Electronic Supporting Information (ESI)

Self-assembly of Nitrogen-Doped Carbon Nanoparticle: A New Ratio UV-vis Optical Sensor for High Sensitive and Selective Detection of Hg^{2+} in Aqueous Solution **

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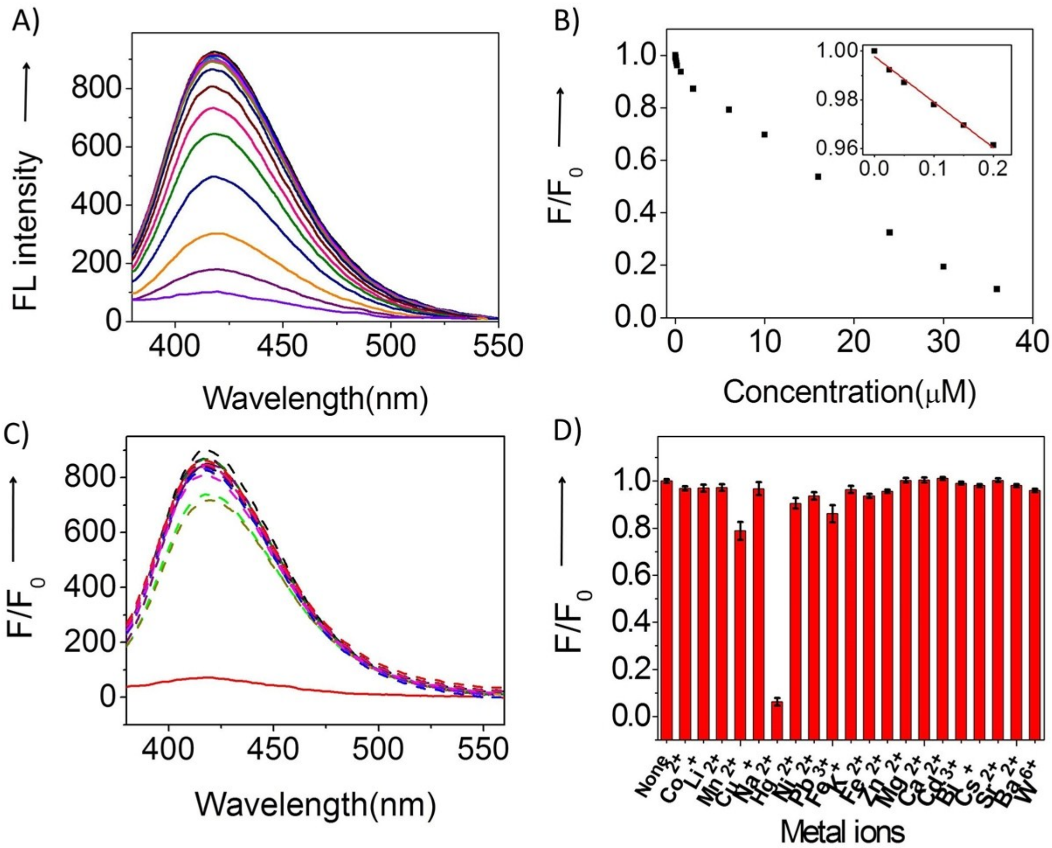

Fig. S1 The N-CNPs were used as a fluorescence sensor to detect Hg^{2+}. (A) Fluorescence emission spectra of N-CNPs dispersion in the presence of different Hg^{2+} concentrations (from top to bottom: 0, 0.025, 0.05, 0.10, 0.15, 0.20, 0.60, 2.0, 6.0, 10.0, 16.0, 24.0, 30.0, 36.0 μM). (B) Plots of the values of F/F_0 versus the concentrations of Hg^{2+}, Where F, F_0 are the fluorescence intensities of N-CNPs at 420 nm in the absence and presence of Hg^{2+}. (C) Fluorescence emission spectra of N-CNPs dispersion in the presence of different metal ions. The concentrations of all the metal ions are 100 μM and the final concentration of the N-CNPs is 30 μg/mL. (D) Selectivity of the N-CNPs-based fluorescent system： the value of F/F_0 is derived from Figure C. The concentrations of all the metal ions are 100 μM and the final concentration of the N-CNPs is 30 μg/mL.

The N-CNPs dispersion exhibits a strong PL peak at 420 nm in the absence of Hg^{2+} when excited by 355 nm UV light. The presence of Hg^{2+}, however, results in an obvious decrease of fluorescence intensity, indicating that the Hg^{2+} can effectively quench the fluorescence of N-CNPs. Figure S1A shows the fluorescent spectra of N-CNPs dispersion after adding various concentrations of Hg^{2+}. With the addition of Hg^{2+}, the fluorescence intensity at 420 nm was gradually decreased, indicating that the fluorescence intensity of the mixture is sensitive to Hg^{2+} concentration. The fitting line of F_0/F (F, F_0 are the fluorescence intensities of N-NCPs at 420 nm in the absence and presence of Hg^{2+}, respectively) versus the concentrations of Hg^{2+} shows two linear regions at 0–0.2 μM and 0.6–36 μM, respectively. The detection limit is estimated to be 15.2 nM, which is 10 times higher than that of UV-vis sensor.

For the selectivity study, the same concentration (100 μM) of different metal ions, including Li^+, Na^+, K^+, Mg^{2+}, Ca^{2+}, Mn^{2+}, Fe^{2+}, Co^{2+}, Ni^{2+}, Cu^{2+}, Zn^{2+}, Pb^{2+}, Hg^{2+}, Fe^{3+}, Cd^{2+}, Bi^{3+}, Cs^+, Sr^{2+}, Ba^{2+}, W^{6+}, Hg^{2+} were added to the N-CNPs dispersion respectively. Figure 1D shows that although Hg^{2+} can decrease the fluorescent intensity greatest, Cu^{2+} and Fe^{3+} will also decrease the fluorescent intensity slightly.