Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Fluorane Salicylaldehyde Hydrazone Zn(II) Complex: Reversible Photochromic System both in Solution and in Solid Matrix

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Contents

1. Selected spectra and data referred in the paper

Table S1. The influence of light wavelengths on the color changes of **1-Zn**, **2-Zn** and **3-Zn**.

Wavelength / nm	365	400	425	450	475	500	550	600
Color change of 1-Zn	Yes	Yes	Yes	No	No	No	No	No
Color change of 2-Zn	Yes	Yes	Yes	No	No	No	No	No
Color change of 3-Zn	Yes	Yes	Yes	No	No	No	No	No

Table S2. The fluorescence lifetimes and quantum yields fluorescence of **1-Zn**, **2-Zn** and **3-Zn** in solution before and after UV light irradiation.

	Lifetime in DCM / ns		Quantum yield in DCM / %	
	Non-irradiated	Irradiated	Non-irradiated	Irradiated
1-Zn	3.47	3.05	8.17	0.96
2-Zn	3.21	3.06	18.36	6.98
3-Zn	3.18	2.95	11.99	2.73

Table S3. The fluorescence lifetimes and fluorescence quantum yields of **1-Zn**, **2-Zn** and **3-Zn** in solid matrix before and after UV light irradiation.

	Lifetime / ns		Quantum yield / %	
	Non-irradiated	Irradiated	Non-irradiated	Irradiated
1-Zn	1.69	1.59	3.55	1.21
2-Zn	1.57	1.41	6.94	1.44
3-Zn	1.56	1.46	5.70	1.07

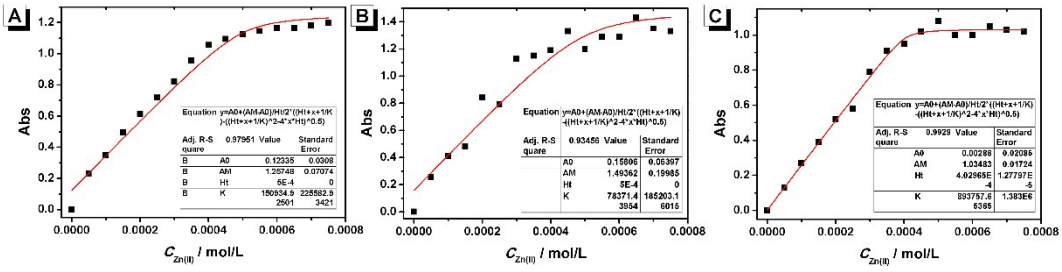

Figure S1. UV-Vis spectra titrations of the dyes of A) **1,** B) **2** and C) **3** to Zn(II) and their nonlinear fitting results. The absorbance wavelength was 615 nm, 494 nm and 585 nm, respectively. A0, AM, Ht and K in the figures represent the absorbance of dyes without Zn(II), the absorbance of dyes with excess Zn(II), the concentration of dyes and the binding constants between dyes and Zn(II), respectively. Conditions: [**1**] = [**2**] = [**3**] = 500 μmol/L, [Zn(II)] = 0-750 μmol/L. 2 mm quartz cells were used in the experiments.

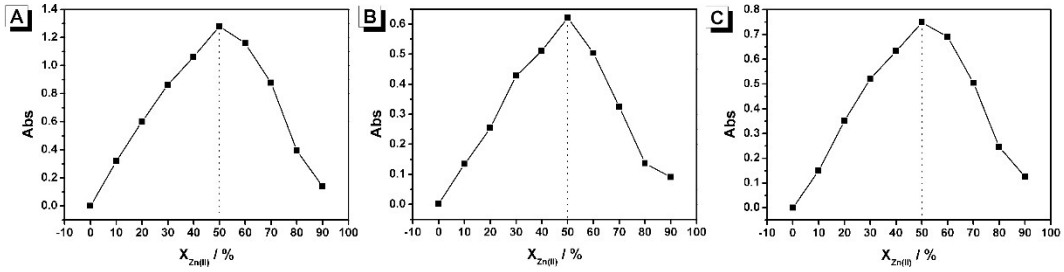

Figure S2. Job's plot method for evaluating the stoichiometry of the complexes. A) **1** with Zn(II), B) **2** with Zn(II) and C) **3** with Zn(II). The absorbance wavelength was 615 nm, 494 nm and 585 nm, respectively. The total concentrations of dyes and Zn(II) were 500 μmol/L. 2 mm quartz cells were used in the experiments.

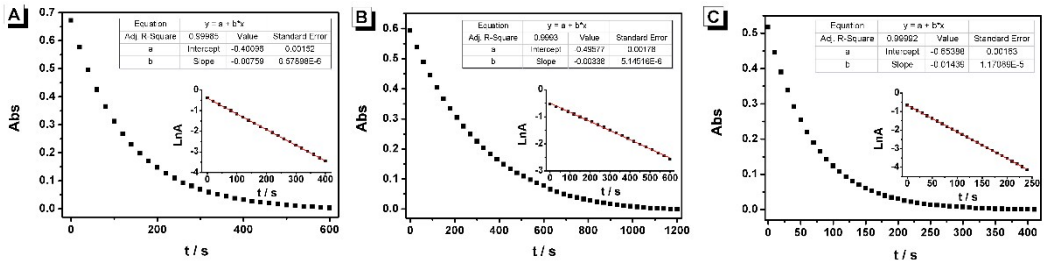

Figure S3. The thermal recovery kinetics of **1-Zn** in different solvents at 20 °C. Inset: The curves were fitted with one-order reaction dynamics (lnA = -*k*t). [**1**] = 500 μmol/L, [Zn(II)] = 5 mmol/L, λ = 615 nm.

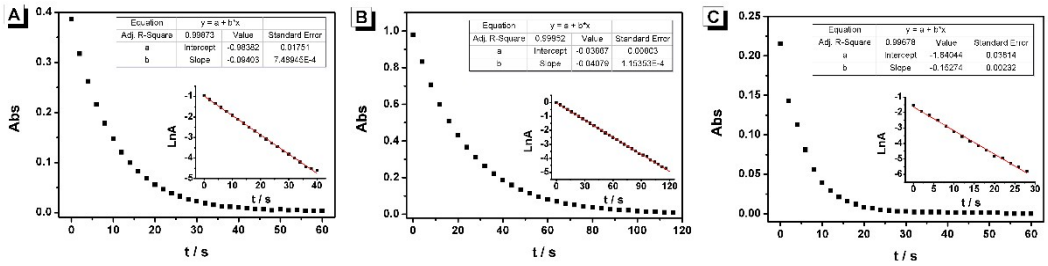

Figure S4. The thermal recovery kinetics of **2-Zn** in different solvents at 20 °C. Inset: The curves were fitted with one-order reaction dynamics (lnA = -*k*t). [**2**] = 500 μmol/L, [Zn(II)] = 5 mmol/L, λ = 494 nm.

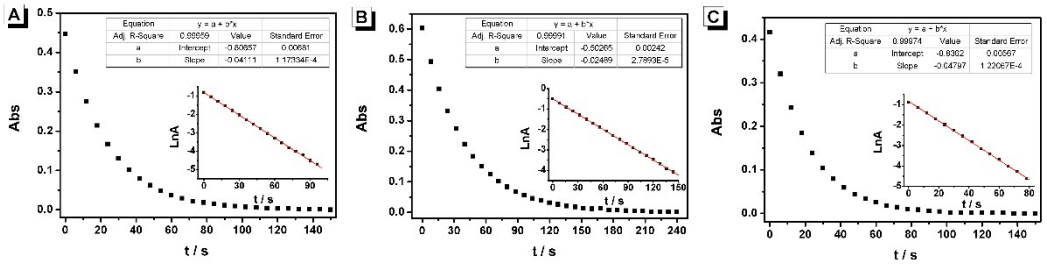

Figure S5. The thermal recovery kinetics of **3-Zn** in different solvents at 20 °C. Inset: The curves were fitted with one-order reaction dynamics (lnA = -*k*t). [**3**] = 500 μmol/L, [Zn(II)] = 5 mmol/L, λ = 585 nm.

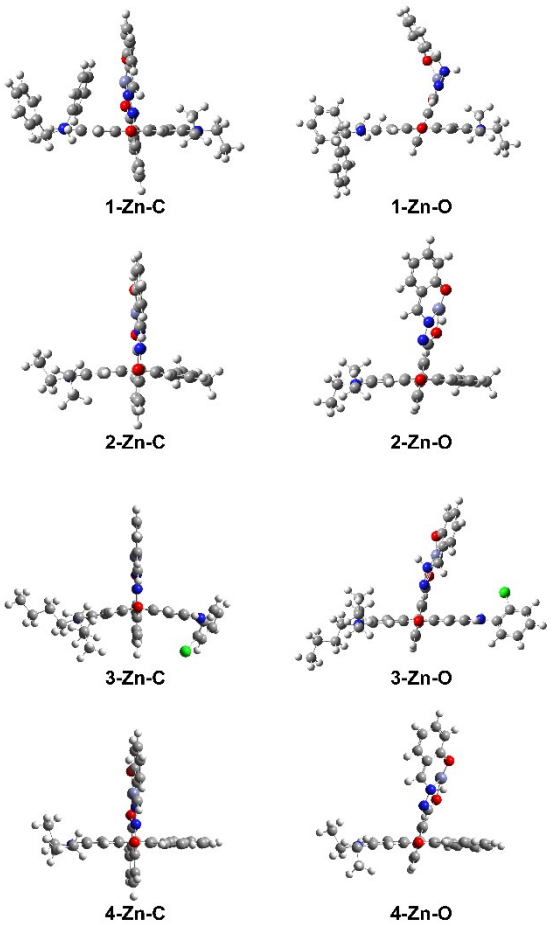

Figure S6. Stationary Born-Oppenheimer states of the complexes in different forms.

2. Caption of the video

Video 1. A video of letters recording on **1-Zn**, **2-Zn** and **3-Zn** in silica gel. [**1**] = [**2**] = [**3**] = 2 μmol/g, [Zn(II)] = 200 μmol/g, the wavelength of laser is 405 nm.

3. NMR spectra

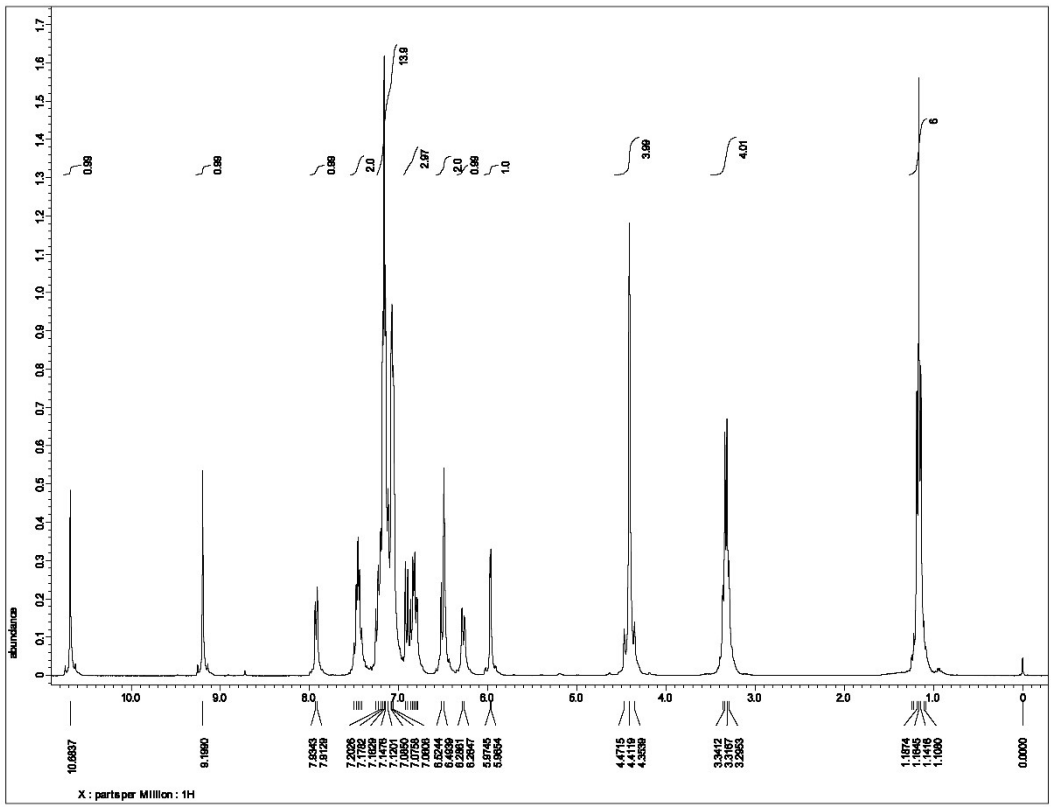

Figure S7. ^{1}H-NMR spectra of **1**.

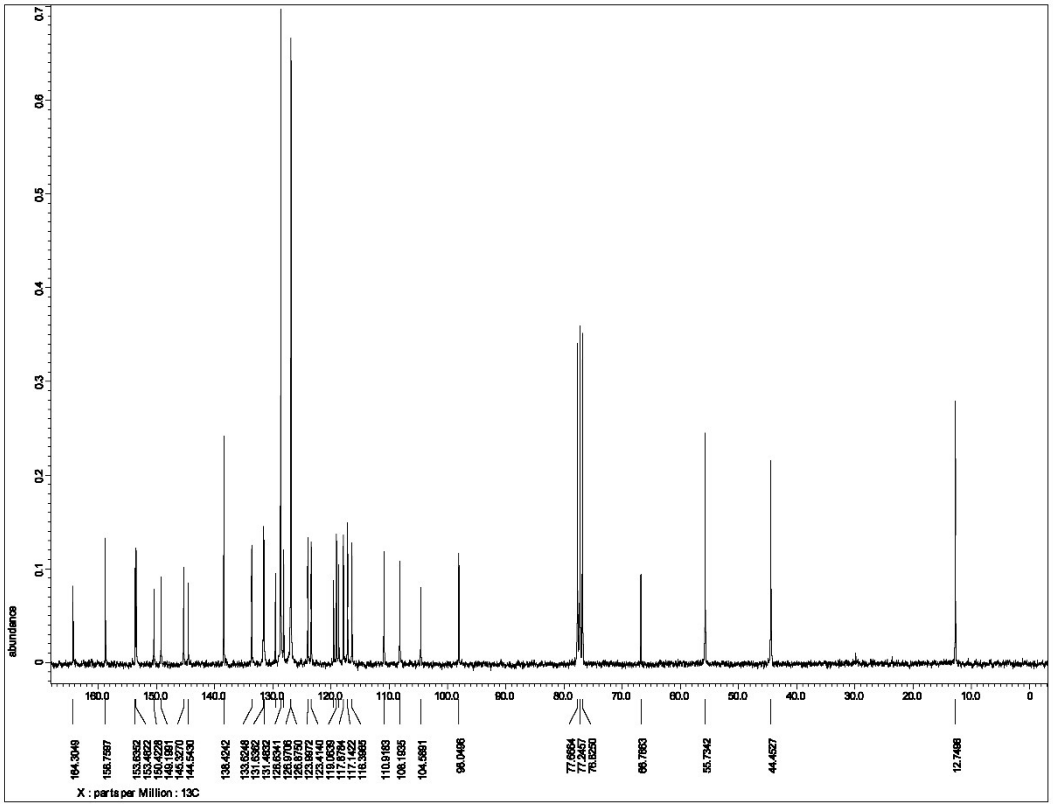

Figure S8. ^{13}C-NMR spectra of **1**.

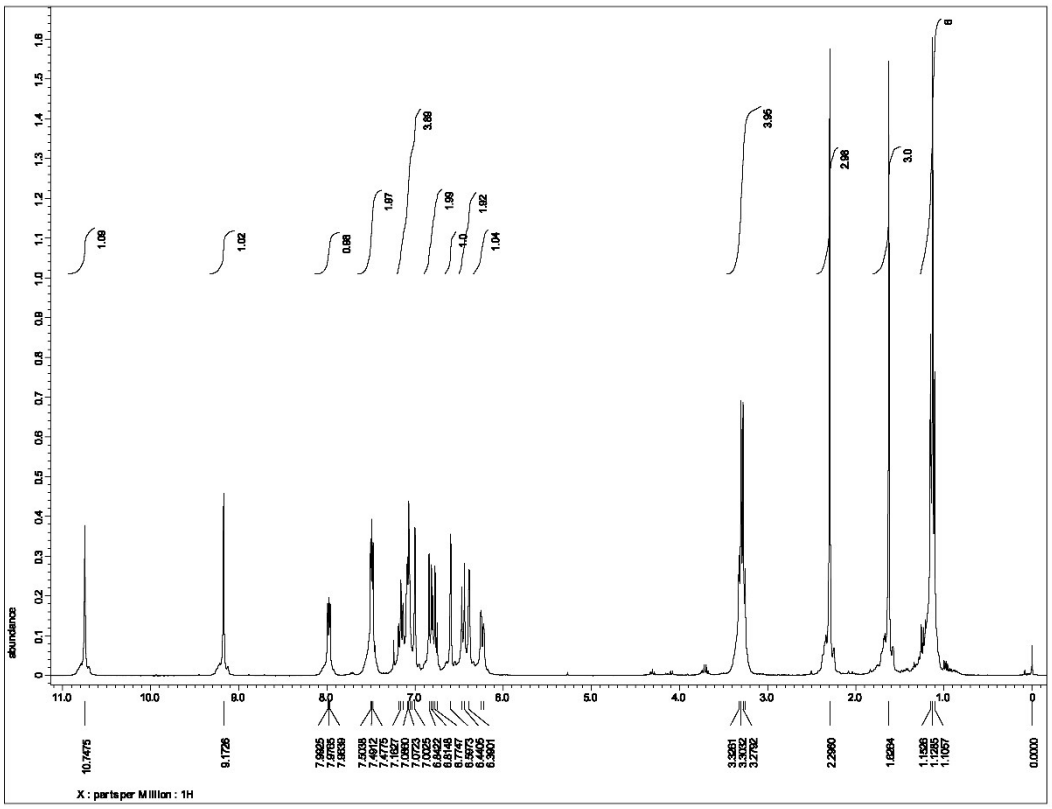

Figure S9. [1]H-NMR spectra of **2**.

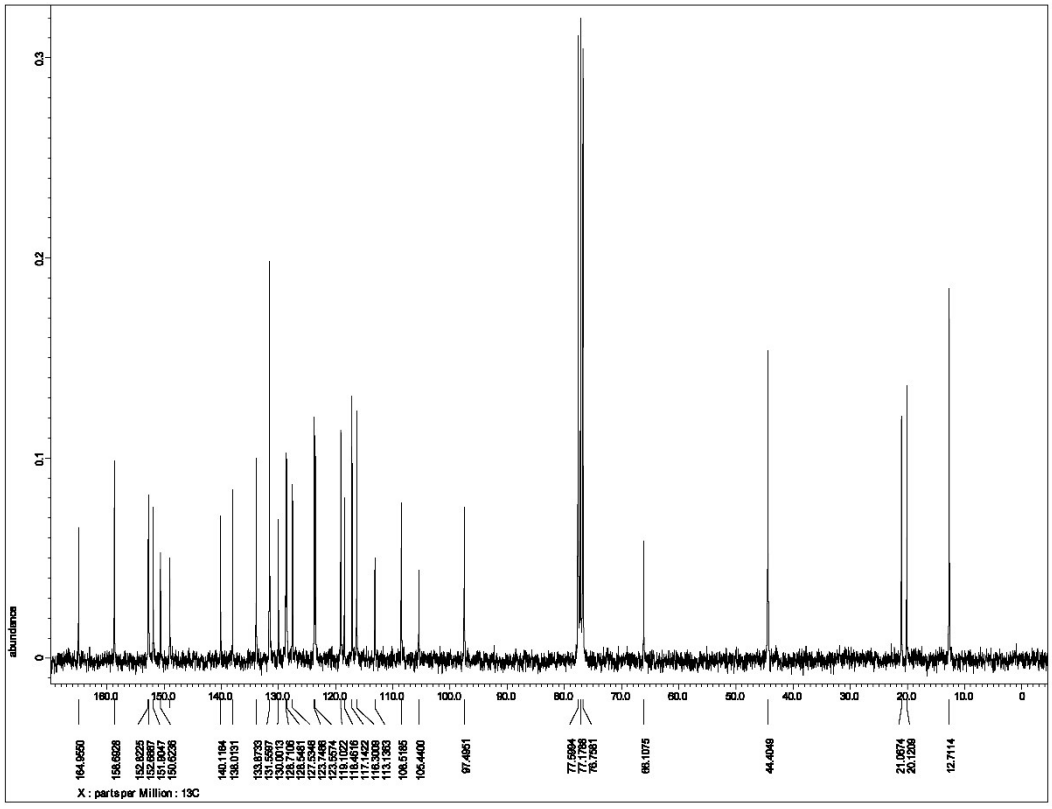

Figure S10. [13]C-NMR spectra of **2**.

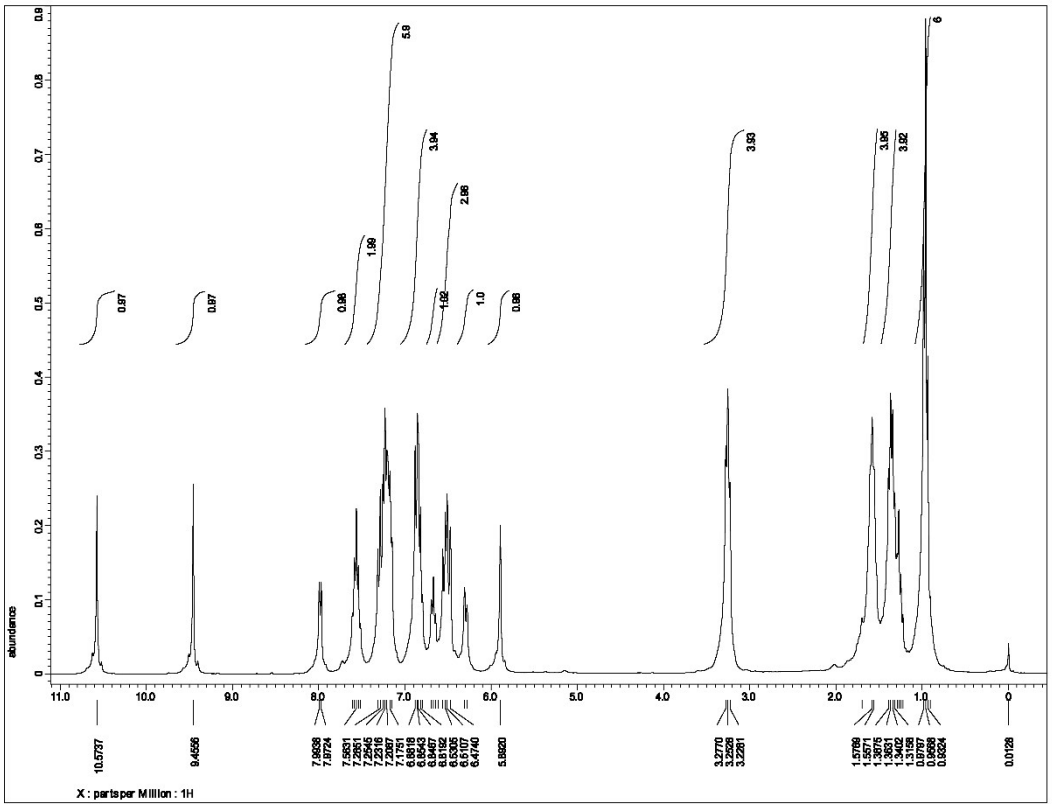

Figure S11. [1]H-NMR spectra of **3**.

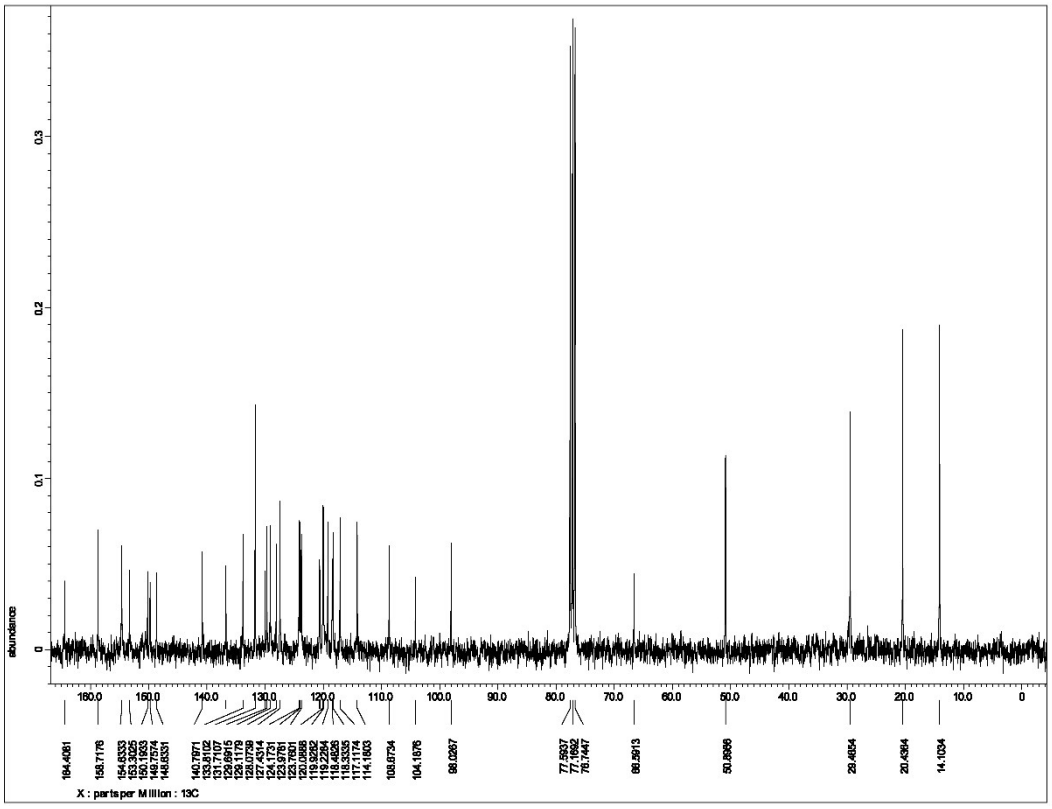

Figure S12. [13]C-NMR spectra of **3**.

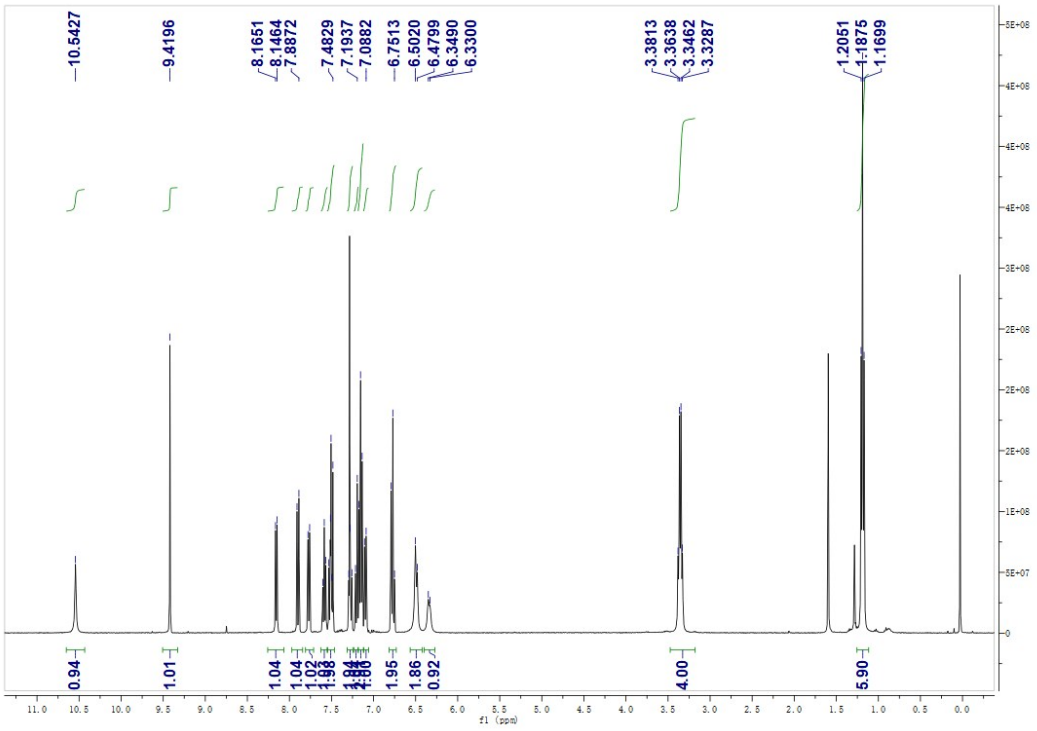

Figure S13. ^{1}H-NMR spectra of **4**.

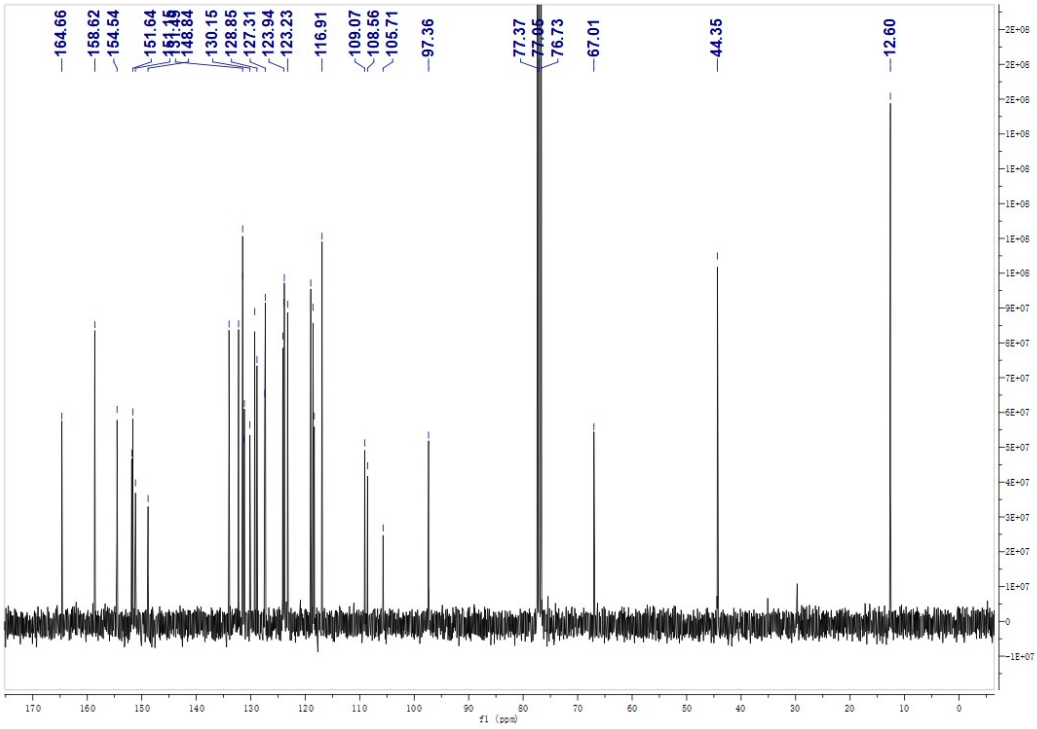

Figure S14. ^{13}C-NMR spectra of **4**.

4. ESI-MS

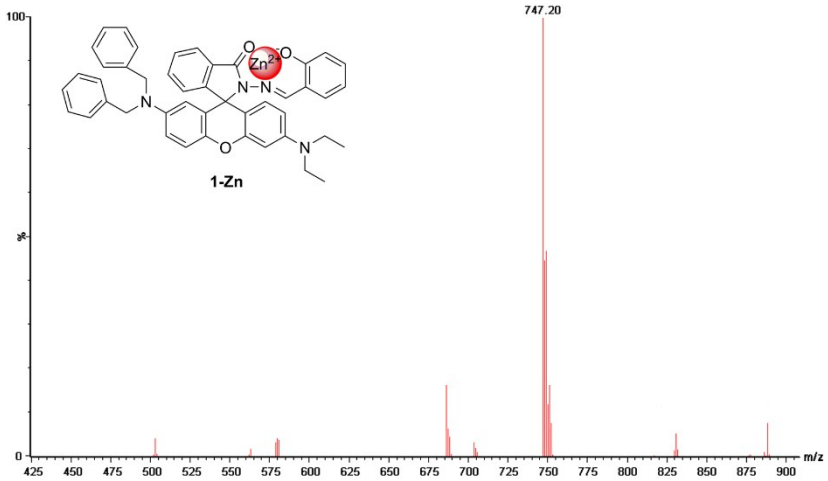

Figure S15. EMI-MS spectra of **1-Zn**.

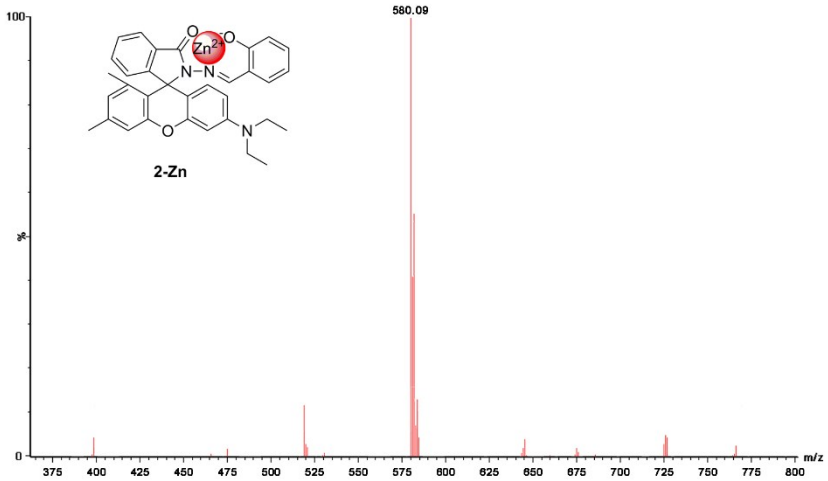

Figure S16. EMI-MS spectra of **2-Zn**.

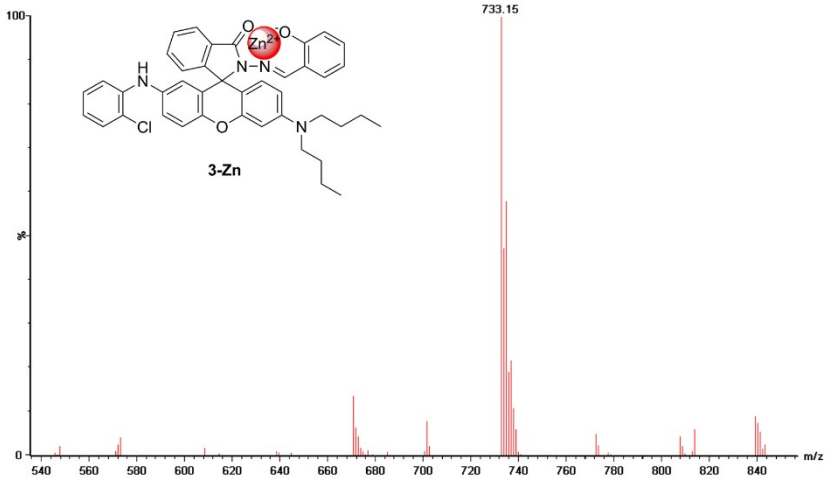

Figure S17. EMI-MS spectra of **3-Zn**.

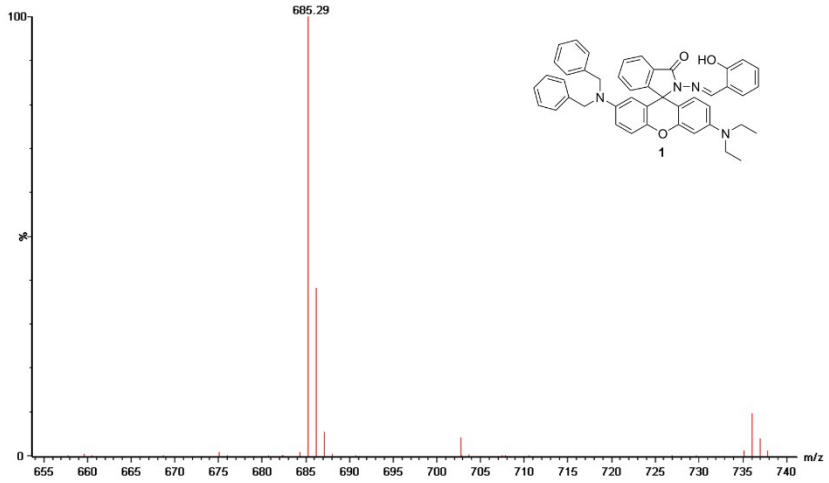

Figure S18. EMI-MS spectra of **1**.

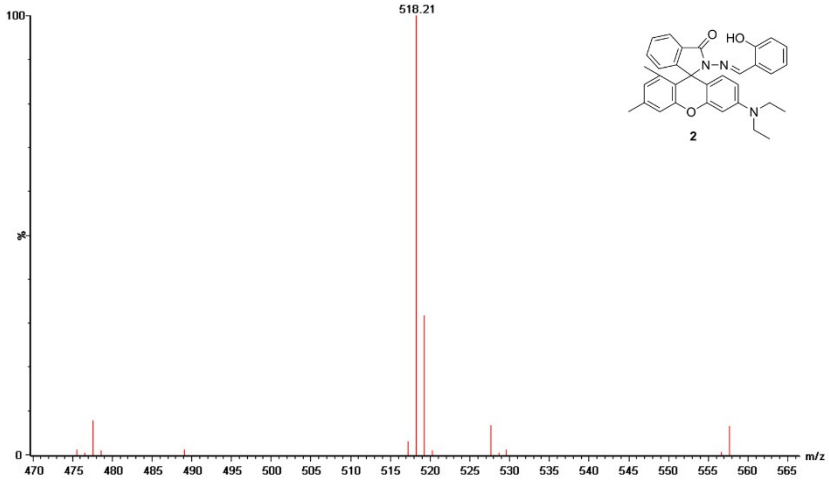

Figure S19. EMI-MS spectra of **2**.

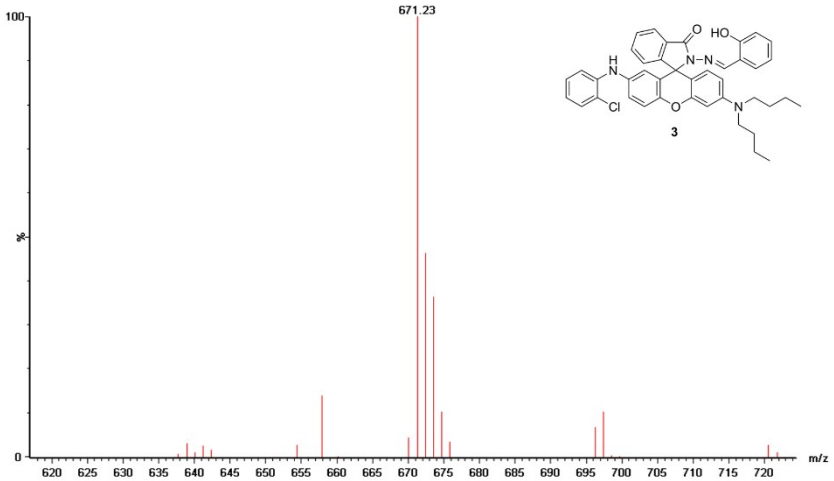

Figure S20. EMI-MS spectra of **3**.

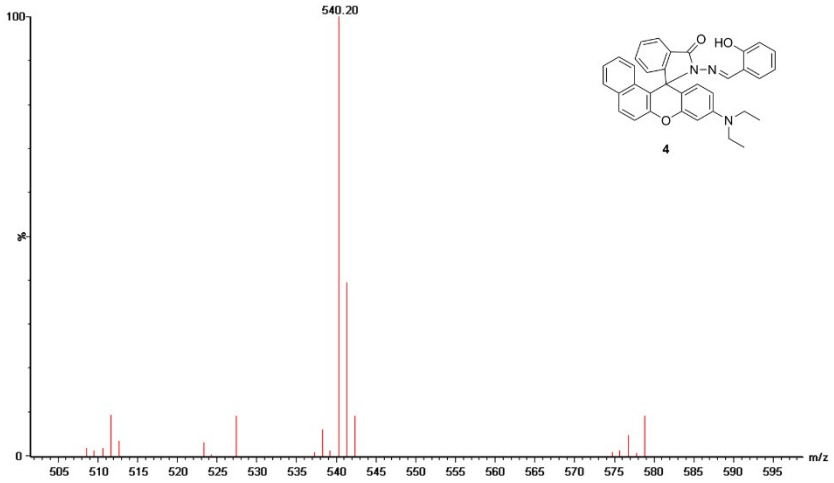

Figure S21. EMI-MS spectra of **4**.