

Supporting Information

Ratiometric Fluorescent Nanosensor Based on Water Soluble Carbon Nanodots with Multiple Sensing Capacities

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Experimental details

Materials: AgNO₃, CaCl₂, BaCl₂, CdCl₂, CuSO₄, Fe(NO₃)₃, MgSO₄, NiCl₂, Pb(NO₃)₂, NaCl, NaOH, Al(NO₃)₃, Zn(NO₃)₂, ethanol and hydrochloric acid were purchased from Beijing Chemical Corp. All chemicals were used as received without further purification. The water used in all experiments was purified through a Millipore system.

Detection of metal ions: calculated amounts of metal ions were added to the C-dot aqueous solution (0.02 mg mL⁻¹). The PL spectra were recorded after reaction for 10 min at 25°C.

Characterizations: Fluorescence excitation and emission spectra were collected using a FLS920 spectrometer. Fluorescence lifetimes were measured using an FLS920 time-correlated single photon counting (TCSPC) system.

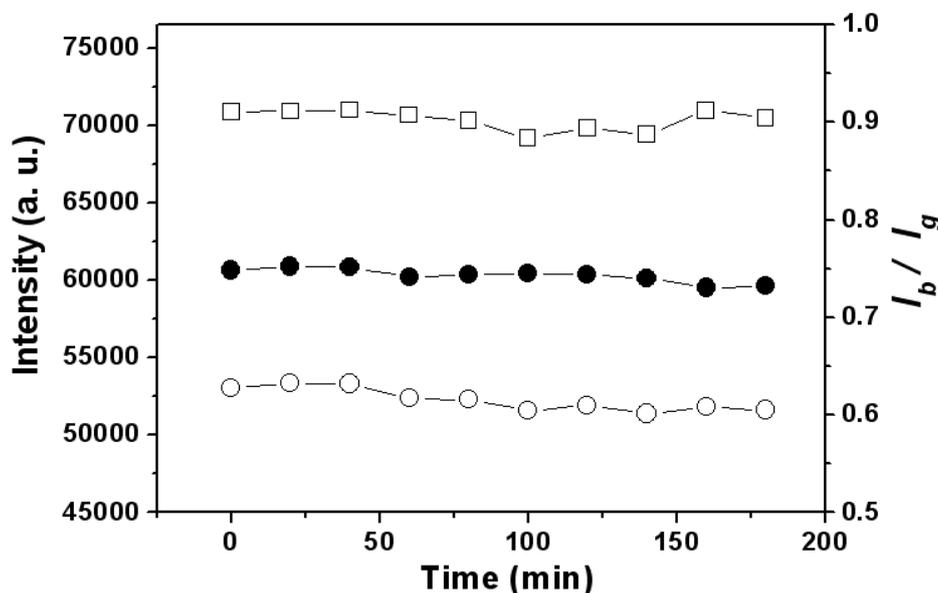


Figure S1. Plots of intensity of blue fluorescence band (○) and green fluorescence band (□) and values of I_b/I_g (●) versus irradiation time under 380 nm excitation at room temperature (light source: 450W Xe lamp, excitation slit: 1 nm).

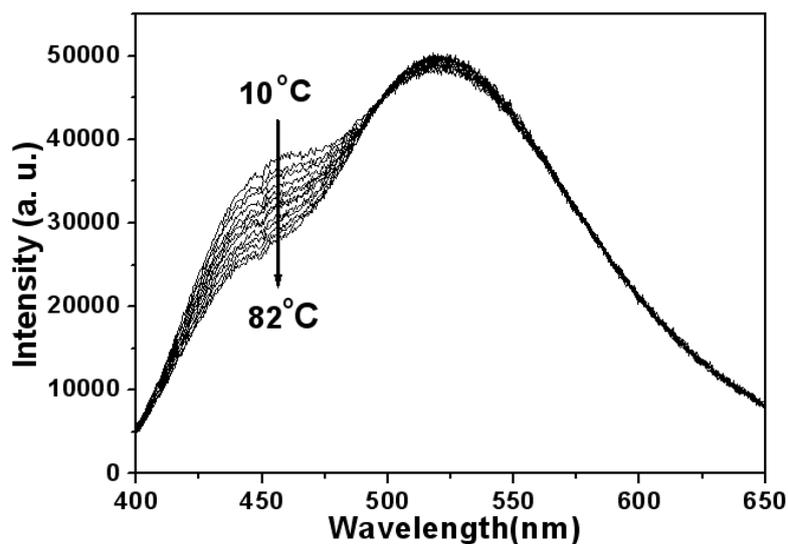


Figure S2. PL spectra of the C-dot dilute aqueous solution (0.1 mg mL⁻¹) at different temperatures in the 10 to 82°C range under excitation at 380 nm.

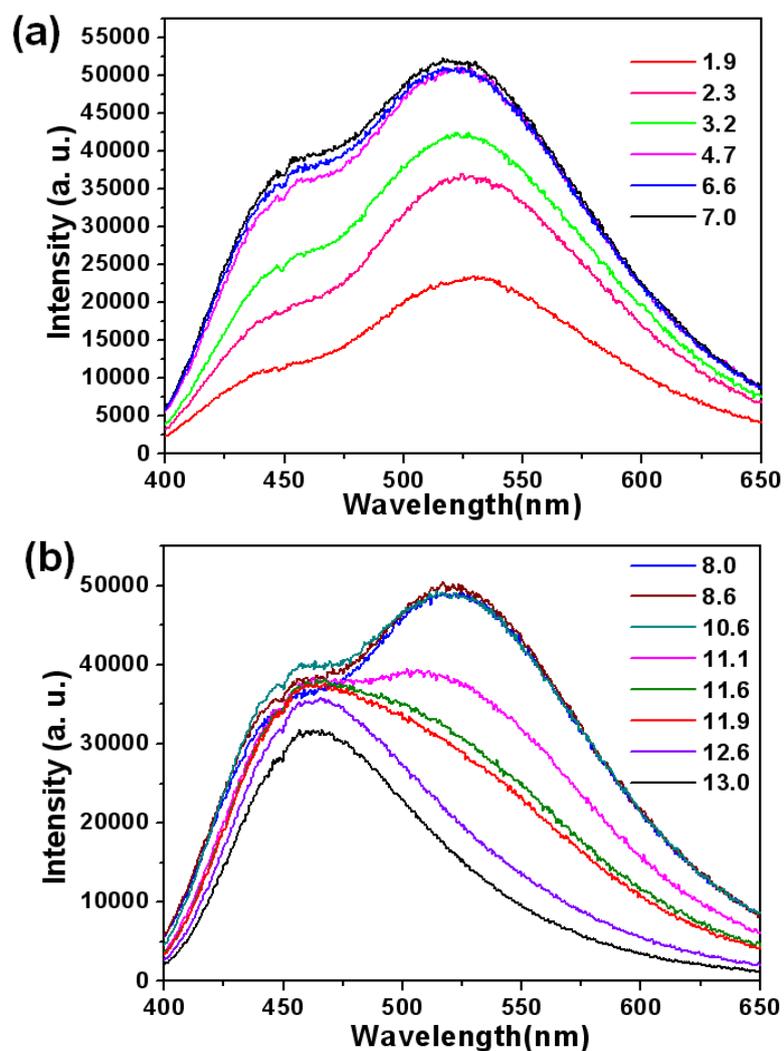


Figure S3. PL spectra of the C-dot aqueous solutions (0.1 mg mL⁻¹) at various pH values under 380 nm excitation at 25°C.

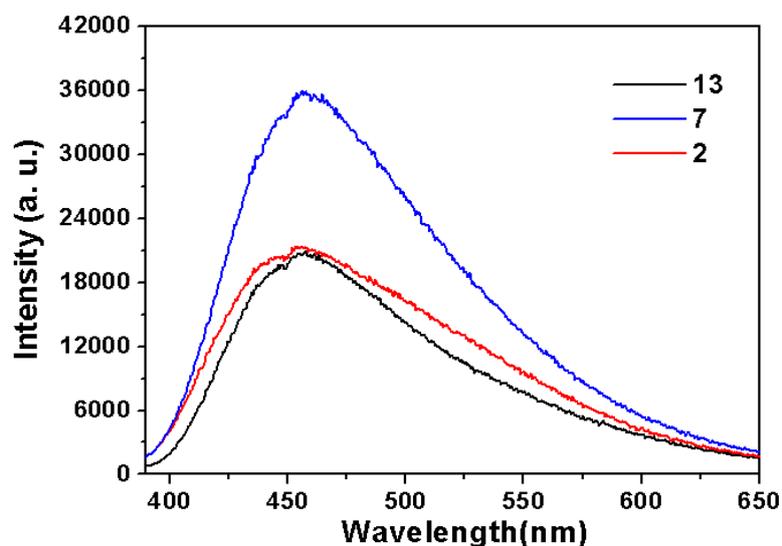


Figure S4. PL spectra of C-dot aqueous solutions (0.1 mg mL^{-1}) with pH values from 13 to 2 by adding hydrochloric acid under 380 nm excitation at 25°C .

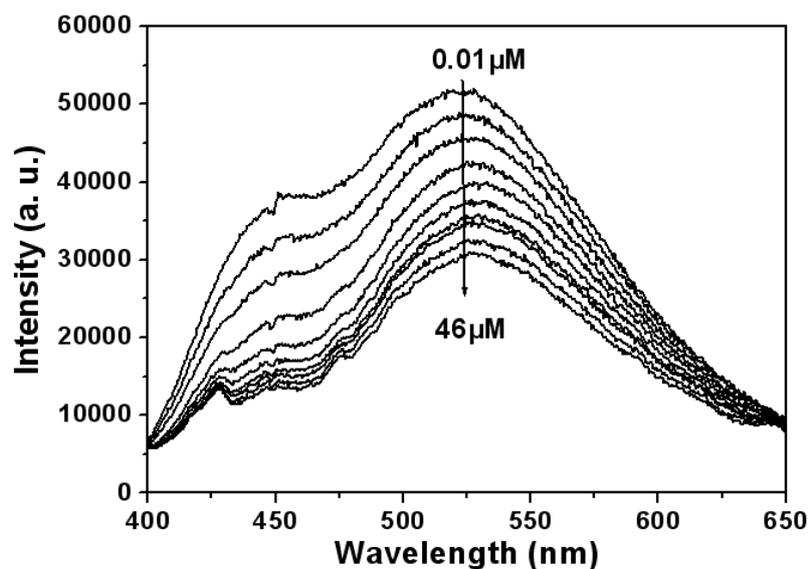


Figure S5. PL spectra of the C-dot aqueous solutions (0.02 mg mL^{-1}) in the presence of Fe^{3+} in concentrations from 0.01 to 46 μM under 380 nm excitation at 25°C .

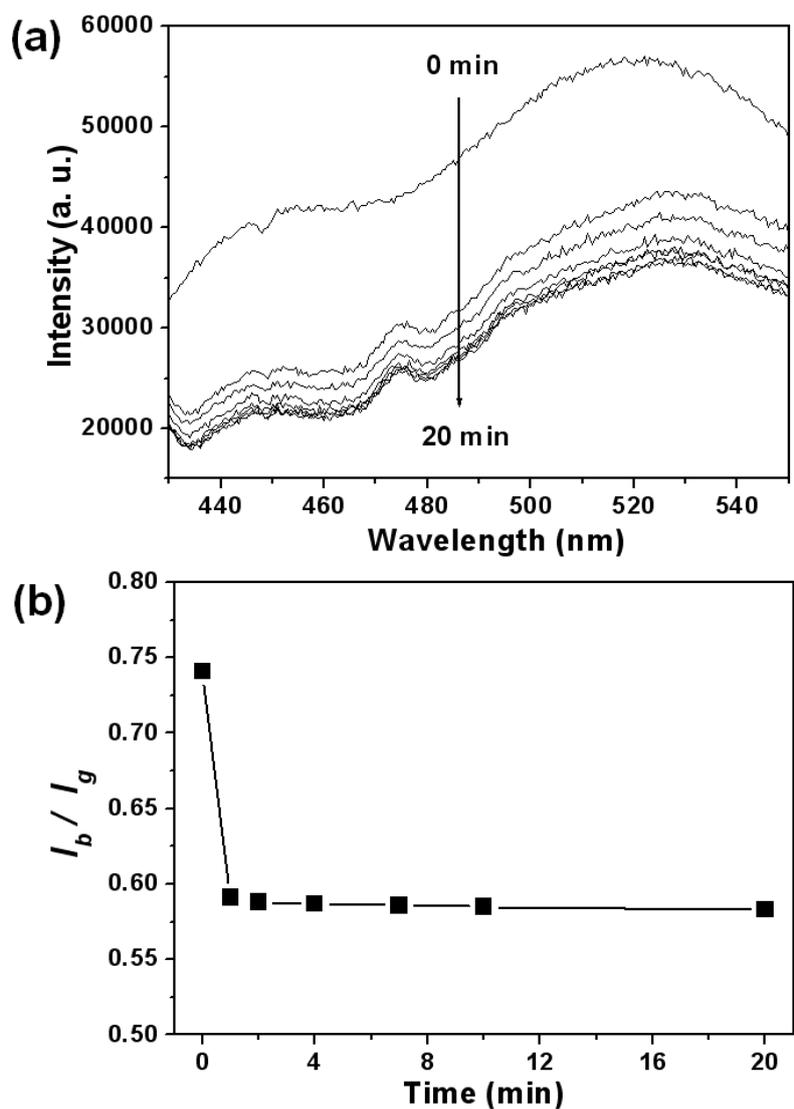


Figure S6. Time-dependent PL spectra of a C-dot-Fe³⁺ solution under 380 nm excitation at 25°C.

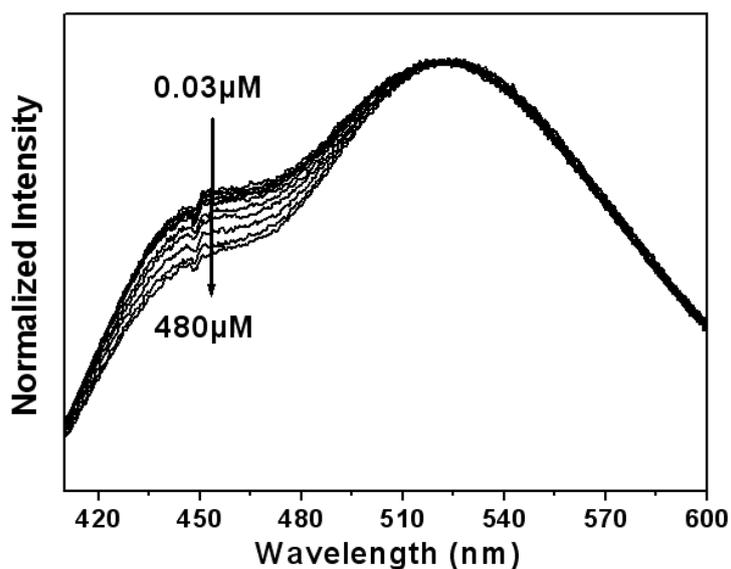


Figure S7. PL spectra of the C-dot aqueous solutions (0.02 mg mL⁻¹) in the presence of different Cu²⁺ concentrations (normalized at the maximum peak of the green fluorescence band, 380 nm excitation at 25°C).

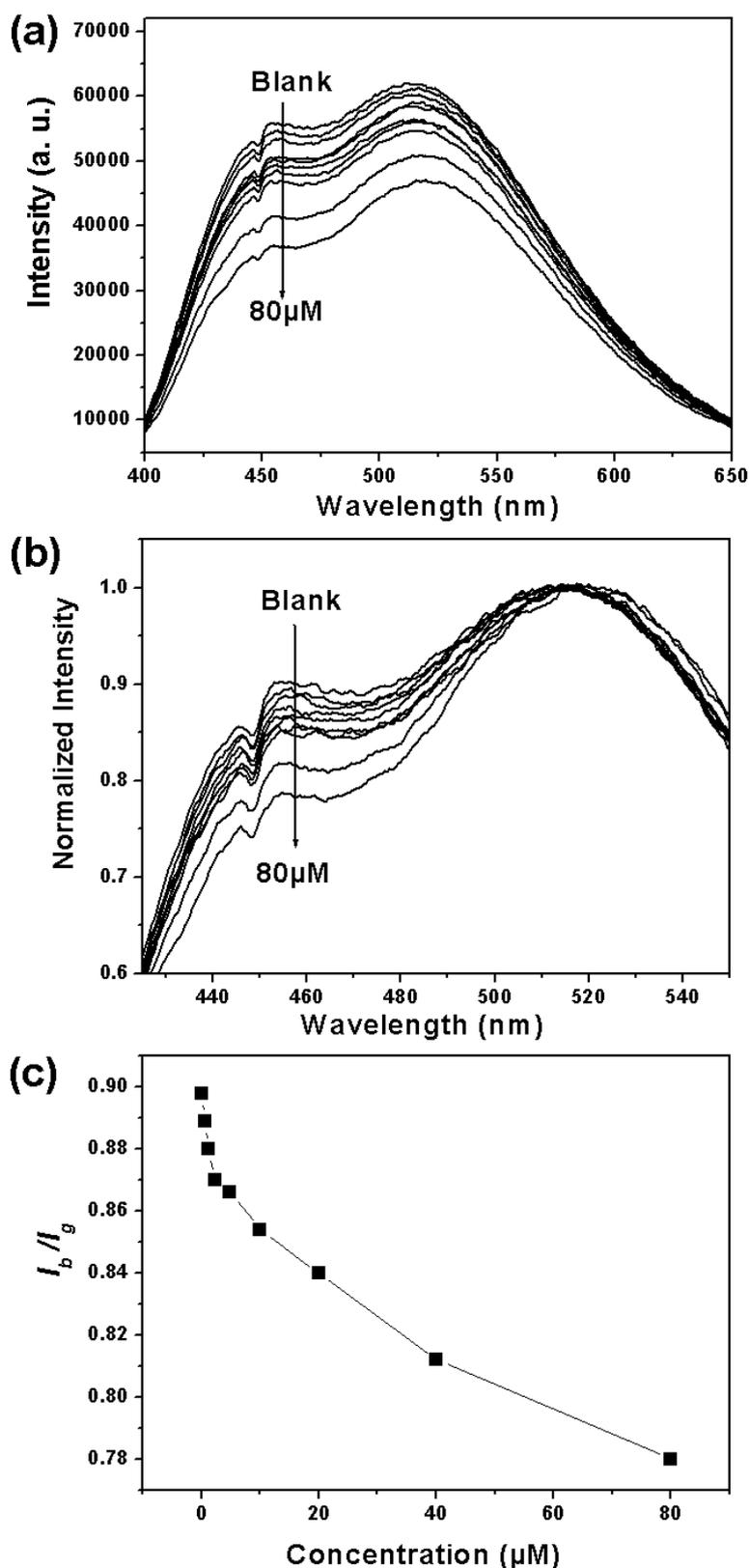


Figure S8. (a) PL spectra and (b) normalized PL spectra (normalized at the maximum peak of the green fluorescence band) of the C-dot dispersion (0.04 mg mL^{-1}) in the presence of different Fe^{3+} concentrations in lake water under 380 nm excitation at room temperature. (c) The dependence of I_b/I_g on the concentrations of Fe^{3+} ions within the range of 0-80 μM in lake water under 380 nm excitation at room temperature.