Electronic Supplementary Material (ESI) for Analyst

Supplementary Data

Phosphorescent sensing of Cr^{3+} with protein-functionalized Mn-doped ZnS quantum dots

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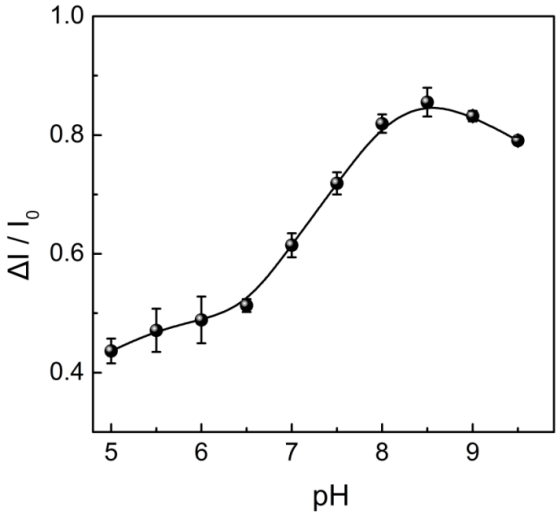

Figure S1 Sample pH-dependent phosphorescence quenching of the dBSA-capped Mn-ZnS QDs by Cr^{3+} (0.3 μM).

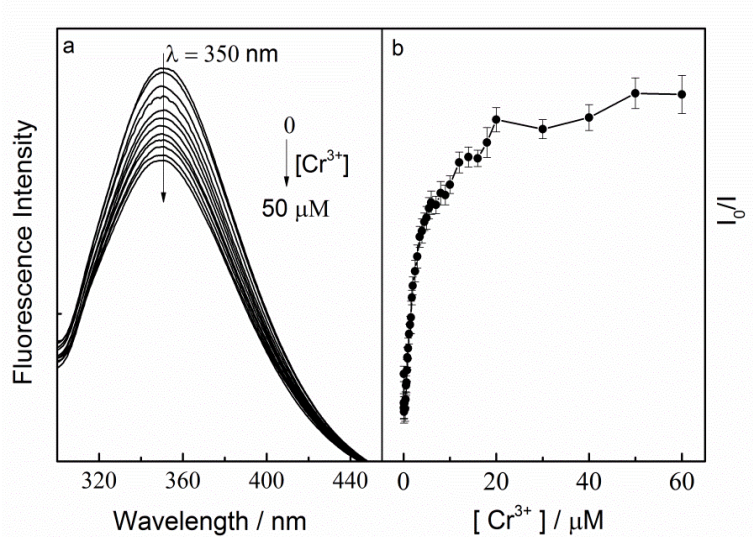

Figure S2 The intrinsic fluorescence of dBSA (λex = 290 nm) was quenched by Cr^{3+}. (a) fluorescence spectra; and (b) variation of the fluorescence intensity *versus* the concentration of Cr^{3+}.

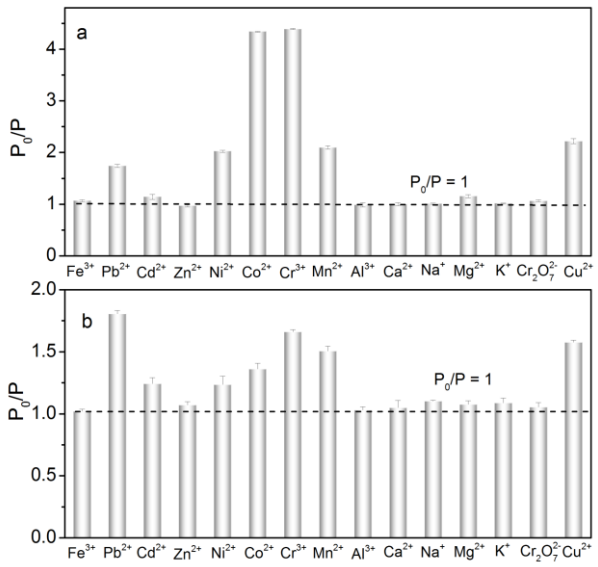

Figure S3 Phosphorescent responses of the uncapped (a, 5 mg/L) and MPA-capped (b, 20 mg/L) Mn-doped ZnS QDs for metal ions. (where the P_0 is the initial phosphorescence intensity of the Mn-doped ZnS QDs in the absence metal ions, P is the phosphorescence intensity in the presence metal ions. 0.3 μM each for Cr^{3+}, Fe^{3+}, Pb^{2+}, Cd^{2+}, Zn^{2+}, Ni^{2+}, Co^{2+}, Mn^{2+} and $Cr_2O_7^{2-}$, 10 mM each for Al^{3+}, Ca^{2+}, Na^{+}, Mg^{2+} and K^{+}.).

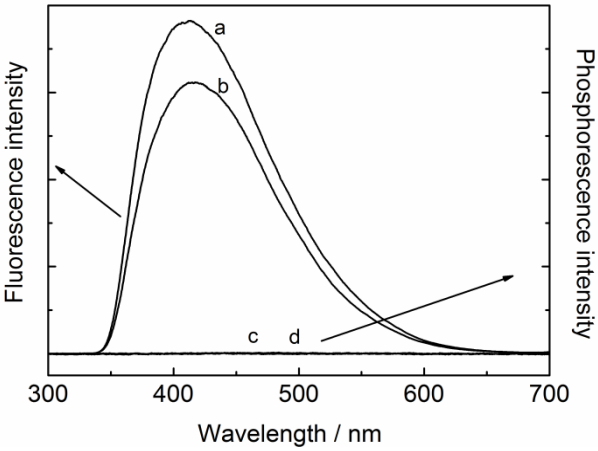

Figure S4 Fluorescence and phosphorescence background of the water samples. (a) and (b), fluorescence background of the tap water and river samples; and (c) and (d), phosphorescence background of the tap water and river samples.

Calculation of the VB and CB of Mn-doped ZnS QDs

The HOMO/LUMO energy levels of the QDs are calculated using the equation:[1]

$$E_{HOMO} = -e(E_{ox}^{onset} + 4.4) \quad (eV)$$
$$E_{LUMO} = -e(E_{red}^{onset} + 4.4) \quad (eV)$$

References

1 Y. C. Li, J. Wen, J. J. Liu, F. Jiang and Y. F. Li, *Prog. Chem.*, 2011, 23, 2215-2224.