Two structural types of lanthanide MOFs based on long chain flexible sebacic acid: Syntheses, luminescence, sensing, and magnetic properties

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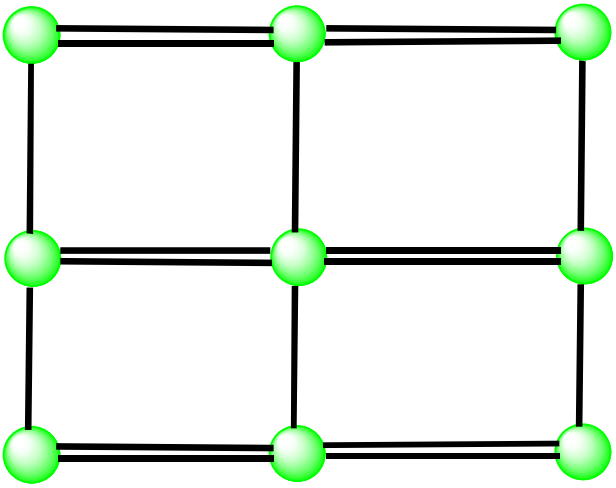
The pretreatment process of sample detection：

Ferrous sulfate tablet purchased from the market：A tablet (0.3 g) is removed the outer sugar coating, and grinded it into a powder using a mortar. The powder sample is dissolved in 25 mL water and sonicated for 15 minutes, and then centrifuged to remove insoluble impurities. After Fe^{2+} ion in solution is oxidized with 30 % H_2O_2 to form Fe^{3+} ion, the solution is diluted to a final volume of 250 mL for testing use. The concentration of **2b** or **2d** is 375 μg/mL for the luminescent testing.

An iron-rich oral liquid purchased from the market: Fe^{2+} ion of iron-rich oral liquid (10 μL) is oxidized with 30 % H_2O_2 to form Fe^{3+} ion and then diluted to a final volume of 250 mL for testing use.

Three-spring lake water: 100 mL of Sanchun Lake water is taken and stood for 48 h, and then centrifuged to remove insoluble impurities. The supernatant is heated to a slightly boiling state and then stood. After cooling to room temperature, the supernatant is applied for testing use.



Schematic S1. The sql topological net with the single edges and double edges.

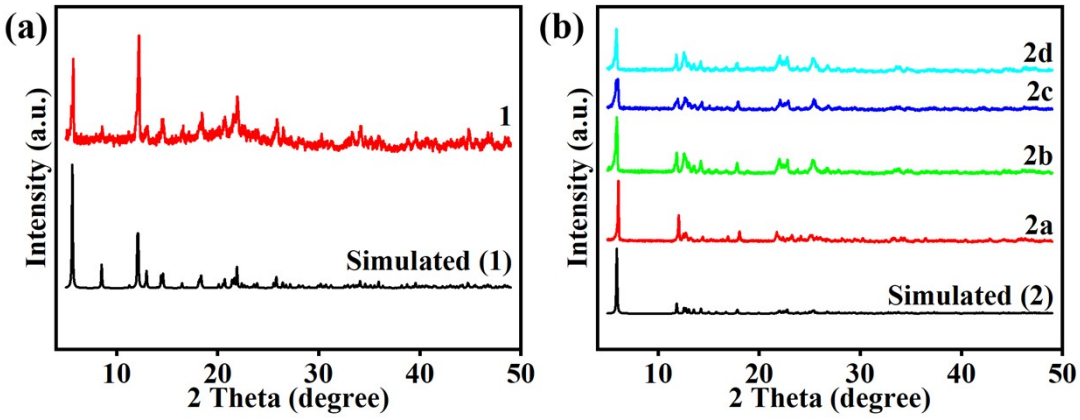


Fig. S1. Simulated and experimental PXRD patterns of **1** (a) and **2** (b).

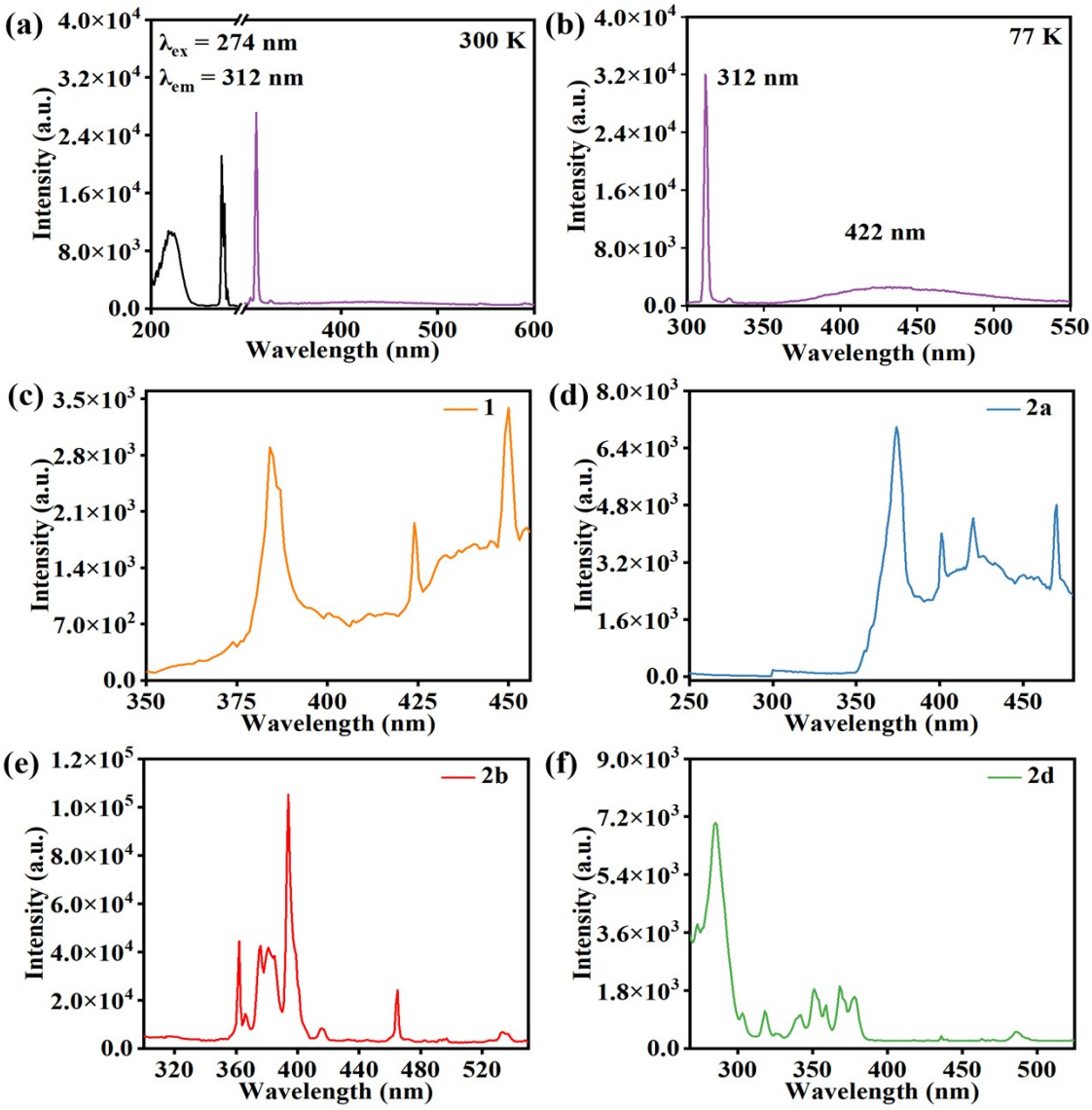


Fig. S2. Emission spectra and excitation spectrum of **2c** at room temperature (a) and 77 K (b). Excitation spectrum of **1** (c), **2a** (d), **2b** (e), **2d** (f), showing weak f-f transition of Ln^{3+} ions.

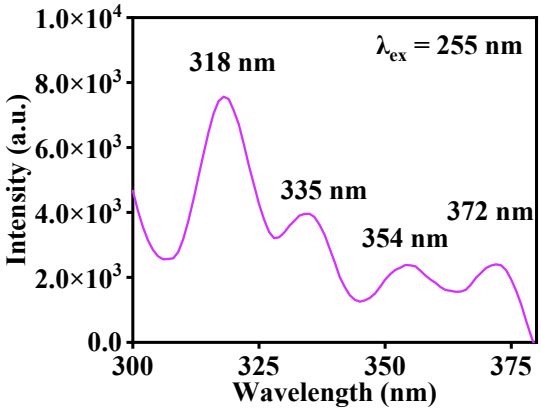


Fig. S3. Emission spectrum of H_2Seb ligand.

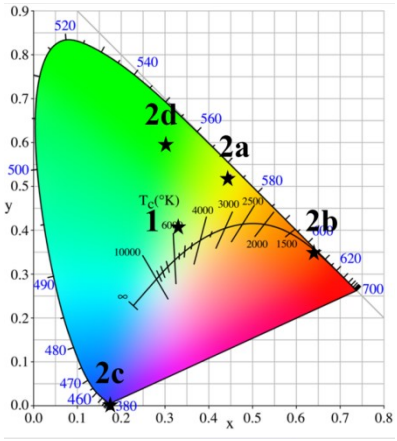


Fig. S4. CIE diagram of **1-2**.

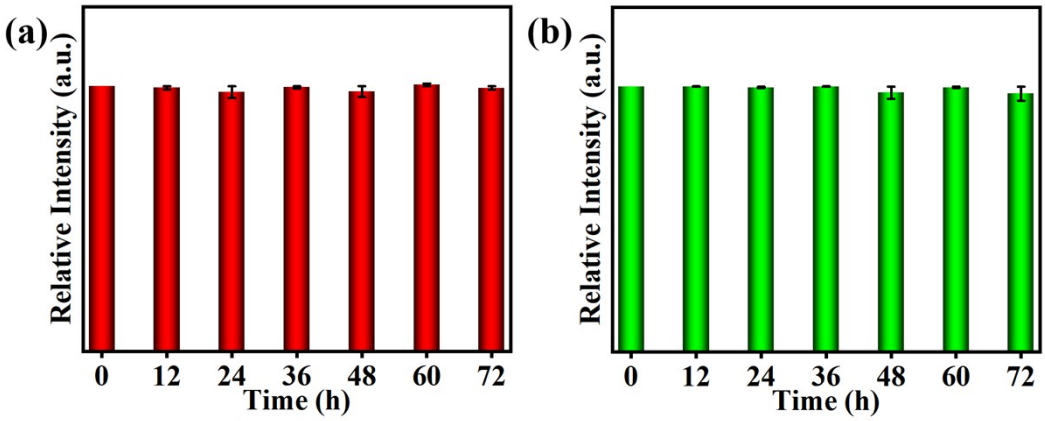


Fig. S5. The Relative luminescent intensity of **2b** (a) and **2d** (b) immersed in water for different times.

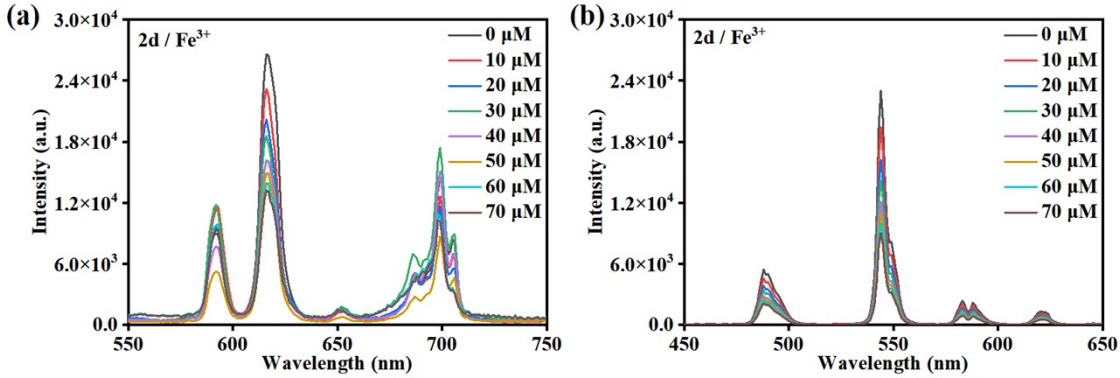


Fig. S6. The luminescent intensity of **2b** and **2d** is gradually decreased with the increase of Fe^{3+} concentration.

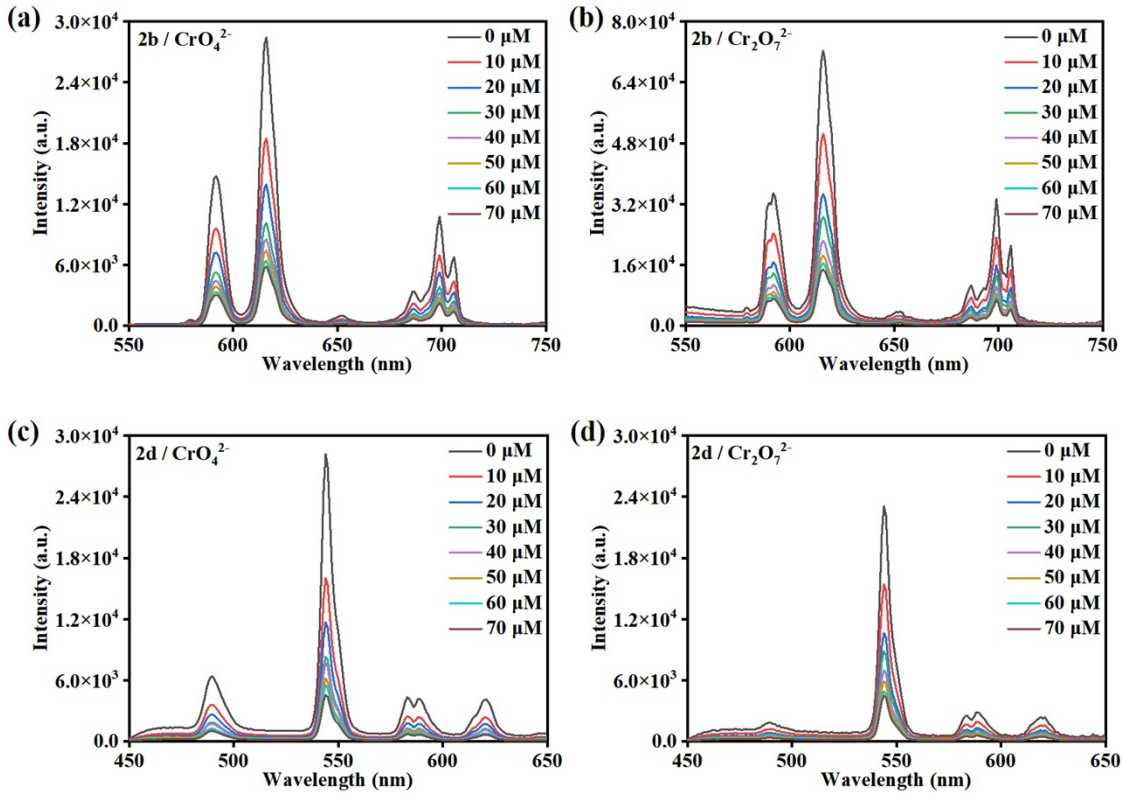


Fig. S7. The luminescent intensity of **2b** and **2d** is gradually decreased with the increase of CrO_4^{2-} / $Cr_2O_7^{2-}$ concentration.

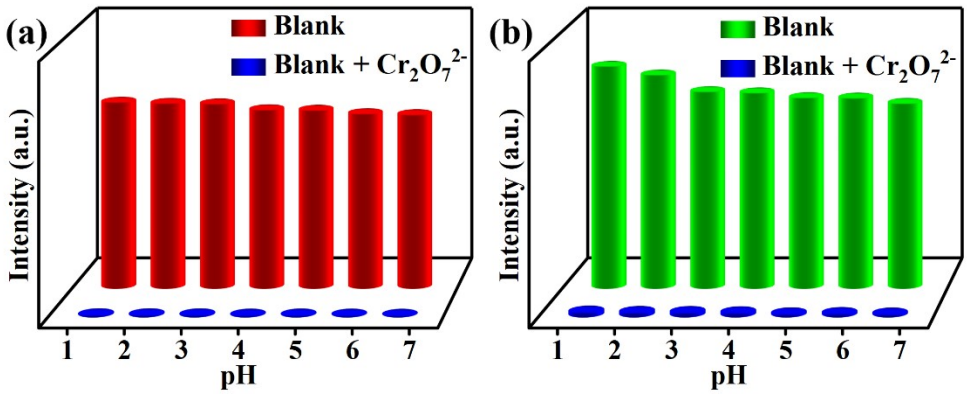


Fig. S8. Effect of pH =1 ~ 7 on the luminescent intensity of **2b** (a) and **2d** (b) with and without the $Cr_2O_7^{2-}$.

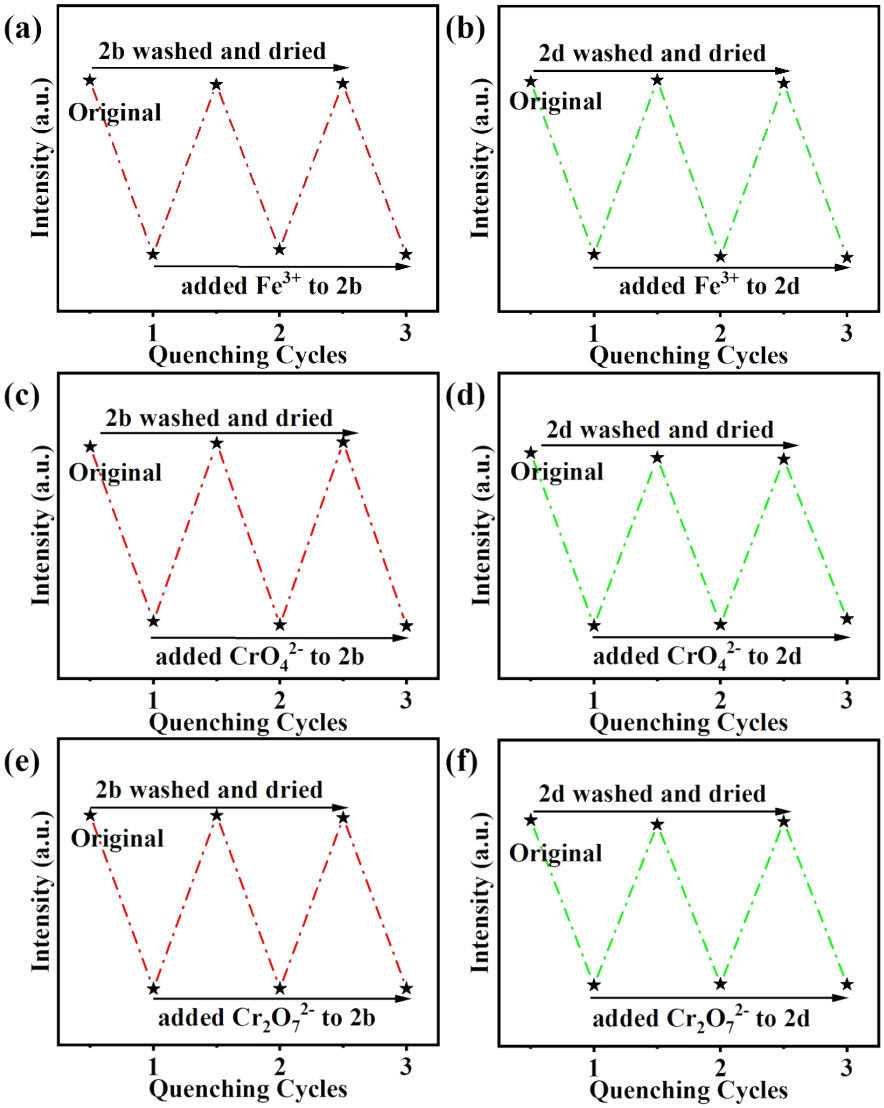


Fig. S9. Luminescent intensity of **2b** and **2d** after three recycles.

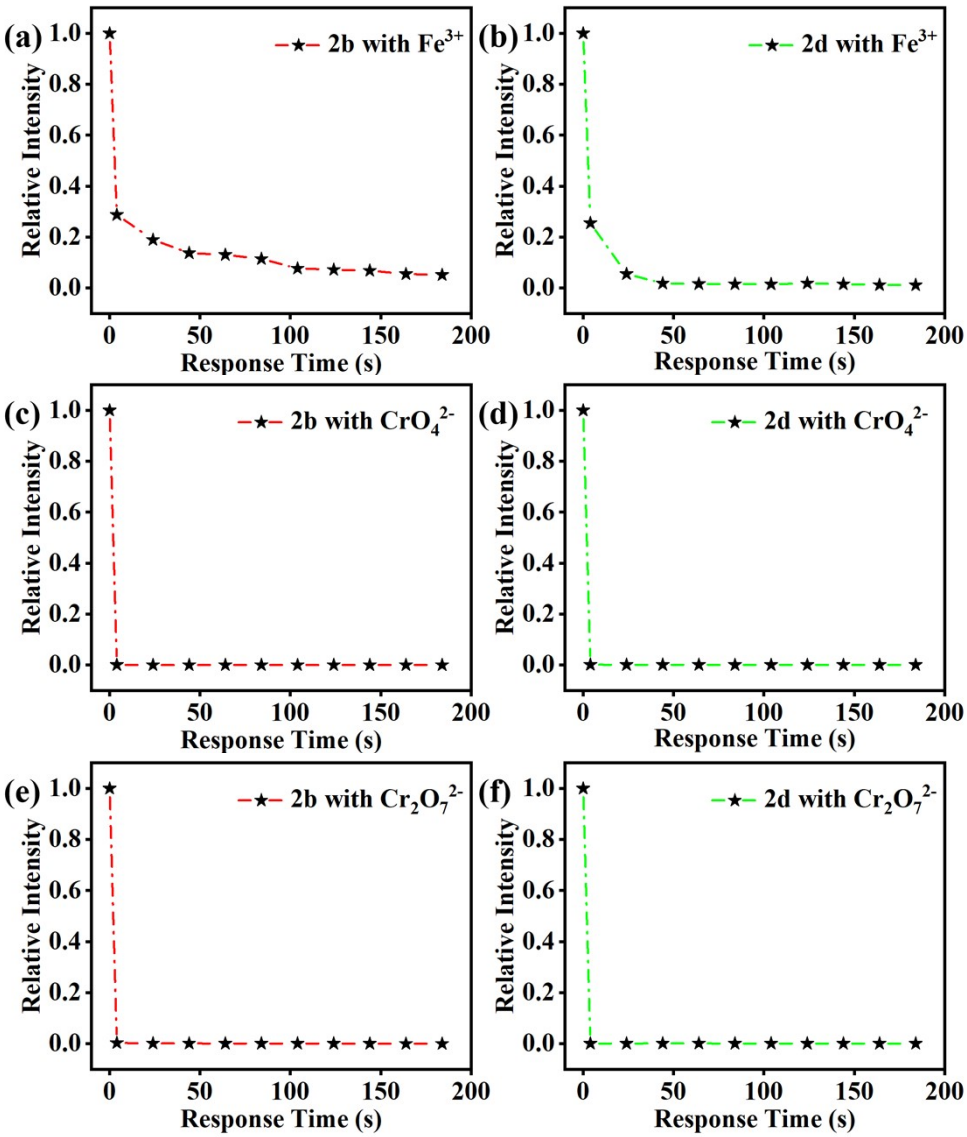


Fig. S10. The response time of **2b** and **2d** after adding Fe^{3+}, CrO_4^{2-} or $Cr_2O_7^{2-}$.

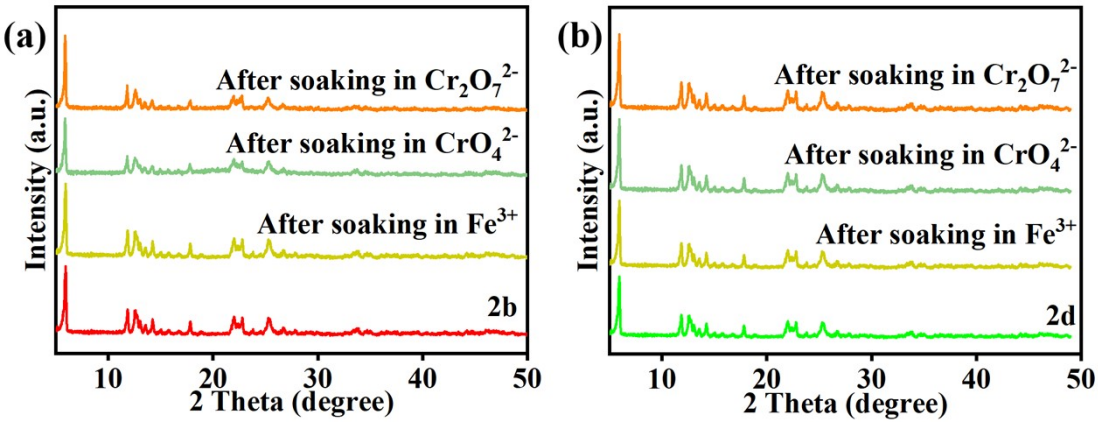


Fig. S11. The PXRD of **2b** (a) and **2d** (b) before and after soaking in Fe^{3+}, CrO_4^{2-}, or $Cr_2O_7^{2-}$.

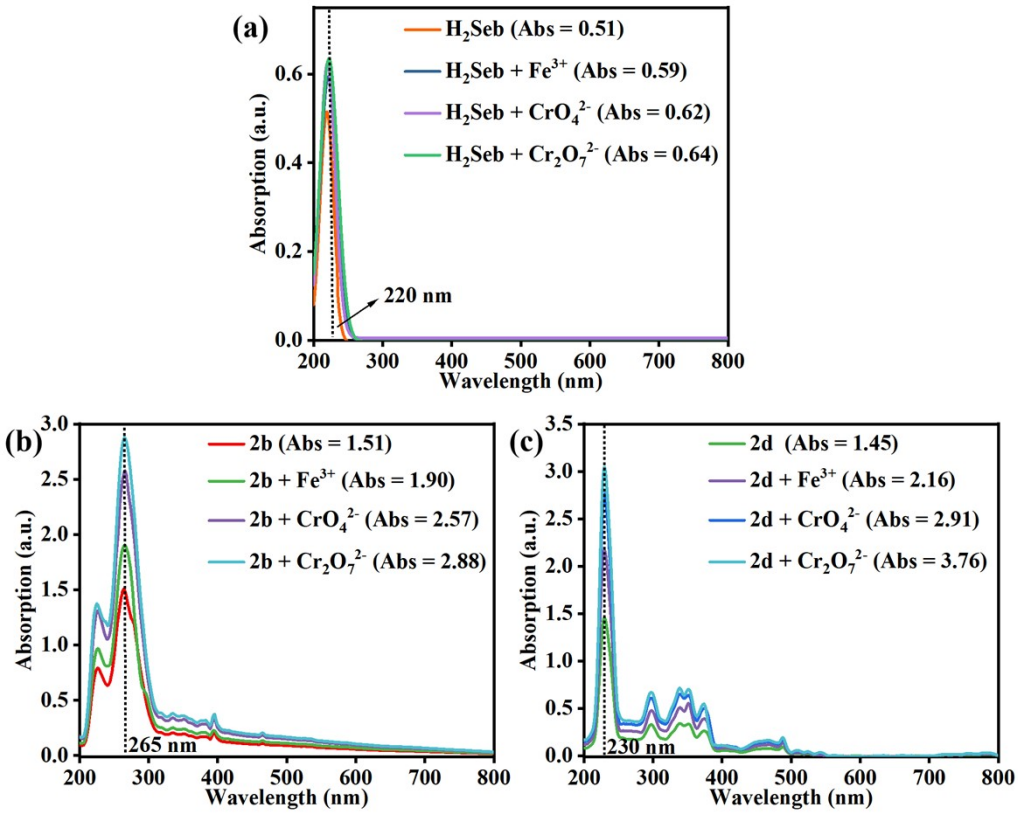


Fig. S12. UV / vis absorption spectra of H_2Seb, $H_2Seb + Fe^{3+}$, $H_2Seb + CrO_4^{2-}$, and $H_2Seb + Cr_2O_7^{2-}$ (a); UV / vis absorption spectra of **2b**, **2b** + Fe^{3+}, **2b** + CrO_4^{2-}, and **2b** + $Cr_2O_7^{2-}$ (b); UV / vis absorption spectra of **2d**, **2d** + Fe^{3+}, **2d** + CrO_4^{2-}, and **2d** + $Cr_2O_7^{2-}$ (c).

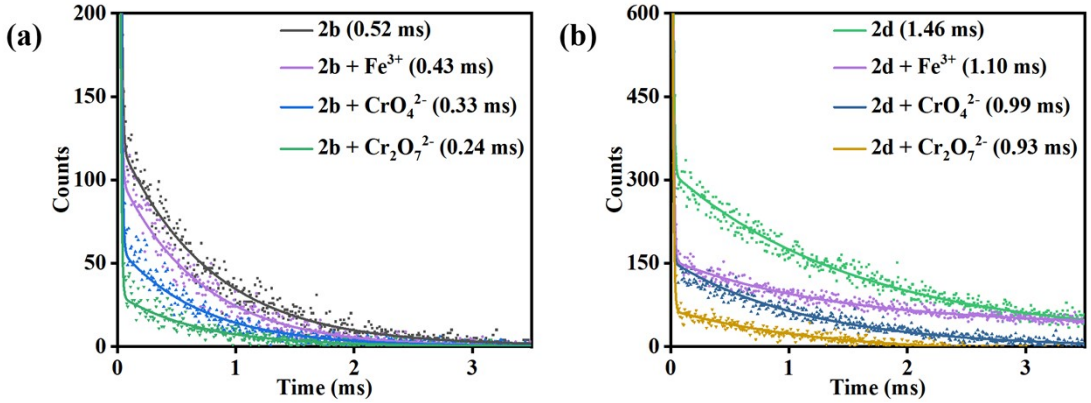


Fig. S13. Luminescence lifetime measurements for **2b**, **2b** + Fe^{3+}, **2b** + CrO_4^{2-}, and **2b** + $Cr_2O_7^{2-}$ (a). Luminescence lifetime measurements for **2d**, **2d** + Fe^{3+}, **2d** + CrO_4^{2-}, and **2d** + $Cr_2O_7^{2-}$ (b). The concentration is 375 μg/mL for the **2b** or **2d**, and 4 μM for analyte.

Table S1. Regarding the fitting components of luminescence lifetime measurements.

Sample	τ_1 (ms)	Proportion of τ_1 (%)	τ_2 (ms)	Proportion of τ_2 (%)	Amplitude 1	Amplitude 2	τ^* (ms)	Residual DF
2b	0.0100	33.47	0.77	66.53	4995.30	124.55	0.52	482
2b + Fe^{3+}	0.0088	37.64	0.69	62.36	4961.84	105.12	0.43	482
2b + CrO_4^{2-}	0.0097	53.89	0.69	46.11	5018.27	60.11	0.33	482
2b + $Cr_2O_7^{2-}$	0.0084	66.40	0.69	33.60	5026.42	31.25	0.24	482
2d	0.0087	7.99	1.59	92.01	4730.54	299.17	1.46	482
2d + Fe^{3+}	0.0089	20.96	1.39	79.04	4920.66	118.29	1.10	482
2d + CrO_4^{2-}	0.0068	15.23	1.16	84.77	4817.60	156.67	0.99	482
2d + $Cr_2O_7^{2-}$	0.0085	28.95	1.31	71.05	4938.46	79.20	0.93	482

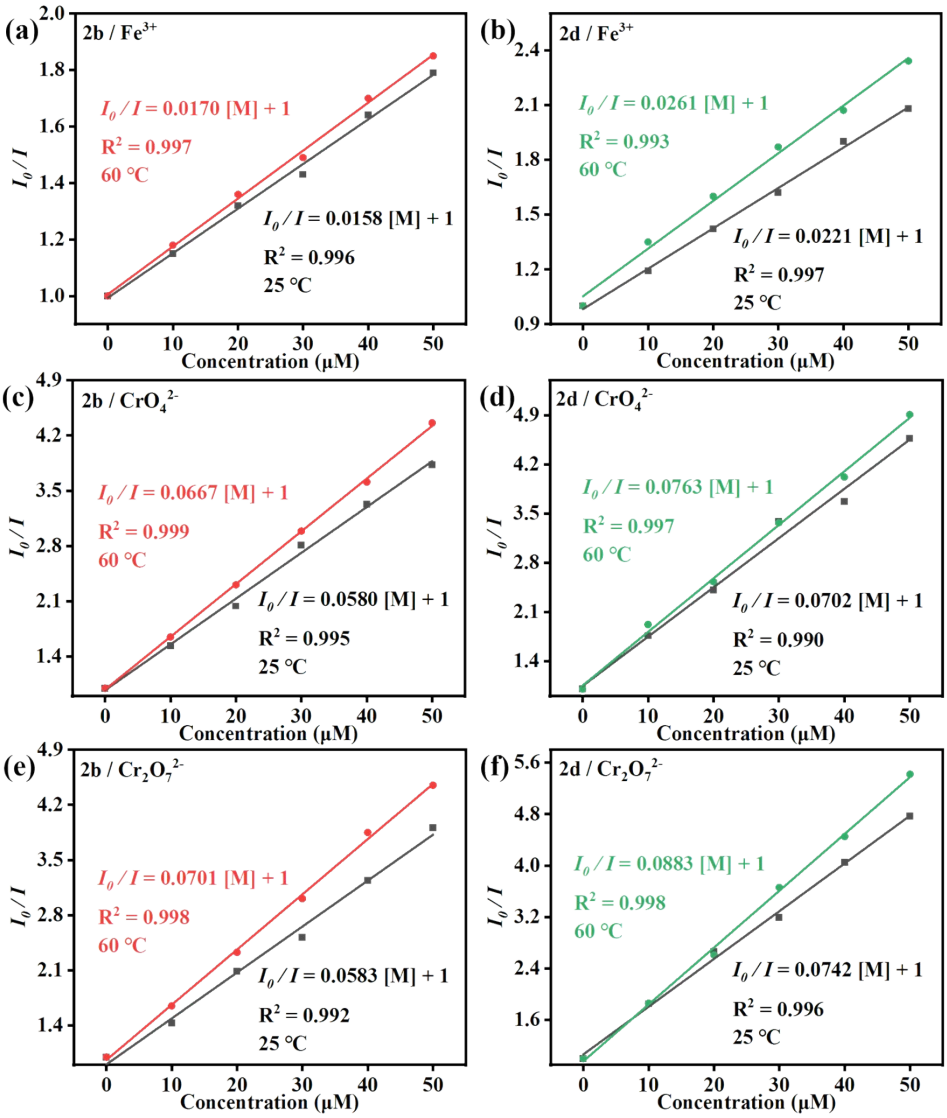


Fig. S14. The linear correlation between I_0/I *vs* concentration of Fe^{3+} (a), CrO_4^{2-} (c) or $Cr_2O_7^{2-}$ (e) for **2b**, and Fe^{3+} (b), CrO_4^{2-} (d) or $Cr_2O_7^{2-}$ (f) for **2d**.

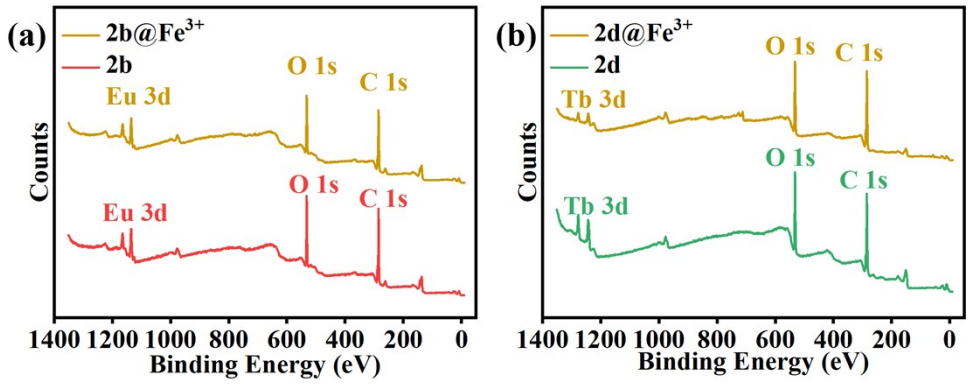


Fig. S15. The XPS of **2b** (a) and **2d** (b) before and after soaking in Fe^{3+} solution for 24 h.