Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Supporting Information

Highly Sensitive and Selective Fluorescence Turn-on Detection of Lead Ion in Water Using Fluorene-Based Compound and Polymer

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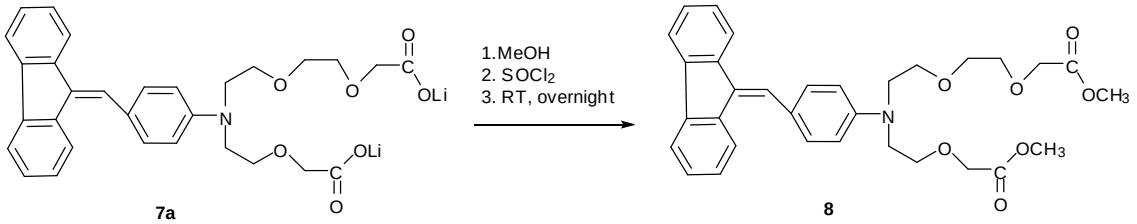


Scheme S1. Synthesis of compound **8** from **7a**

Compound 8. Compound **7a** (0.025 mg, 0.05 mmol) was dissolved in 3 mL of methanol under argon atmosphere and 1.00 g of $SOCl_2$ was added to the solution dropwise. The solution was stirred overnight and monitored by the TLC (hexane/acetone 3:1). The mixture was neutralized by 10% sodium bicarbonate solution and extracted three times with dichloromethane. The solvent was evaporated under the reduced pressure and purified by silica gel column chromatography using hexane and acetone (3:1) as eluting solvent. Compound **8** was obtained as yellow viscous oil after removing the solvent. ^{1}H NMR (300 MHz, $CDCl_3$,): δ 8.01 (1H, d), 7.78 (3H, m), 7.64 (1H, s), 7.55 (2H, d), 7.35 (3H, m), 7.15 (1H, m), 6.79 (2H, d), 4.19 (2H, s), 4.16 (2H, s), 3.75 (18H, m). ESI-MS calculated for [MH^+]: 546.24, found 546.22. IR (NaCl plate, cm^{-1}): 3012, 2951, 2900,1754, 1595, 1600, 1519, 1219.

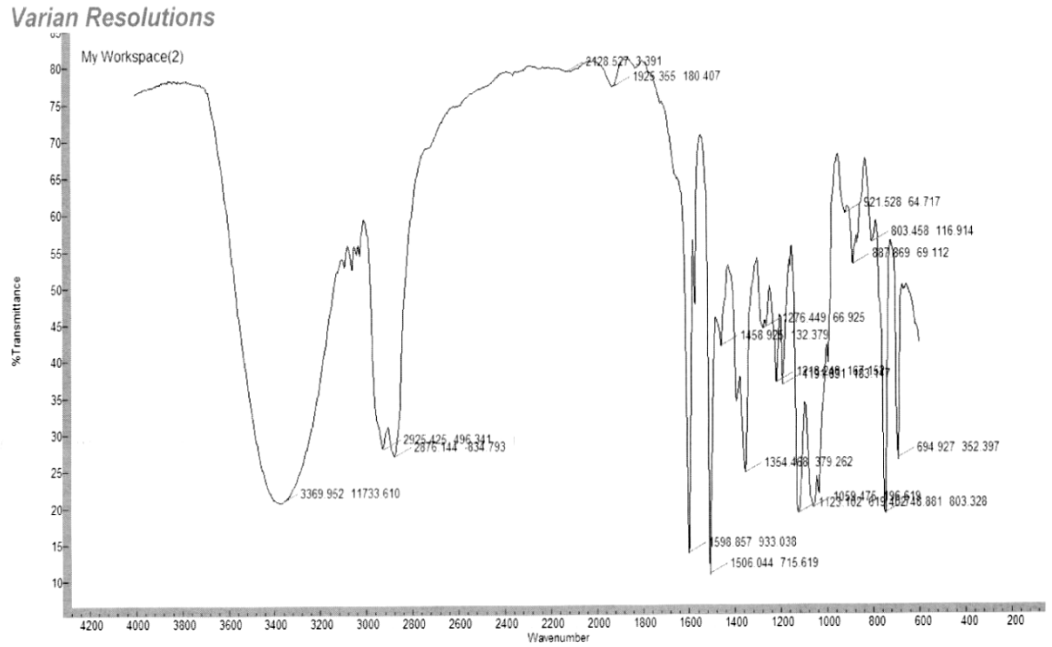


Figure S1. IR spectrum (NaCl plate) of compound **1**.

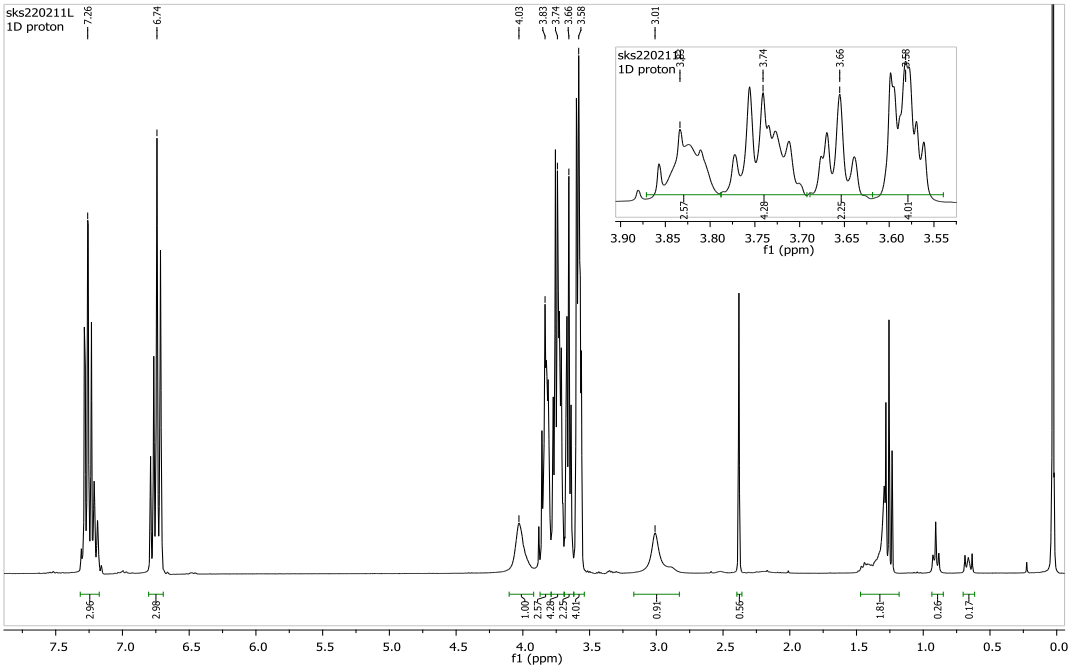


Figure S2. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of compound **1**.

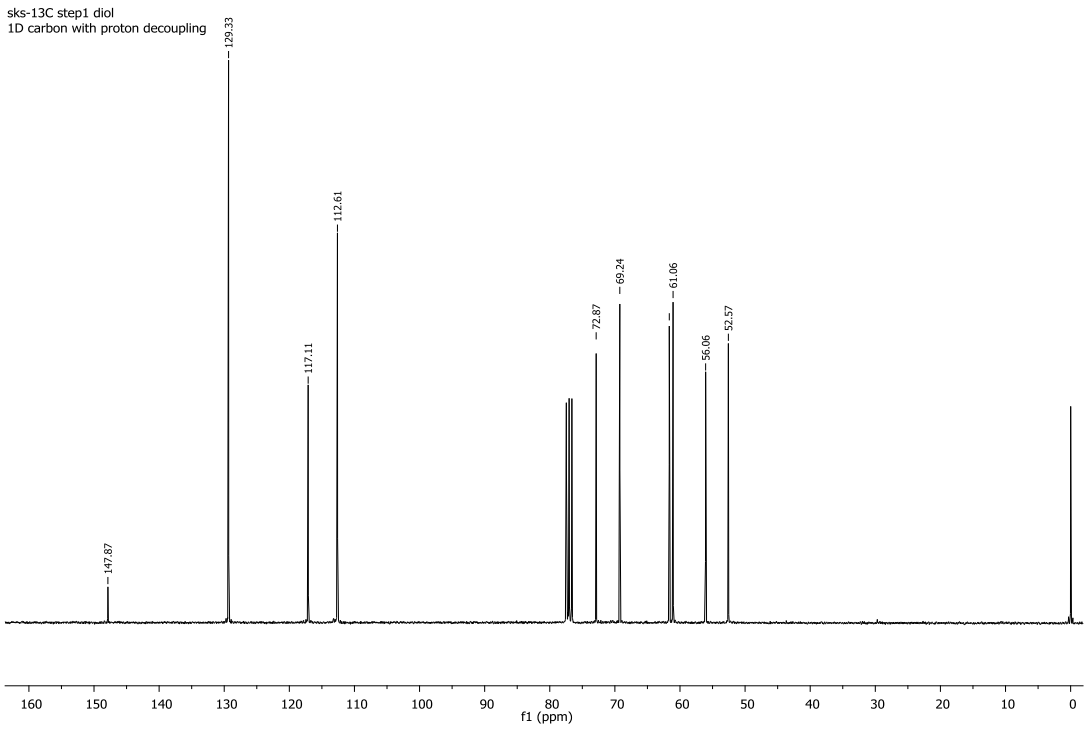


Figure S3. ^{13}C NMR spectrum (75 MHz, $CDCl_3$) of compound **1**.

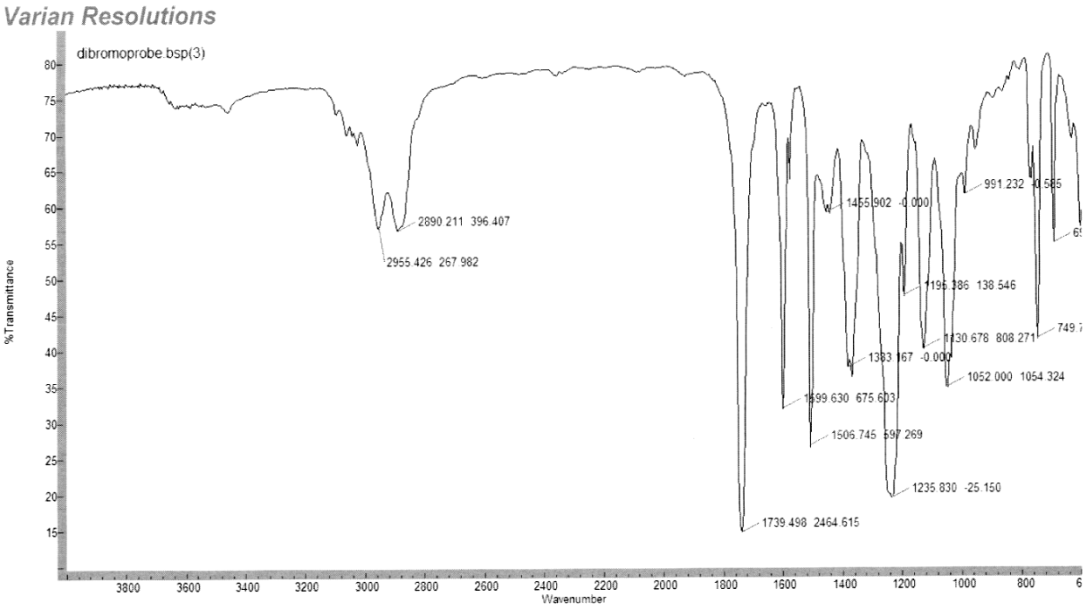


Figure S4. IR spectrum (NaCl plate) of compound **2**.

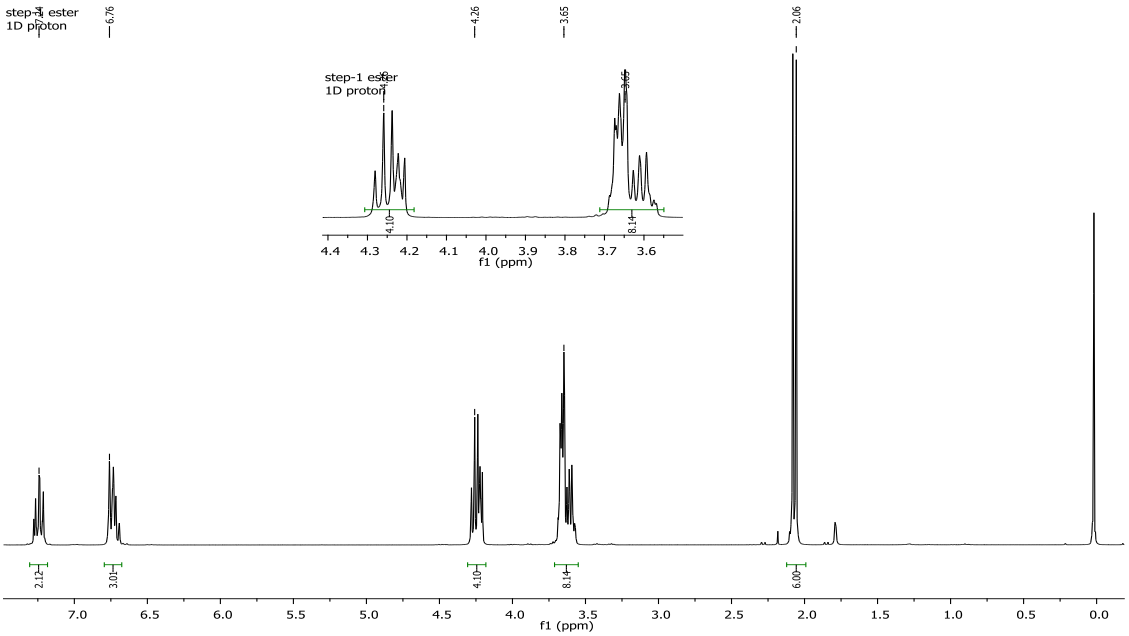


Figure S5. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of compound **2**.

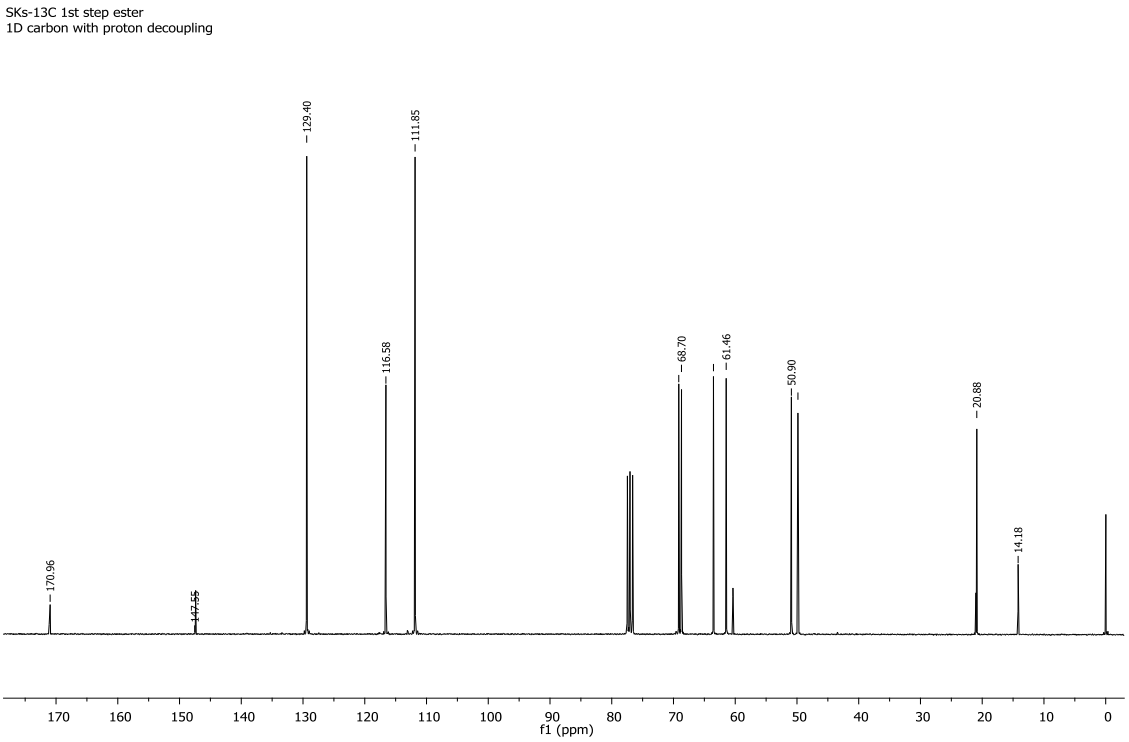


Figure S6. ^{13}C NMR spectrum (75 MHz, $CDCl_3$) of compound **2**.

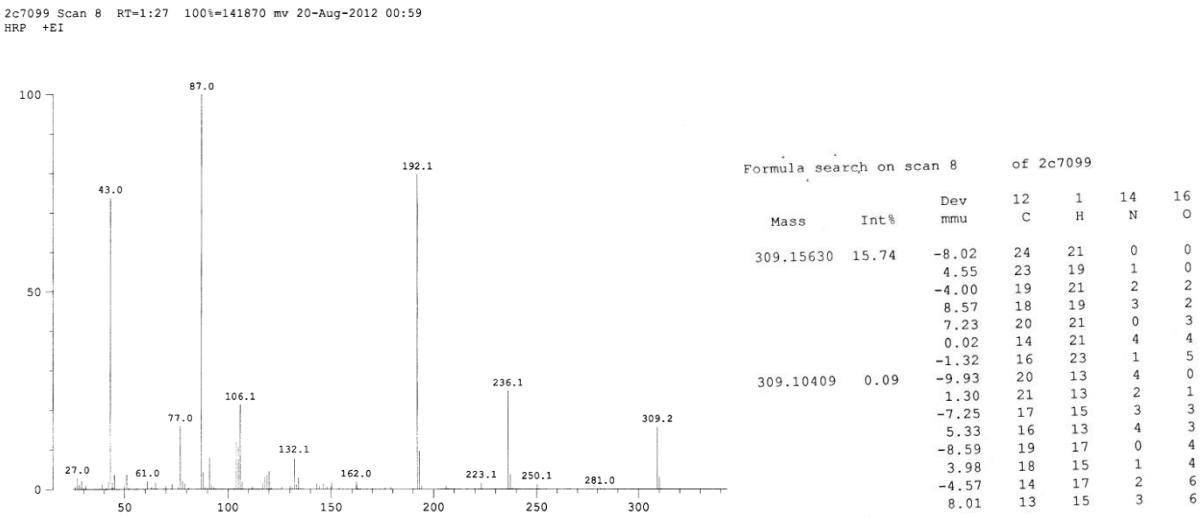


Figure S7. Mass spectrum of compound **2**.

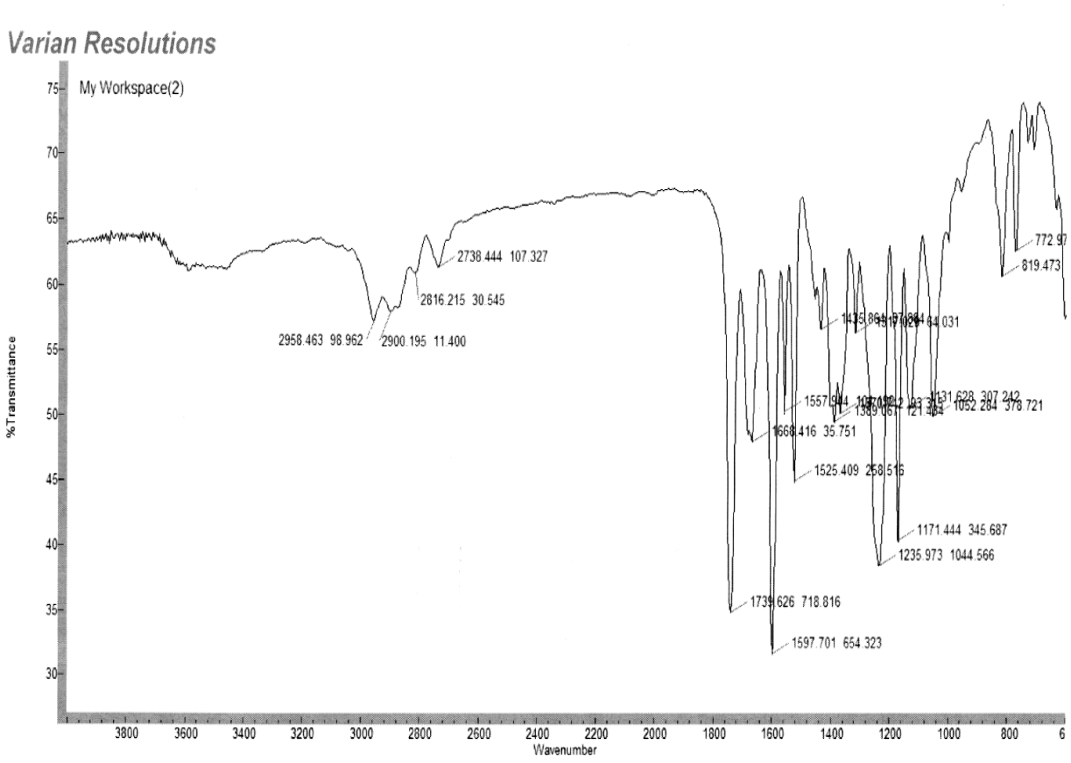


Figure S8. IR spectrum (KBr Pellet) of compound **3**.

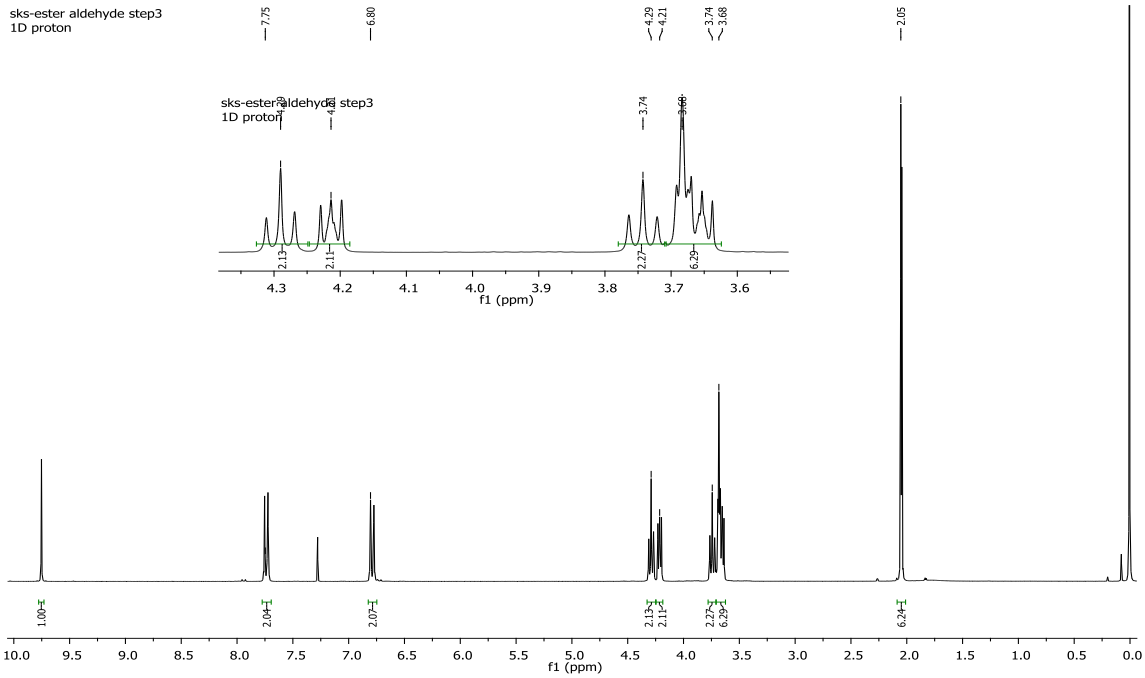


Figure S9. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of compound **3**.

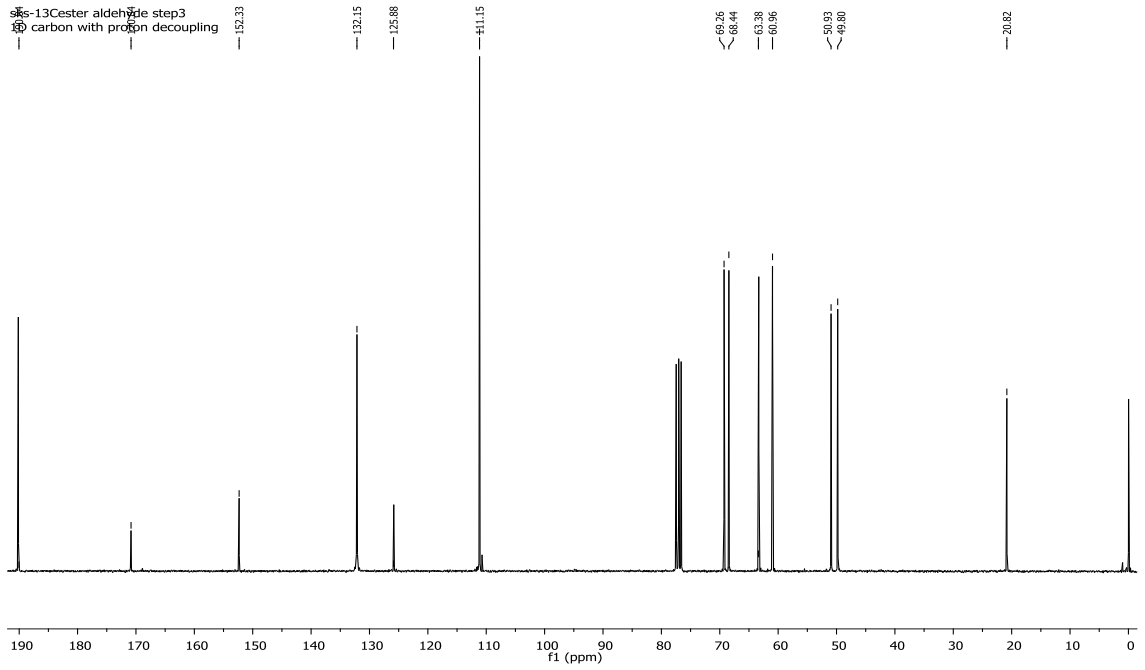
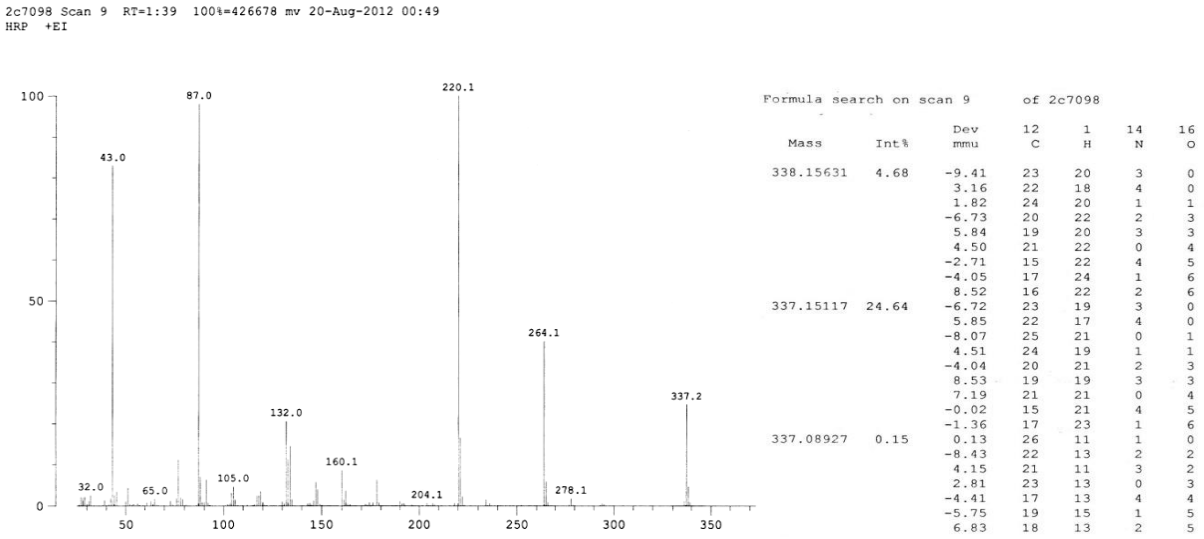


Figure S10. ^{13}C NMR spectrum (75 MHz, $CDCl_3$) of compound **3**.



Formula search on scan 9 of 2c7098

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		1.82	24	20	1	1
		-6.73	20	22	2	3
		5.84	19	20	3	3
		4.50	21	22	0	4
		-2.71	15	22	4	5
		-4.05	17	24	1	6
		8.52	16	22	2	6
337.15117	24.64	-6.72	23	19	3	0
		5.85	22	17	4	0
		-8.07	25	21	0	1
		4.51	24	19	1	1
		-4.04	20	21	2	3
		8.53	19	19	3	3
		7.19	21	21	0	4
		-0.02	15	21	4	5
		-1.36	17	23	1	6
337.08927	0.15	0.13	26	11	1	0
		-8.43	22	13	2	2
		4.15	21	11	3	2
		2.81	23	13	0	3
		-4.41	17	13	4	4
		-5.75	19	15	1	5
		6.83	18	13	2	5

Figure S11. Mass spectrum of compound **3**.

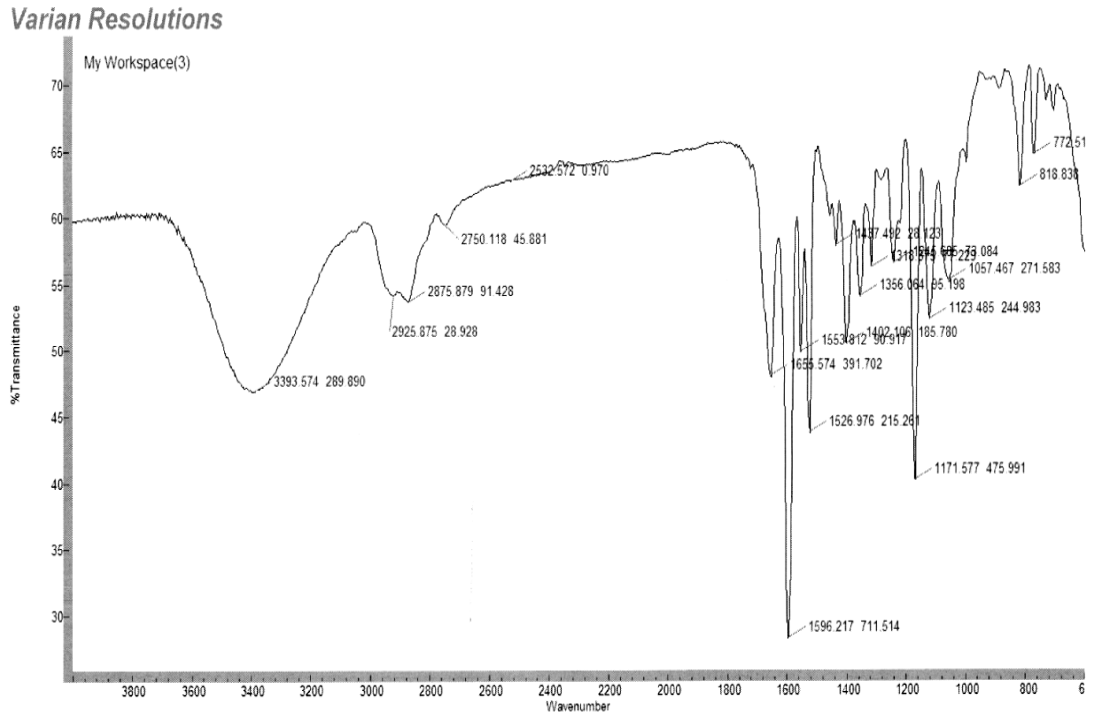


Figure S12. IR spectrum (NaCl plate) of compound **4**.

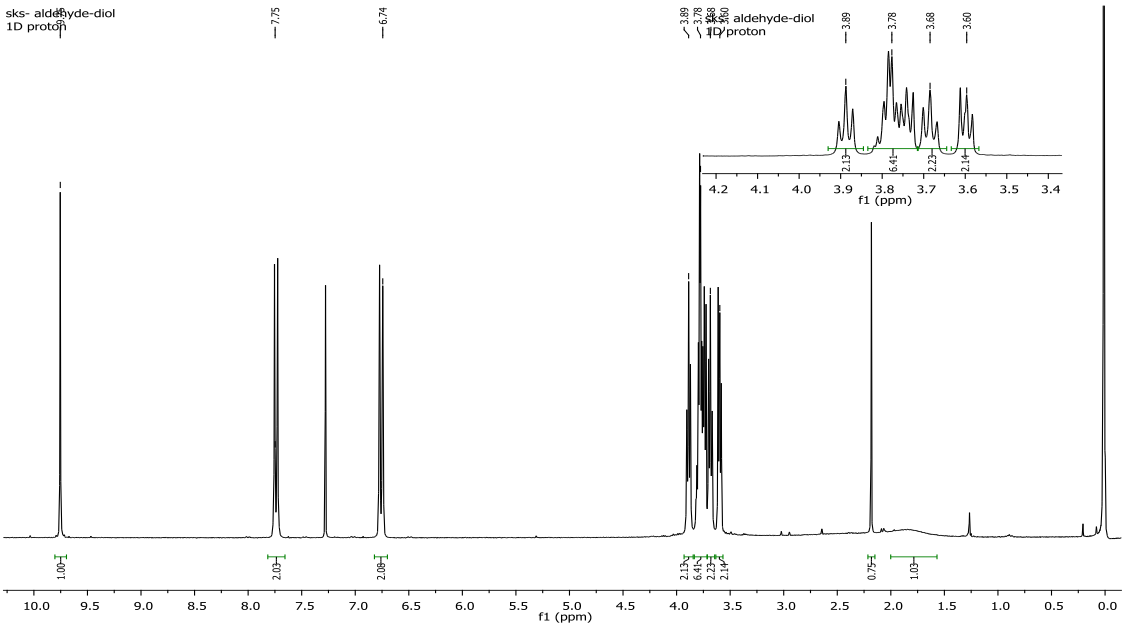


Figure S13. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of compound **4**.

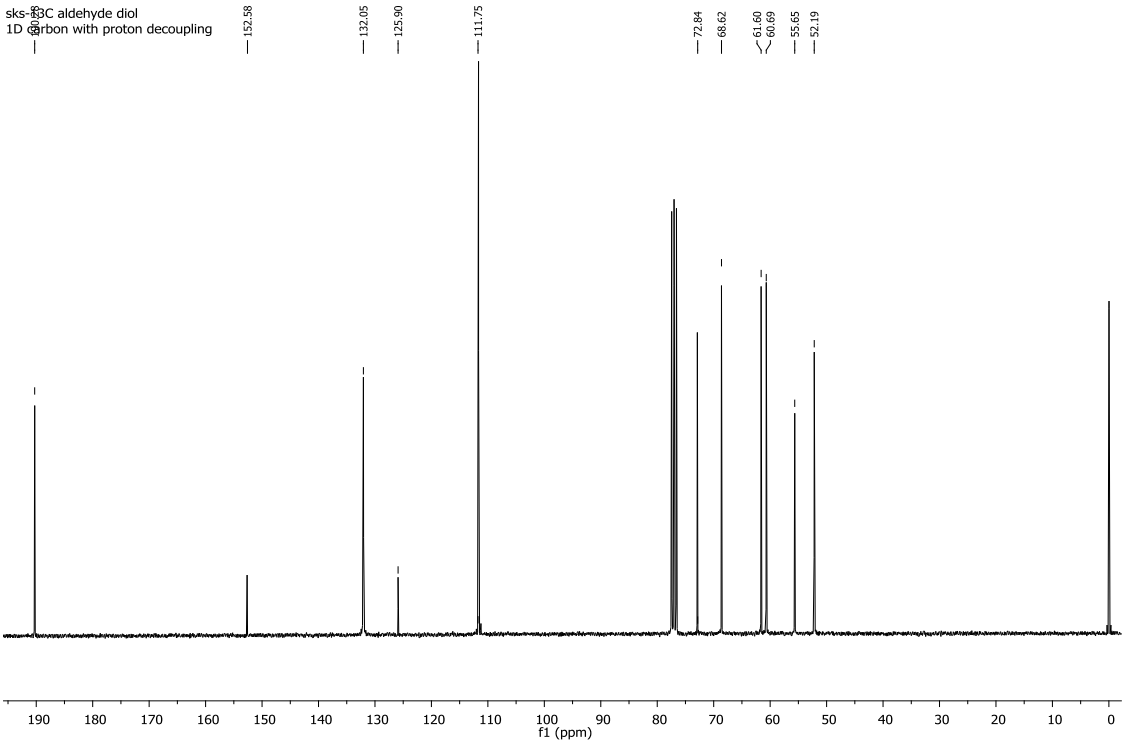


Figure S14. ^{13}C NMR spectrum (75 MHz, $CDCl_3$) of compound **4**.

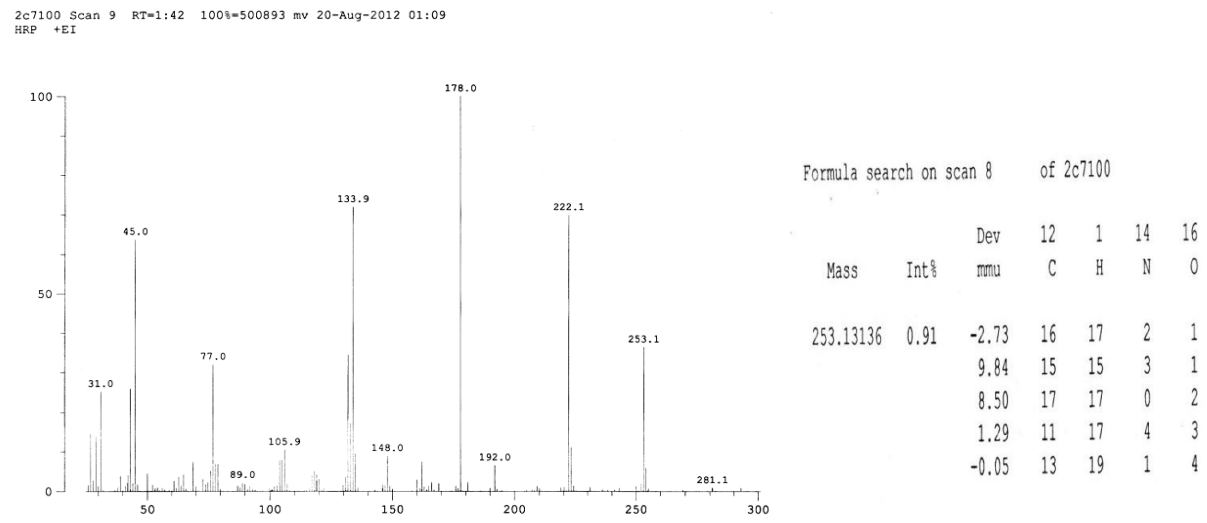


Figure S15. Mass spectrum of compound **4.**

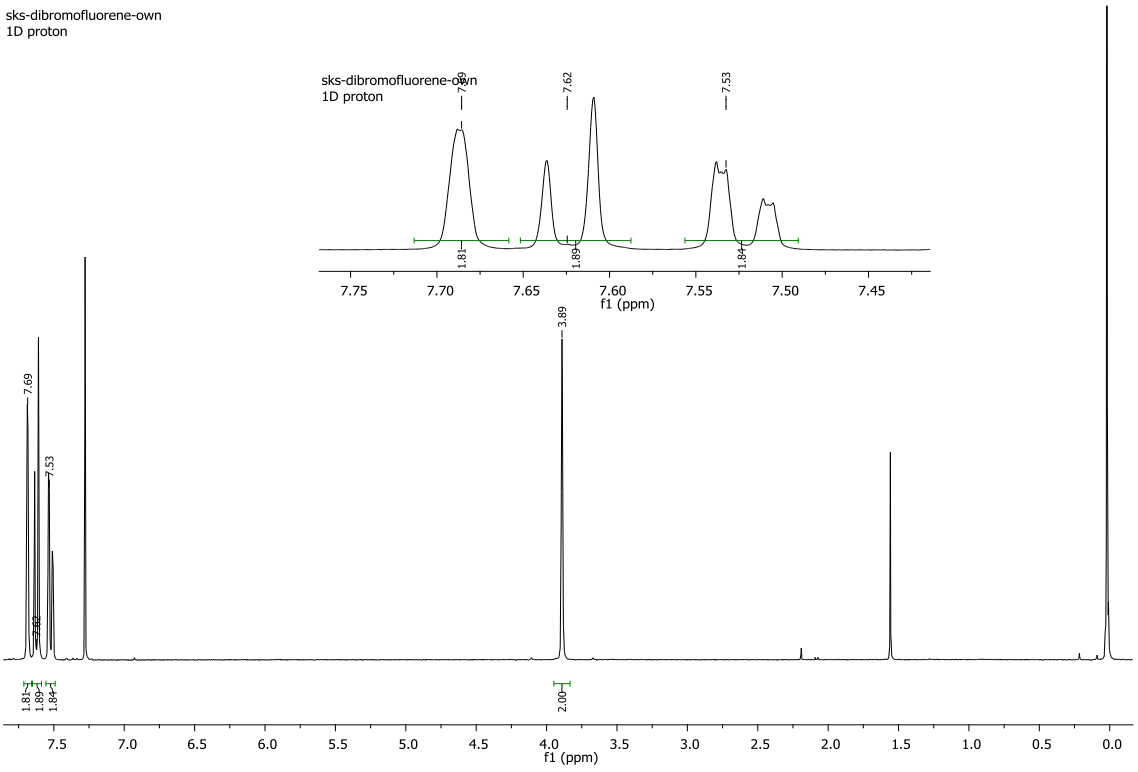


Figure S16. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of 2,7-dibromofluorene.

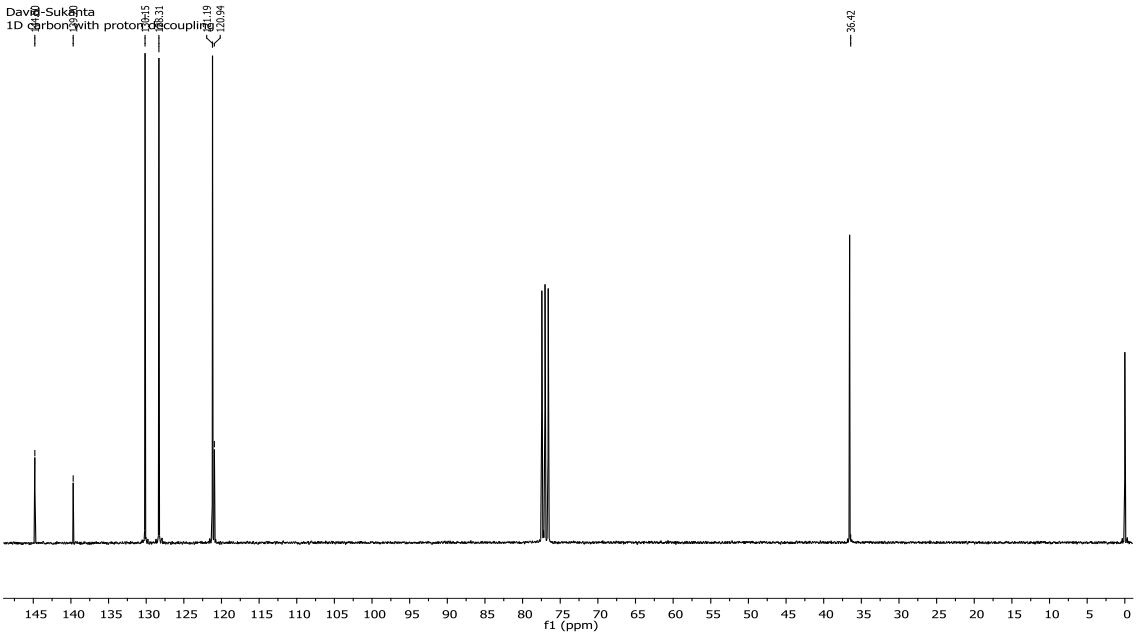


Figure S17. ^{13}C NMR spectrum (75 MHz, $CDCl_3$) of 2,7-dibromofluorene.

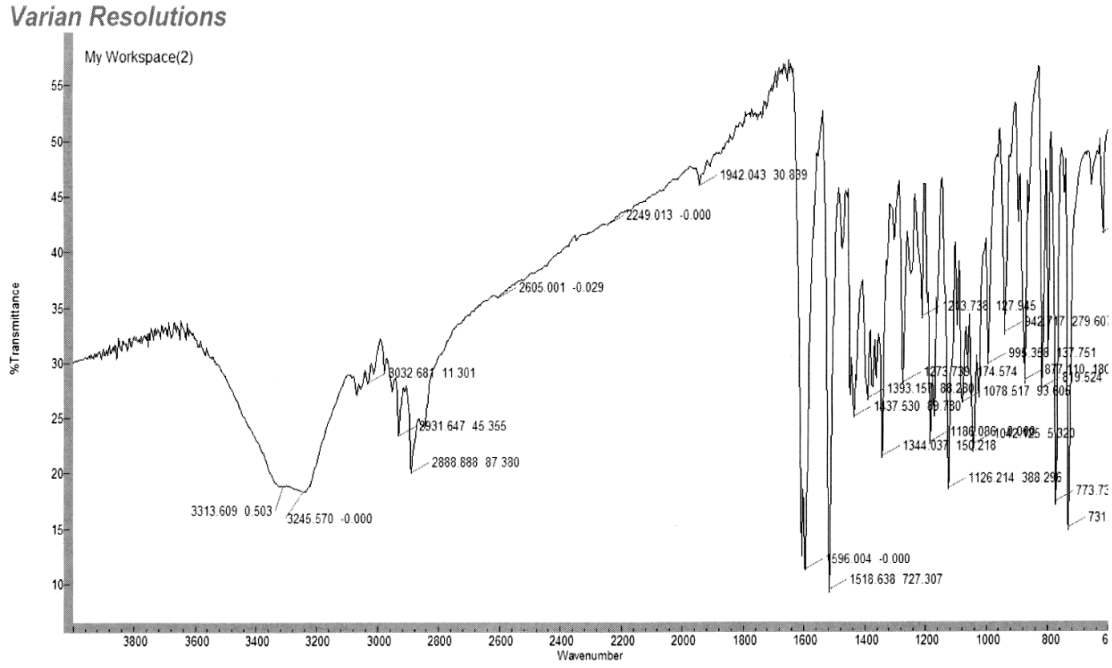


Figure S18. IR spectrum (KBr Pellet) of compound **5a**.

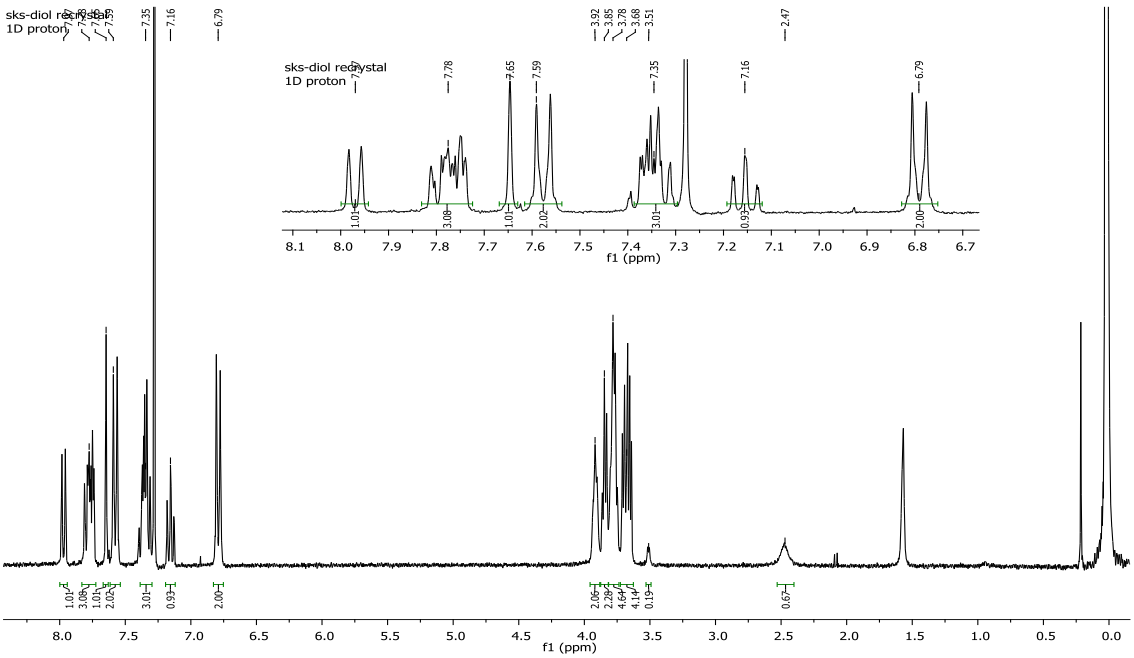


Figure S19. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of compound **5a**.

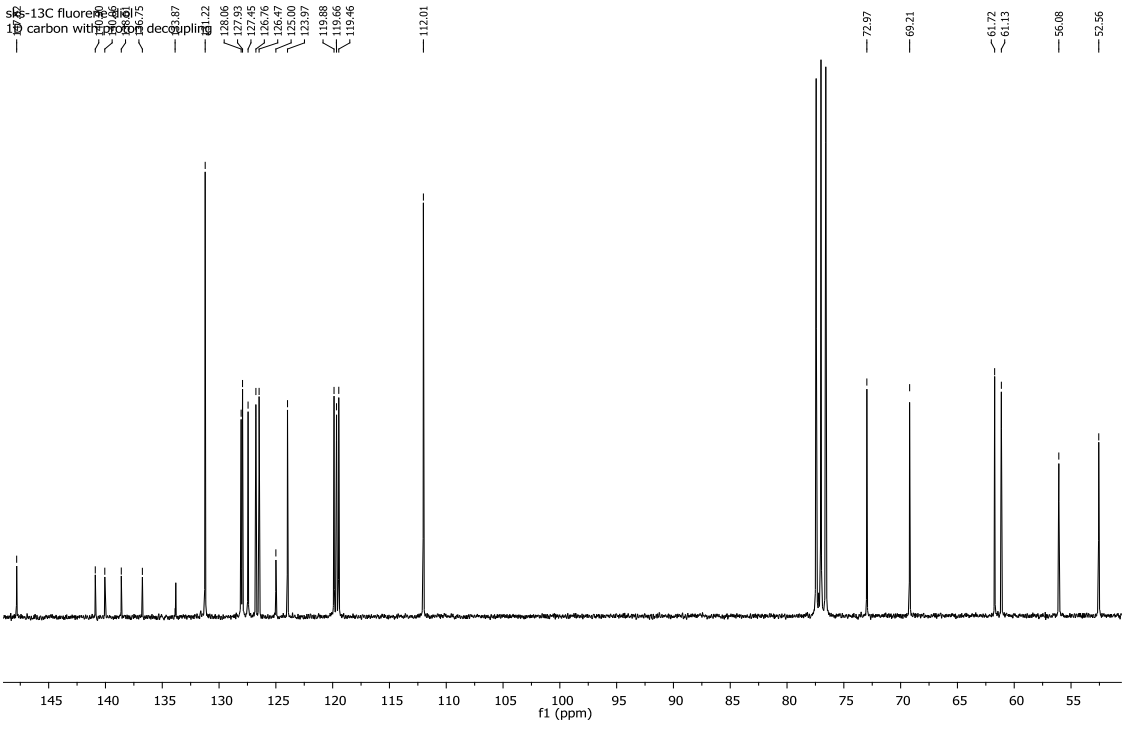


Figure S20. ^{13}C NMR spectrum (75 MHz, $CDCl_3$) of compound **5a**.

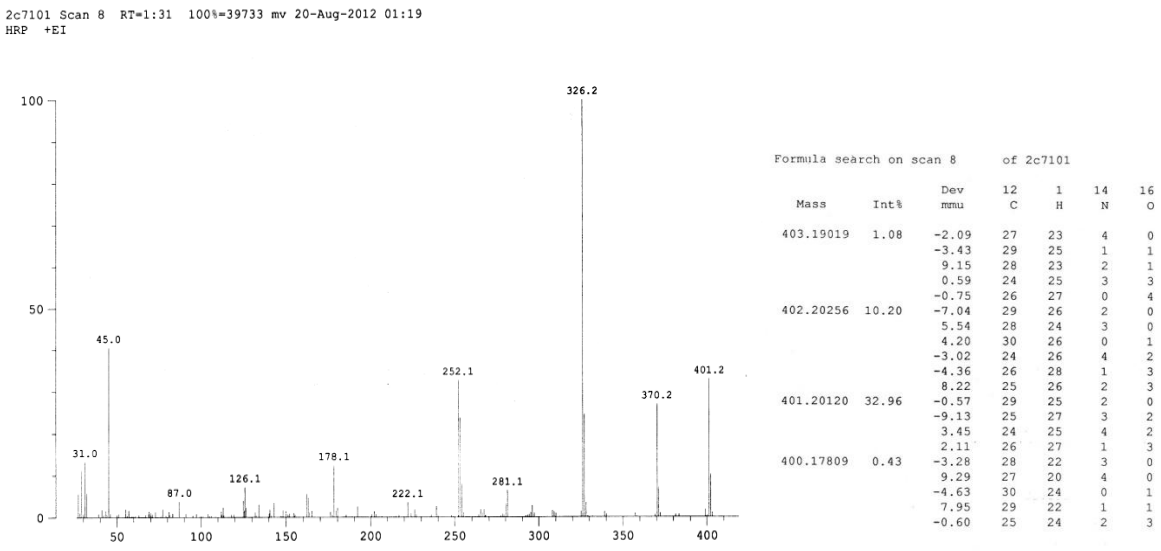


Figure S21. Mass spectrum of compound **5a**.

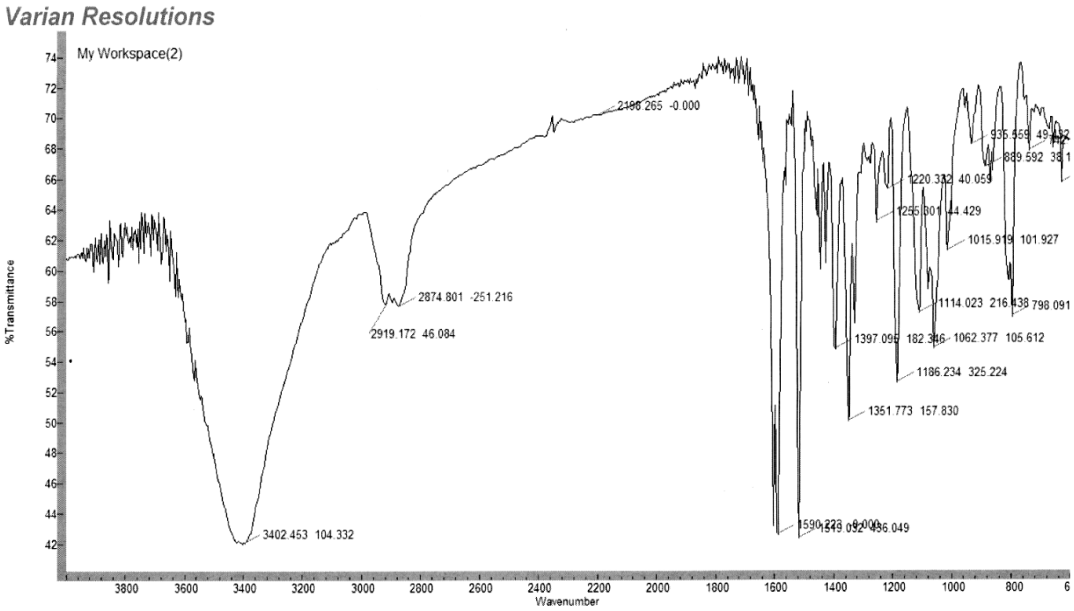


Figure S22. IR spectrum (KBr Pellet) of compound **5b**.

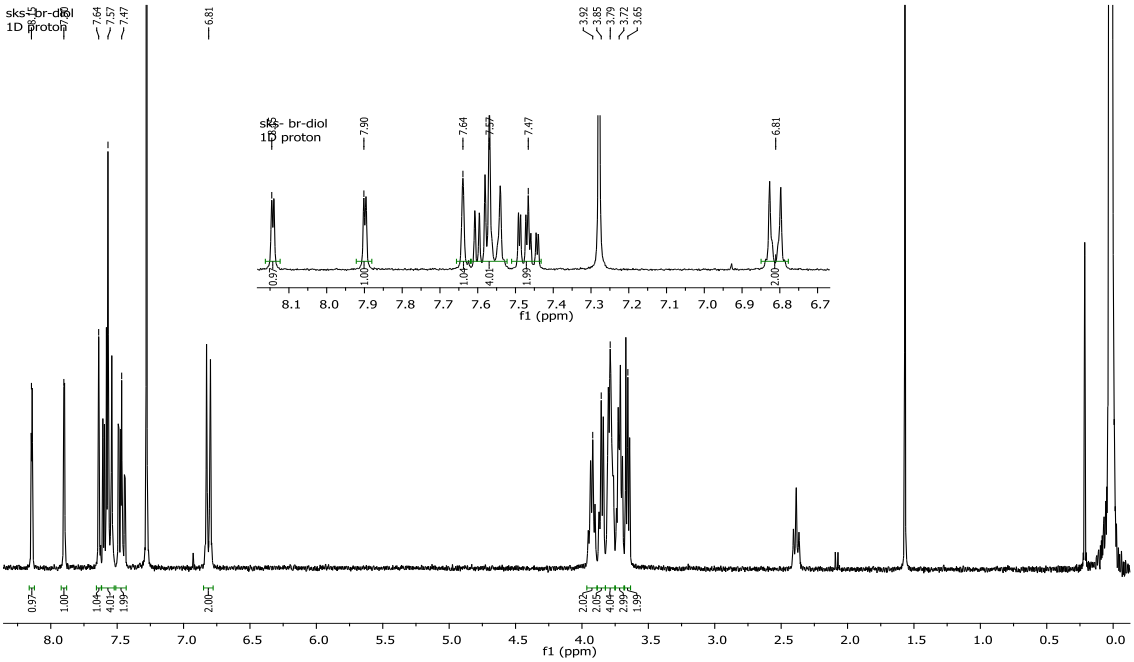


Figure S23. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of compound **5b**.

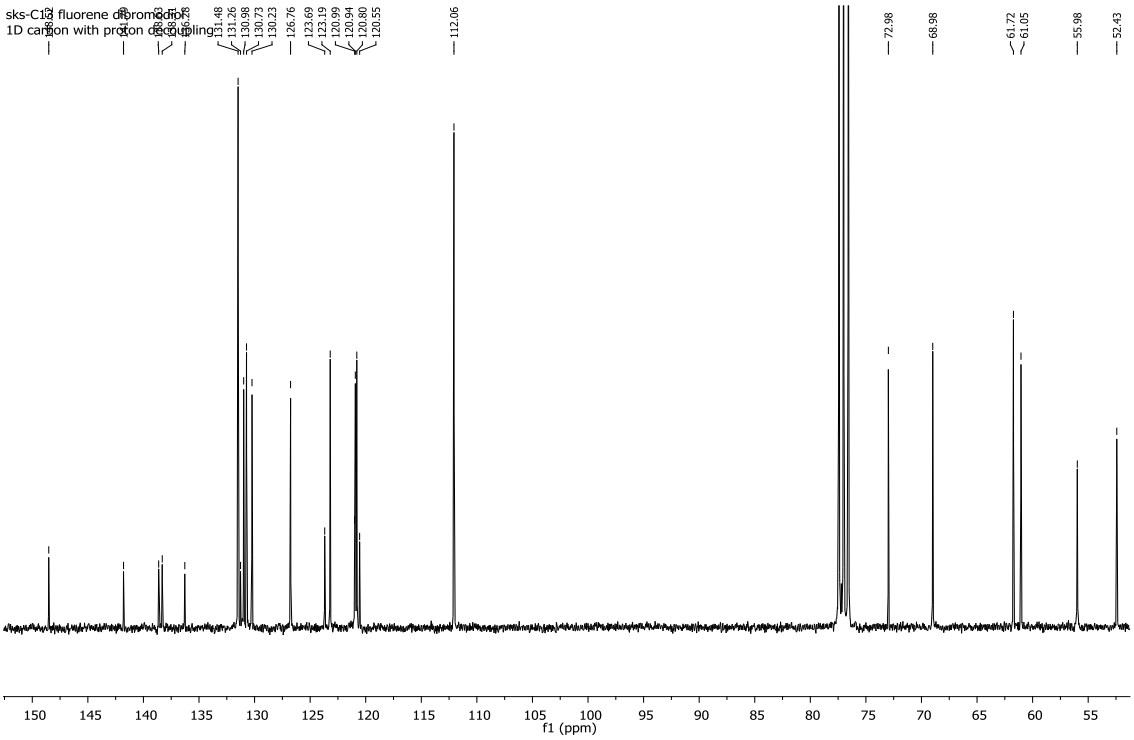
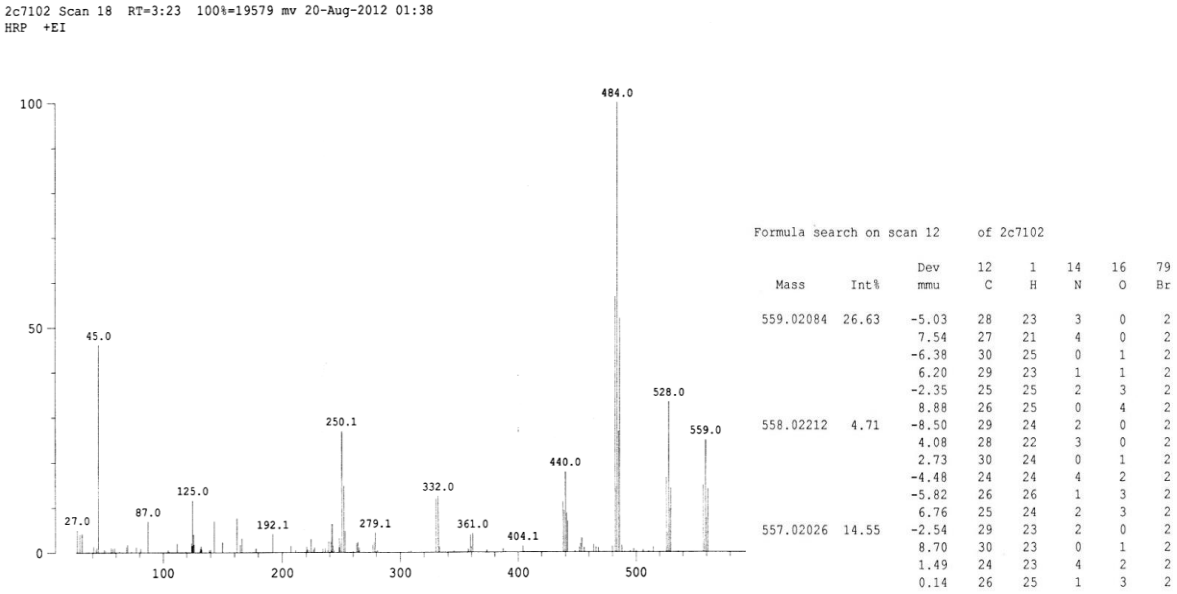


Figure S24. ^{13}C NMR spectrum (75 MHz, $CDCl_3$) of compound **5b**.



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		7.54	27	21	4	0	2
		-6.38	30	25	0	1	2
		6.20	29	23	1	1	2
		-2.35	25	25	2	3	2
		8.88	26	25	0	4	2
558.02212	4.71	-8.50	29	24	2	0	2
		4.08	28	22	3	0	2
		2.73	30	24	0	1	2
		-4.48	24	24	4	2	2
		-5.82	26	26	1	3	2
		6.76	25	24	2	3	2
557.02026	14.55	-2.54	29	23	2	0	2
		8.70	30	23	0	1	2
		1.49	24	23	4	2	2
		0.14	26	25	1	3	2

Figure S25. Mass spectrum of compound **5b**.

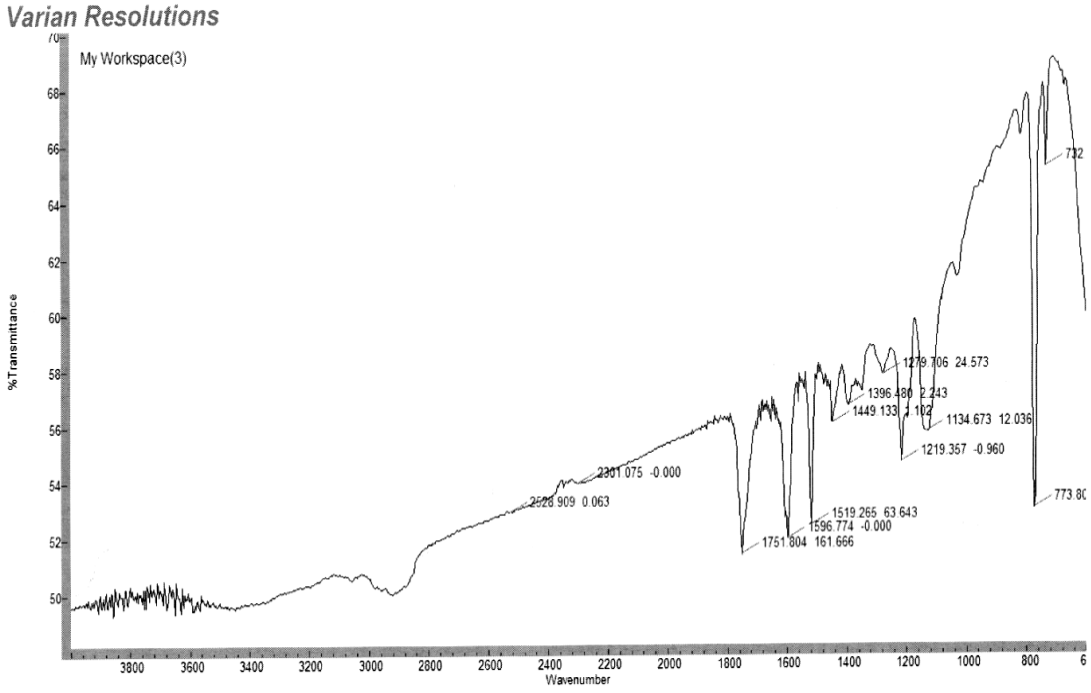

Figure S26. IR spectrum (NaCl Plate) of compound **6a**.

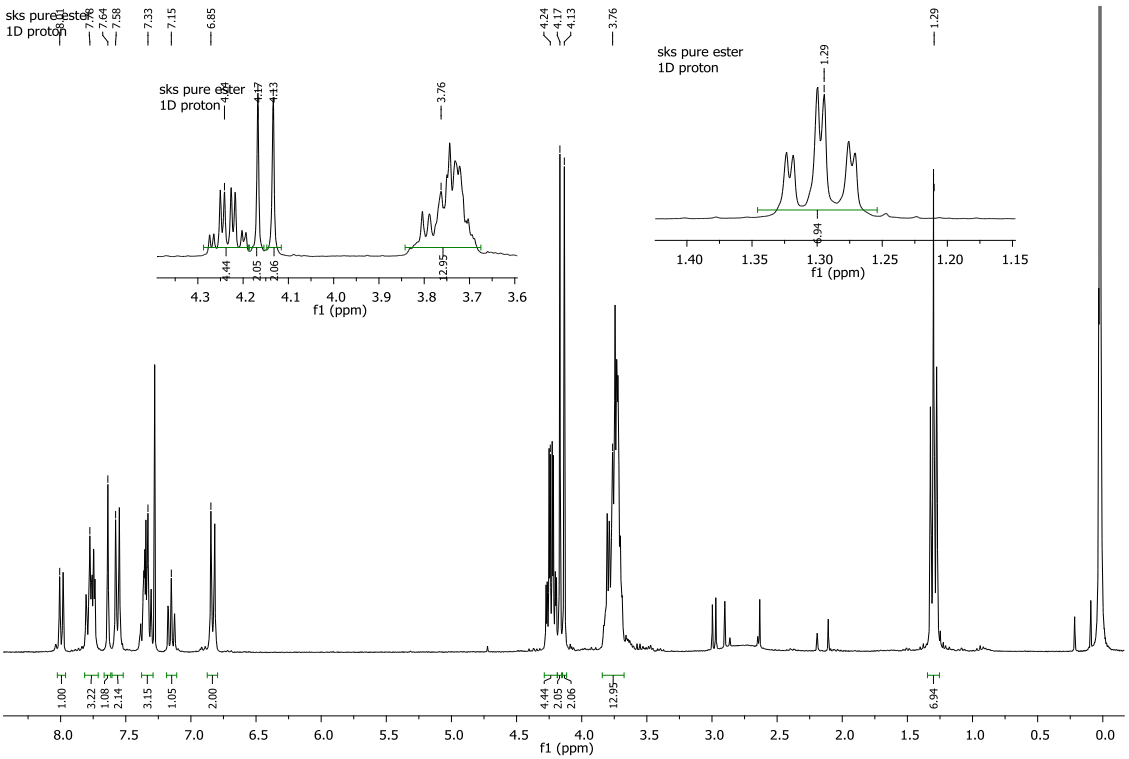

Figure S27. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of compound **6a**.

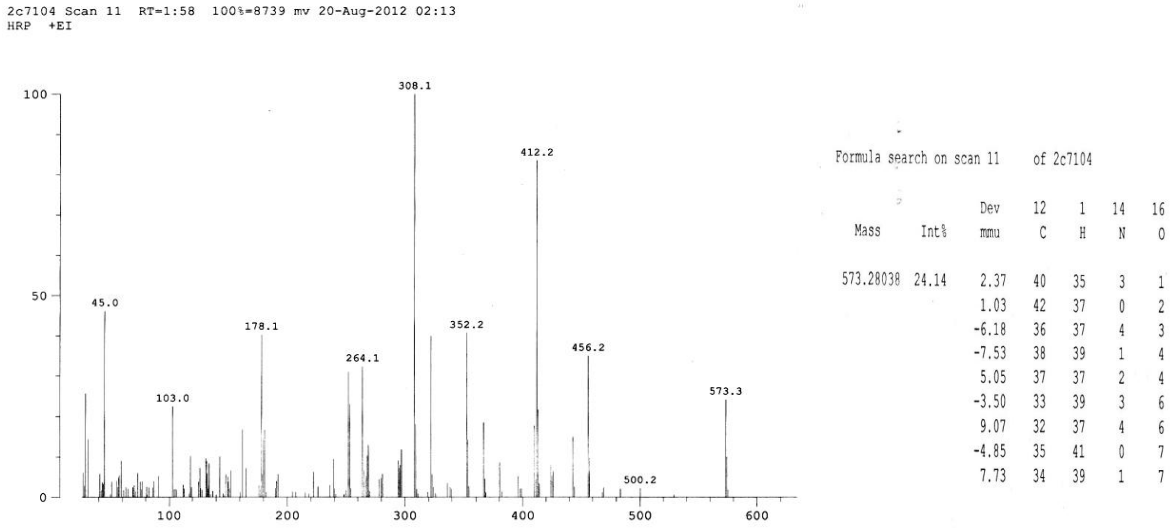

Figure S28. Mass spectrum of compound **6a**.

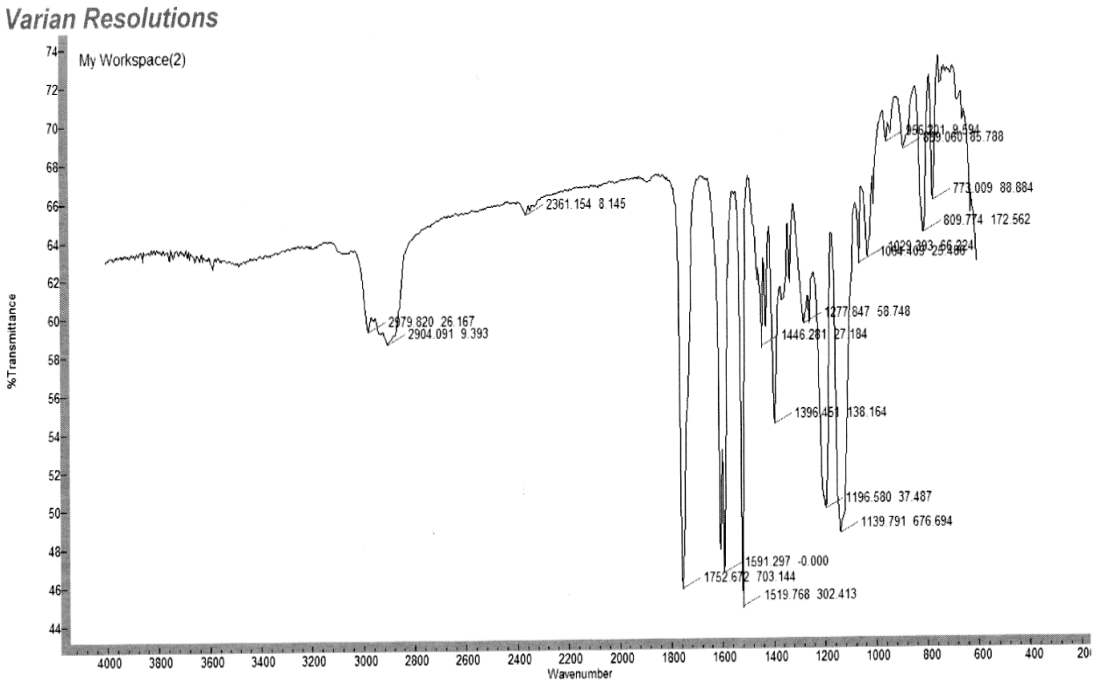

Figure S29. IR spectrum (NaCl Plate) of compound **6b**.

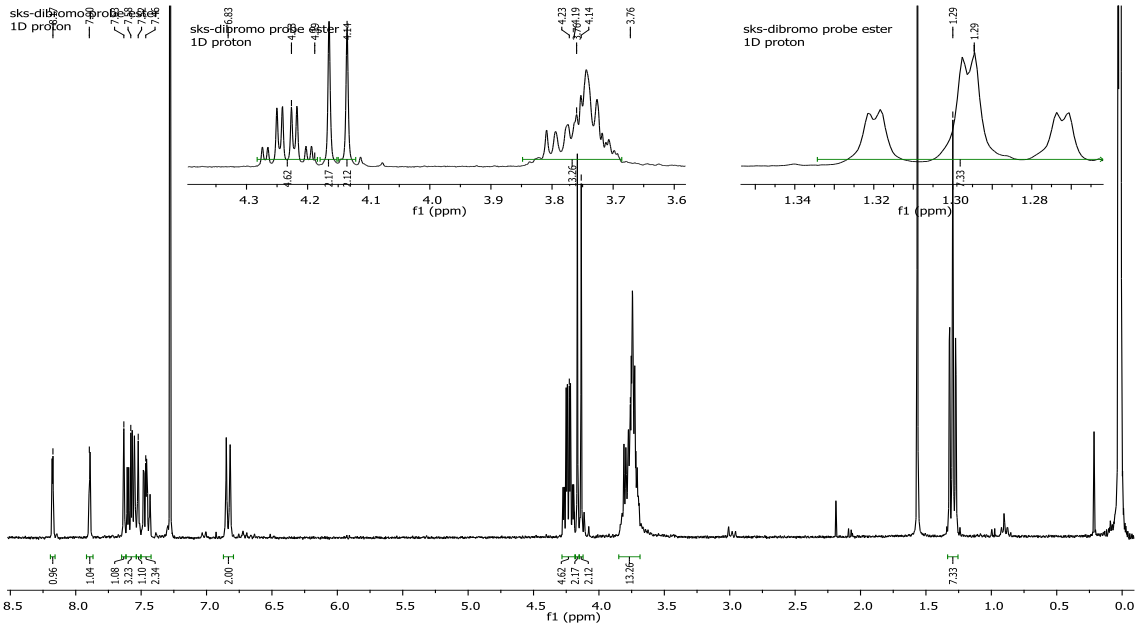

Figure S30. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of compound **6b**.

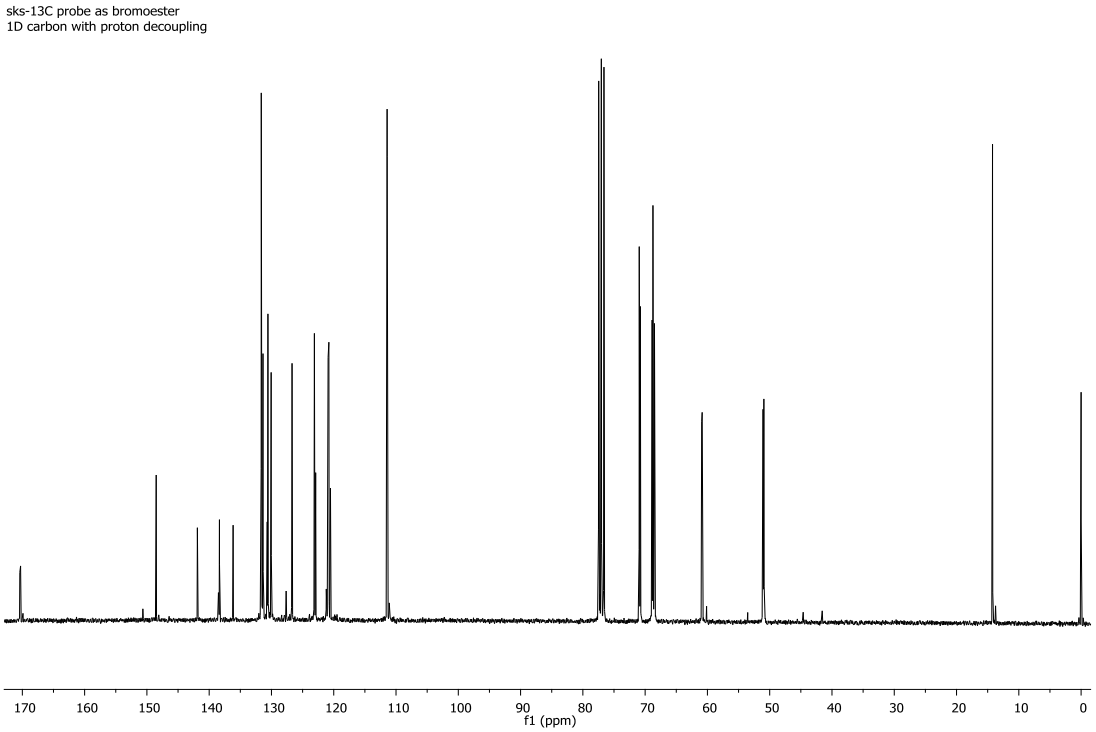

Figure S31. ^{13}C NMR spectrum (75 MHz, $CDCl_3$) of compound **6b**.

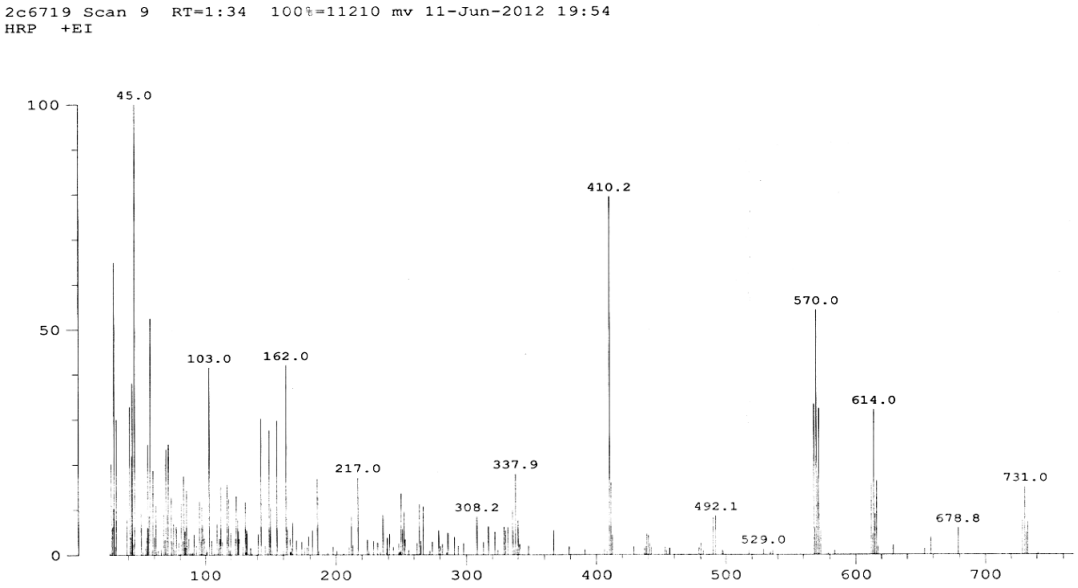

Figure S32 . Mass spectrum of compound **6b**.

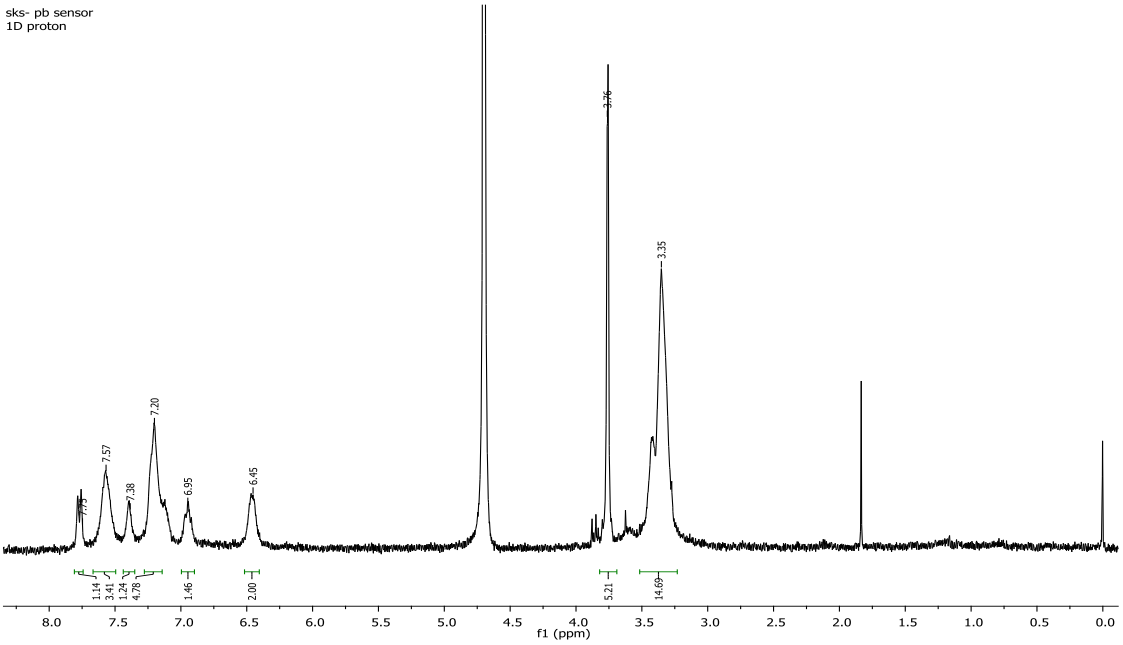

Figure S33. ^{1}H NMR spectrum (300 MHz, D_2O) of compound **7a**.

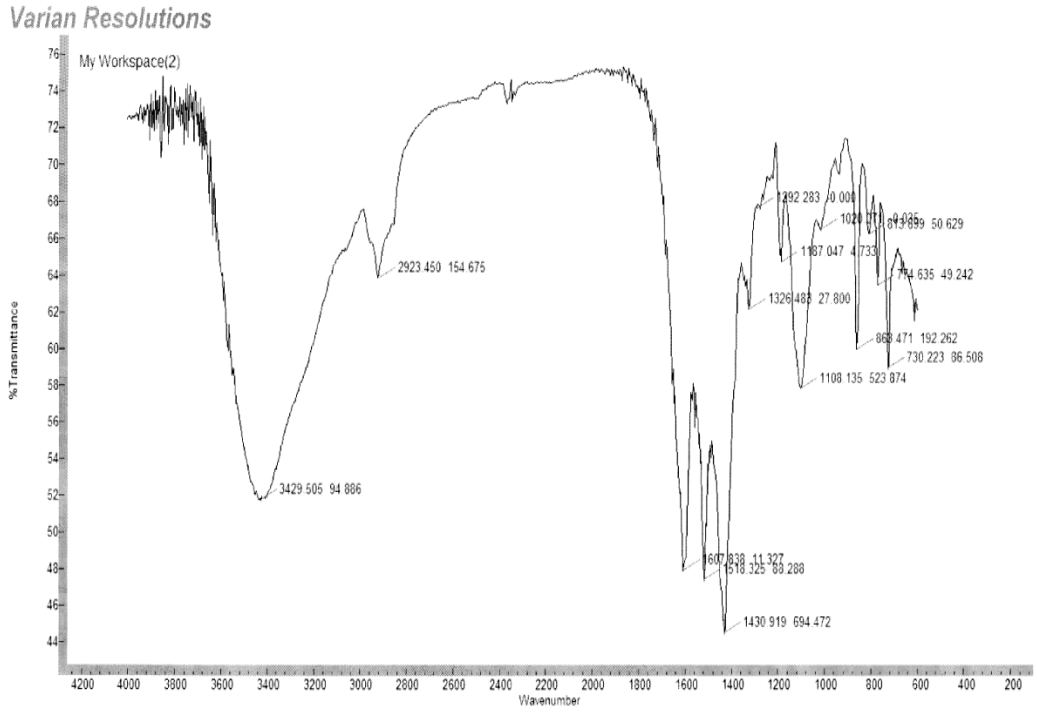

Figure S34. IR spectrum (KBr pellet) of compound **7a**.

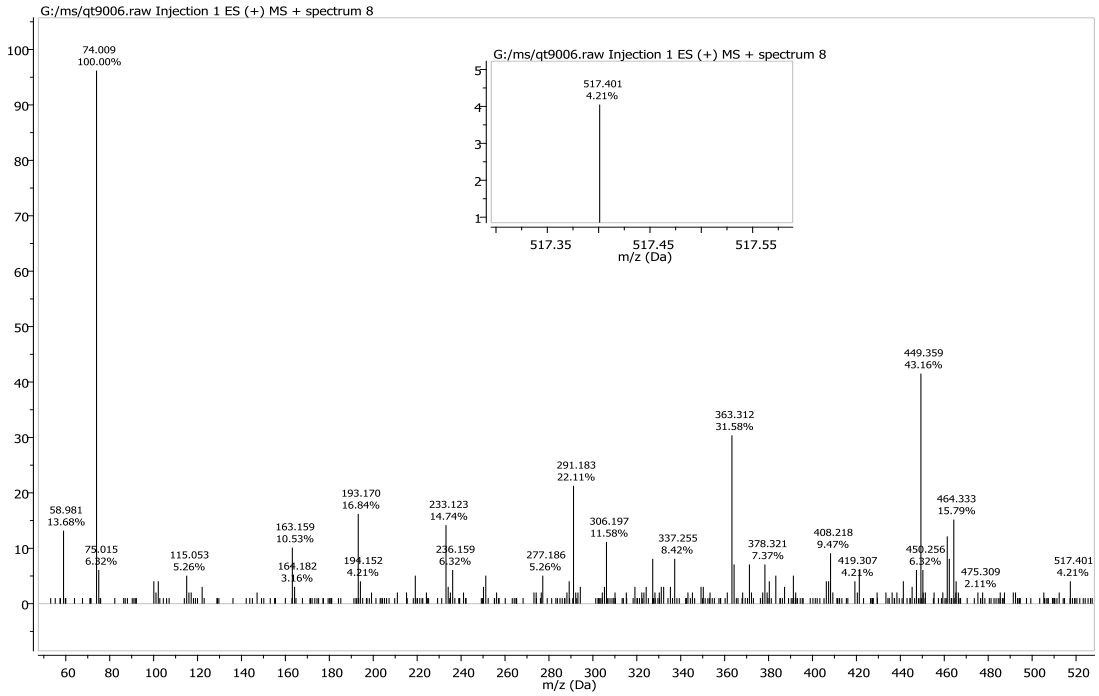

Figure S35. Mass spectrum of compound **7a**.

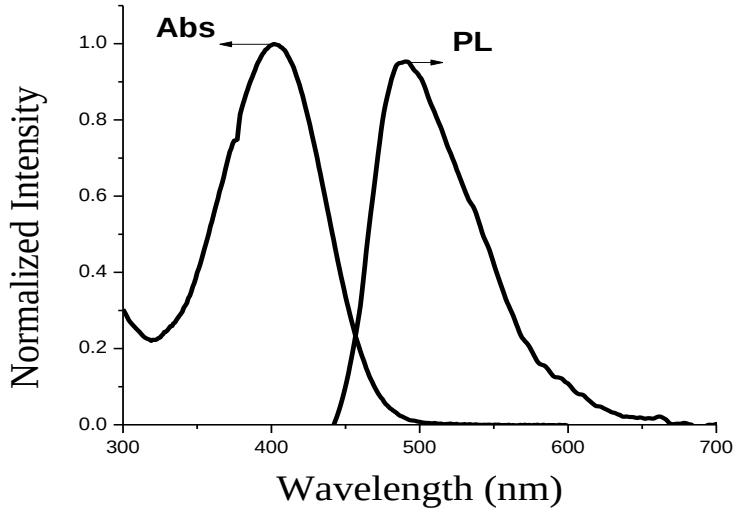

Figure S36. Normalized absorption and emission spectra of compound **7a** in water.

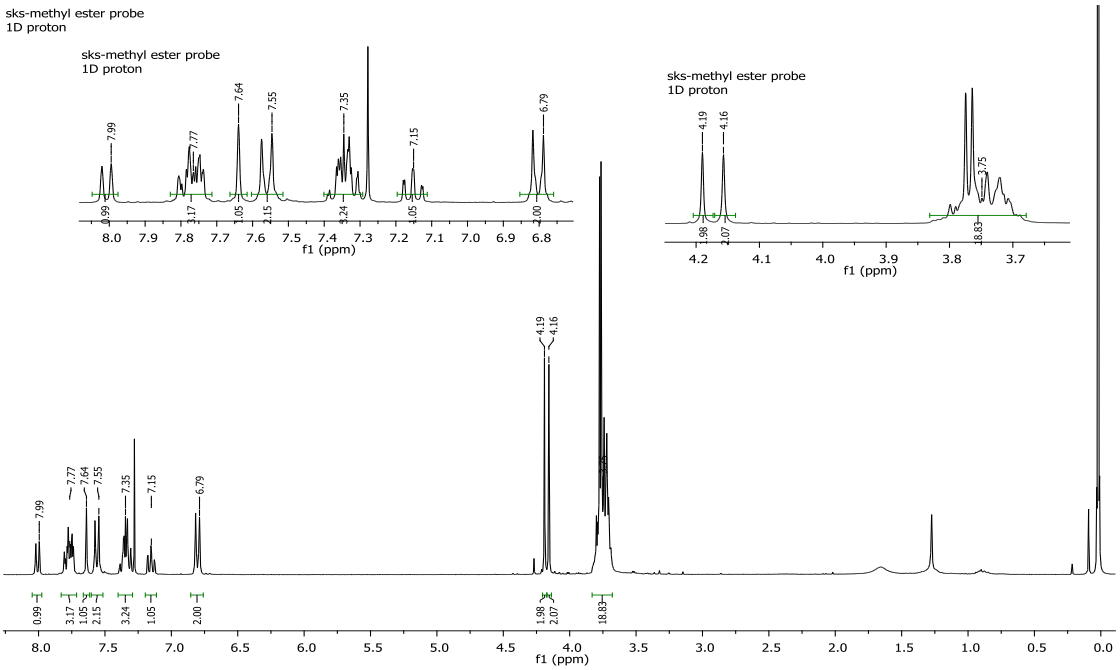

Figure S37. ^{1}HNMR spectrum (300 MHz, $CDCl_3$) of compound **8**.

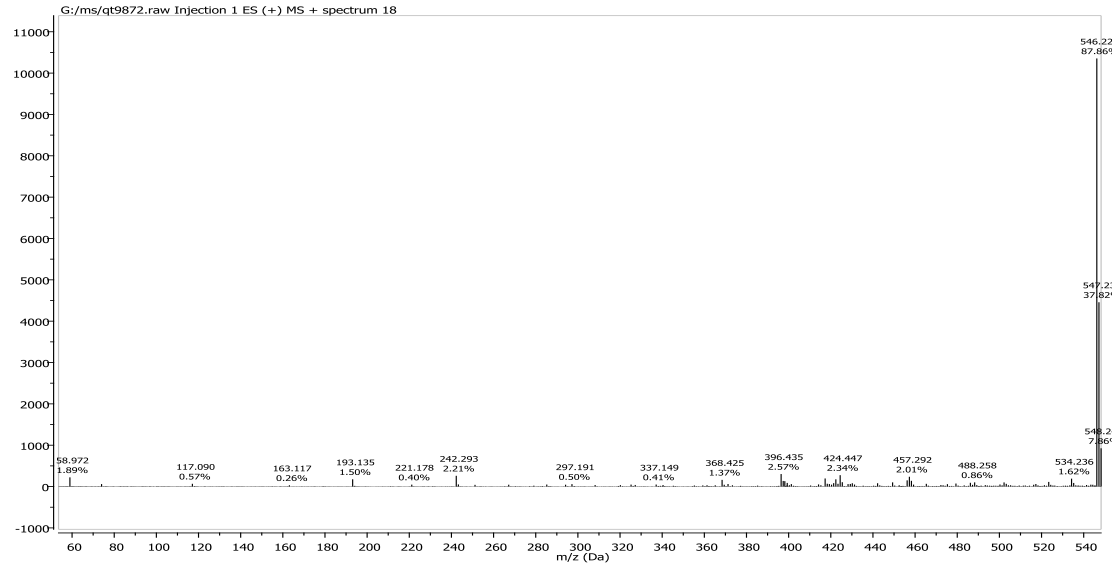

Figure S38. Mass spectrum of compound **8**.

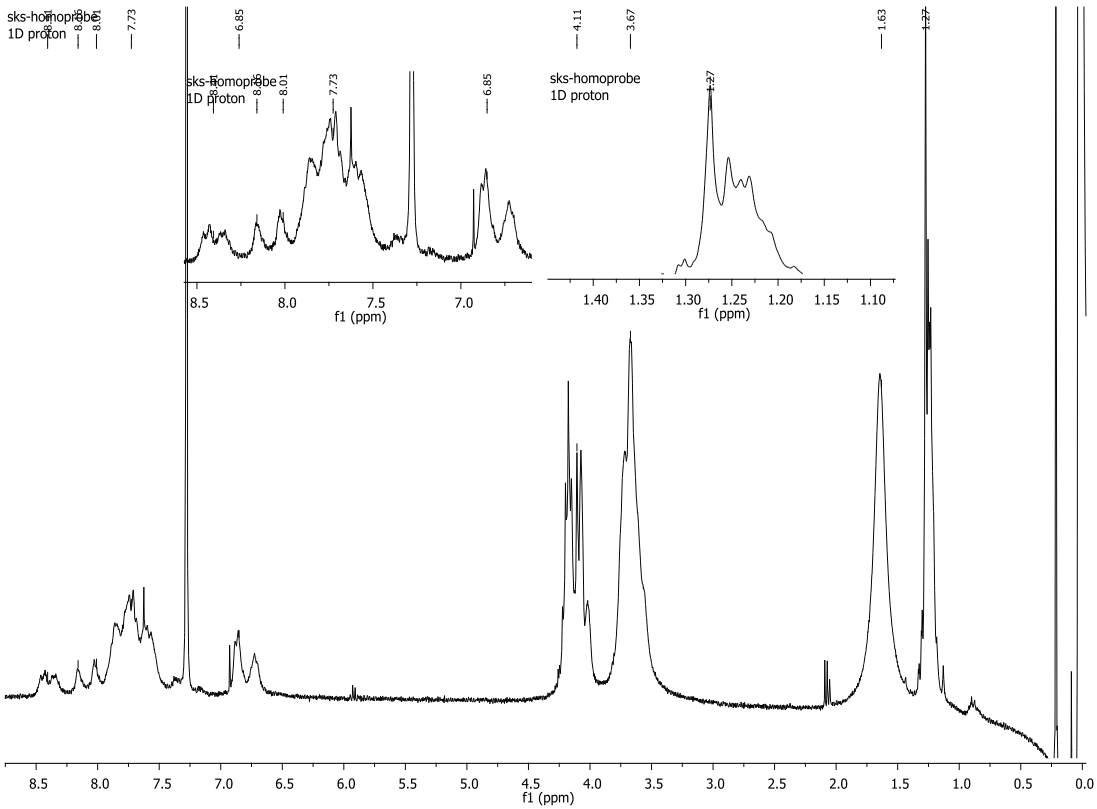

Figure S39. ^{1}H NMR spectrum (300 MHz, $CDCl_3$) of polymer **P1**.

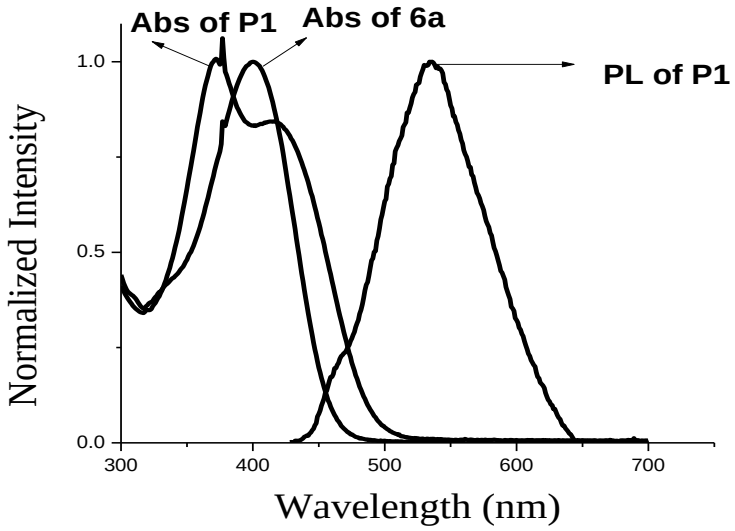

Figure S40. Normalized absorption and emission spectra of polymer **P1** in DMF and compound **6a** in $CHCl_3$.

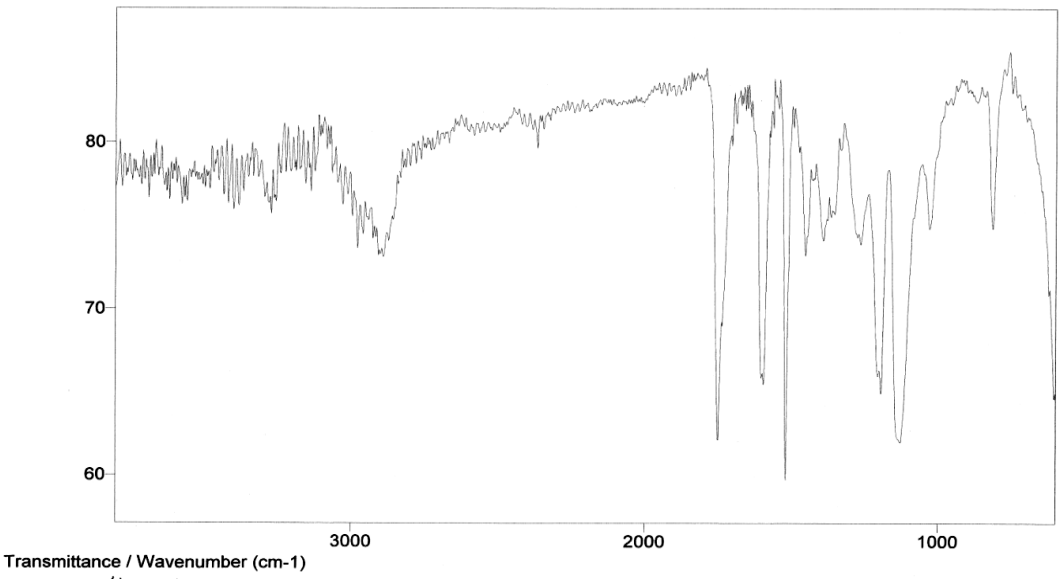

Figure S41. IR spectrum of polymer **P1** (NaCl plate).

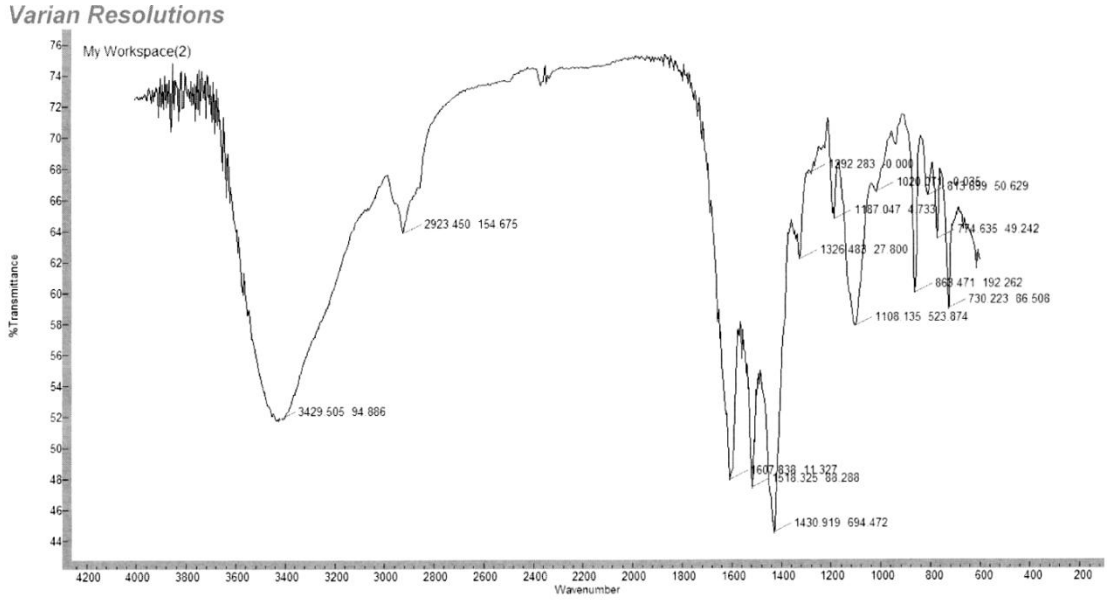

Figure S42. IR spectrum of polymer **P2** (KBr pellet).

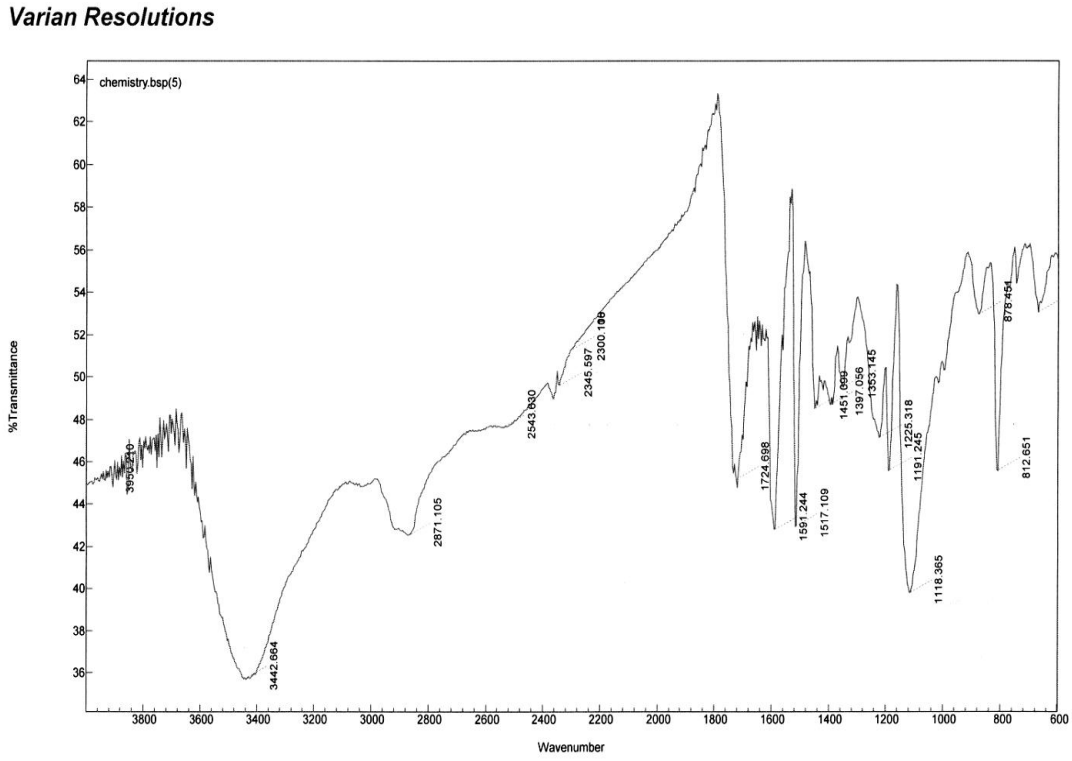

Figure S43. IR spectrum of polymer **P3** (KBr pellet).

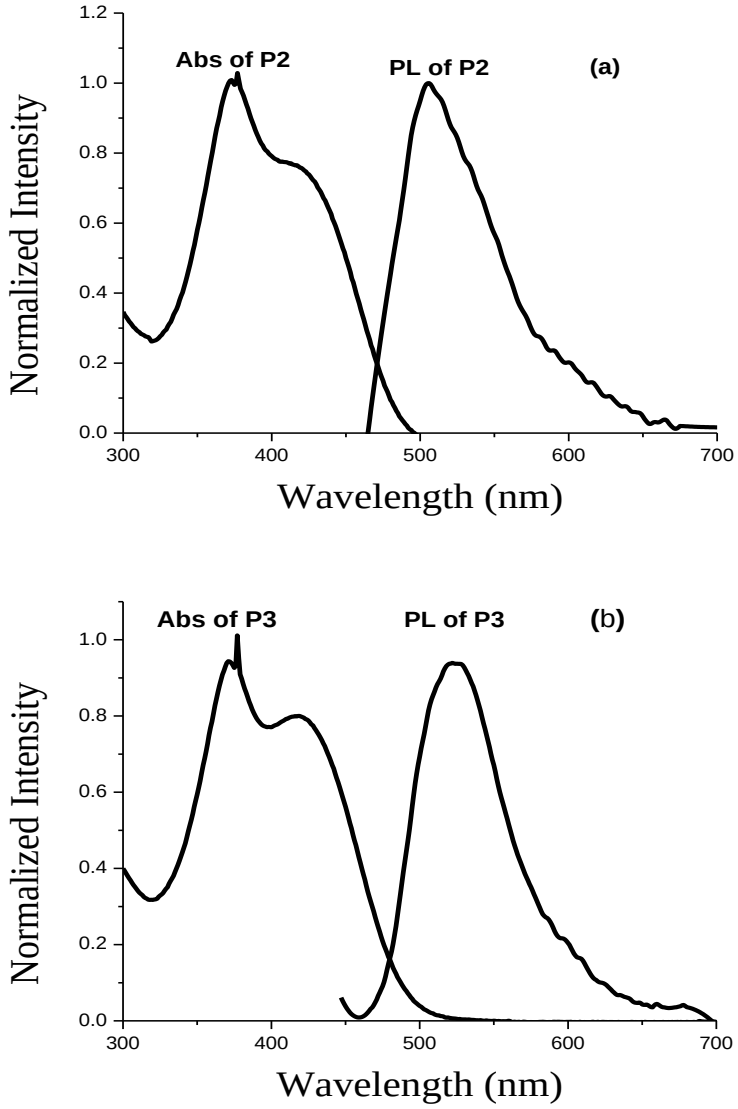

Figure S44. Normalized absorption and emission spectra of (a) polymer **P2** inwater: THF (1:1) and (b) polymer **P3** in DMF.

Figure S45. Photograph of **7a**-Pb^{2+} complex deposited at the bottom of volumetric flask.

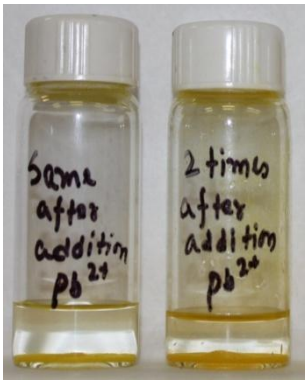

Figure S46. Photograph of **P2**-Pb^{2+} deposited at the bottom of vials.

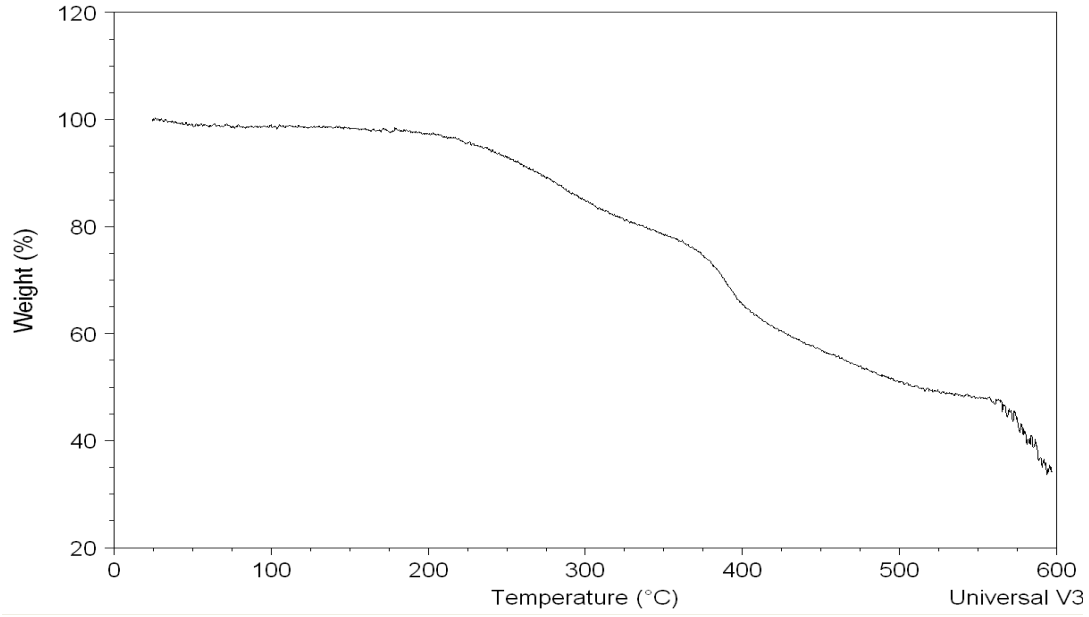

Figure S47. TGA of polymer **P1**.

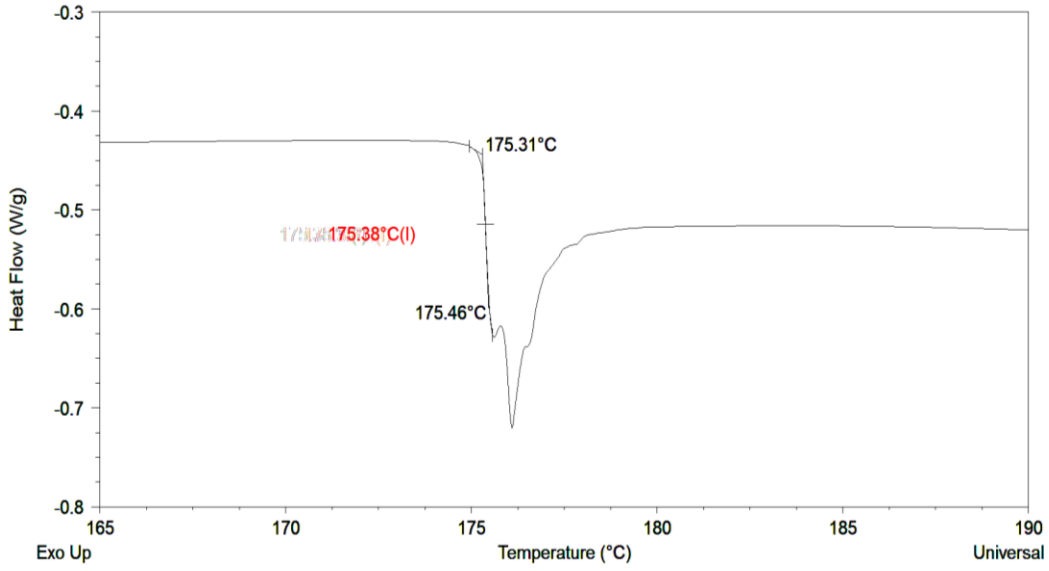

Figure S48. DSC trace of polymer **P1**

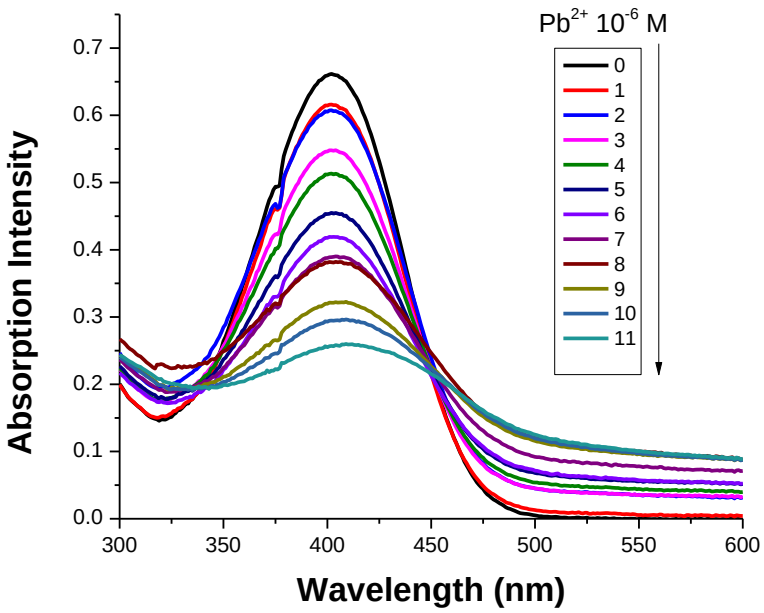

Figure S49. Changes of absorption spectra of **7a** in water (5×10^{-5} M) upon addition of Pb^{2+} (0 to 11×10^{-6} M).

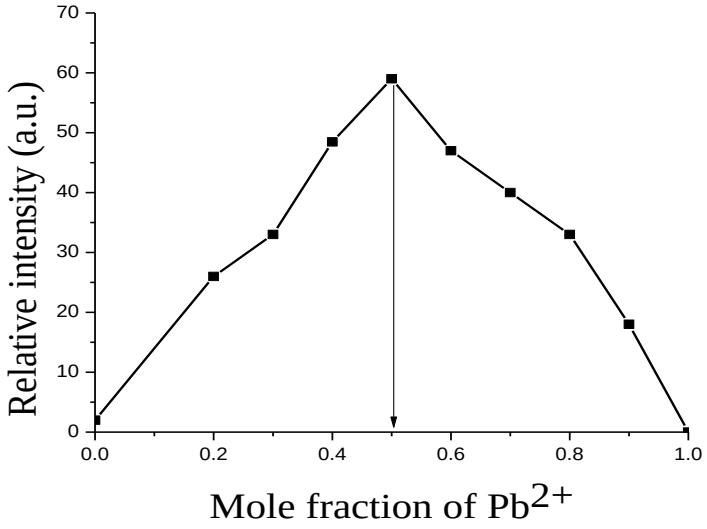

Figure S50. Job's plot of compound **7a** and Pb^{2+}. The total concentration of compound **7a**and Pb^{2+} was kept at 6.0 x 10^{-4}M. Excitation at 400 nm and emission intensity at 489 nm.

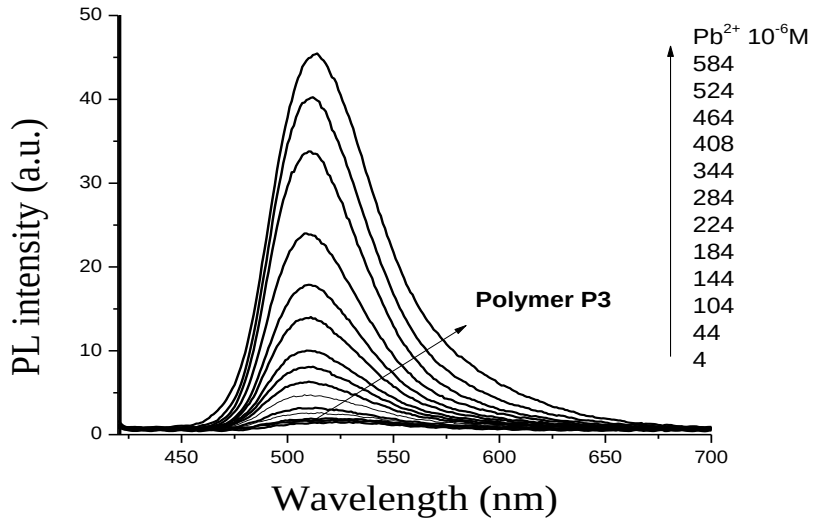

Figure S51. Changes of fluorescence spectra of polymer **P3** (2.8×10^{-4} M) in DMF upon addition of Pb^{2+} (0 to 584×10^{-6} M) (excitation at 400 nm).

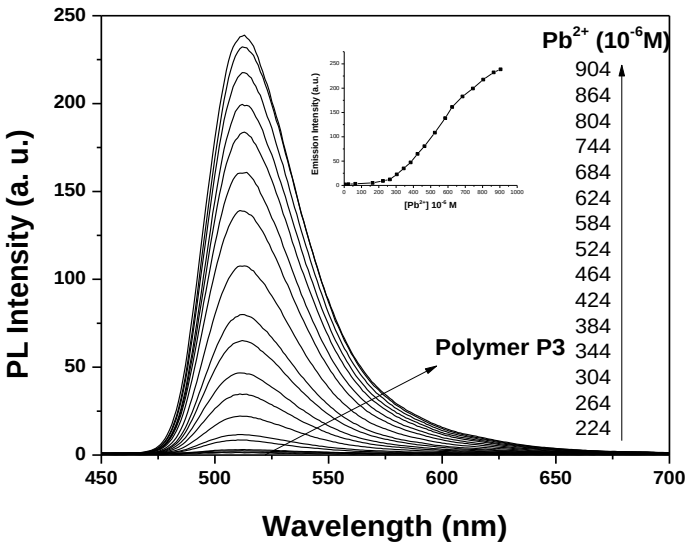

Figure S52. Changes of fluorescence spectra of polymer **P3** (2.8×10^{-4} M) in pure water/THF (1:1) with 2.5 mg of LiOH upon addition of Pb^{2+} (0 to 904×10^{-6} M) (excitation at 400 nm).