

## **Ratiometric luminescent detection of hydrazine with a carbon dots-hemicyanine nano hybrid system**

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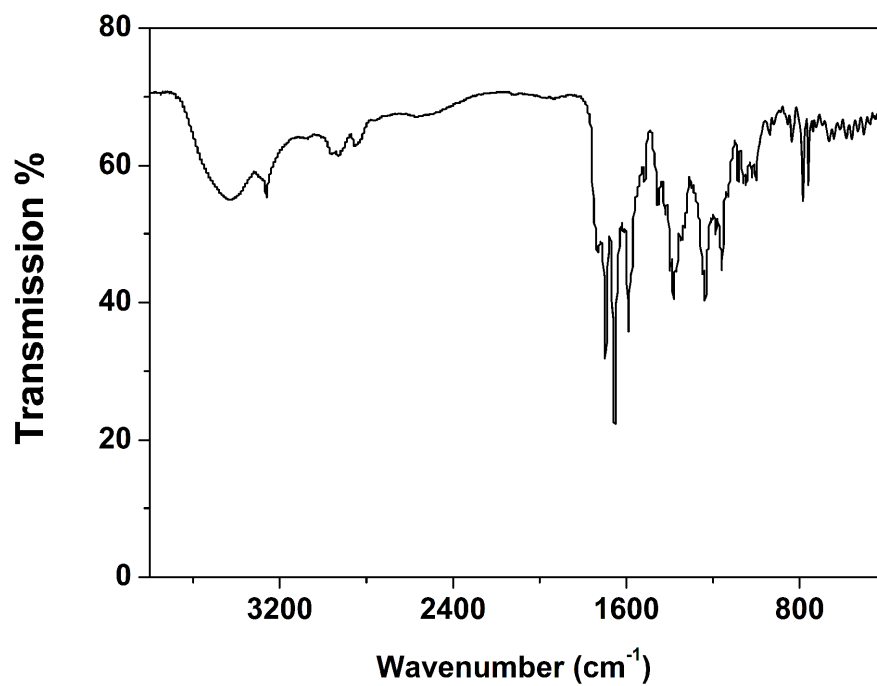


Fig. S1 FT-IR spectrum of the CDs.

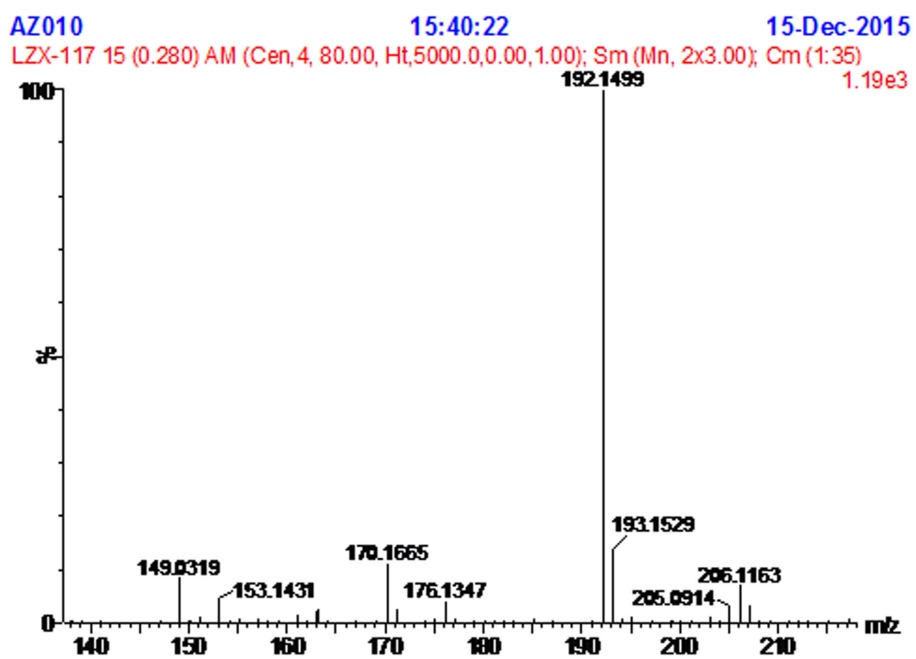
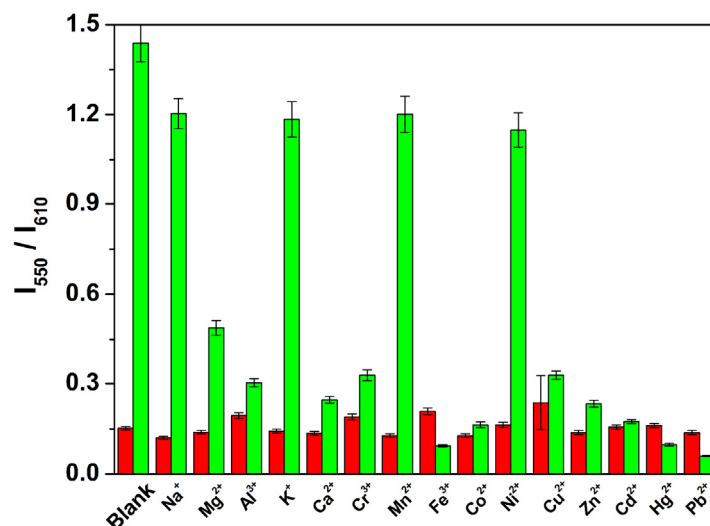
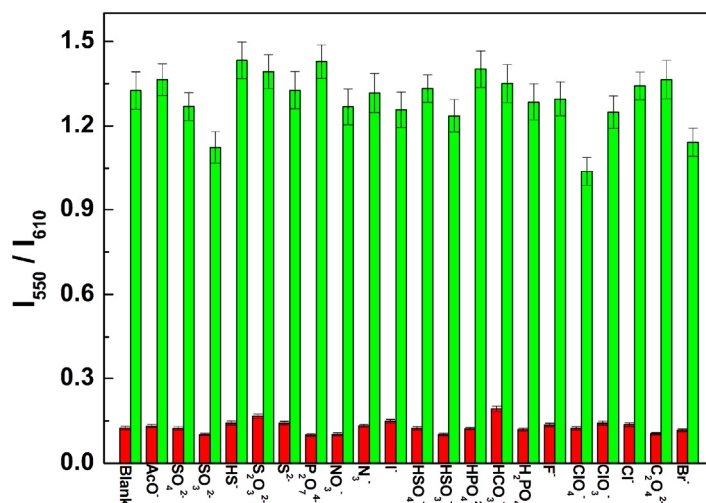


Fig. S2 Mass spectrum of the product from the reaction of probe 1 and hydrazine.



**Fig. S3** Fluorescence response of the **CNDs-hemicyanine** nano hybrid system ( $V_{\text{water}}/V_{\text{DMSO}}= 1/9$ ) upon addition of different metal ions (100 equiv of metal ions relative to **1**) (red bars), and fluorescence change of the mixture of the **CNDs-hemicyanine** nano hybrid system and hydrazine (1 mM in water) after addition of an excess of the indicated metal ions (100 equiv relative to **1**) (green bars). The excitation wavelength was 530 nm and the reaction time was 60 min.  $I_{550}$  and  $I_{610}$  represent the emission intensity at 550 nm and 610 nm. The metal ions used were  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Cd}^{2+}$ ,  $\text{Hg}^{2+}$ ,  $\text{Pb}^{2+}$ .



**Fig. S4** Fluorescence responses of the **CNDs-hemicyanine** nano hybrid system ( $V_{\text{water}}/V_{\text{DMSO}}= 1/9$ ) upon addition of different anions (100 equiv of species relative to **1**) (red bars), and fluorescence change of the mixture of the **CNDs-hemicyanine** nano hybrid system and hydrazine (1 mM in water) after addition of an excess of the indicated species (100 equiv relative to **1**) (green bars). The excitation wavelength was 530 nm and the reaction time was 60 min.  $I_{550}$  and  $I_{610}$  represent the emission intensity at 550 nm and 610 nm. The anions used were blank,  $\text{CH}_3\text{COO}^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{SO}_3^{2-}$ ,  $\text{HS}^-$ ,  $\text{S}_2\text{O}_3^{2-}$ ,  $\text{S}_2^-$ ,  $\text{P}_2\text{O}_7^{4-}$ ,  $\text{NO}_3^-$ ,  $\text{N}_3^-$ ,  $\text{I}^-$ ,  $\text{HSO}_4^-$ ,  $\text{HSO}_3^-$ ,  $\text{HPO}_4^{2-}$ ,  $\text{HCO}_3^-$ ,  $\text{H}_2\text{PO}_4^-$ ,  $\text{F}^-$ ,  $\text{ClO}_4^-$ ,  $\text{ClO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{C}_2\text{O}_4^{2-}$ , and  $\text{Br}^-$ .