A differential ICT based molecular probe for multi-ions and multifunction logic circuits

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![Graph](image.png)

**Fig. S1:** The spectral fitting of the absorbance data on incremental addition of fluoride ions to the solution of probe 1 (20 µM, CH$_3$CN)
Fig. S2: The spectral fitting of the absorbance data on incremental addition of Cu$^{2+}$ ions to the solution of probe 1 (20 µM, CH$_3$CN)

The spectral fitting of these absorbance data shows the formation of M:L complex log β$_{LCu}$ = 6.78 ± 0.12.

Fig. S3: The spectral fitting of the absorbance data on incremental addition of Zn$^{2+}$ ions to the solution of probe 1 (20 µM, CH$_3$CN)

The spectral fitting of these absorbance data shows the formation of ML complex log β$_{LZn}$ = 5.6 ± 0.02
**Fig. S4:** The visible color changes observed on addition of F\(^{-}\), Zn\(^{2+}\), Cu\(^{2+}\) or both F\(^{-}\) and Cu\(^{2+}\) or F\(^{-}\) and Zn\(^{2+}\) ions to the solution of 1 (20 µM, CH\(_3\)CN).

**Fig. S5:** Bar diagram of half-subtractor showing the absorption intensities with different inputs; (a) only 1; (b) 1 + TBA F (80 µM); (c) 1 + Cu\(^{2+}\) (20 µM); (d) 1 + Cu\(^{2+}\) (20 µM) + TBA F (80 µM).

**Fig. S6:** Bar diagram of half-adder with the absorption intensities with different inputs; probe 1 (20 µM) (a) only 1; (b) 1 + TBA F (80 µM); (c) 1 + Cu\(^{2+}\) (20 µM); (d) 1 + Cu\(^{2+}\) (20 µM) + TBA F (80 µM); XOR at 495 nm AND at 610 nm.
**Fig. S7:** Bar diagram of half-adder with the absorption intensities with different inputs to 1 (20 µM, CH$_3$CN). (a) only 1; (b) 1 + TBA F (80 µM); (c) 1 + Zn$^{2+}$ (20 µM); (d) 1 + Zn$^{2+}$ (20 µM) + TBA F (80 µM). XOR at 495 nm, INHIBIT at 465 nm.

**Fig. S8:** Bar diagram of comparator logic function with the absorption intensities with different inputs to 1 (20 µM, CH$_3$CN). (a) only 1; (b) 1 + TBA F (80 µM); (c) 1 + Zn$^{2+}$ (20 µM); (d) 1 + Zn$^{2+}$ (20 µM) + TBA F (80 µM). XNOR at 400 nm, INHIBIT at 465 nm.
**Fig. S9:** (A) UV-vis spectra of probe 1 (20 µM, CH$_3$CN) (a) only 1; (b) 1 + Cu$^{2+}$ (20 µM); (c) 1 + Cu$^{2+}$ (20 µM) + TBA F (80 µM); (d) 1 + Cu$^{2+}$ (20 µM) + TBA F (80 µM) + EDTA (80 µM). (B) UV-vis spectra of probe 1 (20 µM, CH$_3$CN) (a) only 1; (b) 1 + TBA F (80 µM); (c) 1 + Zn$^{2+}$ (20 µM); (d) 1 + Zn$^{2+}$ (20 µM) + TBA F (80 µM).

The addition of EDTA removes Cu$^{2+}$ due to complex formation and free F$^-$ ions due to formation of HF or NaF.