Supporting Information

An efficient ruthenium(II) tris(bipyridyl)-based chemosensor for the specific detection of cysteine and its luminescence imaging in living zebrafish

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Fig. S1. $^1$H-NMR spectrum of Ru-E in the solution of D$_2$O and d$_6$-DMSO (v/v=5:1).
Fig. S2. $^{13}$C-NMR spectrum of complex Ru-E in CD$_3$CN.
Fig. S3. TOF-Mass spectrum of complex Ru-E in H₂O. The peaks at m/z = 415.1021 corresponds to [Ru-E]²⁺.
Fig. S4. The UV-Vis titration profiles for Ru-E (5 μM) in the presence of varying Cys amounts (0, 0.4, 0.8, 1.2, 1.6, 2 equiv.).

Fig. S5. The relationship between emission intensity at 620 nm Ru-E (10 μM) and Cys amount.

\[ Y = 14.60909 + 152.60909X \]
\[ R = 0.99968 \]
Fig. S6. Luminescence intensity of Ru-E (10 μM) in HEPES solutions (10 mM) at each concentration of Cys added, normalized between the minimum fluorescence intensity and the maximum fluorescence intensity. The linear fit was drawn by taking the seven points ([Cys] = 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 2.0 equiv.) of the linear region and the detection limit was determined to be $3.2 \times 10^{-6}$ M$^{[1-3]}$.

Fig. S7. The luminescence response of Ru-E (10 μM) in the absence or presence of Cys over two hours.
Fig. S8. Luminescence response of 10 μM Ru-E upon addition of Cys (50 μM) or excess of common cations (100 μM).

Fig. S9. Luminescence response of 10 μM complex Ru-E upon addition of Cys (50 μM) or excess of common anions (100 μM).
Fig. S10. Job plot for determining the stoichiometry of Ru-E and Cys in HEPES solution. The total concentration of Ru-E and Cys is 10 μM.

Fig.S11. $^1$H-NMR spectrum of complex Ru-E after addition of excess of Cys in the solution of D$_2$O and d$_6$-DMSO (v/v=5:1).
Fig. S12. TOF-Mass spectrum of complex Ru-E after addition of Cys in H₂O. The peaks at m/z = 536.1227 corresponds to the addition product [Ru-Cys]²⁺.
Fig. S13. Cell viability treated with different concentrations of Ru-E (20, 40, 60, 80 and 100 μM) in BMSC cells.
Fig. S14. A: Emission spectra of probe Ru-E (10 μM) upon addition of different amounts (5, 10, 20, 30, 40, 50 or 60 μL) of reduced newborn-calf serum solution to the HEPES buffer solution (10 mM, pH 7.4). The inset shows a linear relationship between the emission intensity and the volume of reduced newborn-calf serum added. B: Emission spectra of probe Ru-E (10 μM) only (black), the reduced serum solution (40 μL) only (red), Ru-E (10 μM) with the addition of P(Ph)₃ (green), and Ru-E (10 μM) with the addition of reduced serum solution (40 μL) (blue) in HEPES buffer solution (10 mM, pH 7.4).

References