Electronic Supplementary Material

Identifying the existence of highly-fluorescent carboxylic group-rich carbon nanodots during one-pot synthesis of branched polyethylenimine-passivated amine group-rich carbon nanodots

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Supplementary Table and Figures

Table S1 Photophysical properties of as-synthesized C-Dots.

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	τ_1 (ns)	τ_2 (ns)	τ_3 (ns)	τ_4 (ns)	τ_{av} (ns)	QYs (%)
Fractions 1	0.47±0.01	1.59±0.06	4.17±0.15	9.02±0.15	6.36±0.12	4.2
Fractions 2	0.2±0.04	1.45±0.16	4.93±0.20	11.01±0.03	10.57±0.13	17.4

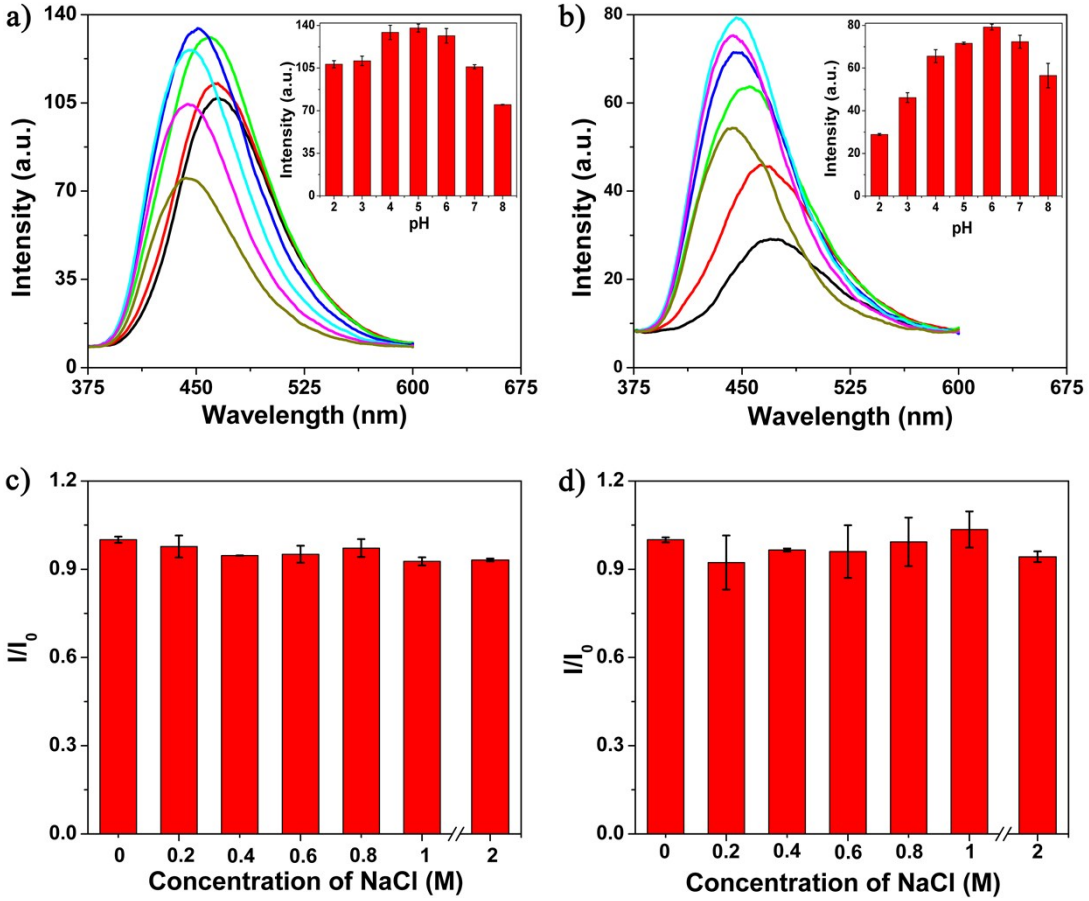


Figure S1 Effect of pH and salt concentration on the fluorescence of the as-synthesized C-Dots. (a, c) for fraction 1 (AR-C-Dots) and (b, d) for fraction 2 (CR-C-Dots).

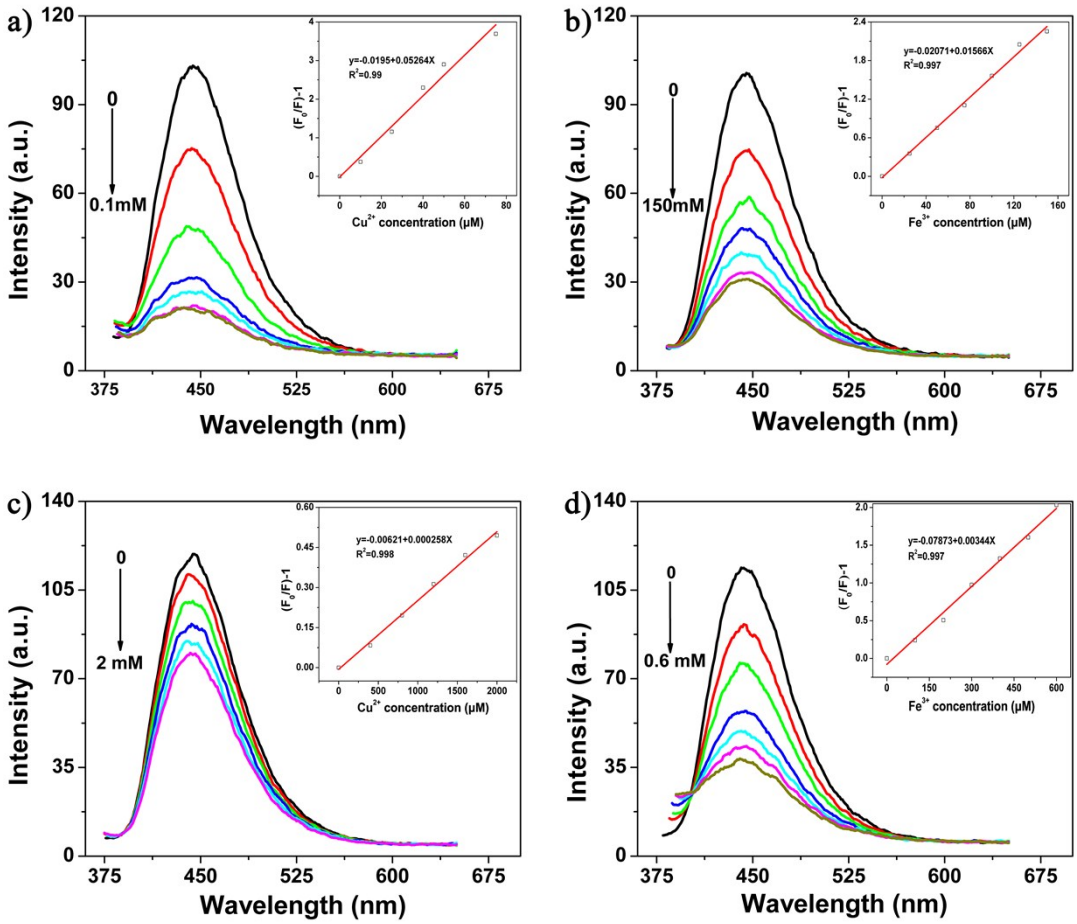


Figure S2 Fluorescence quenching behaviors of as-synthesized C-Dots by Cu^{2+} (a, c) and Fe^{3+} (b, d). Conditions: excitation at 360 nm; F_0 and F are fluorescence intensities at 405 nm in the absence and presence of Cu^{2+}/Fe^{3+}, respectively. (a, b) fraction 1 (AR-C-Dots) and (c, d) fraction 2 (CR-C-Dots).

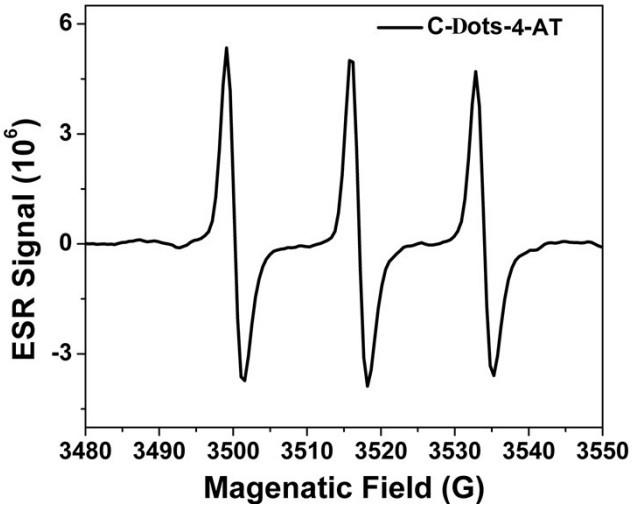


Figure S3 ESR spectrum of nanoprobe C-Dots-4-AT

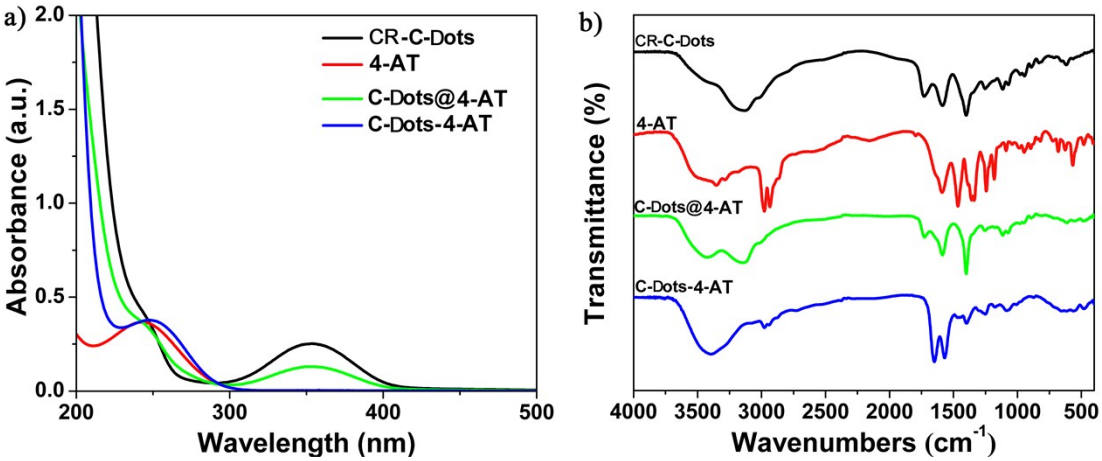
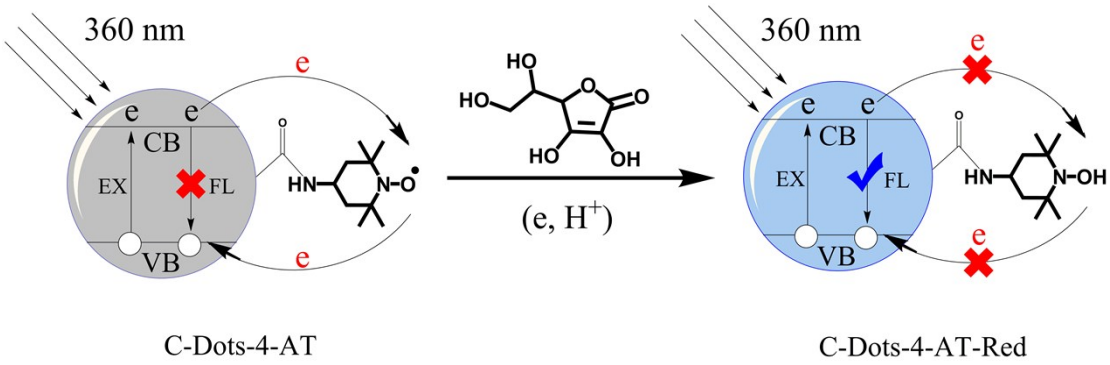


Figure S4 UV-vis absorbance (a) and FT-IR spectrum (b) of C-Dots-4-AT



Scheme S1 Proposed mechanism of ESR and fluorescence dual-responsive nanoprobe of C-Dots-TEMPO for ascorbic acid by Guo et al.[1]

The mechanism of ESR and fluorescence dual-responsive probe for ascorbic acid detection has been proposed by Guo et al. as follows.[1] C-Dots-4-AT showed typical ESR signals when paramagnetic nitroxide 4-AT was covalently conjugated onto C-Dots. On the other hand, paramagnetic 4-AT with singly occupied molecular orbital (SOMO) was an electron acceptor. Upon UV light irradiation, photo-generated electron transferred from conduction band (CB) of C-Dots to SOMO of 4-AT, and then to valence band (VB) of C-Dots. This non-radiative energy relaxation pathway competed with the fluorescence (FL) process, and therefore the C-Dos weakly emitted. Upon addition of ascorbic acid, paramagnetic 4-AT was reduced to diamagnetic hydroxylamine, indicating gradually reduced ESR signal. The non-radiative electron transfer pathway was blocked, and therefore the FL of C-Dots restored.

References

1 F. Lin, D. Pei, W. He, Z. Huang, Y. Huang and X. Guo, *J. Mater. Chem.*, 2012, **22**, 11801-11807.