Supporting Information

A Water-Stable 2-Fold Interpenetrating cds Net as a Bifunctional Fluorescence-Responsive Sensor for Selective Detection of Cr(III) and Cr(VI) Ions

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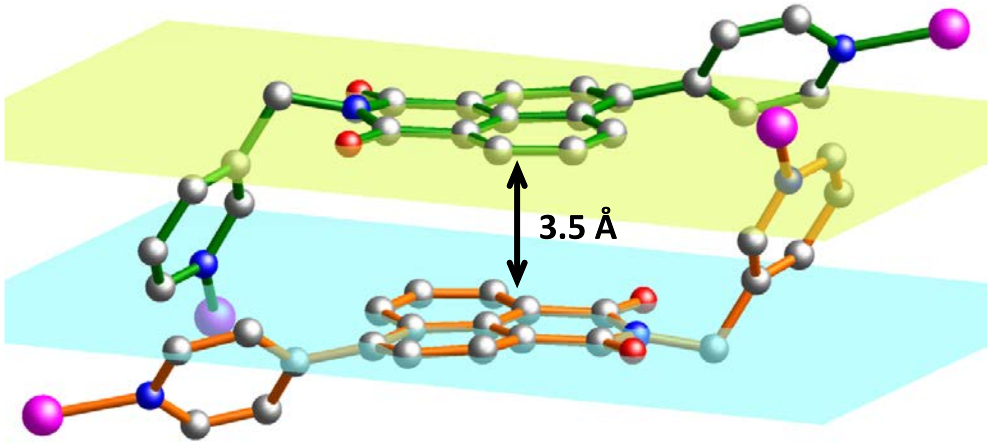


Figure S1. Plot of the inter-net π–π interactions between two neighboring naphthalimide skeletons in the two independent identical **cds** frameworks in the crystal structure of **1**.

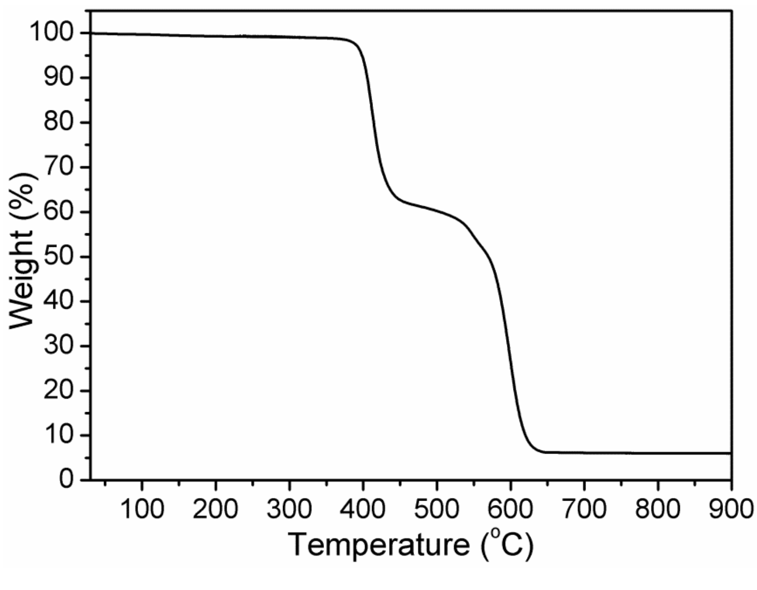


Figure S2. TG curve of **1**.

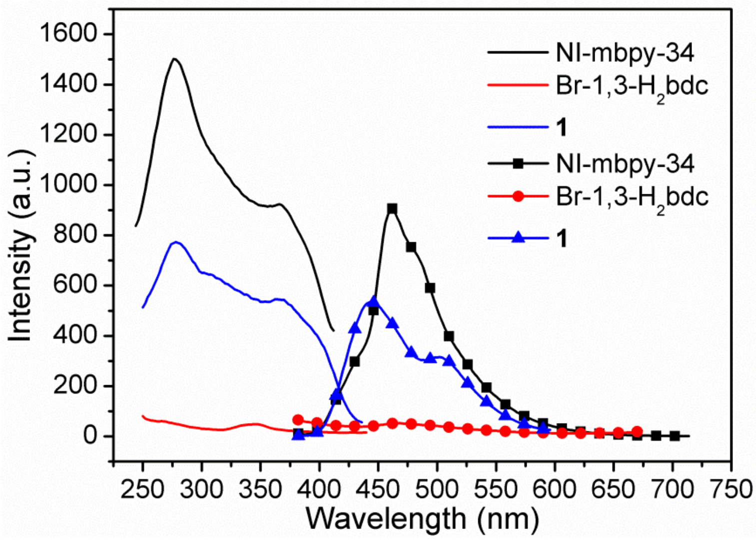


Figure S3. Solid-state excitation (solid lines) and emission spectra (solid lines with symbols) of NI-mbpy-34, Br-1,3-H_2bdc, and **1** at room temperature.

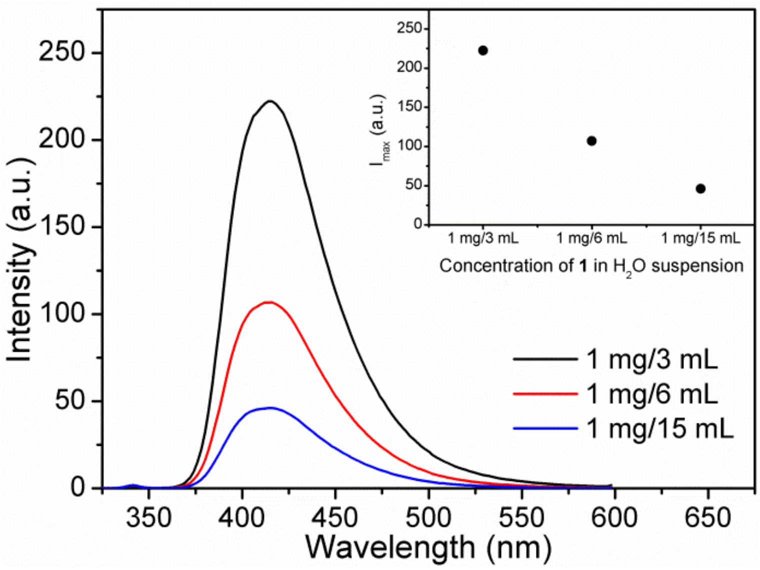


Figure S4. Fluorescence emission spectra of **1** in H_2O suspensions of different concentrations at room temperature upon excitation at 306 nm. Inset: Fluorescence relative ratio responses of **1** in H_2O suspensions of different concentrations.

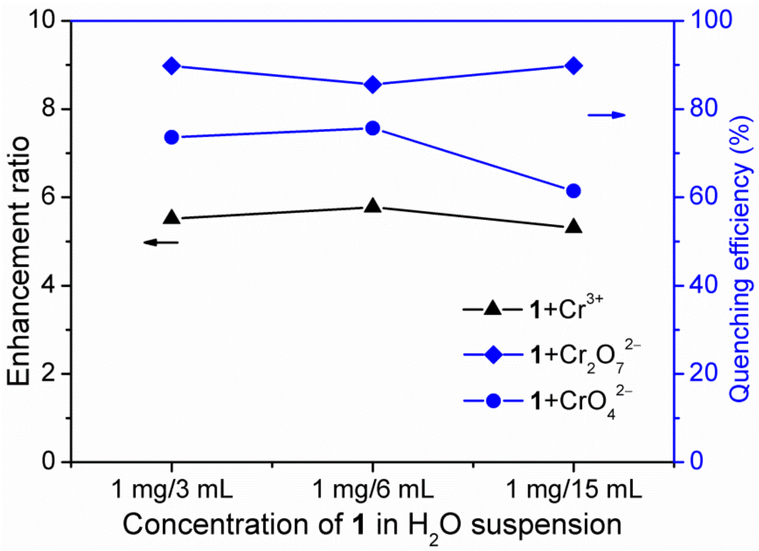
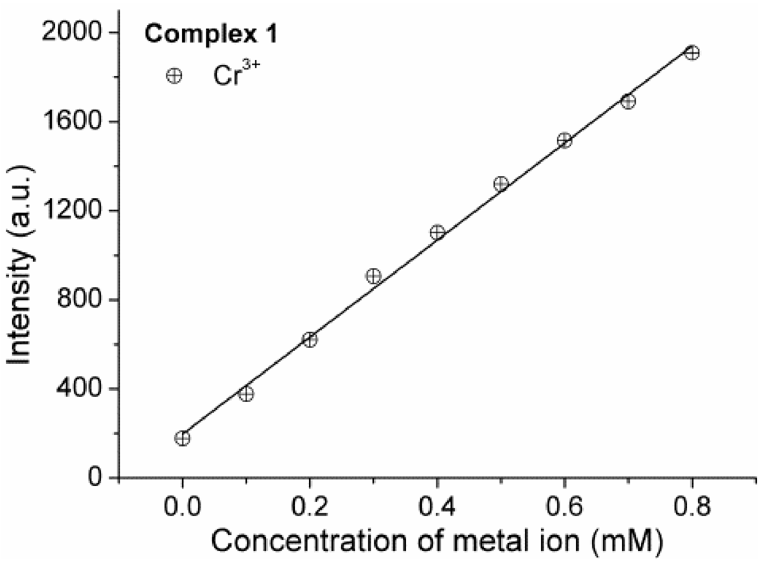


Figure S5. Effect of the concentration of **1** in H_2O suspension on the fluorescence intensity responses upon addition of Cr^{3+} ions (enhancement) and Cr(VI) anions (quenching) at 1.0 mM.



Blank readings	Cr^{3+}
#1	177.8
#2	176.9
#3	174.2
#4	174.5
#5	172.1
Standard deviation (σ)	2.27
$\lvert$ **Slope (*k*)** $\rvert$	2178.4
R^2	0.99631
LOD ($3\sigma/k$), μM (ppb)	3.13 (162.9)

Figure S6. Linear region of fluorescence intensity for the H_2O suspensions of complex **1** upon incremental addition of Cr^{3+} ions. The following table lists the relevant parameters of LOD for the H_2O suspensions of complex **1** toward Cr^{3+} ions. Conditions: λ_{em} = 414 nm (λ_{ex} = 280 nm).

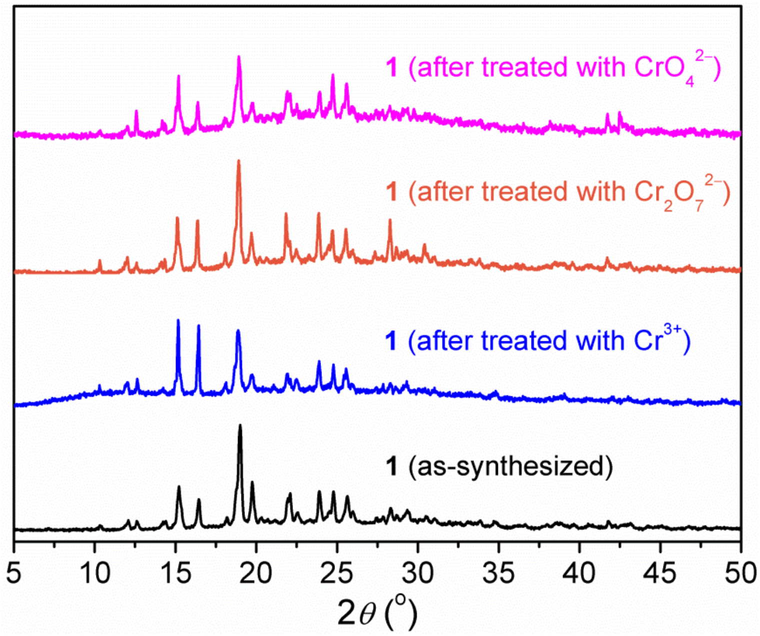


Figure S7. XRPD patterns of **1** before and after immersing in Cr^{3+}, $Cr_2O_7^{2-}$, and CrO_4^{2-} aqueous solutions for 24 h.

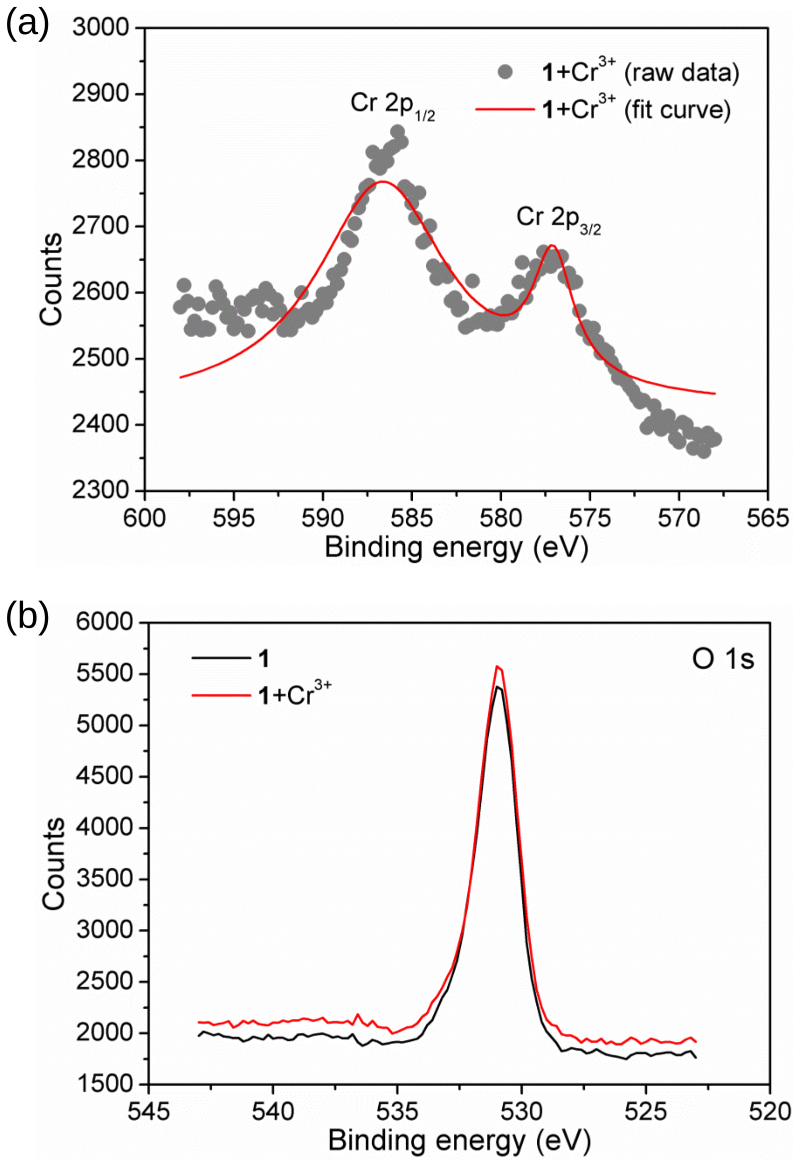


Figure S8. (a) XPS high resolution spectra of Cr 2*p* for **1** after sensing Cr^{3+}. (b) XPS high resolution spectra of O 1*s* for **1** before and after sensing Cr^{3+}.

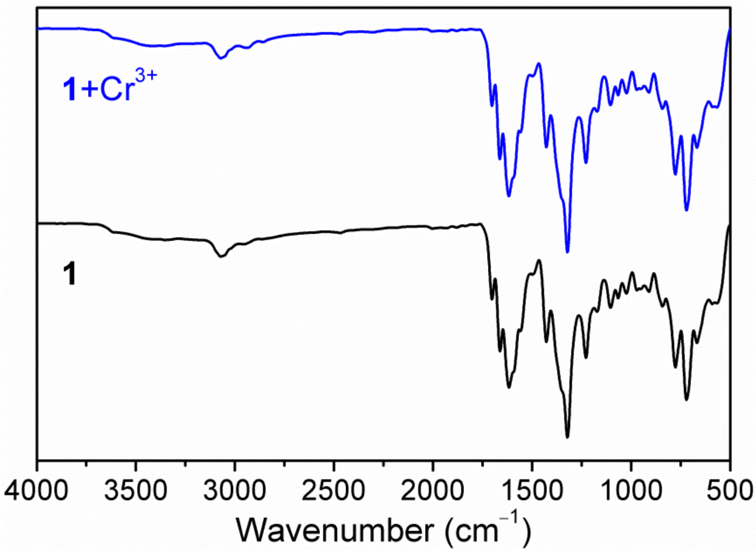


Figure S9. IR spectra of **1** before and after immersing in Cr^{3+} aqueous solution for 24 h.

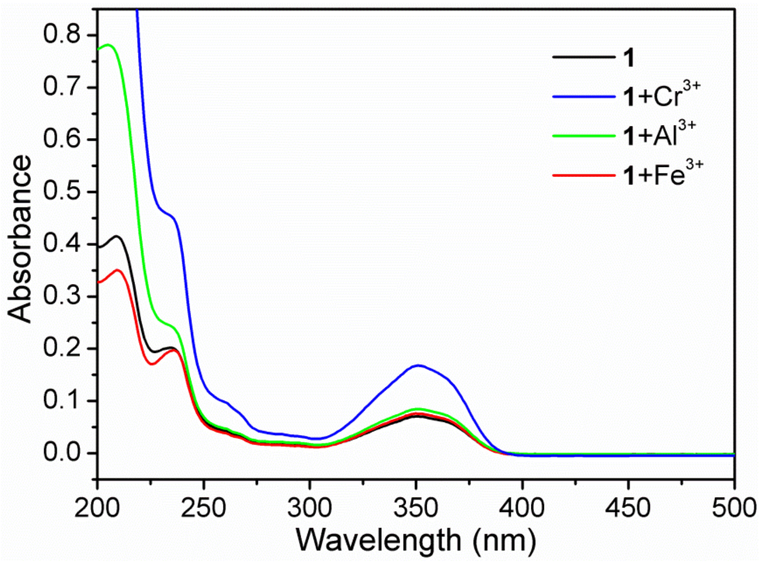


Figure S10. UV-vis spectra of **1** before and after immersing in Cr^{3+}, Al^{3+}, Fe^{3+} aqueous solutions for 24 h.

Influence of Cr^{3+} detection in the coexistence of Cr(VI) anions and vice versa

The influence of Cr^{3+} detection in the coexistence of Cr(VI) anions and vice versa using the well-prepared H_2O suspension of **1** (1 mg/3 mL) as sensor was studied. Interference experiments were carried out in two different ways: (1) adding the interfering ions firstly and then adding the analyte ions; (2) adding the mixture of analyte and interfering ions. The concentrations of analyte and interfering ions both are 1.0 mM. Before and after addition of interfering/analyte ions, the photoluminescence spectra were obtained at an excitation wavelength of 306 nm in each step. As shown in Figure S11, experimental results clearly indicate that Cr(VI) anions strongly interfere with Cr^{3+} detection while Cr^{3+} ions cause no interference on the detection of Cr(VI) anions ($Cr_2O_7^{2-}$, CrO_4^{2-}).

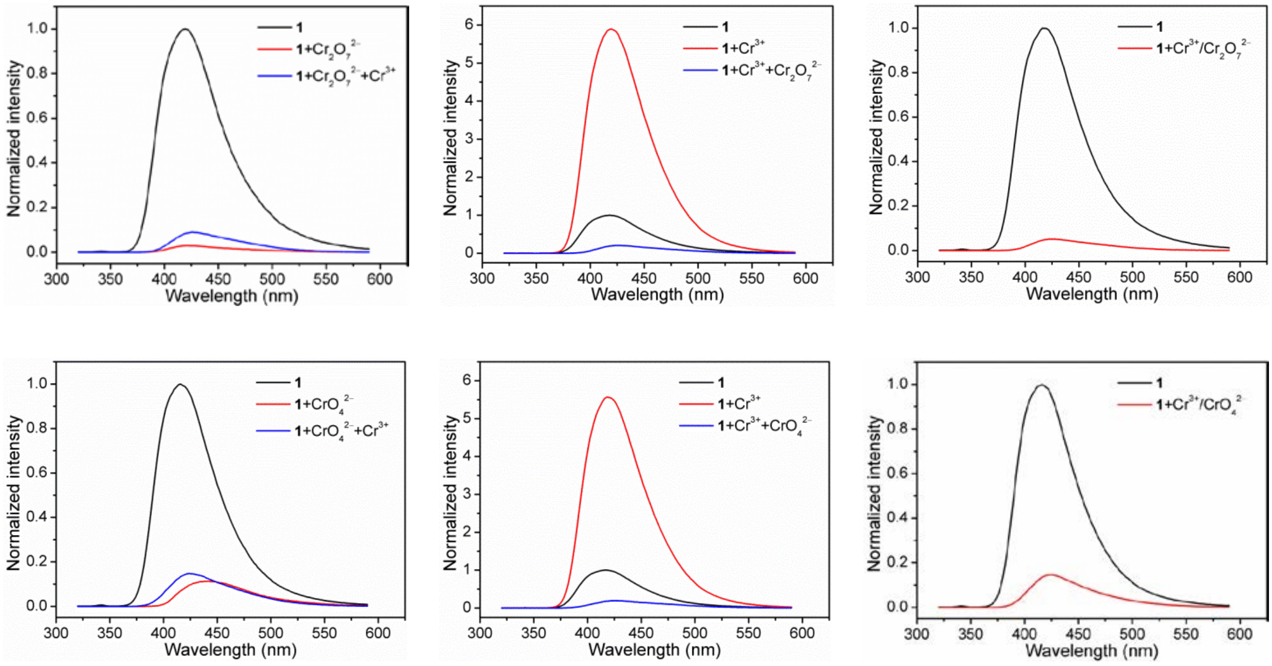
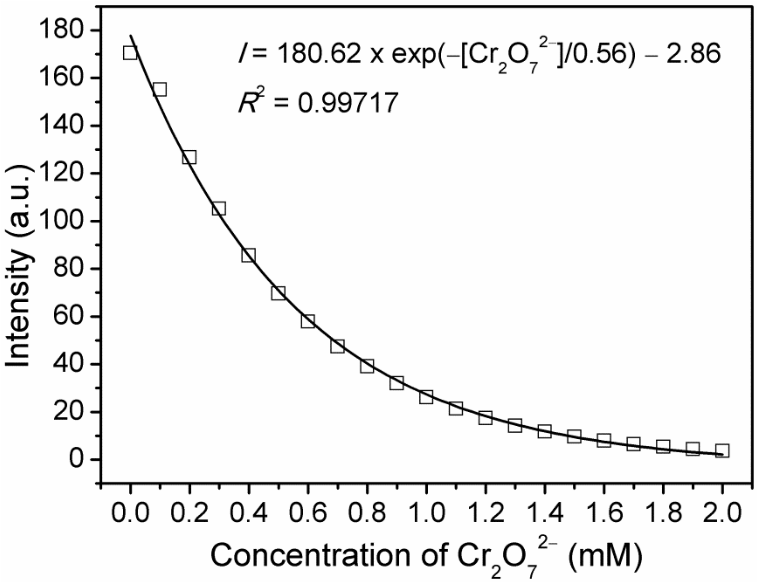


Figure S11. Fluorescence emission spectra of **1** in H_2O suspension (1 mg/3 mL) before and after addition of interfering/analyte ions at room temperature upon excitation at 306 nm.



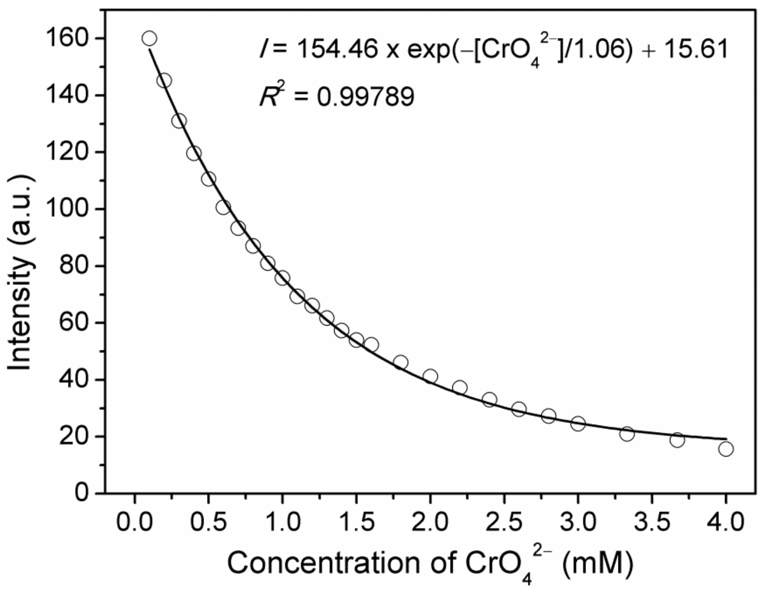
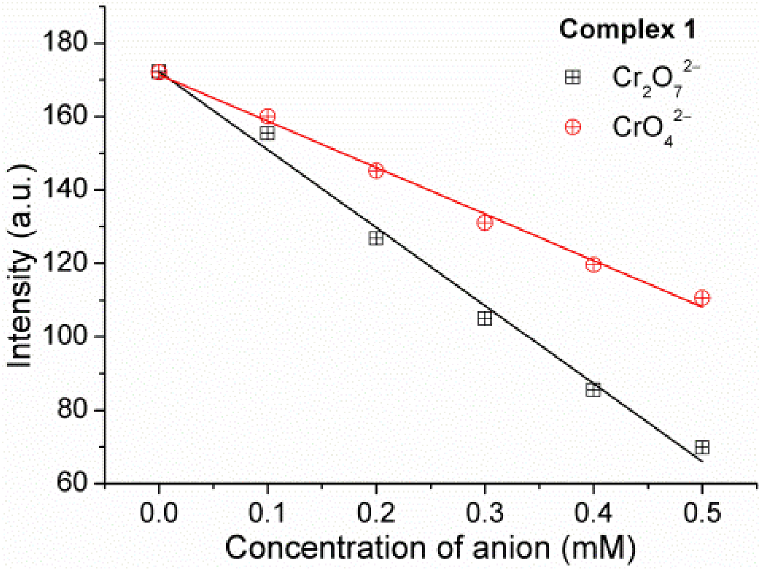


Figure S12. Fluorescence intensity traces (λ_{em} = 438 nm) for the H_2O suspensions of **1** upon incremental addition of $Cr_2O_7^{2-}$ and CrO_4^{2-} ions when excited at 306 nm, following the first-order exponential decay.



Blank readings	$Cr_2O_7^{2-}$	CrO_4^{2-}
#1	170.4	172.1
#2	169.8	171.2
#3	176.1	170.0
#4	175.3	172.3
#5	175.6	172.7
Standard deviation (σ)	3.07	1.08
∣ **Slope (m)** ∣	212.4	126.5
R^2	0.99081	0.99277
LOD (3σ/m), µM (ppm)	43.36 (9.36)	25.57 (2.97)

Figure S13. Linear region of fluorescence intensity (λ_{em} = 438 nm) for the H_2O suspensions of **1** upon incremental addition of $Cr_2O_7^{2-}$ and CrO_4^{2-} ions when excited at 306 nm. The following table lists the relevant parameters of LOD for the H_2O suspensions of **1** toward $Cr_2O_7^{2-}$ and CrO_4^{2-} ions.

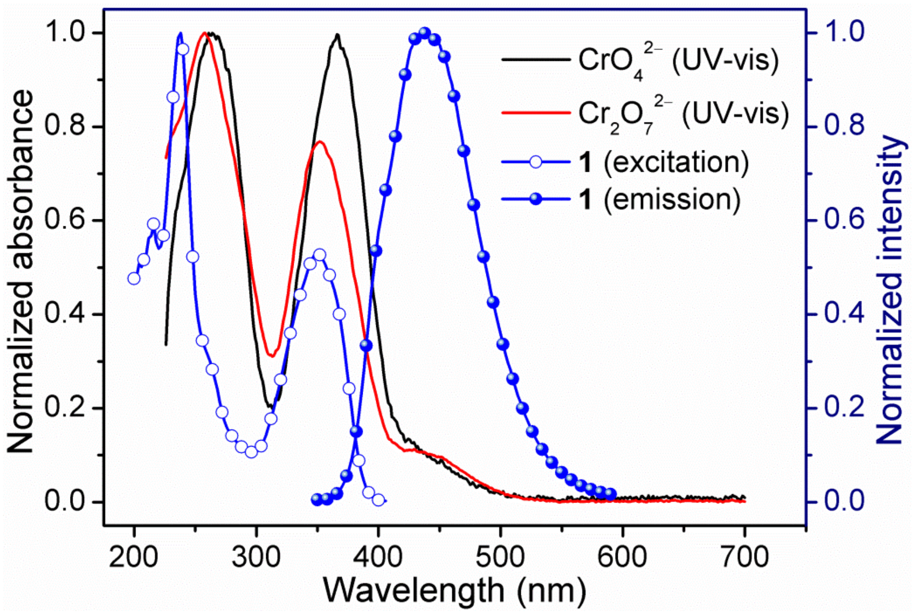


Figure S14. Spectral overlap between the normalized emission spectra of **1** in H_2O suspensions and the normalized absorption spectra of $Cr_2O_7^{2-}$ and CrO_4^{2-} in aqueous solutions.