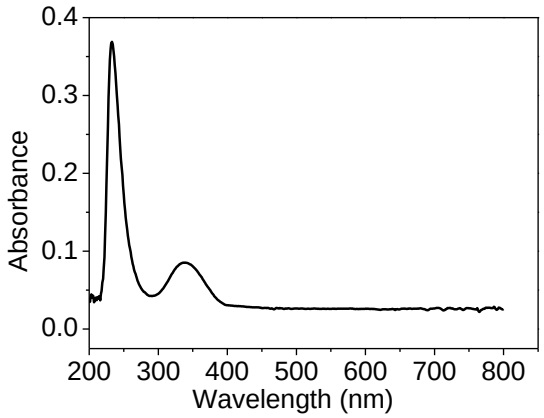

Figure S5. UV absorption spectrum of Zn-CDs

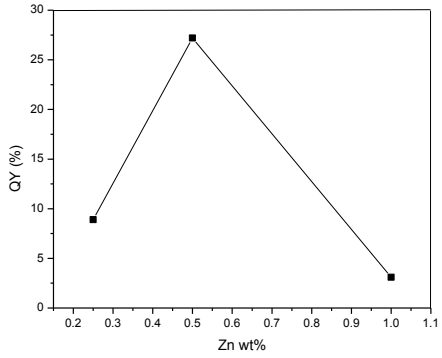

Figure S6. QY according to different Zn %

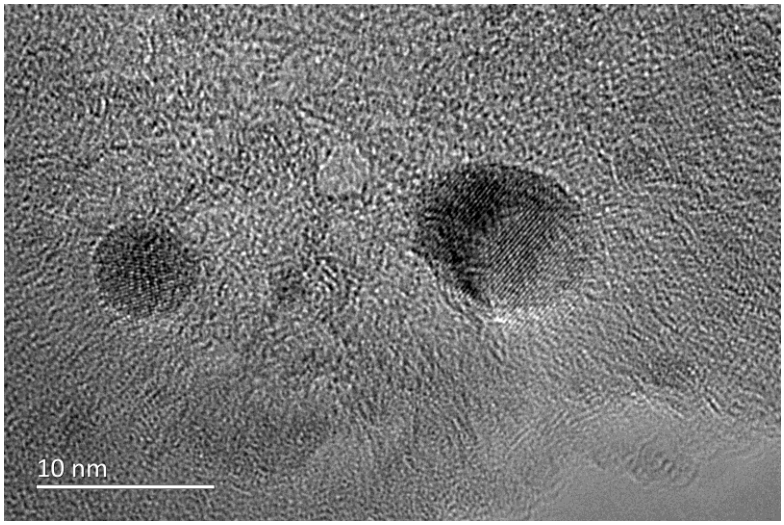

Figure S7 High resolution TEM picture of Zn-CDs

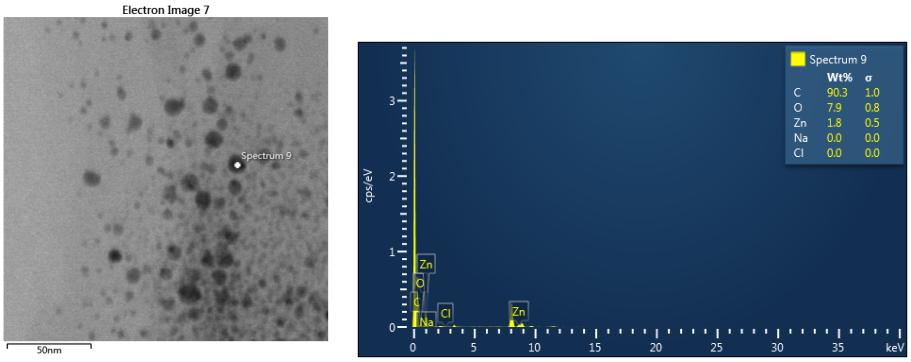

Figure S8 TEM-EDX analysis of Zn-CDs

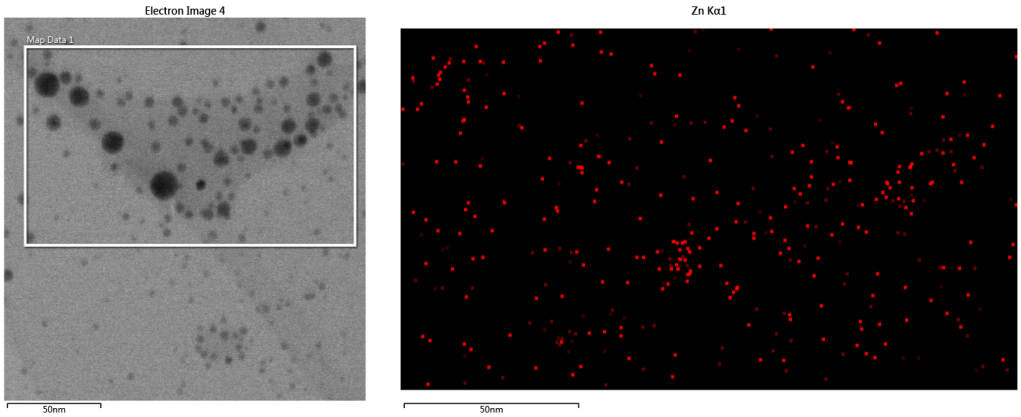

Figure S9 EDX mapping analysis of Zn-CDs

Table S1 Zn wt% content tested by ICP

ratio	Zn wt%
1 : 0.25	6.5%
1 : 0.5	7.9%
1 : 0.75	11.6%
1 : 1	13.2%

It is found that the PL quantum yield reach the maximum when the molar ratio for sodium citrate and zinc chloride is 1:0.5. Compared with other reported CDs doped with heteroatom,[1-3] by testing the Zn content with ICP (Table S1), the as-prepared Zn-doped carbon dots has a high doping ratio (from 6% to 9%)

Supplementary references

[1]. D. Sun, R. Ban, P.-H. Zhang, G.-H. Wu, J.-R. Zhang and J. J. Zhu, *Carbon*, 2013, 64, 424-434.

[2]. J. Cheng, C. Wang, Y. Zhang, S. Yang and S Chen, *RSC Adv.*, 2016, 6,

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[3]. Y. Guo, L. Zhang, X. Liu, B. Li, D. Tang, W. Liu and W. Qin, *J. Mater. Chem. A*, 2016, 4, 4044-4055
[4] J. Hou, T. Zhou, L. Wang, P. Zhang, L.D. *Sensor. Actuat. B: Chem,*, 2016, 230, 615-622