

Supporting Information

Chaotropic Anion Induced Self Assembly of Naphthalimide – Glutathione Nanohybrid: Selective recognition of bisulphate anion in aqueous medium

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Table of Contents

Figure S1. ¹ H NMR spectrum of compound 1 .
Figure S2. ¹³ C NMR spectrum of compound 1 .
Figure S3. ¹ H NMR spectrum of compound 2 .
Figure S4. ¹³ C NMR spectrum of compound 2 .
Figure S5. ¹ H NMR spectrum of compound 3 .
Figure S6. ¹³ C NMR spectrum of compound 3 .
Figure S7. DLS histogram of the nano – aggregates of host upon binding with the bisulphate anions.
Figure S8. Fluorescence profile of Nanohybrid in 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80% and 90% H ₂ O fraction mixture with THF.
Figure S9. FT-IR spectrum of compound-1; NH-1 and NH-1 on addition of bisulphate anion.
Figure S10. pH effect on the self-assembly
Figure S11. Salt effect on the self-assembly
Figure S12. Zeta potential measurements of organic nanoparticles (ONPs); nanohybrid (NH-1) and NH-1 on addition of bisulphate (repeated in triplicate).

Figure S13. PXRD spectrum of NH-1 on addition of bisulphate anion.
Figure S14. Effect of various anions on UV-visible absorption profile of NH-1.
Table S1: Comparison table of our bisulphate ion sensor with the previously reported literature
Table S2: Quantum yield studies
Table S3: Comparison of developed method with the turbidity method reported in the literature for the estimation of HSO_4^- .

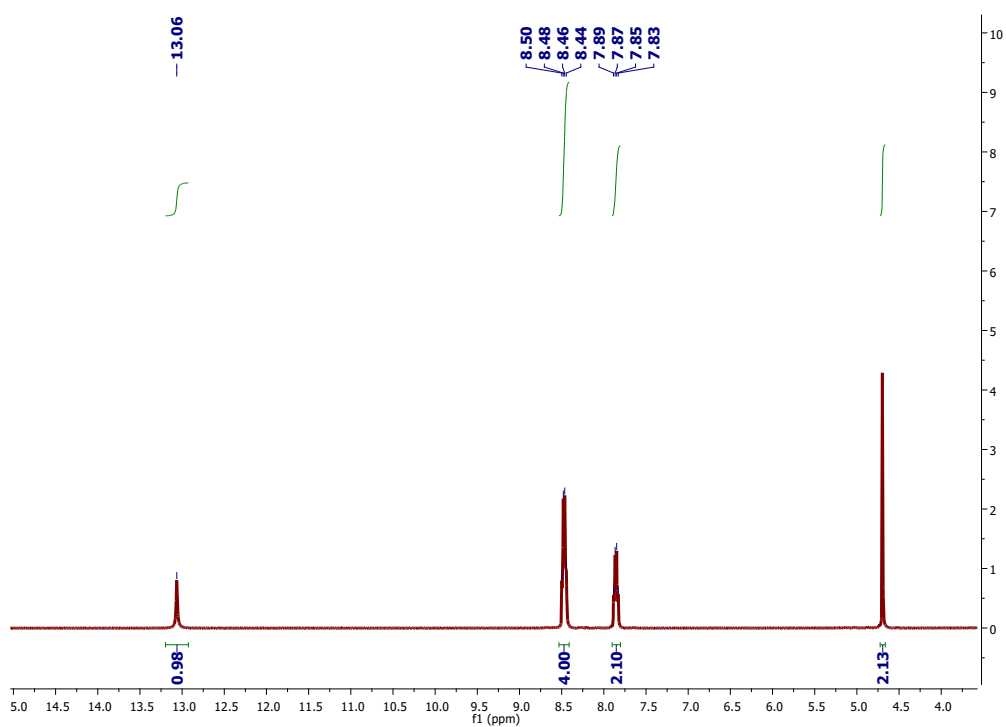


Figure S1. ^1H NMR spectrum of compound 1.

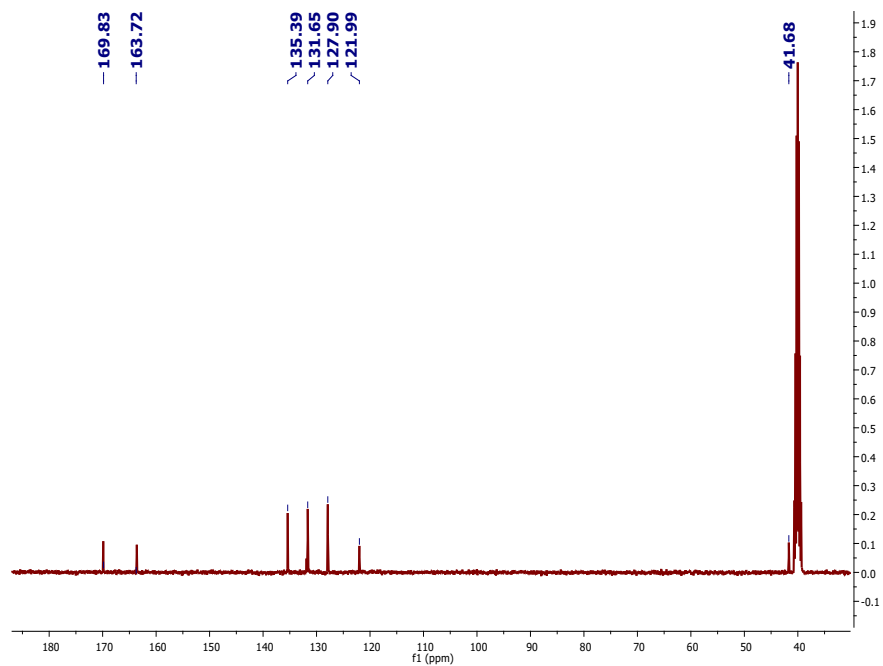


Figure S2. ^{13}C NMR spectrum of **compound 1**.

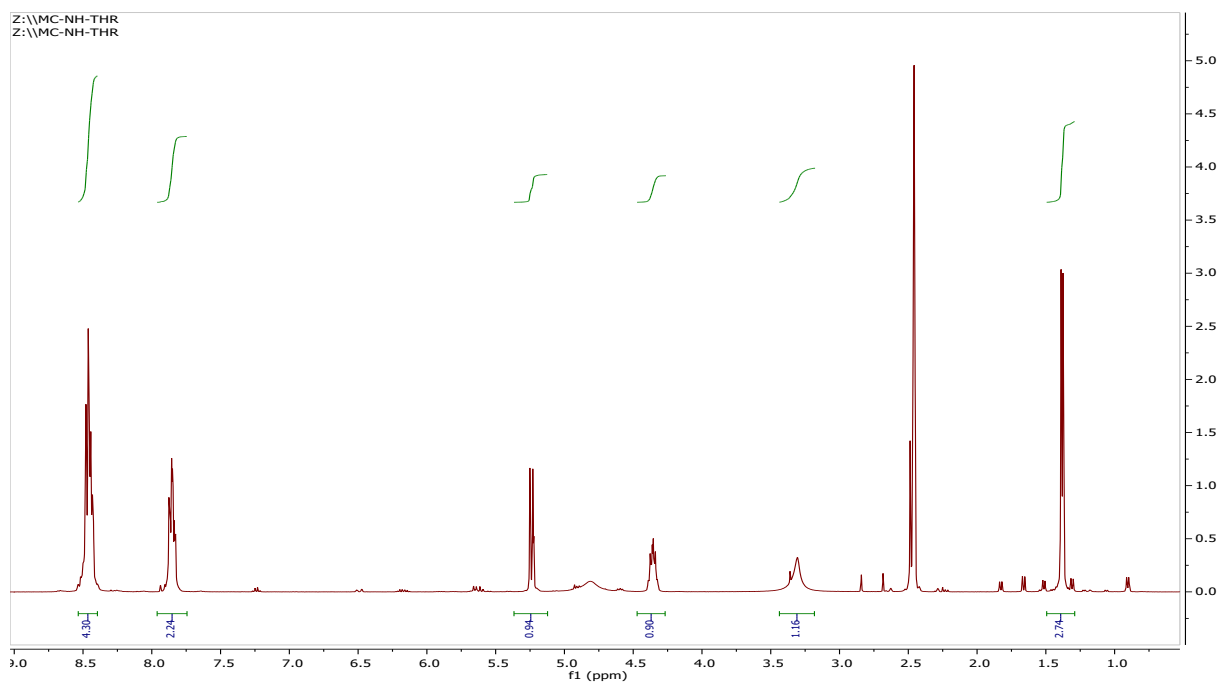


Figure S3. ^1H NMR spectrum of **compound 2**.

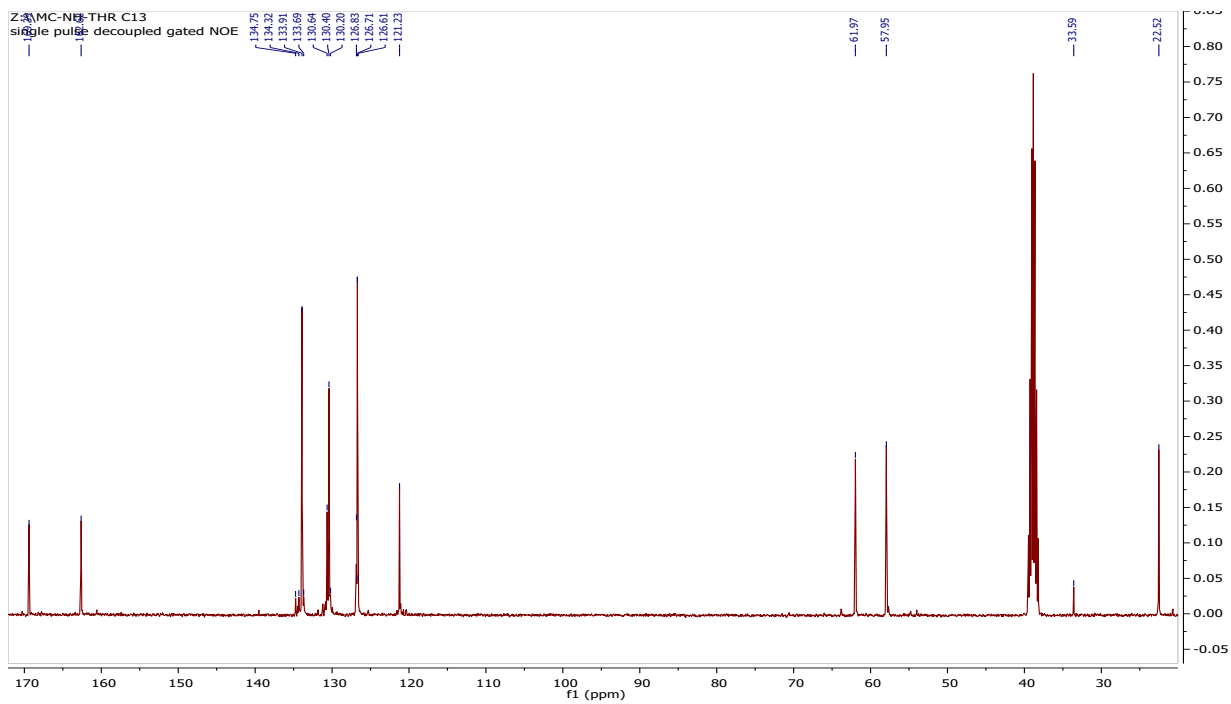


Figure S4. ^{13}C NMR spectrum of compound 2.

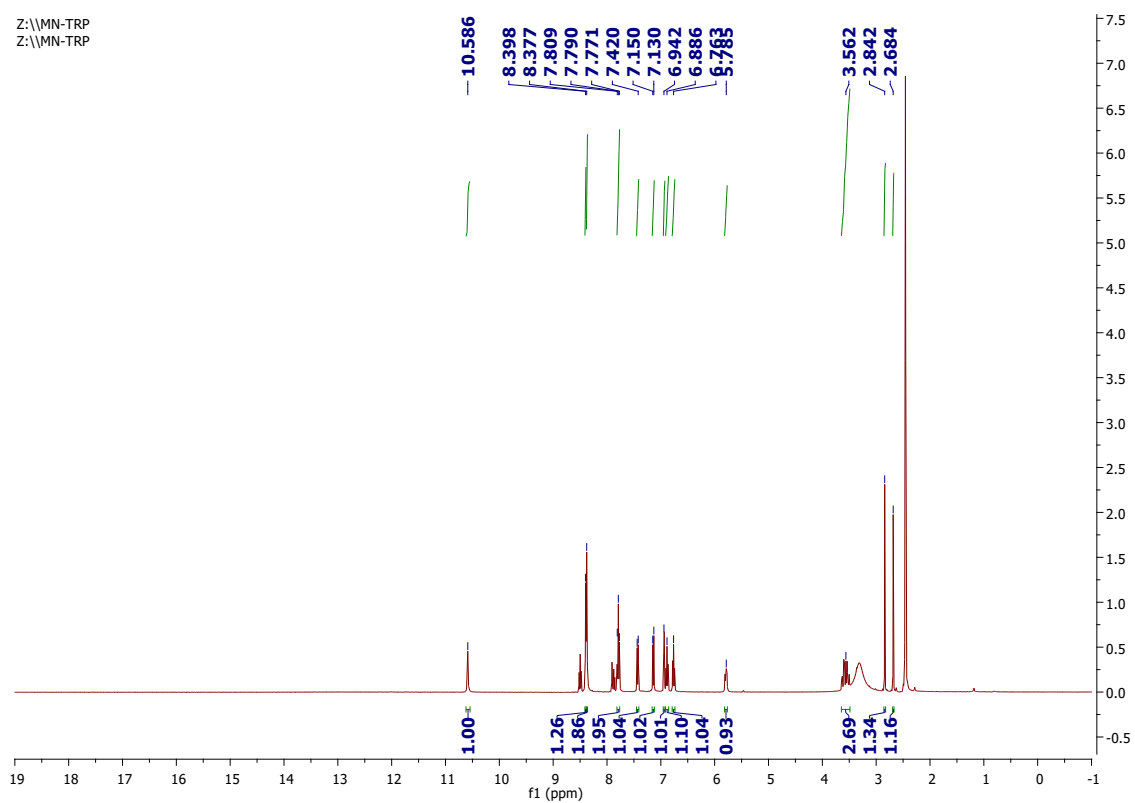


Figure S5. ^1H NMR spectrum of compound 3.

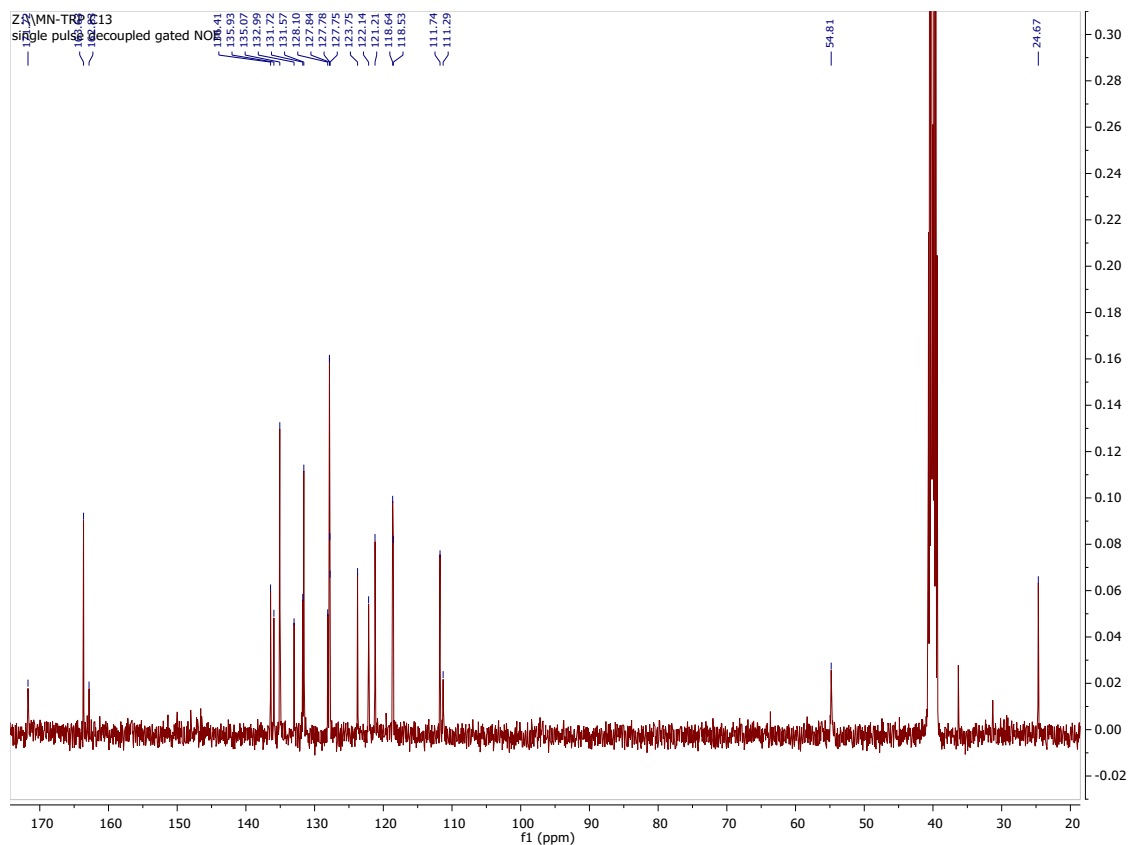


Figure S6. ^{13}C NMR spectrum of **compound 3**.



Figure S7. DLS histogram of the nano – aggregates of host (NH-1) upon binding with the bisulphate anions.

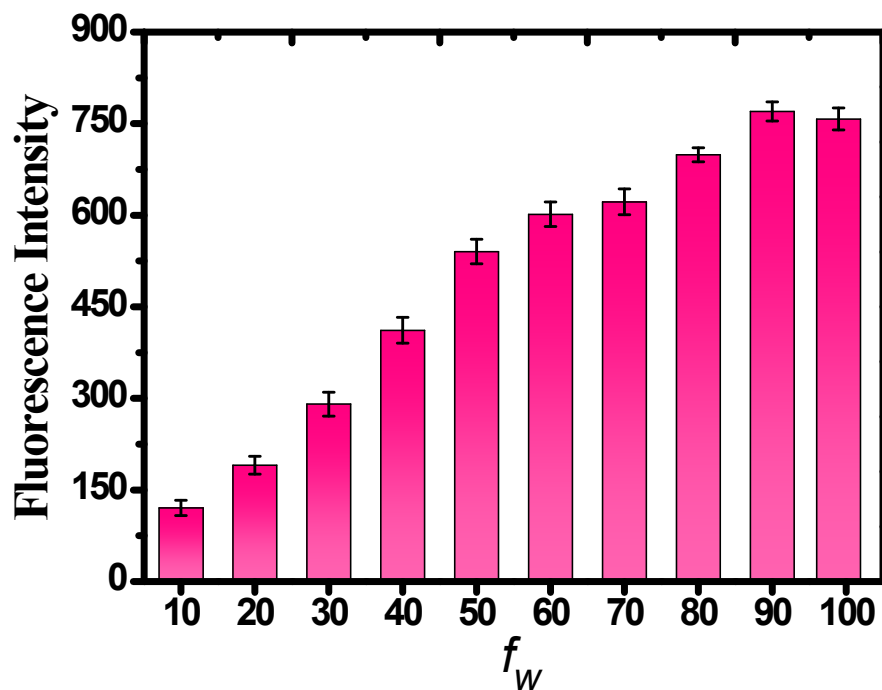


Figure S8. Fluorescence profile of NanoHybrid in 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80% and 90% H₂O fraction mixture with THF (performed in triplicate).

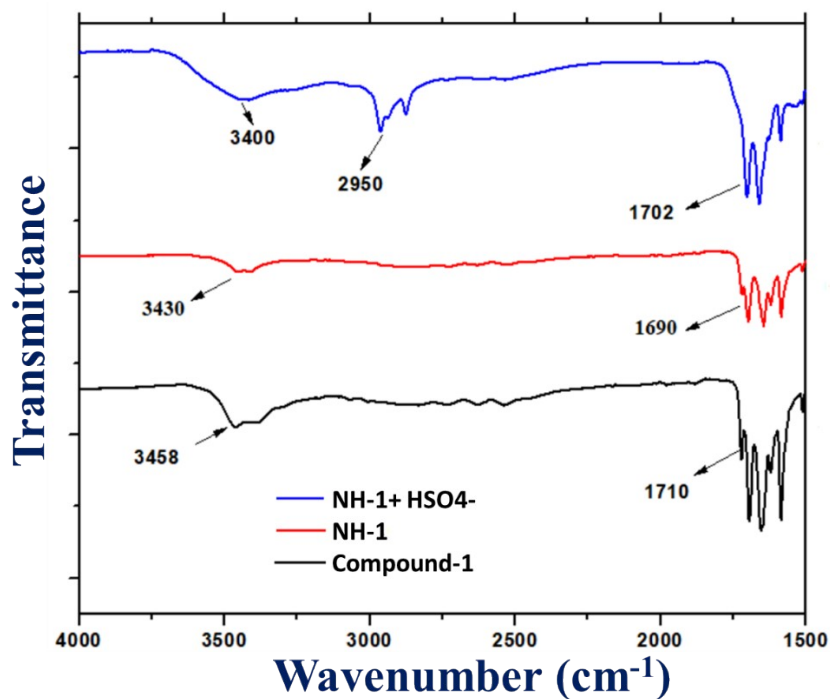


Figure S9: FT-IR spectrum of compound-1; NH-1 and NH-1 on addition of bisulphate anion.

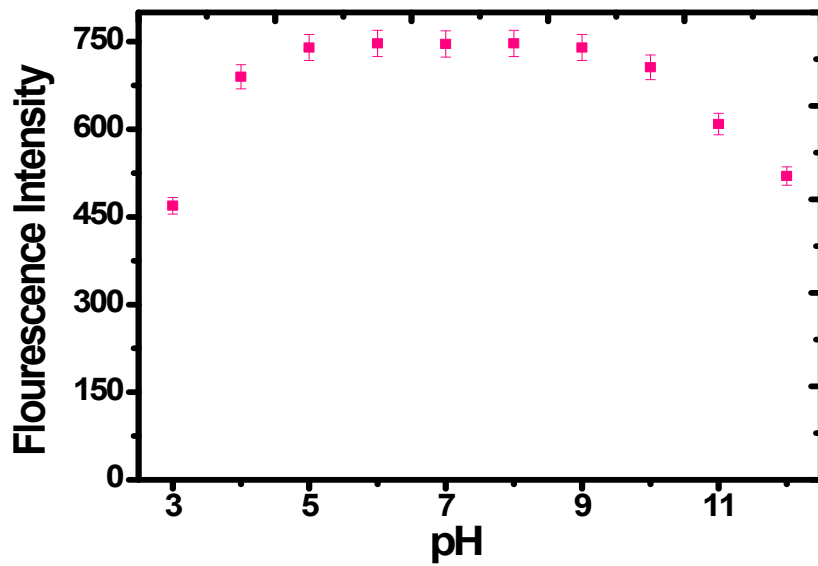


Figure S10. pH effect on the self-assembly (performed in triplicate).

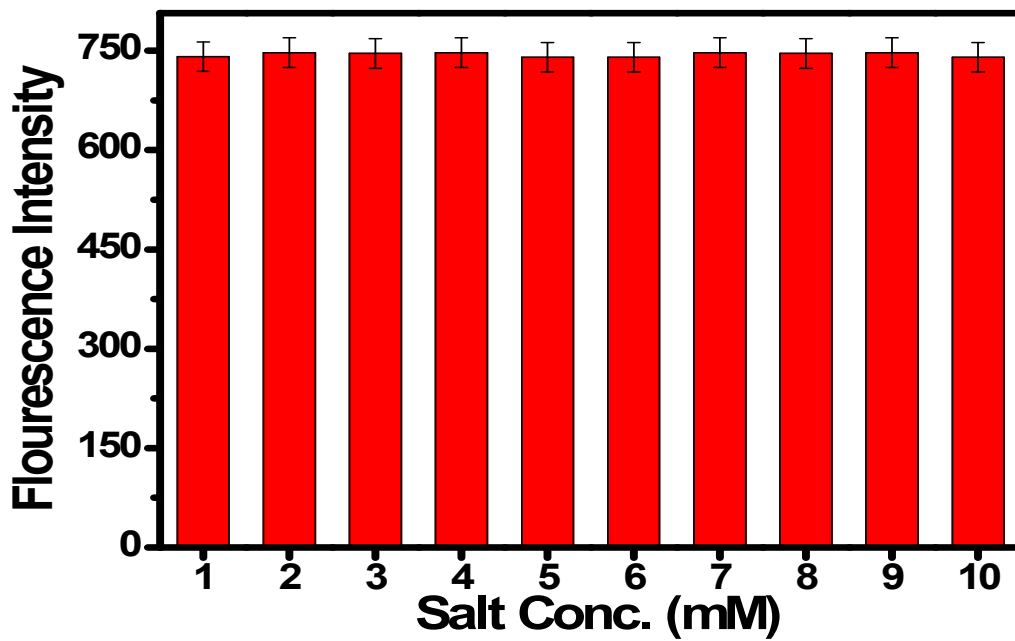


Figure S11. Salt effect on the self-assembly (performed in triplicate).

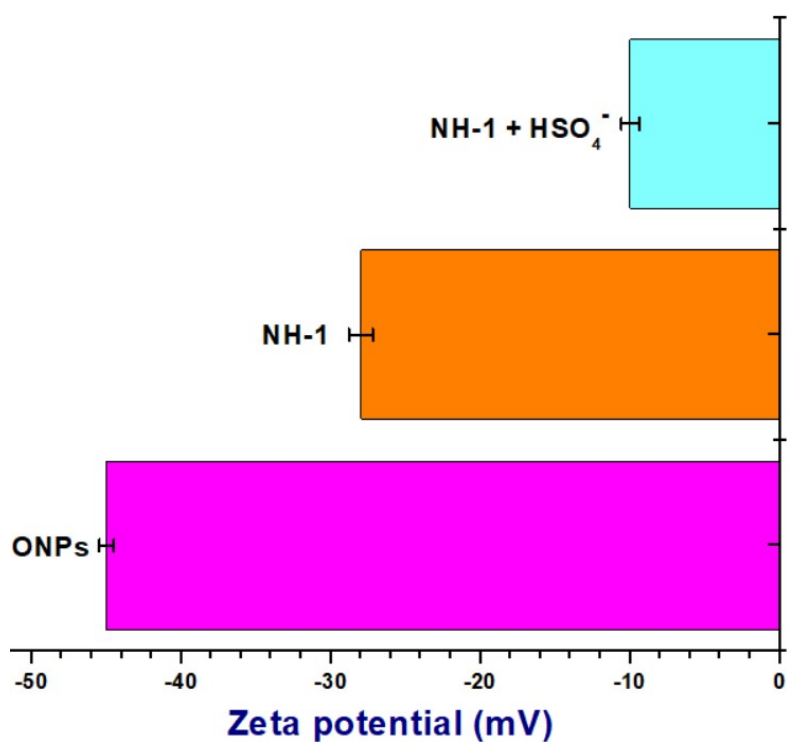


Figure S12: Zeta potential measurements of organic nanoparticles (ONPs); nanohybrid (NH-1) and NH-1 on addition of bisulphate (repeated in triplicate).

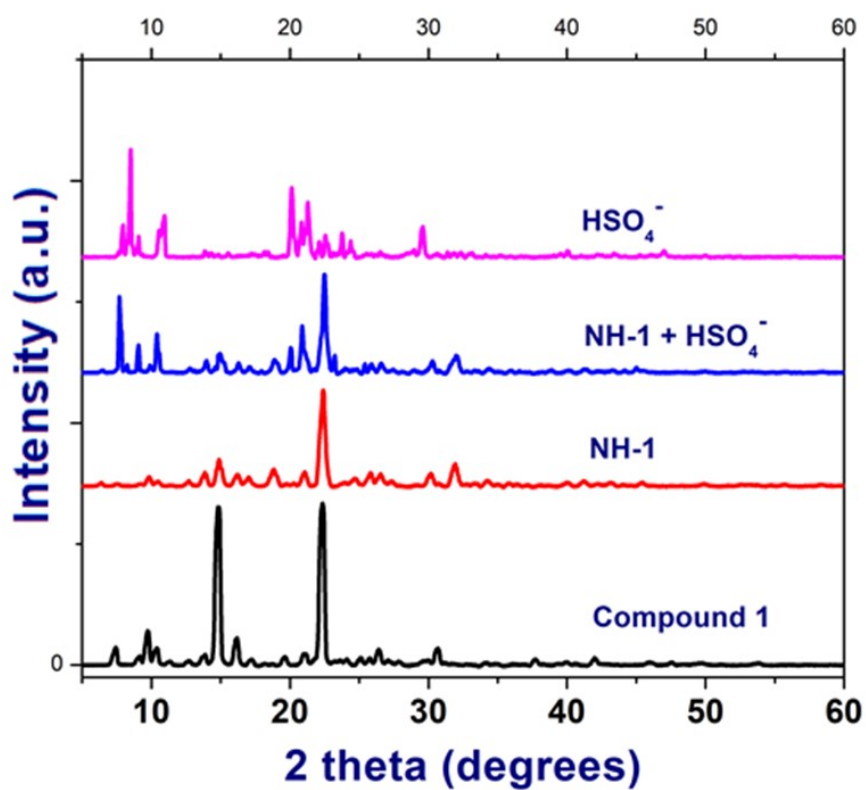


Figure S13: PXRD spectrum of NH-1 on addition of bisulphate anion.

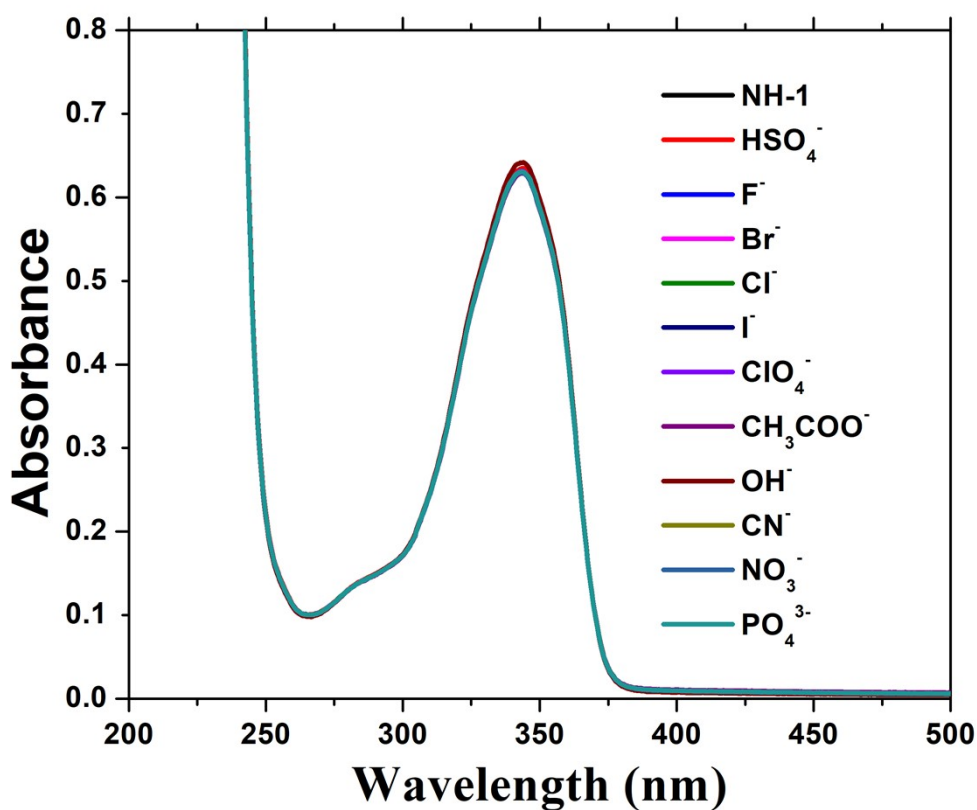


Figure S14: Effect of various anions on UV-visible absorption profile of NH-1.

Table S1: Comparison table of our bisulphate ion sensor with the previously reported literature.

Sr. No.	Medium	Technique Used	Detection Limit	References
1	Aqueous	Fluorescence	50 μM	Inorg. Chem. 2011 , 50, 2953-2956
2	Semi aqueous	Fluorescence	3.75×10^{-6} M	Chem. Commun. 2009 , 7128-7130
3	Aqueous	Fluorescence	1.12 μM	Anal. Methods. 2014 , 6, 9030-9036
4	Aqueous	Fluorescence	108 nM	RSC Adv. 2014 , 4, 48004-48011
5	Ethanol	Fluorescence	1.5 μM	Inorg. Chem. 2013 , 52, 7487-

				7496.
6	Aqueous	Fluorescence	5×10^{-6} M	J. Mater. Chem. B. 2013 , 1, 5014-5020
7	Aqueous	Optical and electrochemical	3.18×10^{-7} M	RSC Adv. 2015 , 5, 50532-50539
8	Aqueous	Fluorescence	5.67 nM	Dalton Trans. 2015 , 44, 12589-12597
9	ACN : H ₂ O	UV- visible absorption spectroscopy and Fluorescence	1.6067×10^{-7} M	RSC Adv. 2016 , 6, 34376-34380.
10	Aqueous	UV-visible absorption	5 nM	Tetrahedron Lett. 2019 , 60, 1457-1462
11	Aqueous	UV-visible absorption	8.65×10^{-7} M	Inorg. Chem. Commun. 2022 , 139, 109966.
12	Aqueous	Fluorescence	3 nM	This work

Table S2: Quantum yield studies.

S. No.	Compound	Quantum yield
1	NH-1	0.15
2	NH-1 + HSO ₄ ⁻	0.42

The quantum yield (QY) of NH-1 was calculated with the following equation, where 'NH-1' and 'st' corresponds to the nanohybrid of **compound 1** sample and reference standard, QS (quinine sulphate), respectively. The QY (Φ) of QS in 0.1 M H₂SO₄ is determined to be 54%.

$$\Phi(\text{nanohybrid}) = \Phi_{\text{st}} \cdot \left(\frac{A_{\text{st}}}{A_{\text{nanohybrid}}} \right) \cdot \left(\frac{F_{\text{nanohybrid}}}{F_{\text{st}}} \right) \cdot \left(\frac{\eta^2_{\text{nanohybrid}}}{\eta^2_{\text{st}}} \right)$$

Where:

$\Phi_{\text{nanohybrid}}$ = quantum yield of nanohybrid

Φ_{st} = quantum yield of standard

$F_{\text{nanohybrid}}$ = Fluorescence intensity of nanohybrid

F_{st} = Fluorescence intensity of standard

η = refractive index

Table S3: Comparison of developed method with the turbidity method reported in the literature for the estimation of HSO₄⁻.

S. No.	Sample Name	Concentration of HSO ₄ ⁻ added	Percentage recovery (This work)	Percentage recovery (Turbidimetry)
1	S1	14 nM	95.8%	93.4%
2	S2	25 nM	98.7%	95.8%
3	S3	16 nM	95.8%	93.6%