Supporting Information

Naphthalimide- benzimidazole conjugate for the light-up fluorescence detection of Ga^{3+} and DCP

Shifali Chopra[a], Gulshan Kumar[b], Iqubal Singh[c] and Vijay Luxami[a*]

[a] Department of Chemistry and Biochemistry, Thapar Institute of Engineering and Technology, Patiala-147001, India

[b] Department of Chemistry, Banasthali University, Banasthali Newai 304022, Rajasthan, India

[c] School of Pharmaceutical Sciences, Lovely Professional University, Phagwara 144411, India

[a*]Email: vluxami@thapar.edu

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Figure S6: Natural transition orbitals of **NaHB (left, highest occupied NTO and center, lowest unoccupied NTO)** and intramolecular fragment based charge transfer presentation in **NaHB** (right).

Figure S7. (a) UV-visible spectra of **NaHB** (10 μM, CH_3CN: H_2O (9:1)) in the presence of various metal ions; **(b)** the variation of UV-visible spectra of **NaHB** (10 μM, CH_3CN: H_2O (9:1)) upon the addition of Ga^{3+} ions (0–60 μM)

Table S1. Comparison of present probe **NaHB** with other literature-reported probes

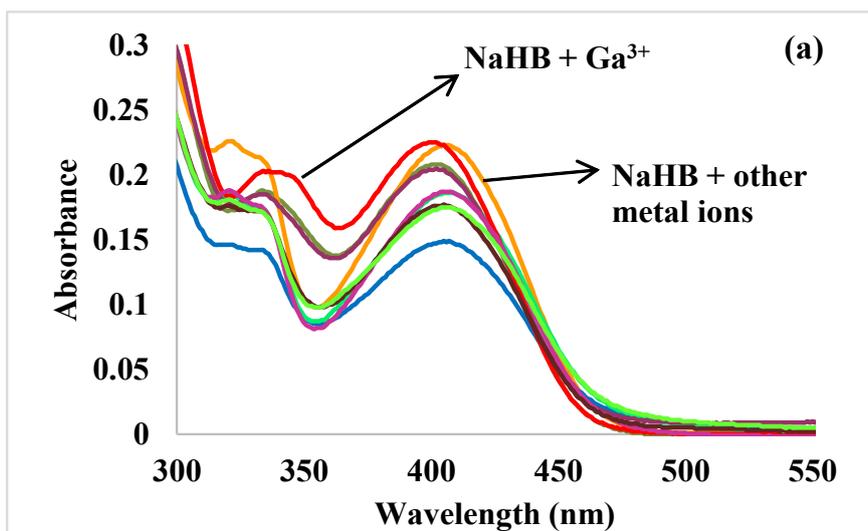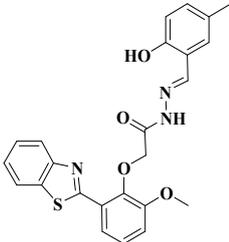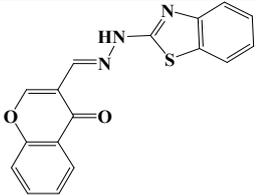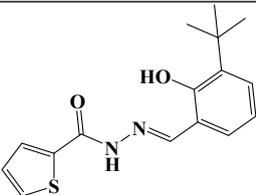| Ref.	Probes	Analyte	Test Medium	LOD	Binding Constants
1.		Al^{3+} Ga^{3+}	DMF: H$_2$O (v/v = 2:3)	1.51 μM 4.28 μM	Test paper, smartphone colour analyzing, cytotoxicity assay and cell imaging
2.		Ga^{3+}	DMSO: H$_2$O (v/v = 9:1)	4.88 × 10^{-2} μM	Logic gate and imaging in onion cells
3.		Ga^{3+}	DMSO/bis–tris buffer solution (0.3%)	0.058 μM	Test strips and determination in water samples
4.		Ga^{3+}	DMSO: PBS (v/v = 2:3)	0.13 μM	Test strips, determination in water, soil, food, plants samples
5.		Cd^{2+} Ga^{3+}	DMSO: H$_2$O (v/v = 9:1)	0.19 μM 0.97 μM	NA
6.		Ga^{3+}	PBS: DMSO (v/v = 9:1)	0.11 μM	Imaging in A549 cells
7.		DCP	MeOH	0.78 μM	Test strips
8.		DCP	CH$_3$CN/H$_2$O (v/v = 4:6)	0.14 μM	Paper strip, determination in soil sample, cell imaging
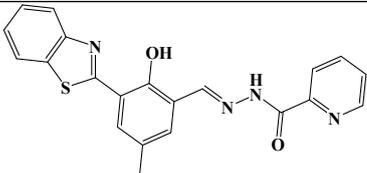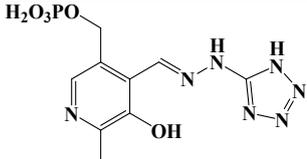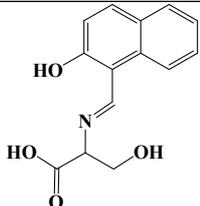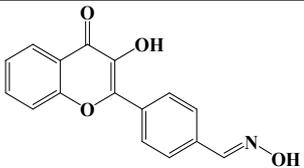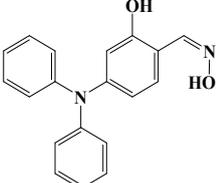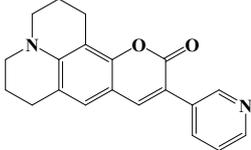
9.		DCP	CH_3CN	4.6 µM	Imaging in PC12 cells, test strips
10.		DCP	$CHCl_3$	33.4 µM	Test strips
This work		Ga^{3+} DCP	$CH_3CN: H_2O$ (v/v = 9:1)	36 nM 11 nM	5.15×10^4 M^{-1} 1.2×10^5 M^{-1}
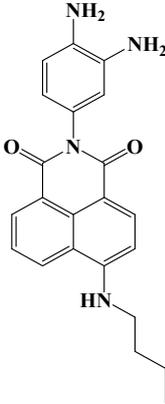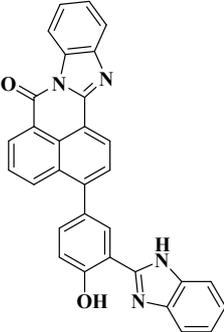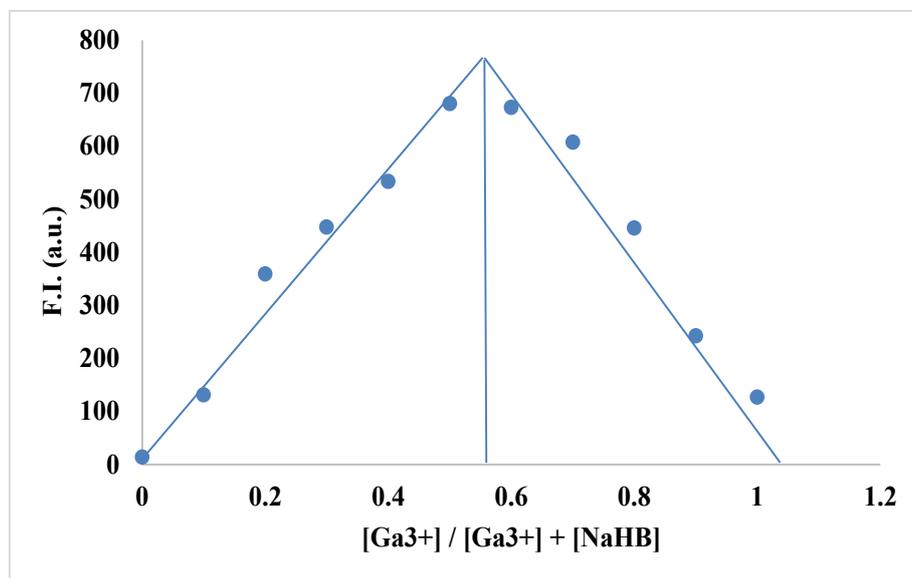
Figure S8. Job's plot within fluorescence intensity and mole fraction of Ga^{3+}
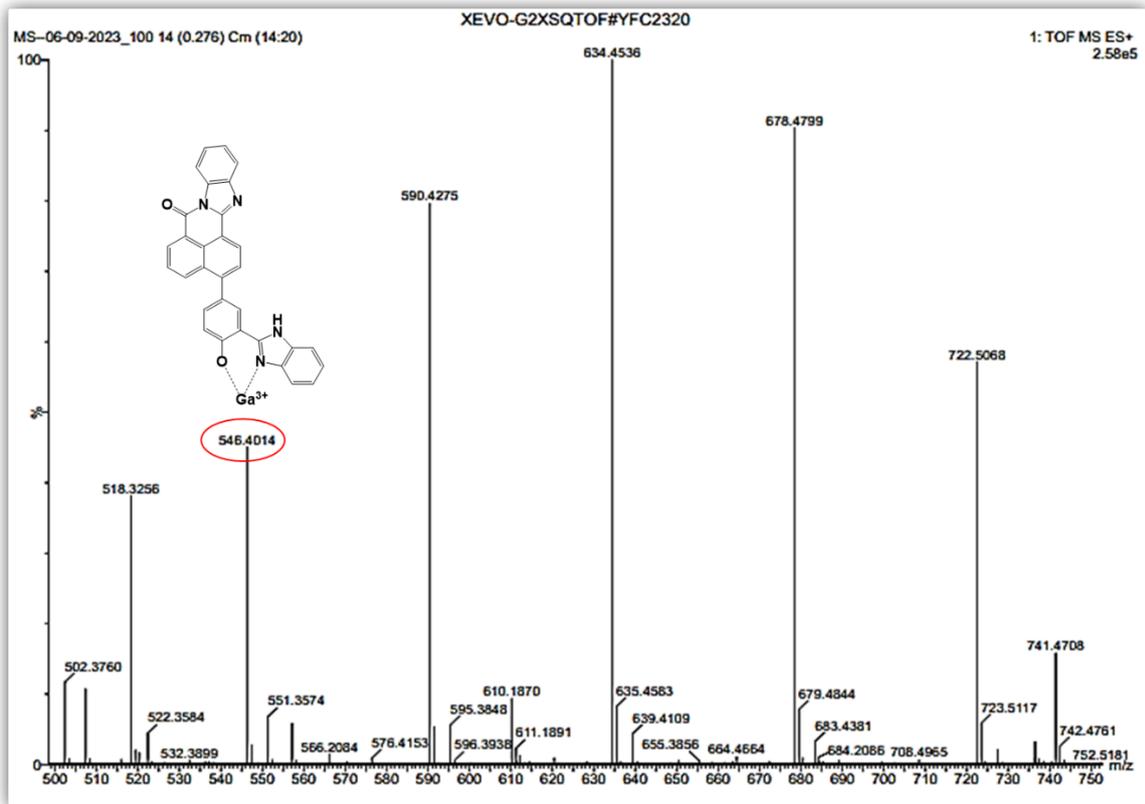
Figure S9: ESI Mass spectrum of NaHB + Ga³⁺.
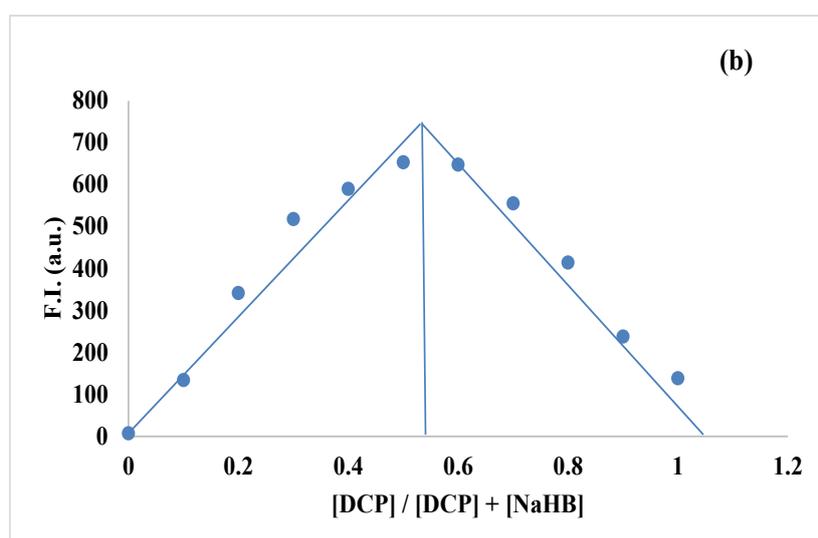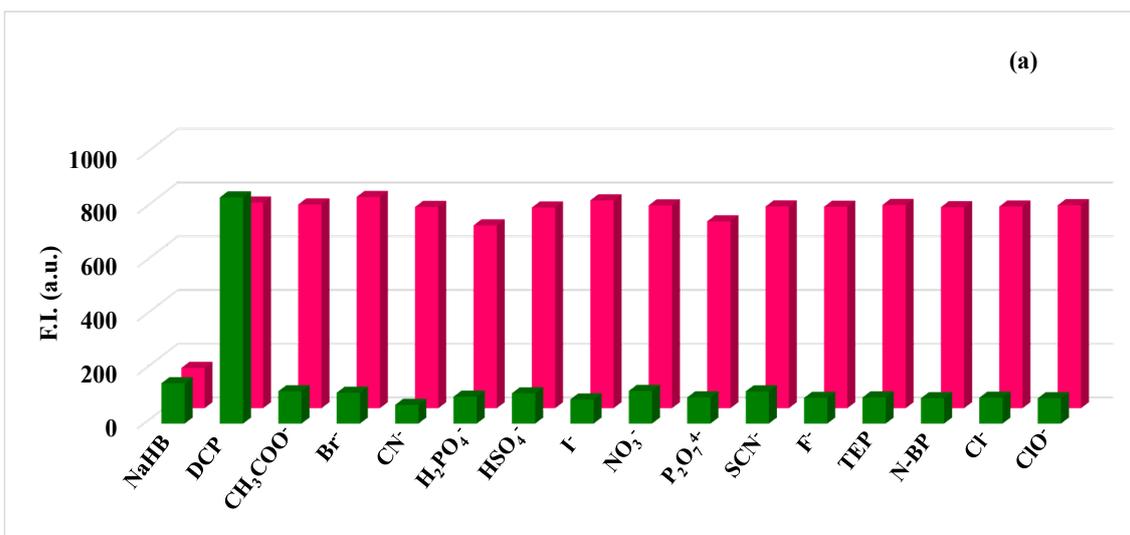
Figure S10. (a) Green bars represent the selectivity of **NaHB** (10 μM, CH$_3$CN: H$_2$O (9:1; v/v)), at λ_{em} = 520 nm upon addition of different anions and pink bars show the competitive selectivity of **NaHB** in the presence of DCP ions **(b)** Job's plot within fluorescence intensity and mole fraction of DCP.

Figure S11: (a) ESI Mass spectrum of isolated product of **NaHB** + DCP. **(b)** MS-MS fragments of reaction of **NaHB** and DCP.

Figure S12: (a) Paper strips coated with **NaHB** along with dropwise addition of solutions of different concentrations of Ga^{3+} (10^{-1}- 10^{-6} M), **(b)** Paper strips coated with **NaHB** along with dropwise addition of different metal ions (10^{-2} M) and **(c)** dropwise addition of different anions (10^{-1} M)

Table S2. Quantitative analysis of interfering ions

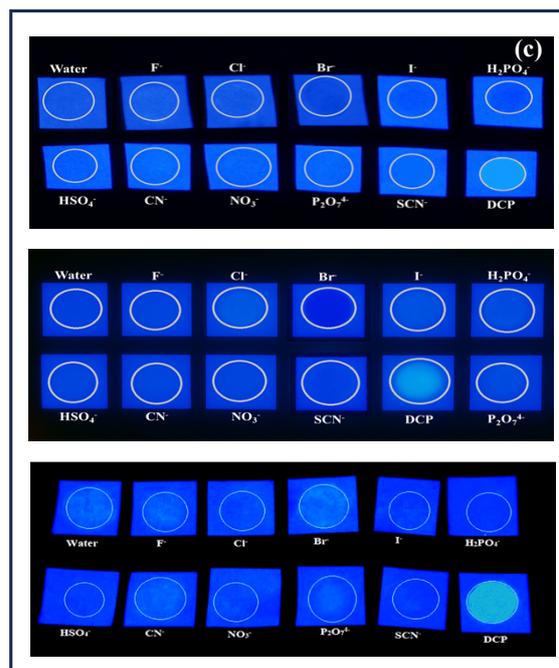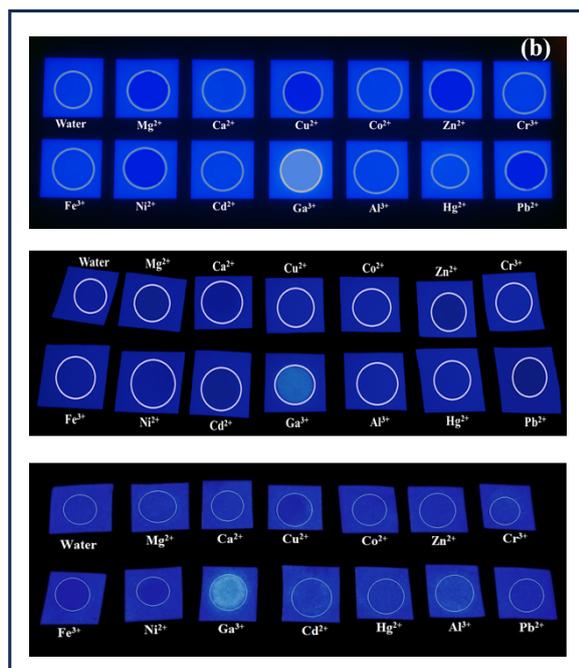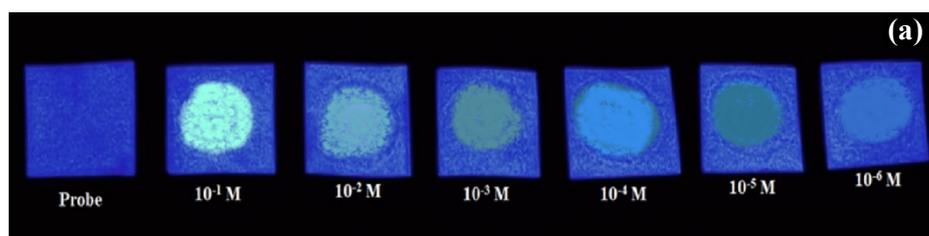| Interferent	Interferent Conc.	SD	% signal change ± Uncertainity in % signal change	p-value
Al^{3+}	1 mM	5.15	1.22 ± 0.84	0.5
Ca^{2+}	1 mM	5.7	3.71 ± 0.88	0.99
Co^{2+}	1 mM	5.57	0.56 ± 0.87	0.78
Cr^{3+}	1 mM	6.48	4.49 ± 0.94	0.07
Cu^{2+}	1 mM	6.44	16.28 ± 0.94	0.47
Fe^{3+}	1 mM	6.56	16.47 ± 0.95	0.09
Mg^{2+}	1 mM	2.65	6.49 ± 0.68	0.27
Hg^{2+}	1 mM	4.74	5.59 ± 0.81	0.78
Pb^{2+}	1 mM	5.52	6.54 ± 0.86	0.37
K^{+}	1 mM	6.08	12.14 ± 0.91	0.52
Na^{+}	1 mM	5.83	10.38 ± 0.89	0.56
Fe^{2+}	1 mM	6.36	15.55 ± 0.93	0.14
Zn^{2+}	1 mM	4.69	10.9 ± 0.8	0.28
All of the ions	1 mM	6.2	12.27 ± 0.92	0.11

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