

Supporting Information

Magnetic Mesoporous Nanomaterials with AIE Properties for Selective Detection and Removal of CN^- from Water under Magnetic Conditions

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1. CHARACTERIZATION OF FSTB

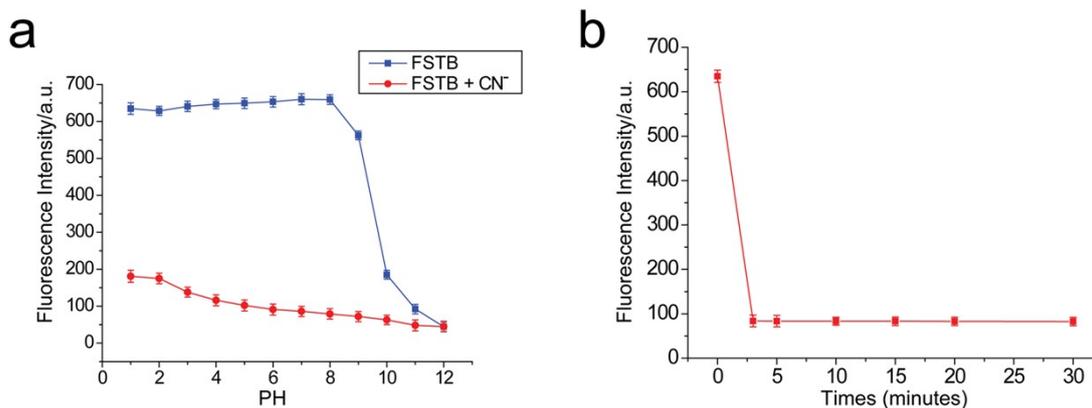


Figure S1. (a) The pH effect on the fluorescence intensity of the **FSTB** and **FSTB** + CN^- ; (b) The fluorescence intensity of **FSTB** toward CN^- as a function of time.

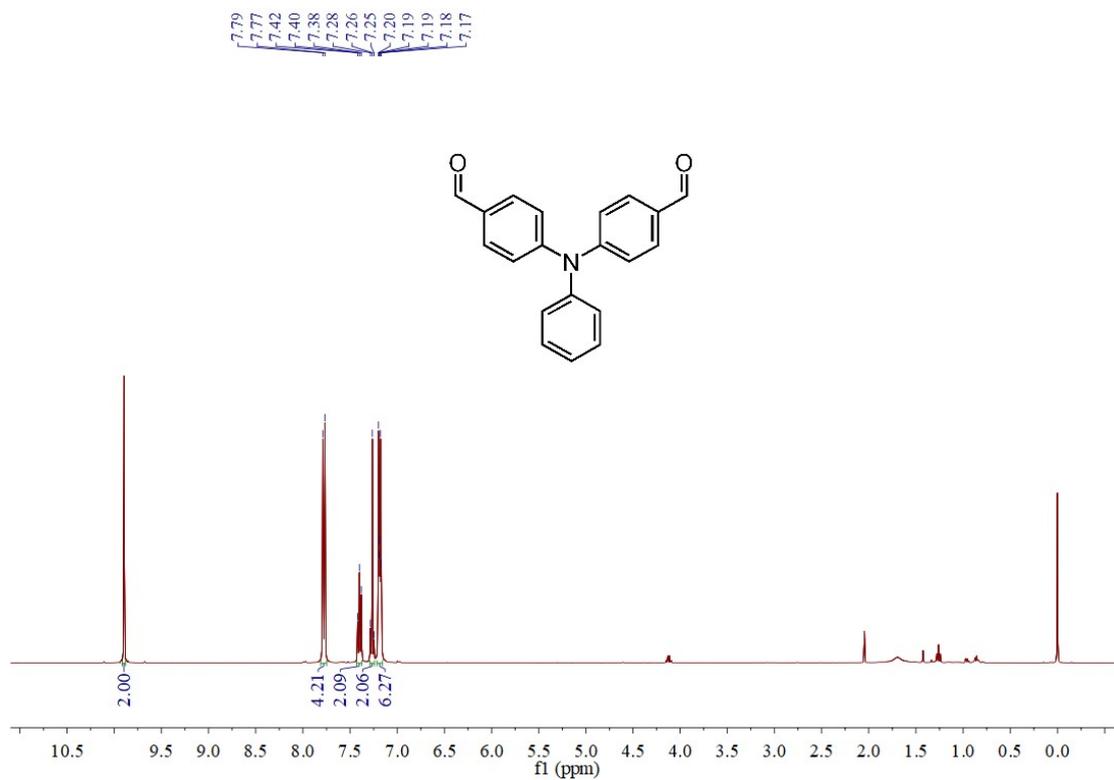


Figure S2. ^1H NMR spectrum of 4,4'-diformyltriphenylamine (a5).

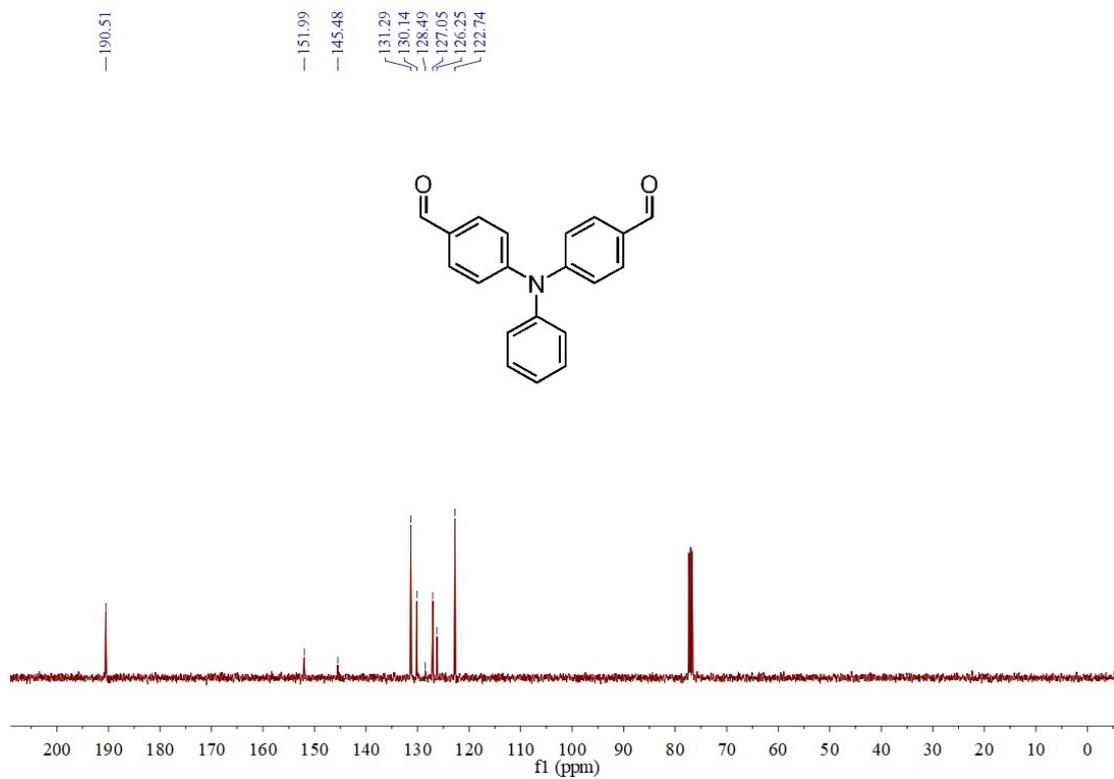


Figure S3. ^{13}C NMR spectrum of 4,4'-diformyltriphenylamine (a5).

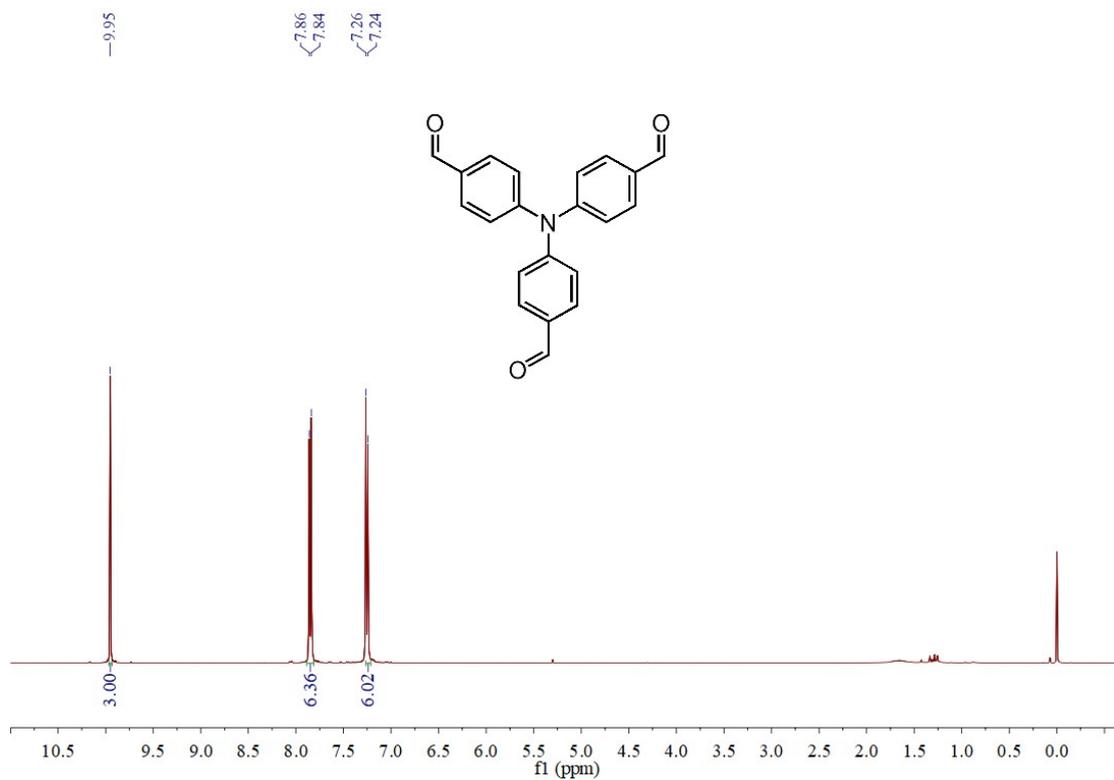


Figure S4. ¹H NMR spectrum of Tris(4-formylphenyl)amine (a6).

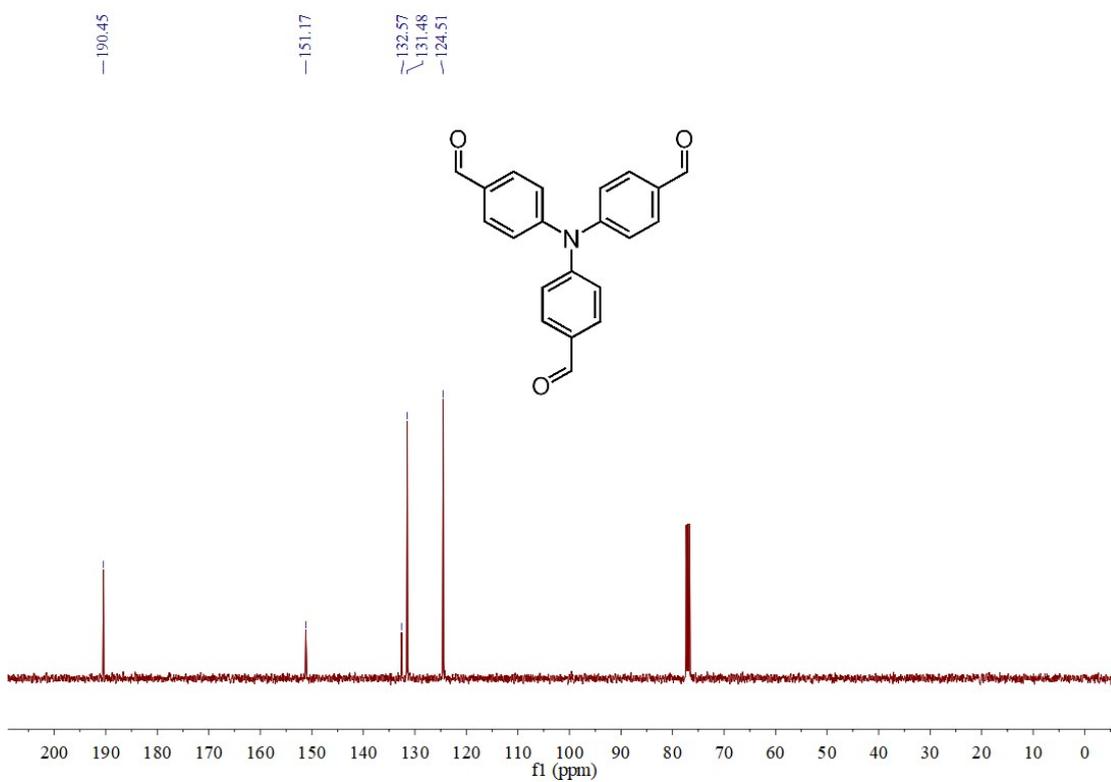


Figure S5. ¹³C NMR spectrum of Tris(4-formylphenyl)amine (a6).

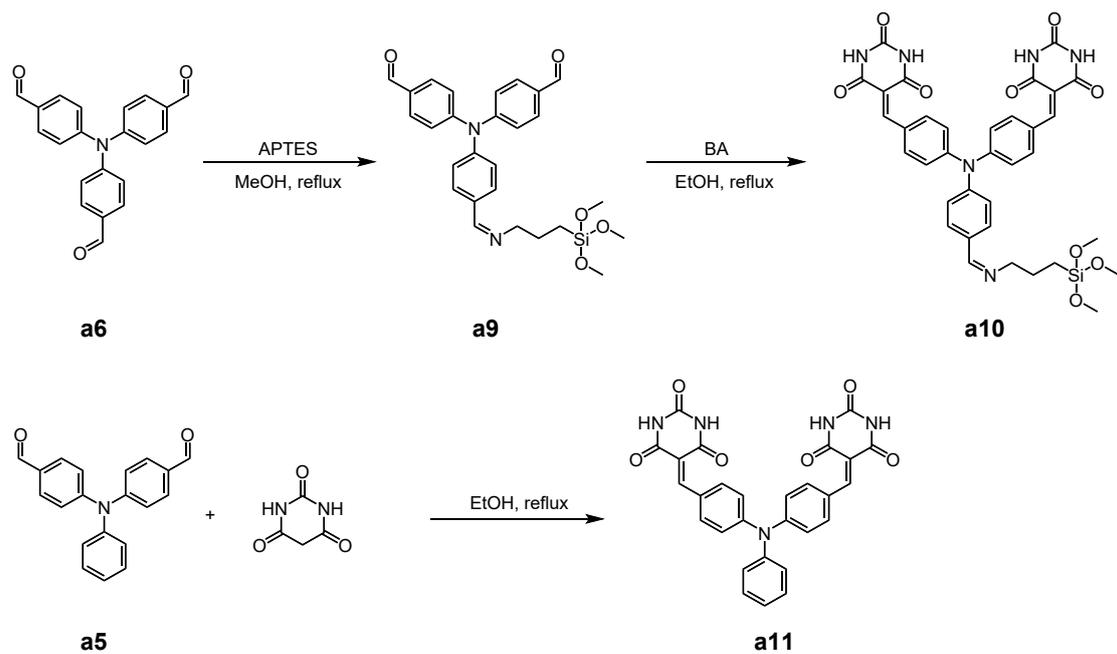
The synthetic procedures and NMR spectrum

The products of **a6** and APTES: the **a6** (0.10 g, 0.3 mmol) and APTES (0.06 g, 0.3 mmol) were heated and stirred in dry methanol (5 mL) under reflux for 12 hours, then the crude product was purified by column chromatography (PE/EA = 10/1) to a yellow solid **a9**. **a9** (55%): ¹H NMR (400 MHz, CDCl₃, 298 K): δ = 9.95 (s, 1H), 9.90 (s, 1H), 7.85 (d, J = 8.4 Hz, 2H), 7.78 (d, J = 8.5 Hz, 3H), 7.47 (d, J = 8.4 Hz, 1H), 7.25 (d, J = 8.9 Hz, 2H), 7.20 (s, 1H), 7.19-7.15 (m, 3H), 5.38 (d, J = 10.3 Hz, 1H), 3.49 (s, 6H), 3.38 (d, J = 7.0 Hz, 5H), 1.26 (s, 2H), 1.06 (s, 2H). ¹³C NMR (101 MHz, CDCl₃, 298 K): δ = 190.46, 151.91, 151.19, 145.61, 136.12, 132.62, 131.48, 131.30, 128.49, 128.09, 126.52, 125.73, 124.53, 122.93, 102.89, 53.08, 50.85, 31.49, 30.13, 29.68.

Under an N₂ atmosphere, **a9** (0.1 g, 0.2 mmol) and barbituric acid (BA) (0.065 g, 0.5 mmol) were heated and stirred in dry ethanol (5 mL) under reflux for 6 hours, washed twice with ethanol, and finally dried under vacuum at 50 °C for 24 hours to obtain a red solid **a10** (75%). Due to the poor solubility of **a10** in deuterated solvents, the corresponding NMR spectrum pictures were not obtained, so we synthesized the products of **a5** and BA, which indirectly proved that BA is bonded to triphenylamine.

Under nitrogen, a mixture of **a5** (0.3 g, 1.0 mmol) and BA (0.4 g, 3.1 mmol) in ethanol (10 mL) was refluxed for 4 h. The residue was purified using column chromatography on silica to afford the product as a red powder **a11** after vacuum dried at 50 °C overnight¹. **a11** (red solid, 91%): ¹H NMR (400 MHz, DMSO-d₆, 298 K): δ = 11.31 (s, 2H), 11.17 (s, 2H), 8.28 (d, J = 8.8 Hz, 4H), 8.19 (s, 2H), 7.48 (t, J = 7.7 Hz, 2H), 7.33 (t, J = 7.3 Hz, 1H), 7.25 (d, J = 7.9 Hz, 2H), 7.07 (d, J = 8.7 Hz, 4H). ¹³C NMR (101 MHz, DMSO-d₆, 298 K): δ = 164.27, 162.48, 154.38, 150.62, 150.35, 145.00, 137.12, 130.83, 127.82, 127.42, 121.81, 116.44.

The method used in the main paper is the direct bonding synthesis method, while the successful synthesis of **a9**, **a10** and **a11** demonstrated the feasibility of the compounds prepared by the post-synthesis grafting method to be bound to magnetic microspheres.



Scheme 1. The synthetic procedures of **a9**, **a10** and **a11**.

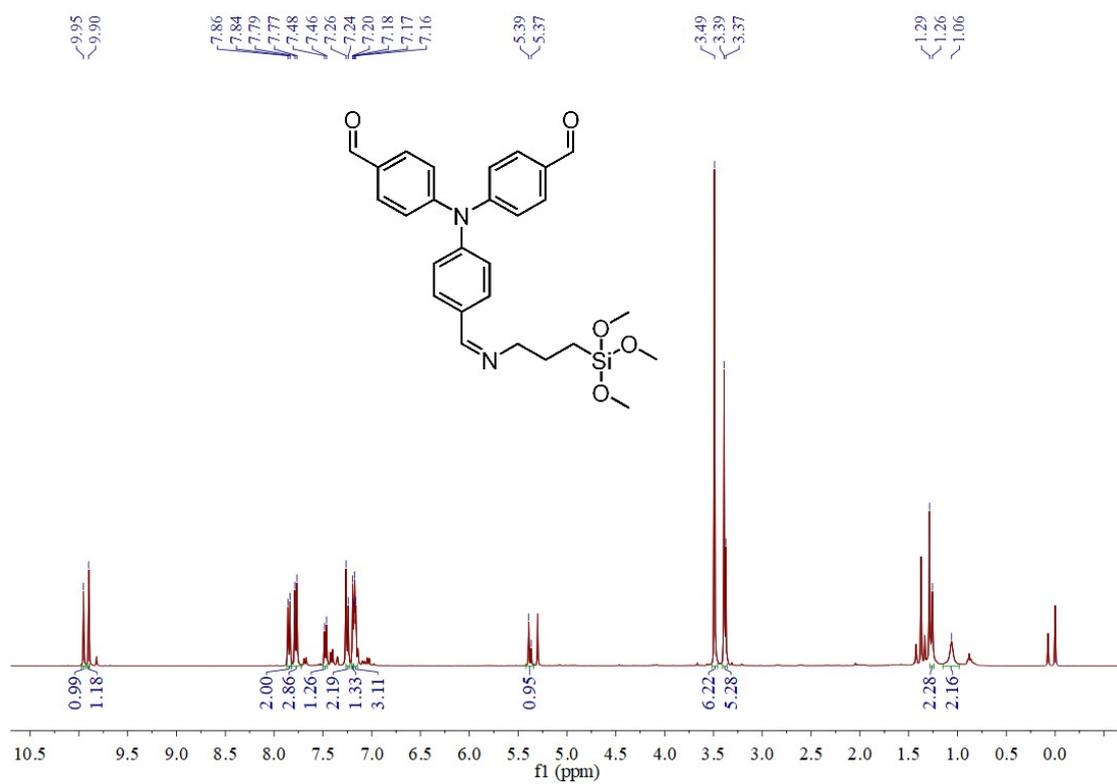


Figure S6. ^1H NMR spectrum of **a9**.

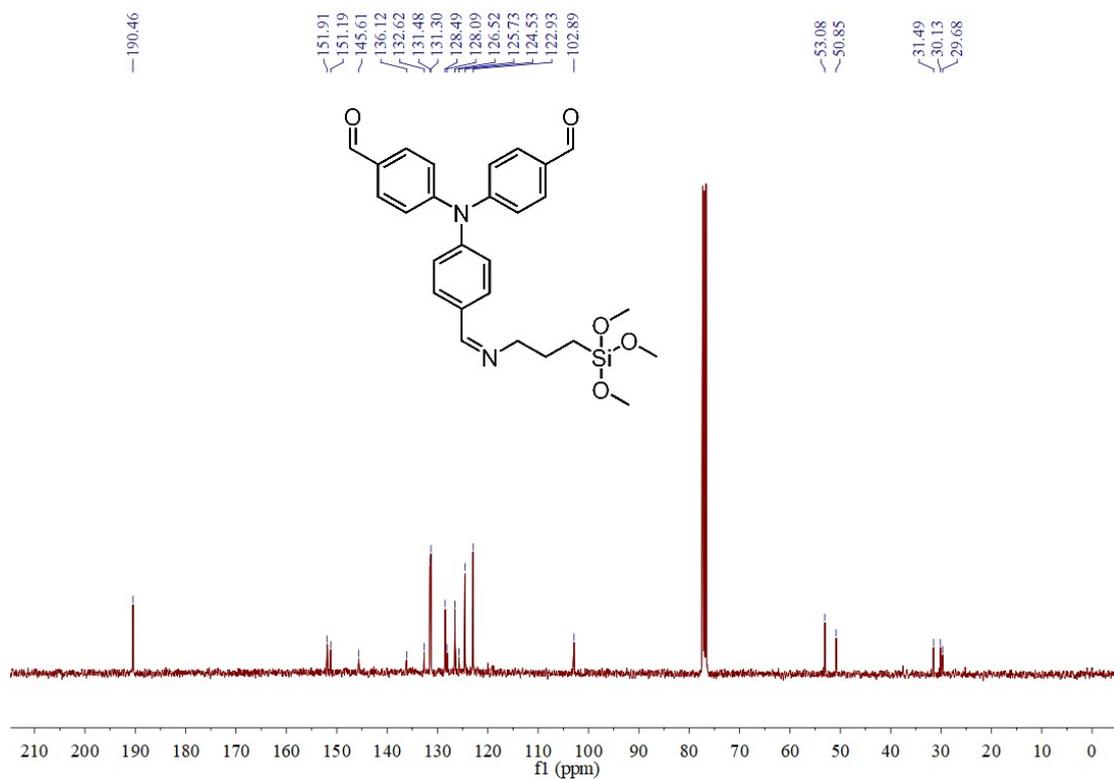


Figure S7. ^{13}C NMR spectrum of **a9**.

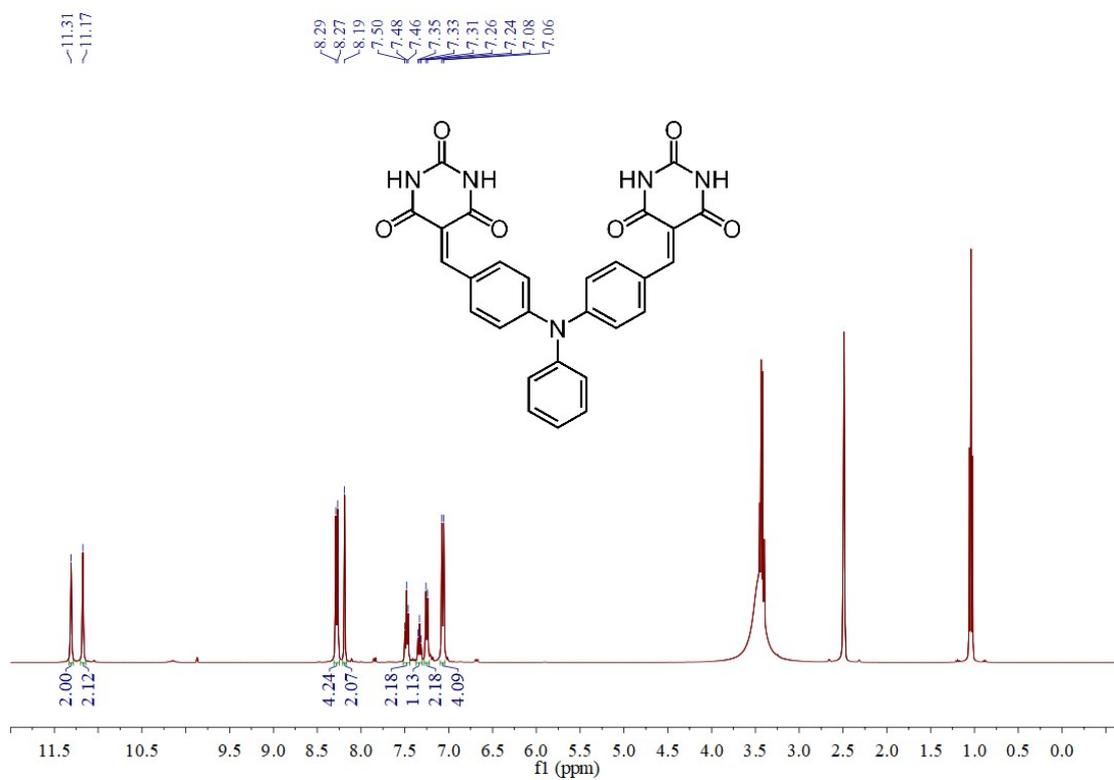


Figure S8. ^1H NMR spectrum of **a11**.

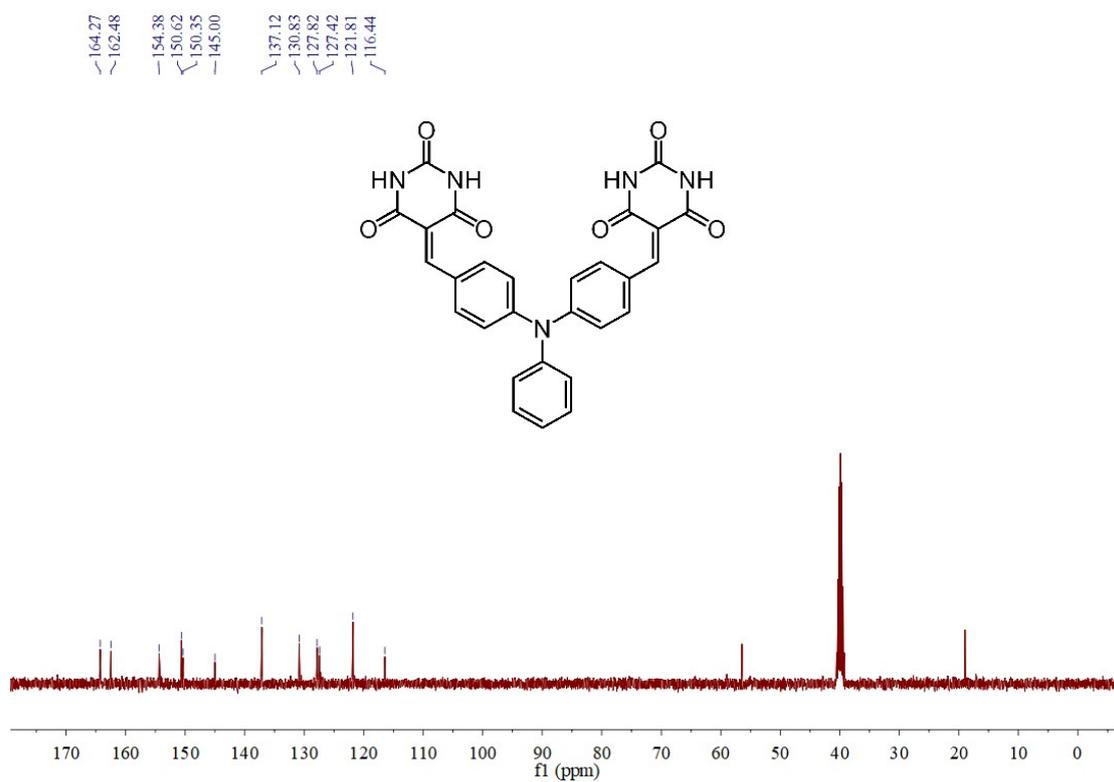
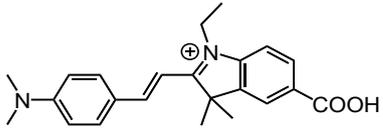
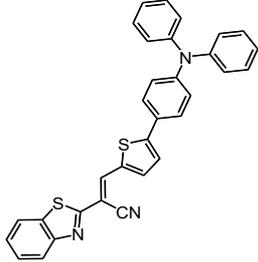
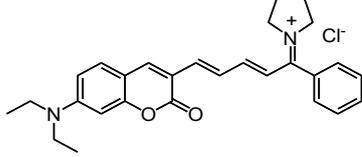


Table S1. The FSTB compared to prior sensors.

Probes	LOD/mol L ⁻¹	Magnetic removal	References
	2.1×10^{-6}	No	2
	3.83×10^{-6}	No	3
NP3	2.0×10^{-6}	No	4
	2.3×10^{-7}	No	5

	3.34×10^{-7}	No	6
	4.24×10^{-8}	No	7
	7.5×10^{-8}	No	8
FSTB	2.49×10^{-8}	Yes	This work

References

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