Supplementary Information (SI)

A new fluorescent and colorimetric chemosensor for Al³⁺ and F⁻/CN⁻ based on a

julolidine unit and its bioimaging in living cells

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Solvent	Detection limit	Cell image	Reference
CH₃CN	5.47 × 10 ⁻⁷ M	No	44
MeOH-HEPES buffer (8/2, v/v)	7.41× 10-6 M	No	45
МеОН	$8.08 imes 10^{-8} M$	Al ³⁺	46
DMF-H ₂ O (9/1, v/v)	6.7× 10 ⁻⁶ M	No	47
MeOH-H ₂ O (6/4, v/v)	1.5 × 10 ⁻⁶ M	No	48
CH ₃ CN	$1.8 \times 10^{-7} \mathrm{M}$	No	49
CH3CN	20.5 nM	Al ³⁺	This work
	Solvent CH3CN MeOH-HEPES buffer (8/2, v/v) MeOH DMF-H2O (9/1, v/v) MeOH-H2O (6/4, v/v) CH3CN CH3CN	Solvent Detection limit CH ₃ CN 5.47×10^{-7} M MeOH-HEPES 7.41×10^{-6} M buffer 8.08×10^{-8} M MeOH 8.08×10^{-8} M DMF-H ₂ O 6.7×10^{-6} M (9/1, v/v) 6.7×10^{-6} M CH ₃ CN 1.5×10^{-6} M CH ₃ CN 1.8×10^{-7} M CH ₃ CN 20.5 nM	Solvent Detection limit Cell image CH ₃ CN 5.47×10^{-7} M No MeOH-HEPES 7.41×10 -6 M No buffer 8.08×10^{-8} M Al ³⁺ DMF-H ₂ O 6.7×10^{-6} M No (9/1, v/v) 6.7×10^{-6} M No CH ₃ CN 1.5×10^{-6} M No CH ₃ CN 1.8×10^{-7} M No CH ₃ CN 20.5 nM Al ³⁺

Table S1. Examples for the detection of Al^{3+} by organic chemosensors.



Fig. S1. ¹H NMR (DMSO-*d*₆, 400 MHz) spectrum of HL.



Fig. S2. 13 C NMR (DMSO- d_6 , 100 MHz) spectrum of HL.



Fig. S3. HRMS of HL.



Fig. S4. Absorbance of HL at 440 nm in the presence of different equiv. of Al^{3+} .

Spectrum from 180109-60.wiff (sample 1) - 023, +TOF MS (100 - 2000) from 0.084 to 0.451 min



Fig. S5. Job's Plot of fluorescence titration (λ =521nm) of HL with Al³⁺, showing 2:1 stoichiometry.



Fig. S6. Hildebrand–Benesi plot based on the 2:1 ratio between **HL** and Al³⁺, the association constant (K_a) of **HL** with Al³⁺ was calculated to be 6.35×10^4 M⁻¹.



Fig. S7. HRMS of HL+Al³⁺.



Fig. S8. The change of absorption spectra and color of **HL** induced by CN^{-} in acetonitrile (2.0 × 10^{-5} mol L⁻¹); b) the change of fluorescence emission intensity of **HL** induced by CN^{-} in acetonitrile (2.0 × 10^{-5} mol L⁻¹).



Fig. S9. The association constant (K_a) of **HL** with F⁻ was calculated to be 1.25×10^4 M⁻¹.



Fig. S10. The limit of detection (LOD) of HL toward F⁻, LOD is 88.4 nM.



Fig. S11. The association constant (K_a) of HL with CN⁻ was calculated to be 1.48×10^4 M⁻¹.



Fig. S12. The limit of detection (LOD) of HL toward CN⁻, LOD is 61.0 nM.



Fig. S13. ¹H NMR spectral changes of HL induced by CN⁻ in DMSO-d₆.