## Luminescence Mechanism of Carbon Dots by Tailoring Functional 1 Groups for Sensing Fe<sup>3+</sup> Ions 2

## Jingjing Yu<sup>a</sup>, Chang Liu<sup>a</sup>, Kang Yuan<sup>a</sup>, Zunming Lu<sup>a</sup>, Yahui Cheng<sup>b</sup>, Lanlan Li<sup>a</sup>, 3 Xinghua Zhang<sup>a,\*</sup>, Peng Jin<sup>a,\*</sup>, Fanbin Meng<sup>a</sup>, Hui Liu<sup>c,\*</sup> 4

- 5 <sup>a</sup>School of Materials Science and Engineering, Hebei University of Technology, Tianjin, China.
- 6 7 <sup>b</sup>Department of Electronics and Key Laboratory of Photo-Electronic Thin Film Devices and Technology of Tianjin, Nankai
- University, Tianjin, China.
- 8 <sup>c</sup>Tianjin University, Sch Mat Sci&Engn, Inst New Energy Mat, Key Lab Adv Ceram & Machining Technol, MinistEduc, Tian-
- 9 jin, China.

<sup>\*</sup>Corresponding authors. Tel.: +86 022 60204805, Fax.: +86 022 60202660, Email: zhangxinghua@hebut.edu.cn; china.peng.jin@gmail.com; hui liu@tju.edu.cn.

## 1 Supporting Information

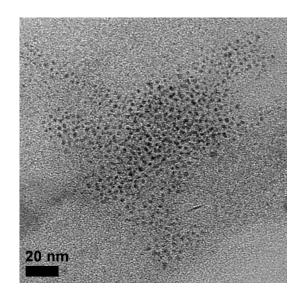


Figure S1. TEM image of CDs-1.

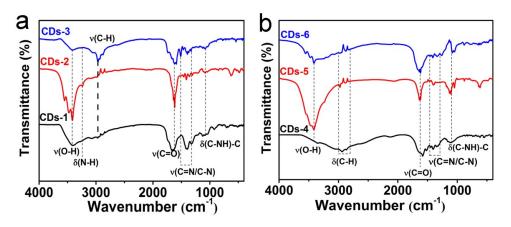
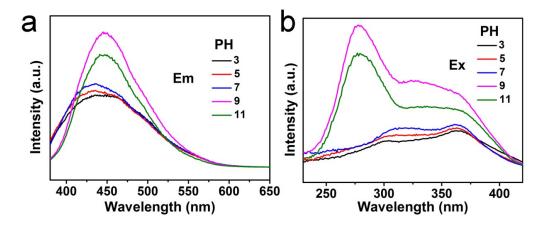
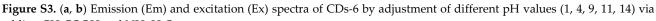
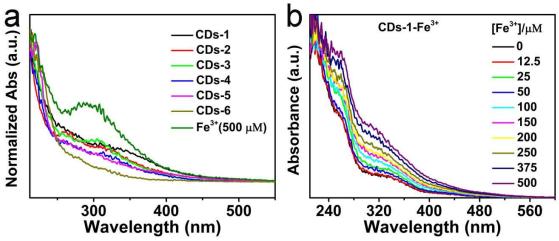


Figure S2. FT-IR spectra of (a) CDs-1, CDs-2, and CDs-3; and (b) CDs-4, CDs-5, and CDs-6.



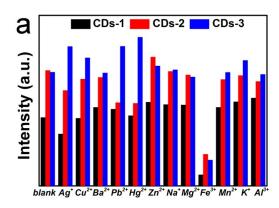


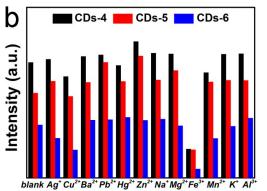
8 adding CH<sub>3</sub>COOH and NH<sub>3</sub>·H<sub>2</sub>O.



**Figure S4.** (a) Absorption spectra of CDs-1, CDs-2, CDs-3, CDs-4, CDs-5, CDs-6, and Fe<sup>3+</sup> ion solution. (b) Absorption spectra of CDs-1 in the presence of different concentrations of Fe<sup>3+</sup> ions.







**Figure S5.** Comparison of fluorescence intensities of CDs under 365 nm excitation (including CDs-*x*, x = 1, 2, 3, 4, 5, 6) in the presence of different metal ions (the concentration of metal ions is 500  $\mu$ M; the concentration of CDs-1 is 1 mg/mL).

)