

Supplementary Information

Facile preparation of a multifunctional fluorescent nanosensor for chemical and biological applications

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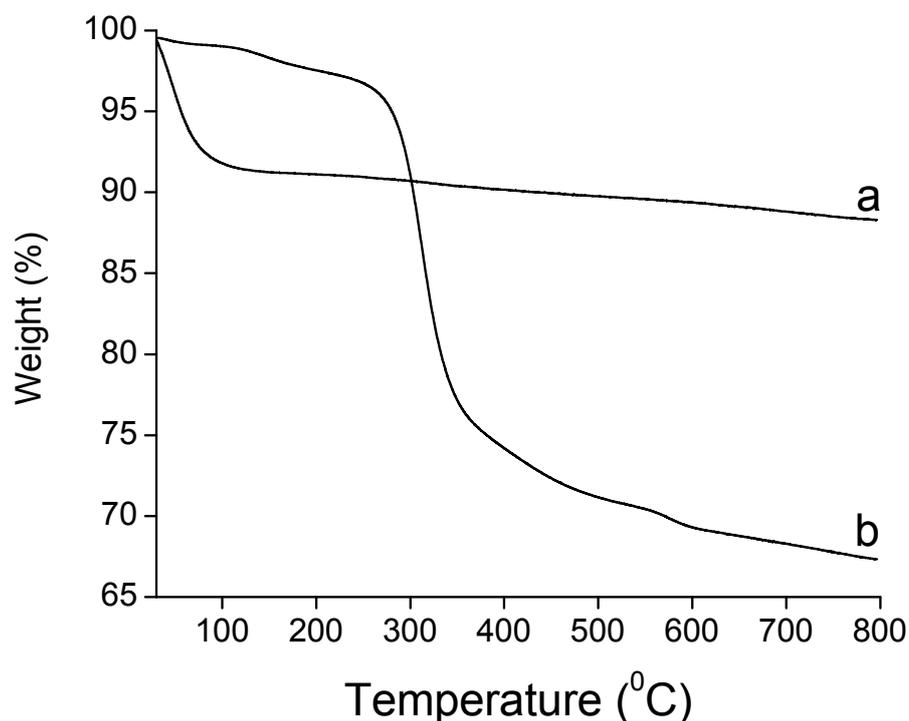


Fig. S1 TGA curves of (a) solvent-extracted SBA-15 and (b) functionalized SBA-15 samples. The amount of functional group in SBA-15 is estimated to be 0.78 mmol g^{-1} . Note: CHNS element analysis data of functionalized SBA-15 (sample **1**) are as follows: C: 20.4 wt%, H: 2.59 wt%, N: 4.23 wt%, S: 2.64 wt%. Thus the atomic ratio is calculated to be C : H : N : S = 20.6 : 31.4 : 3.7 : 1.0, which is in good agreement with the molar composition of organic part of **1**: $\text{C}_{21}\text{H}_{31}\text{N}_4\text{SO}_3$ (MW: 419 g/mol). According to TGA curve b, the amount of organic part (functional group, $\text{C}_{21}\text{H}_{31}\text{N}_4\text{SO}_3$) of **1** is 32.6 wt%. Therefore the moles of organic groups per gram of SBA-15 is calculated to $32.6 \text{ \%}/419 = 0.78 \text{ mmol}$. Namely, the amount of functional group in SBA-15 is 0.78 mmol g^{-1} .

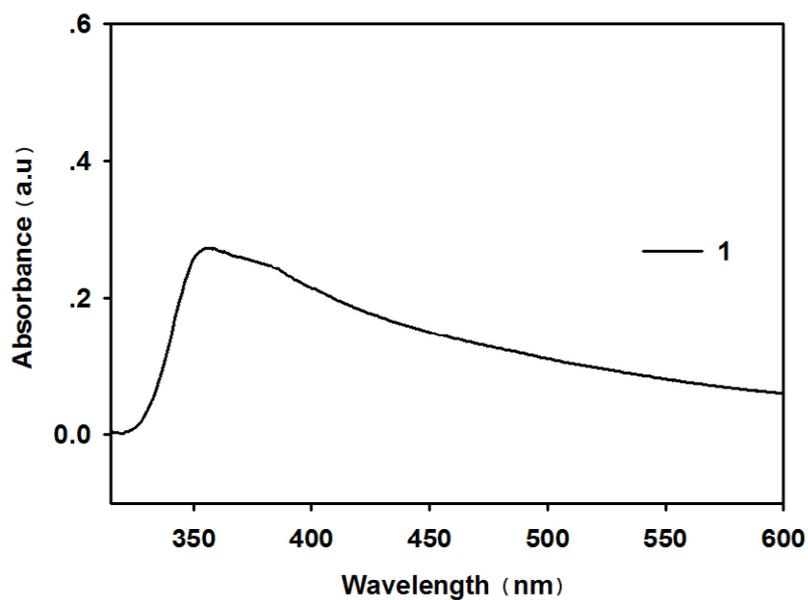


Fig. S2 Absorption spectrum of **1** (0.02 g L^{-1}) suspended in aqueous solution.

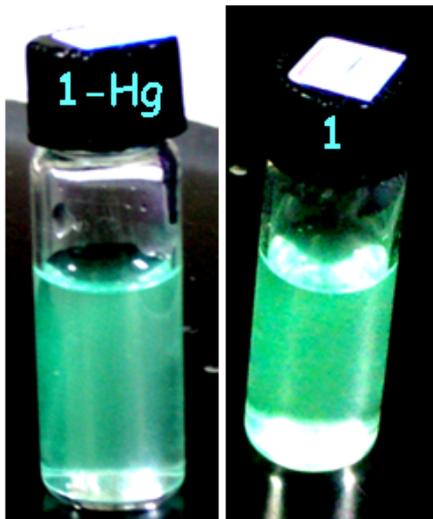


Fig. S3 Photographs of **1** (0.025 g L^{-1} , pH 6.5) in the presence and absence of Hg^{2+} ($5 \times 10^{-5} \text{ M}$) under illumination with 365 nm light.

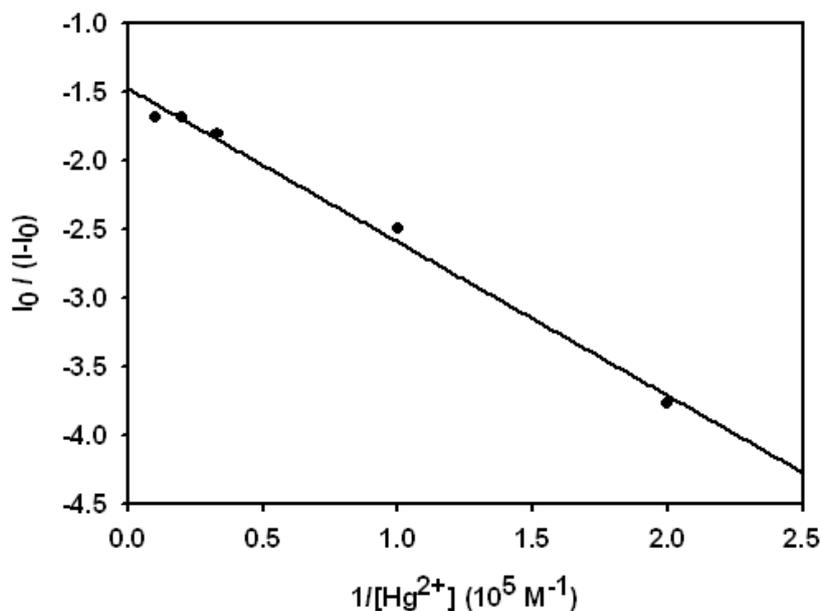


Fig. S4 The plot of $I_0/(I-I_0)$ versus $1/[Hg^{2+}]$. I and I_0 are the fluorescence intensity of **1** at 510 nm in the presence and absence of different amounts of Hg^{2+} ions, respectively.

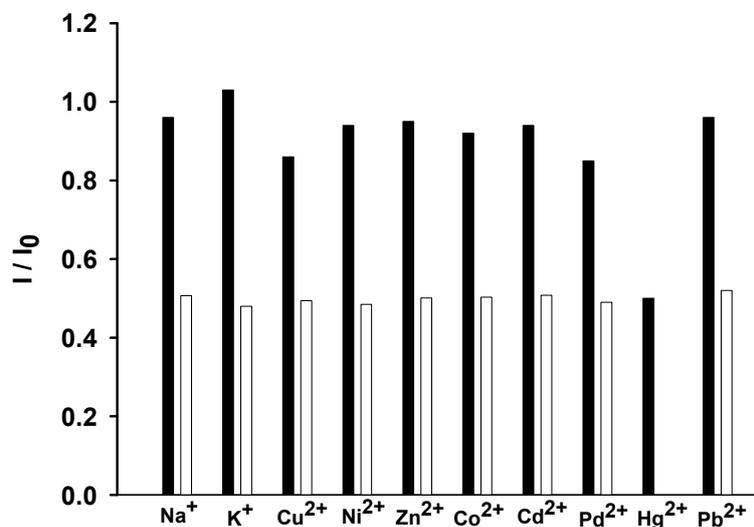


Fig. S5 Fluorescence response of **1** (0.02 g L^{-1}) toward various metal cations (all as chlorides) in aqueous suspensions. I and I_0 are the fluorescence intensity of **1** at 510 nm in the presence and absence of metal cations, respectively. Black bars: each cation ($5 \times 10^{-5} \text{ M}$) was added. White bars: each cation ($5 \times 10^{-4} \text{ M}$) and Hg^{2+} ion ($5 \times 10^{-5} \text{ M}$) were added.

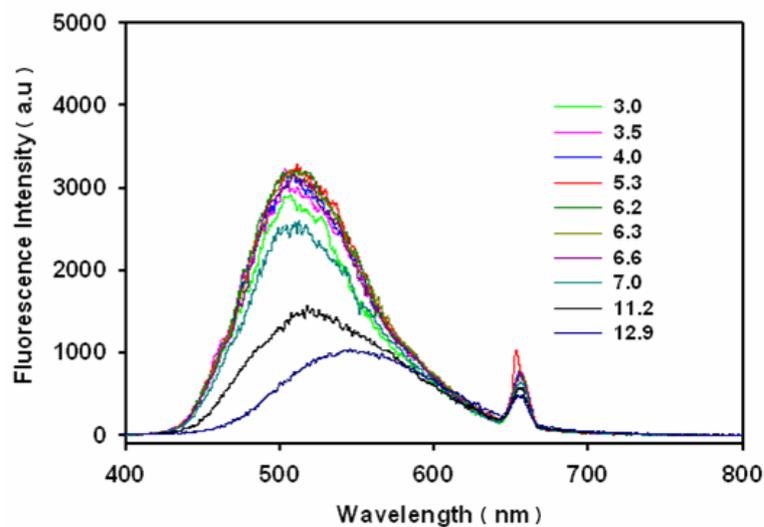


Fig. S6 Fluorescence emission spectra of **1** (0.015 g L^{-1}) at different pH values in aqueous suspensions.

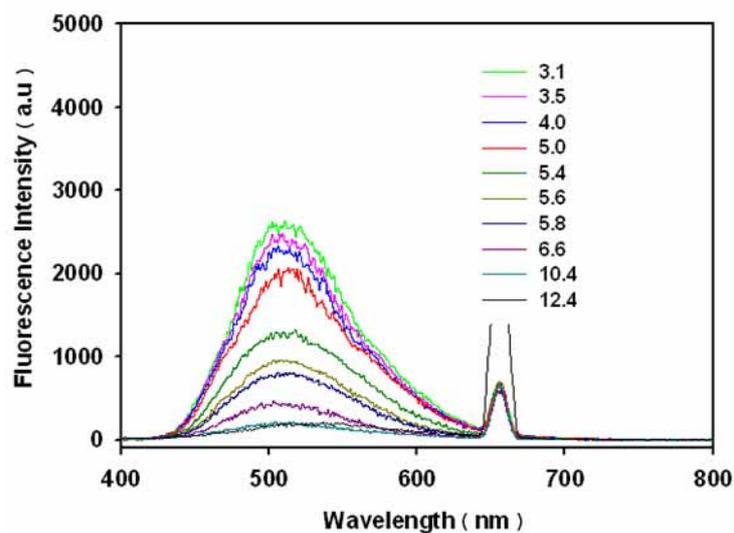


Fig. S7 Fluorescence emission spectra of **1** (0.015 g L^{-1}) in the presence of Hg^{2+} ($5 \times 10^{-5} \text{ M}$) at different pH values in aqueous suspensions.

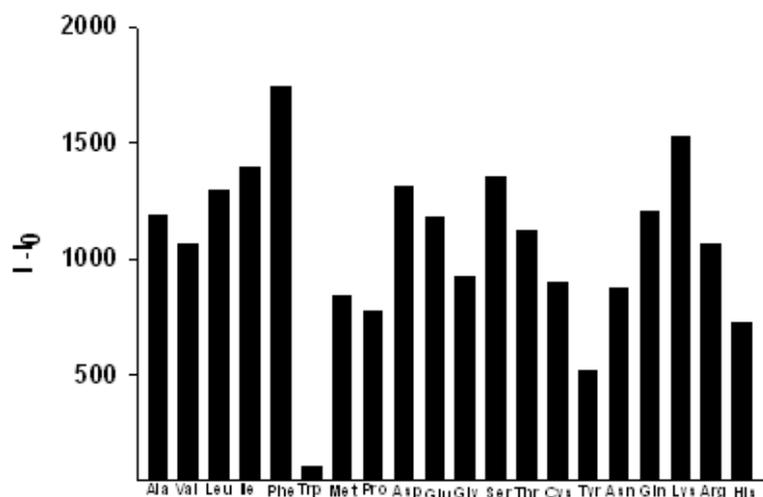


Fig. S8 Fluorescence emission intensity change of 1/Hg²⁺ (0.02 g L⁻¹, 5×10⁻⁵ M, pH 6.5) in the presence of various amino acids in aqueous suspensions.

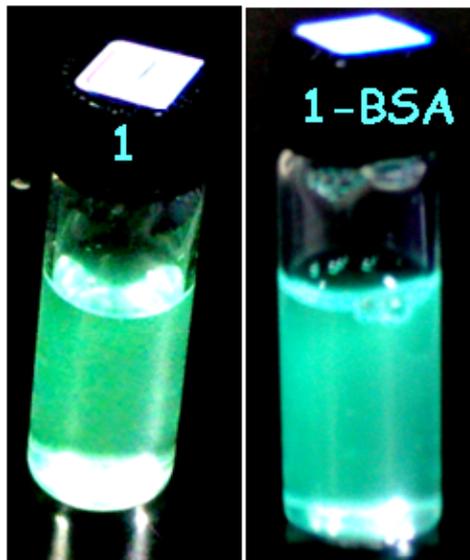


Fig. S9 Photographs of 1 (0.025 g L⁻¹, pH 6.5) in the absence and presence of BSA (2.5×10⁻⁶ M) under illumination with 365 nm light.

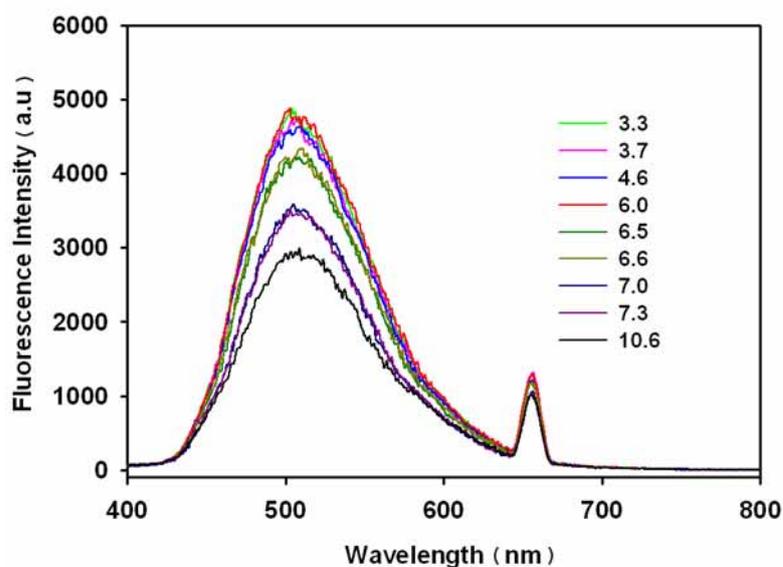


Fig. S10 Fluorescence emission spectra of **1** (0.015 g L^{-1}) in the presence of BSA ($2.5 \times 10^{-6} \text{ M}$) at different pH values in aqueous suspensions.

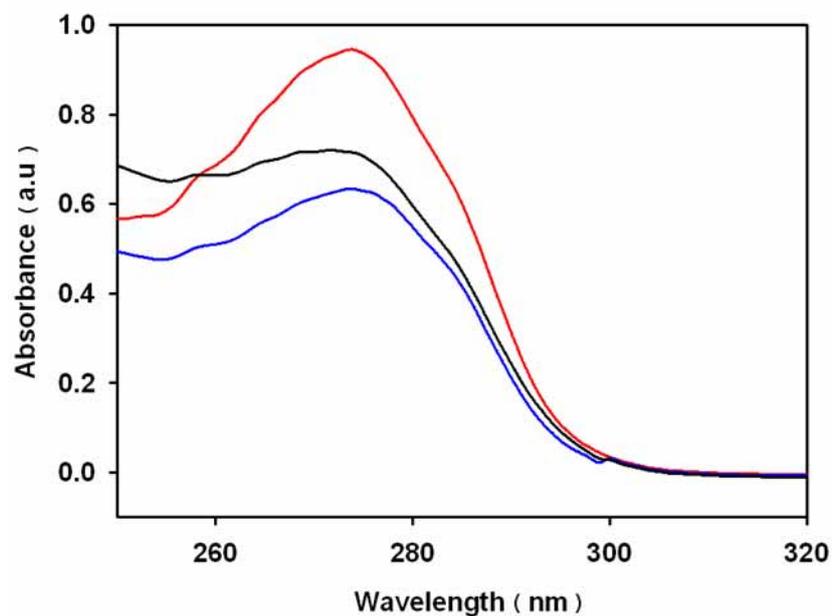


Fig. S11 Absorption spectra of BSA before and after adsorption by **1** and **2**. BSA solution before adsorption (red line), adsorbed by **1** (black line), adsorbed by **2** (blue line). 876 mg g^{-1} of BSA was adsorbed by **1**, 1185 mg g^{-1} of BSA was adsorbed by **2**.