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Electronic Supporting Information

Fluorescence "Turn on" Detection of Cr^{3+} using N-doped-CDs and Graphitic Nanosheets Hybrid

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Part S1 XPS spectra characterization of the N-doped-CDs@GNSs hybrid

Part S2 Fluorescence detection of Cu^{2+} using the products obtained with 0.8 ml 1,6-hexamethylenediamine

Fig. S1-S9

Part S1 XPS spectra characterization of the N-doped-CDs@GNSs hybrid

As shown in Fig. S1a, there exist three peaks in the XPS spectrum of the N-doped CDs, i.e., 285.9, 400.3 and 532.3 eV, which are attributed to C1s, N1s and O1s, respectively. And the XPS results also indicate that the N-doped-CDs@GNSs hybrid is mainly composed of C, O and N, with an atomic ratio of about 41:11:3. The C1s spectrum (Fig. S1b) shows four peaks at 284.5, 285.4, 285.8 and 288.8 eV, which are attributed to sp2C, sp3C, C-N/C-O and C=N/C=O respectively. The two peaks at 531.2 and 532.5 eV in the O1s spectrum (Fig. S1c) are attributed to C=O and C−OH/C−O−C groups, respectively; while the N1s spectrum (Fig. S1d) shows three peaks at 399.8, 400.2 and 407.2 eV, which are attributed to the C−N−C, $N-(C)_3$ and N−O bands, respectively.

Part S2 Fluorescence detection of Cu^{2+} using the products obtained with 0.8 ml 1,6-hexamethylenediamine

The fluorescence responses of the products obtained with 0.8 ml 1,6-hexamethylenediamine to different concentrations of Cu^{2+} in aqueous solution were shown in Fig. S6a and b. It can be observed that the fluorescence intensity (I) of the products decreases steadily with $[Cu^{2+}]$. As depicted in the inset of Fig. S6b, there exists an approximate linear relationship between I/I_0 and $[Cu^{2+}]$ in the given concentration range as follows:

$$I / I_0 = 0.99 - 3.7\times10^8[Cu^{2+}] \qquad ([Cu^{2+}] \text{ in the range of } 0\text{–}9\times10^{-8}\text{ M}) \qquad (1)$$

where I and I_0 refer to fluorescence intensities of the products in solution with and without Cu^{2+} respectively. Under the current experimental condition, a detection lower limit of 0.4 nM was achieved based on the 3σ method.

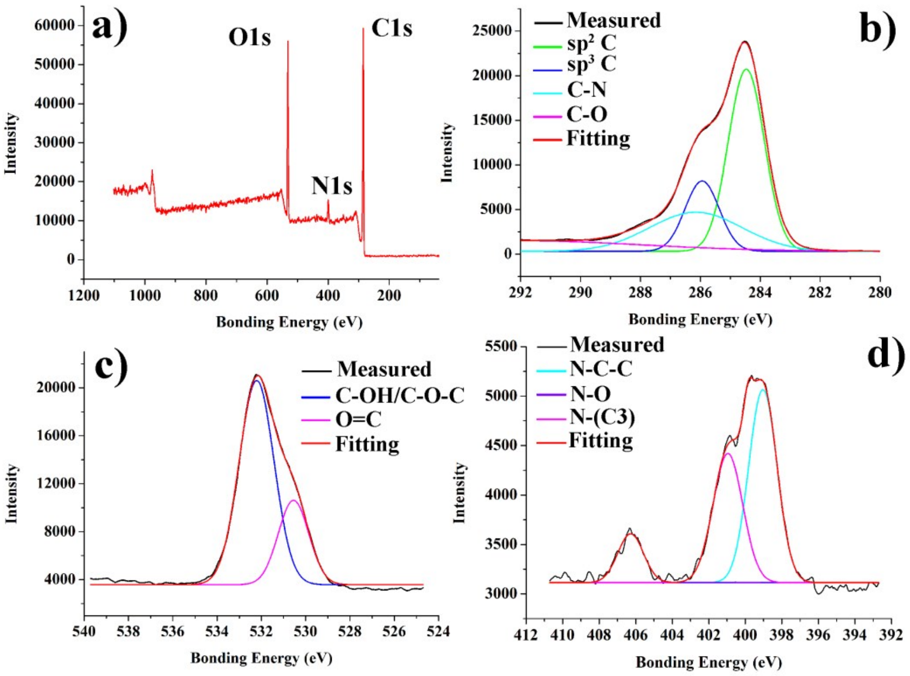

Fig. S1 a) XPS, b) C1s, c) O1s and N1s spectra of the N-doped-CDs@GNSs hybrid.

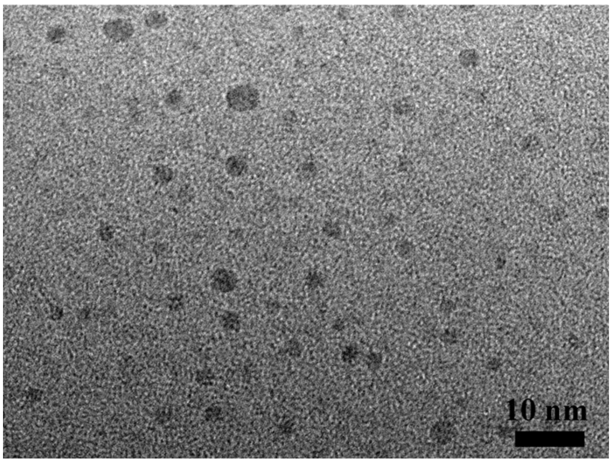

Fig. S2 SEM images of 70 uniformly dispersed N-doped-CDs used for their average diameter statistic.

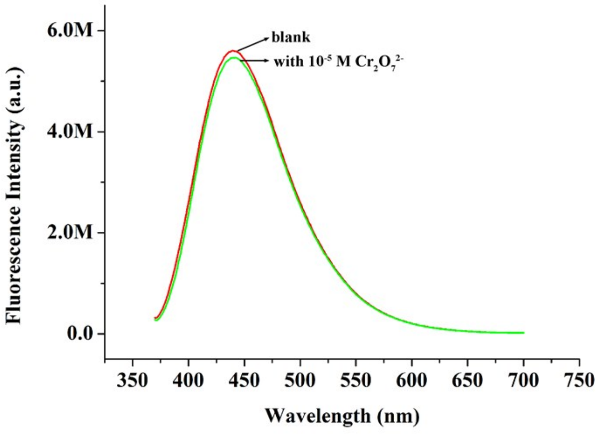

Fig. S3 Fluorescence spectra of the N-doped-CDs@GNSs hybrid solution in the absence and presence of $Cr_2O_7^{2-}$ respectively.

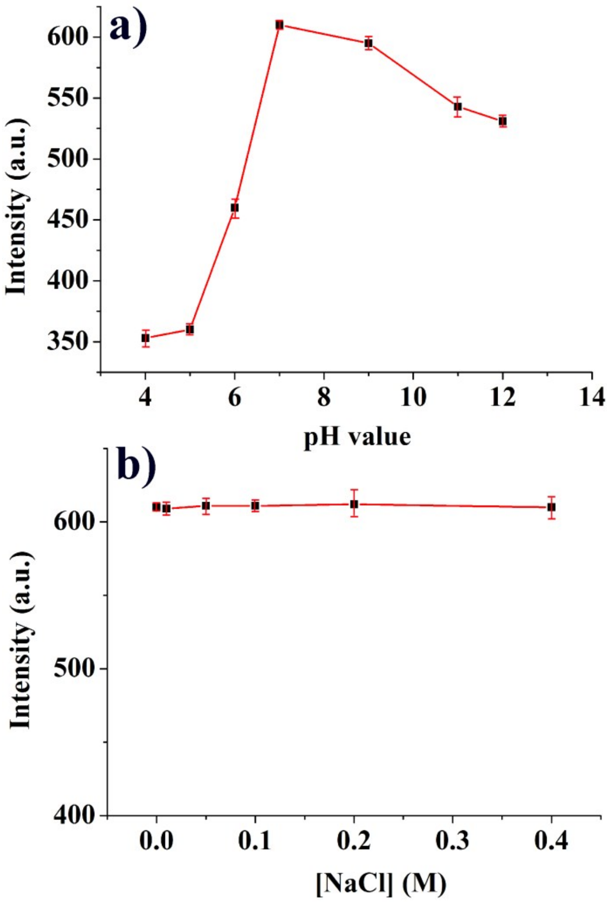

Fig. S4 Effect of (a) pH and (b) different ionic strength on the fluorescence intensity of the N-doped-CDs@GNSs hybrid in solution.

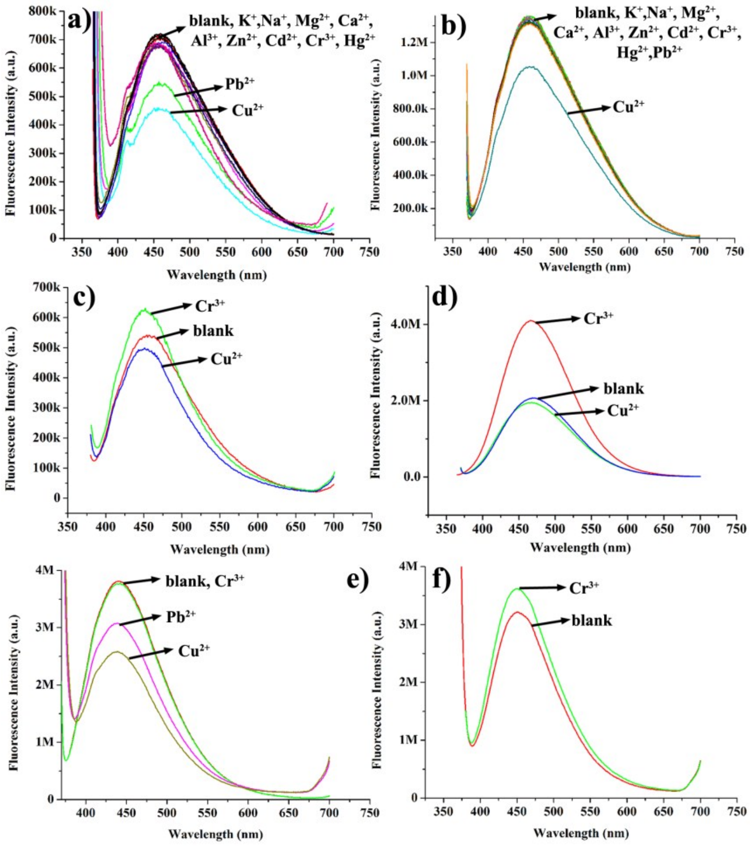

Fig. S5 Fluorescence spectra of the products obtained with a) 0, b) 0.8, c) 1, d) 2 mL 1,6-hexamethylenediamine in the presence of different metal ions, e) fluorescence spectra of the products obtained with 1,6-hexamethylenediamine alone in the presence of different metal ions, f) fluorescence response of the products obtained without NaOH to different metal ions.

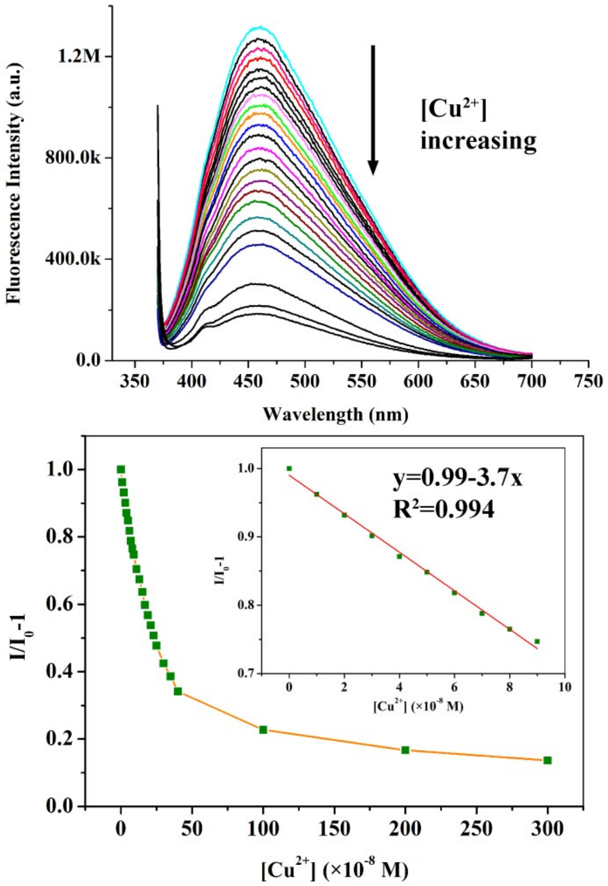

Fig. S6 Fluorescence spectra and corresponding titration curves of the products obtained with 0.8 mL 1,6-hexamethylenediamine for detection of Cu^{2+}.

	K^+	Na^+	Mg^{2+}	Ca^{2+}	Al^{3+}	Cu^{2+}	Pb^{2+}	Cd^{2+}	Co^{2+}	Ni^{2+}	Hg^{2+}	Zn^{2+}	Cr^{3+}
before adsorption	1.8054	1.8103	1.7930	1.8233	1.8233	1.7991	1.8111	1.8314	1.8022	1.7970	1.8336	1.7993	1.8156
after adsorption	1.7554	1.7609	1.7131	1.8078	1.8133	1.7901	1.7789	1.7699	1.8105	1.7632	1.8003	1.7258	0.3073

Fig. S7 Concentrations of various metal ions before and after adsorbed by the N-doped-CDs@GNSs hybrid.

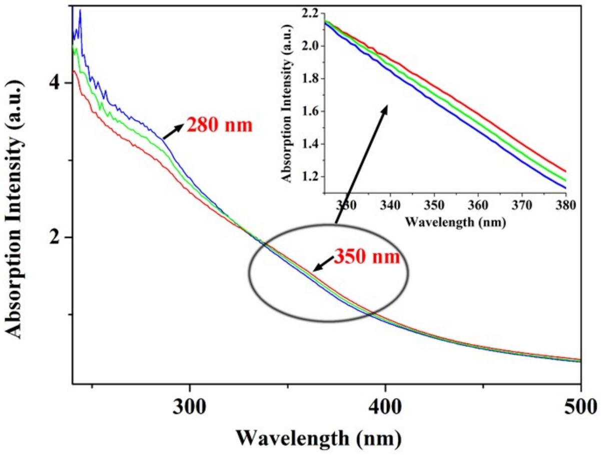

Fig. S8 UV-vis spectra of the N-doped-CDs@GNSs hybrid (red line) with the successive addition of Cr^{3+}.

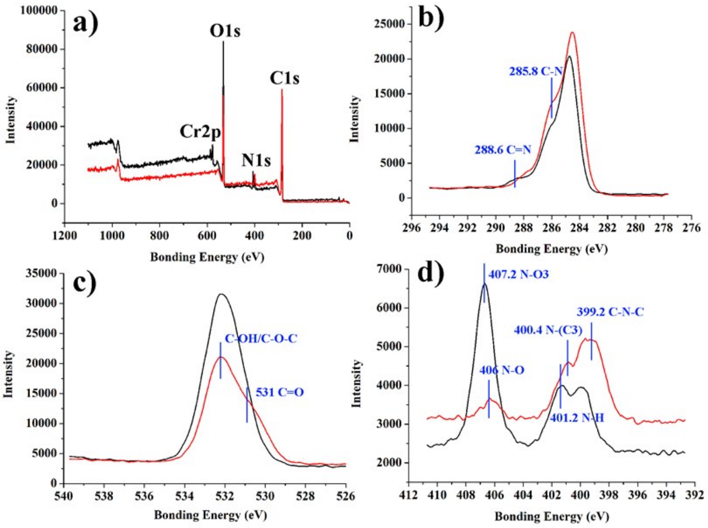

Fig. S9 a) XPS, b) C1s, c) O1s and d) N1s spectra of the N-doped-CDs@GNSs hybrid in the absence (red line) and presence (black line) of Cr^{3+}.