Supporting information for

Rhodamine 6G hydrazone with coumarin unit: a novel single-molecule multianalyte (Cu^{2+} and Hg^{2+}) sensor at different pH value

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Fig. S1 The influence of tested ions on the fluorescence intensity ratio at 550 and 498 nm (F_{550}/F_{498}) of RC1 in CH\textsubscript{3}CN/H\textsubscript{2}O (9/1, v/v, pH = 7.4) solution, excitation wavelength was 445 nm.

Fig. S2 The overlap (shown with vertical stripes) between emission and absorption spectra of the donor and acceptor, respectively.
**Fig. S3** Normalized response of fluorescence ratio calibration value \((R = F_{550}/F_{498})\) for **RC1** as a function of \(\text{Cu}^{2+}\) concentration in \(\text{CH}_3\text{CN}/\text{H}_2\text{O} (9/1, \text{v/v}, \text{pH} = 7.4)\) solution.

**Fig. S4** Normalized response of fluorescence calibration value (intensity at 498 nm) for **RC1** as a function of \(\text{Hg}^{2+}\) concentration in \(\text{CH}_3\text{CN}/\text{H}_2\text{O} (9/1, \text{v/v}, \text{pH} = 10.0)\) solution.
Fig. S5 Job plots of RC1 and Hg$^{2+}$ in CH$_3$CN/H$_2$O (9/1, v/v, pH = 10.0) solution. The total concentration of RC1 and Hg$^{2+}$ were all kept at 5 $\mu$M.

Fig. S6 The Benesi-Hildebrand plot of the RC1-Hg$^{2+}$ complex based on fluorescence intensity at 498 nm.
Fig. S7 ESI-MS spectrum of the sensor RC1 with Cu$^{2+}$ in CH$_3$CN solution.

Fig. S8 ESI-MS spectrum of the sensor RC1 with Hg$^{2+}$ in CH$_3$CN solution.
Fig. S9 Partition of $^1$H NMR spectrum of the sensor RC1 with and without Hg$^{2+}$ in DMSO-$d_6$ solution.

Fig. S10 The effect of pH (2.0-11.0) on the fluorescence ratio ($F_{550}/F_{498}$) of 5 μM probe RC1 with 5 equiv. Cu$^{2+}$ in CH$_3$CN/H$_2$O (9/1, v/v, pH = 7.4) solution.
**Fig. S11** The effect of pH (2.0-11.0) on the relative fluorescence intensity of 5 μM probe RC1 with 5 equiv. Hg²⁺ in CH₃CN/H₂O (9/1, v/v, pH = 10.0) solution.

**Fig. S12** The effect of 5 equiv. coexistent metal cations on the relative fluorescence intensity of 5 μM RC1 with 5 equiv. Cu²⁺ in CH₃CN/H₂O (9/1, v/v, pH = 7.4) solution.
**Fig. S13** The effect of 5 equiv. coexistent metal cations on the relative fluorescence intensity of 5 μM RC1 with 5 equiv. Hg$^{2+}$ in CH$_3$CN/H$_2$O (9/1, v/v, pH = 10.0) solution.

**Fig. S14** Time course for the fluorescence ratio change (F$_{550}$/F$_{498}$) of 5 μM RC1 upon the addition of 5.0 equiv. Cu$^{2+}$ in CH$_3$CN/H$_2$O (9/1, v/v, pH = 7.4) solution at room temperature.
**Fig. S15** Time course for the fluorescence response at 498 nm of 5 μM RC1 upon the addition of 5.0 equiv. Hg$^{2+}$ in CH$_3$CN/H$_2$O (9/1, v/v, pH = 10.0) solution at room temperature.

**Fig. S16** Fluorescence response of Cu$^{2+}$ ions (5 eq.) to the sensor RC1 (5 μM) with and without Na$_2$EDTA (5 eq.) in CH$_3$CN/H$_2$O (9/1, v/v, pH = 10.0) solution.
Fig. S17 Fluorescence intensity changes (490 nm) of R1 (5 μM) upon alternating addition of Hg$^{2+}$ (5 eq.)/EDTA (5 eq.) in CH$_3$CN/H$_2$O (9/1, v/v, pH = 10.0) solution.

Fig. S18 $^1$H NMR spectrum of R1 in DMSO-$d_6$ solution.
Fig. S19 ESI-MS spectrum of RC1 in CH$_3$CN solution.