**Fig. S1.** Absorbance spectra of probe 2a ($5.0 \times 10^{-6}$ M) in the presence of 10 equiv of different metal ions in C$_2$H$_5$OH solution.

**Fig. S2** The fluorescence intensity of probe 2a ($5.0 \times 10^{-6}$ M) in the absence or presence of Al$^{3+}$ in EtOH solution at different pH values (1–12) ($\lambda_{ex} = 330$ nm) (A). The fluorescence intensity of different concentration of probe 2a in the presence of Al$^{3+}$ ($5.0 \times 10^{-5}$ M) (B). The fluorescence intensity of probe 2a ($5.0 \times 10^{-6}$ M) with Al$^{3+}$ in the presence of Al$^{3+}$ at different EtOH/HEPES buffer (C), in EtOH solution at different response time (D). Fluorescence photograph of 2a ($5.0 \times 10^{-6}$ M) in the absence or presence of Al$^{3+}$ under a UV lamp at 365 nm (E).
**Fig. S3.** The fluorescence intensity of probe 2a (5.0 × 10⁻⁶ M) with Al³⁺ in solution (EtOH/HEPES buffer, v/v = 6/4, 10 mM HEPES, pH = 7.4) at different time, λ<sub>ex</sub> = 330 nm.

![Fluorescence Intensity Graph](image)

**Fig. S4.** Job's plots for determining the stoichiometry of 2a and Al³⁺ in solution (EtOH/HEPES buffer, v/v = 6/4, 10 mM HEPES, pH = 7.4), λ<sub>ex</sub> = 330 nm.

![Job's Plot Graph](image)

**Fig. S5.** The HRMS spectra of 2a-Al³⁺ complex.

![HRMS Spectra Graph](image)
**Fig. S6.** Molecular orbitals (LUMO and HOMO) of compounds 2a and 2a-Al$^{3+}$

**Fig. S7.** Images of 2a-based test strips tested with Al$^{3+}$ 365 nm under UV lamp (A, a: 2a; b: 2a+Al$^{3+}$) and under sunlight (B, a1: 2a; b1: 2a+Al$^{3+}$).
**Fig. S8.** Fluorescence intensity of probe 2a treatment with Al$^{3+}$ (0, 2, 5, 10, 15 μM) in three water samples. The linear relationship between the fluorescence intensity and Al$^{3+}$ concentration (0, 2, 5, 10, 15 μM) in (b) lake water and (c) tap water and (d) distilled water samples.

**Fig. S9.** The linear relationship between the fluorescence intensity and Al$^{3+}$ concentration (0, 2, 5, 10, 15 μM) in 20% HCl (V/V) aqueous solution.
**Fig. S10.** MTT assay of Hela cells was incubated with 0.1, 1, 10, 20 and $50 \times 10^{-6}$ M probe 2a for 48 h.
Table S1: Comparison of different fluorescent probes for the determination of Al$^{3+}$.

| Probe | In food samples test | Solution | Detection limit | Reference |
|-------|----------------------|----------|-----------------|-----------|
| ![Probe 1](image1.png) | NO | CH$_3$CN | 5.47×10$^{-7}$ | Dyes and Pigments, 2018, [37] |
| ![Probe 2](image2.png) | NO | Methanol | 9.3×10$^{-8}$ | Tetrahedron Letters, 2017, [38] |
| ![Probe 3](image3.png) | NO | H$_2$O:DMF=1:5 | 7.5×10$^{-7}$ | J. Photoch. Photobio. A, 2018, [39] |
| ![Probe 4](image4.png) | NO | H$_2$O:CH$_3$CN = 3:1 | 7.5×10$^{-7}$ | Sens. Actuators B: Chem, 2018, [40] |
| ![Probe 5](image5.png) | NO | CH$_3$OH:H$_2$O = 4:1, | 2.99×10$^{-7}$ | Sens. Actuators B: Chem, 2017, [41] |
| ![Probe 6](image6.png) | NO | Methanol | 8.08×10$^{-8}$ | Spectrochim. Acta A, 2018, [42] |
| ![Probe 7](image7.png) | NO | Methanol | 1.75×10$^{-7}$ | J. Photoch. Photobio. A, 2017, [43] |
| ![Probe 8](image8.png) | Yes | EtOH/HEPS buffer = 7/3 | 8.1×10$^{-8}$ | |