

Design a Dual-Signaling Sensing System for Fluorescent Ratiometric Detection of Al³⁺ Ion based on Inner-Filter Effect

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Table S1. Summary of some optical Al³⁺ sensors operated in water.

Method	lower detectable limit [#]	Sensitivity	Working mode
TMPyP-ARS	0.1 μM	High	Dual-signal turn on
Chemosensors	0.1 μM ^{9(a)}	High	Single-signal turn on
	10 μM ^{9(b)}	Low	Single-signal turn on
	1 μM ^{9(c)}	Good	Single-signal turn on
	2 μM ²⁰	Good	DCF enhanced
	2 μM ³⁸	Good	DCF turn on

[#] Lower detectable limit was used here because there are no LOD in these papers.

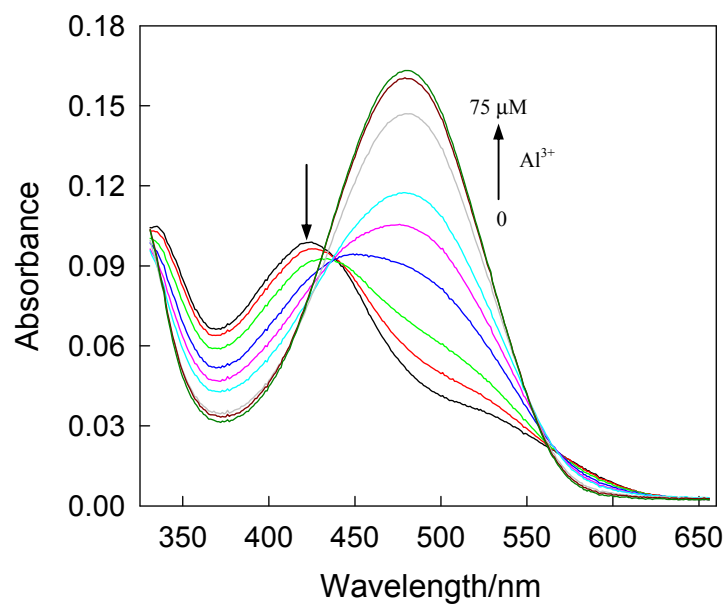


Fig. S1. Investigation on the interaction between ARS (30 μM) and Al^{3+} by Uv-vis spectroscopy by addition of different amounts Al^{3+} (0, 1.0, 2.5, 5.0, 7.5, 10, 25, 50 and 75 μM) in HAc-NaAc buffer solution. The arrows indicate the signal changes as increases in Al^{3+} ion concentrations.

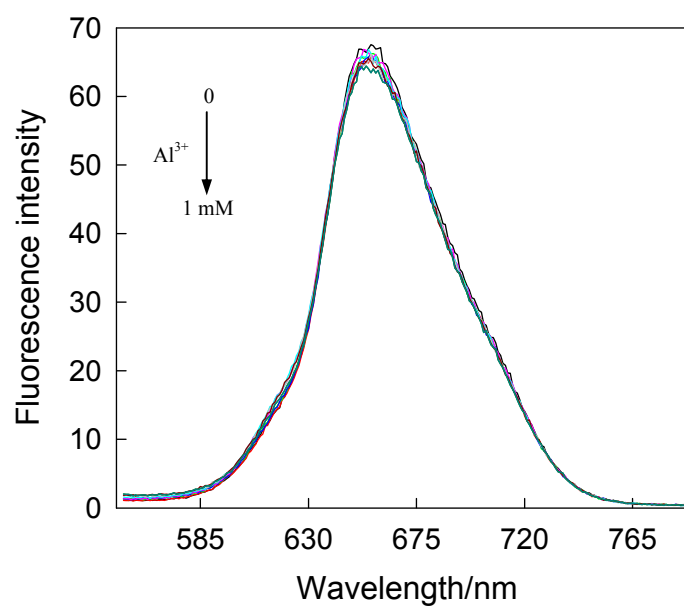


Fig. S2. Fluorescence emission spectral changes of TMPyP (1.0 μM) in HAC-NaAc buffer upon addition of different concentrations of Al³⁺ (0, 0.01, 0.05, 0.1, 0.5 and 1 mM). The arrow indicates the signal changes as increases in Al³⁺ ion concentrations. Spectra were acquired in HAC-NaAc with excitation at 422 nm.

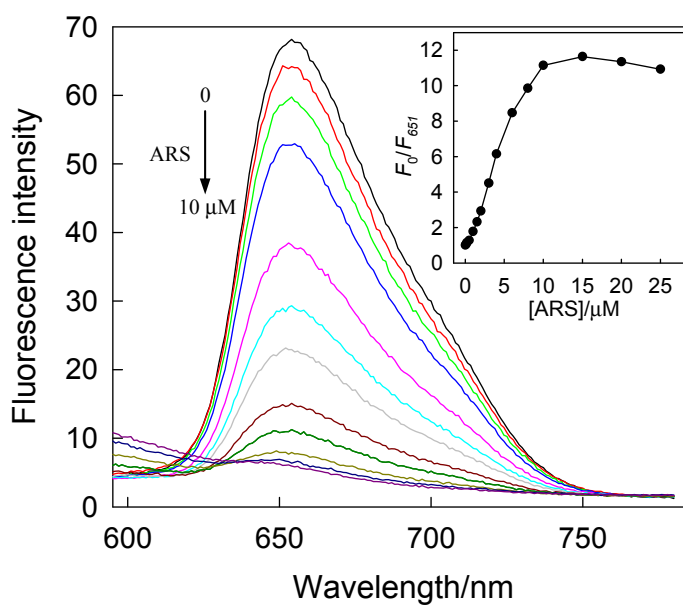


Fig. S3. Effects of ARS (0, 0.1, 0.2, 0.5, 1, 1.5, 2, 3, 4, 6, 8 and 10 μM) on the fluorescence emission spectra of TMPyP (0.1 μM) in HAc-NaAc (pH 5.5) buffer solution. The arrow indicates the fluorescence quenching as increase ARS concentrations. The excitation wavelength was 422 nm. Inset: Quenching efficiency (F_0/F_{651}) as a function of ARS concentrations. F_0 and F_{651} represent the fluorescence intensity at 651 nm in the absence or presence of different concentrations of Al^{3+} , respectively.

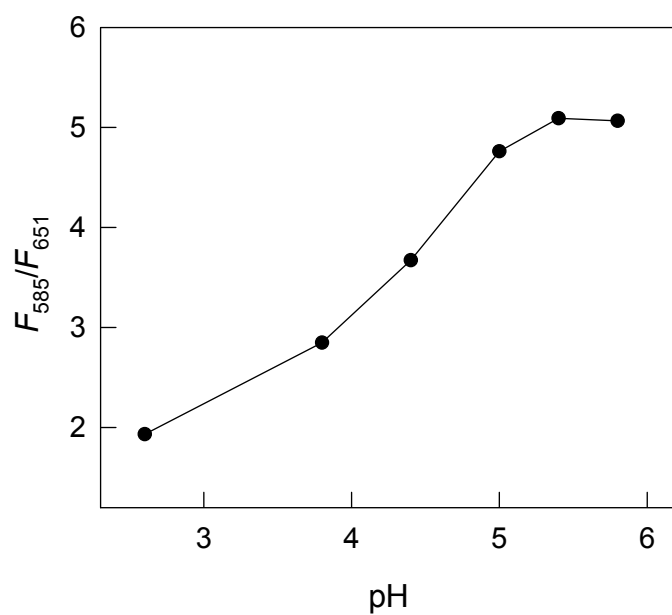


Fig. S4. Effect of pH on the fluorescent ratio (F_{585}/F_0) response of ARS-TMPyP complex to Al^{3+} . F_{585} and F_0 represent the fluorescence intensity at 585 nm in the presence of $5 \mu\text{M Al}^{3+}$, respectively.

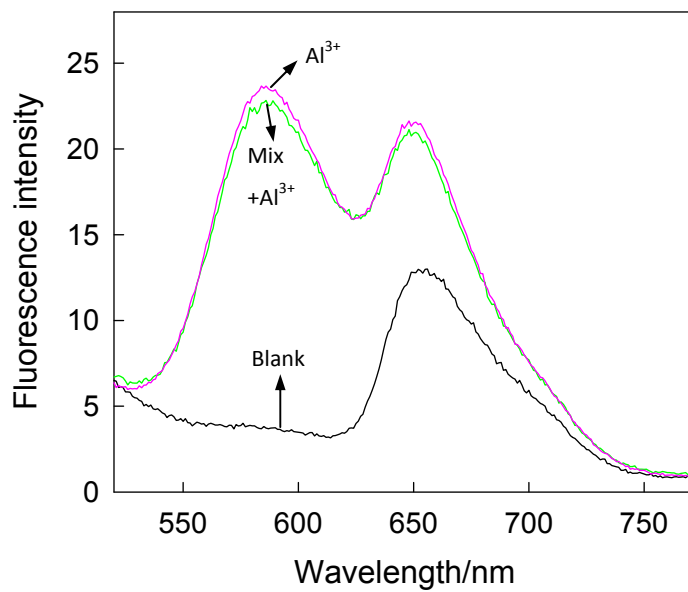


Fig. S5. Fluorescence emission spectra of the ARS/TMPyP complex after the addition of Al³⁺ (5 μ M) or the mixed metal ions (5 μ M).