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

Metal-Free Organic Dyes Derived from Triphenylethylene for Dye-Sensitized Solar Cells: Tuning of the Performance by Phenothiazine and Carbazole

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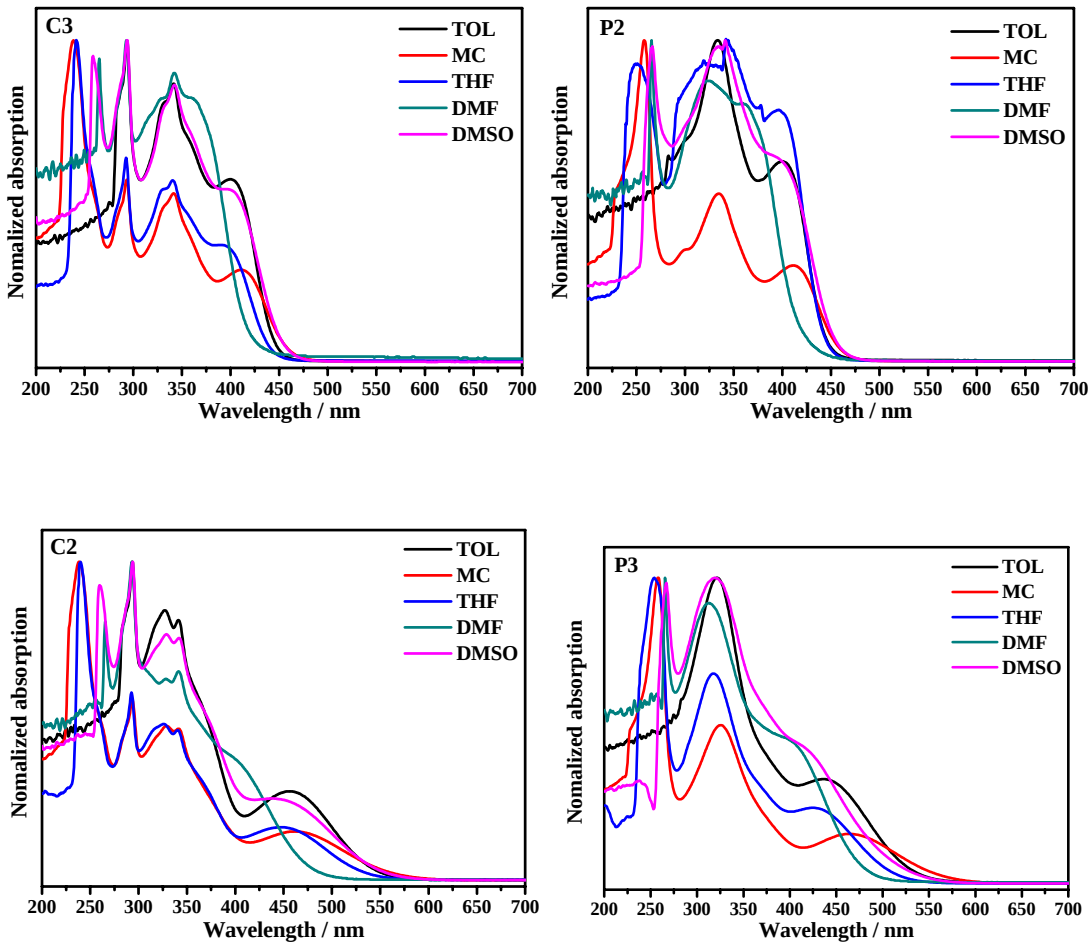

Fig. S1. UV-vis absorption spectra of **C3**, **P2**, **C2** and **P3** dyes in different solvents.

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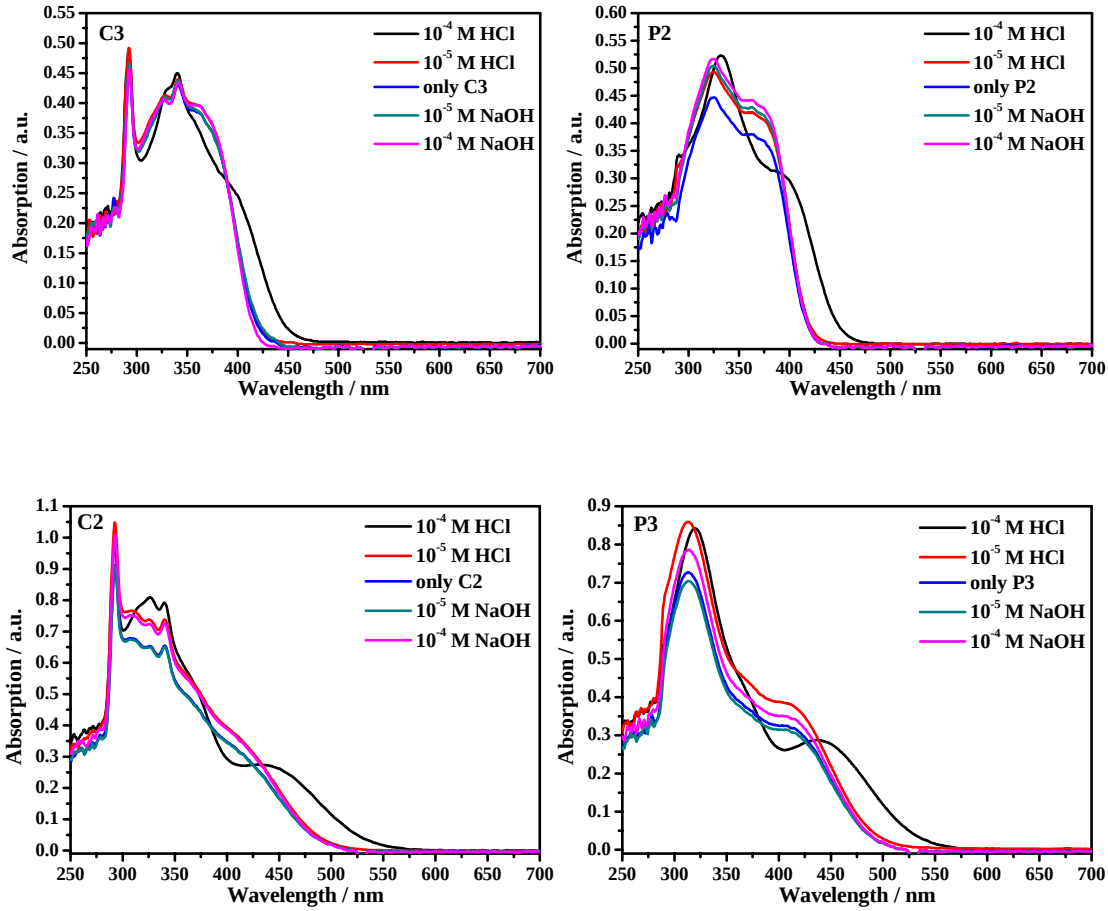

Fig. S2.UV-vis absorption spectra of 10^{-5} M **C3**, **P2**, **C2** and **P3** dyes in THF/H_2O (1:1) mixture with different acidity and alkalinity.

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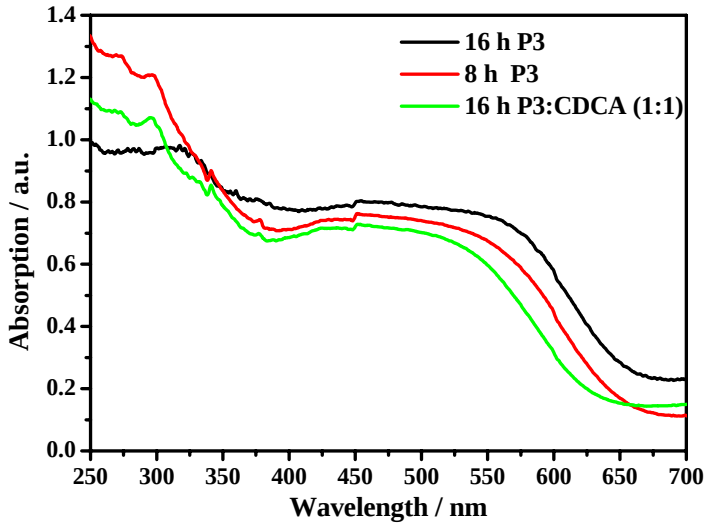

Fig. S3.UV-vis absorption spectra of **P3** on TiO_2 film.

Table S1 **P3** amount vs time

Dye	**P3** (8 h)	**P3** (16 h)	**P3**:CDCA (1:1, 16 h)
Amount / 10^{-7}mol cm^{-2}	4.1	4.1	3.7

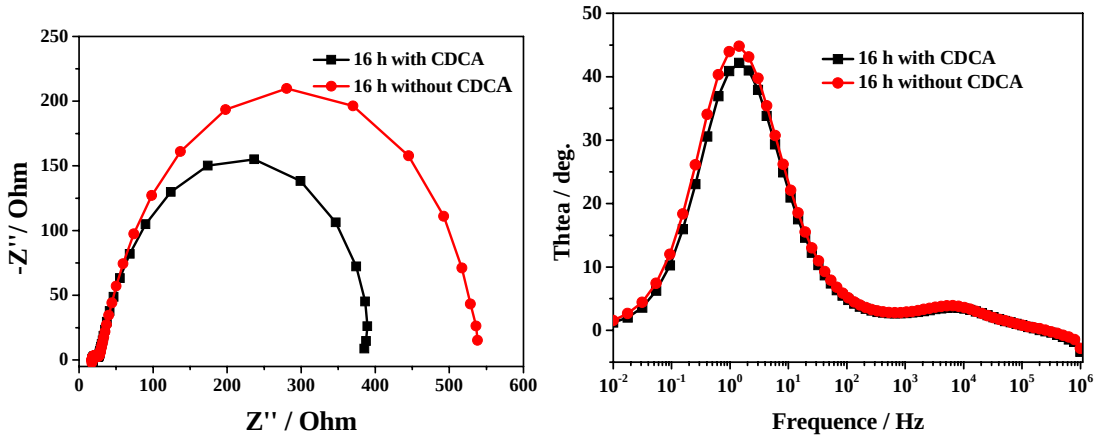

Fig. S4. EIS Nyquist and Bode plots of dye **P3** with coadsorbent (CDCA, 1:1) in the dark.

Lfetime:
With CDCA: 381.3 * 0.001072=408.8 ms
Without CDCA: 481.1 ms

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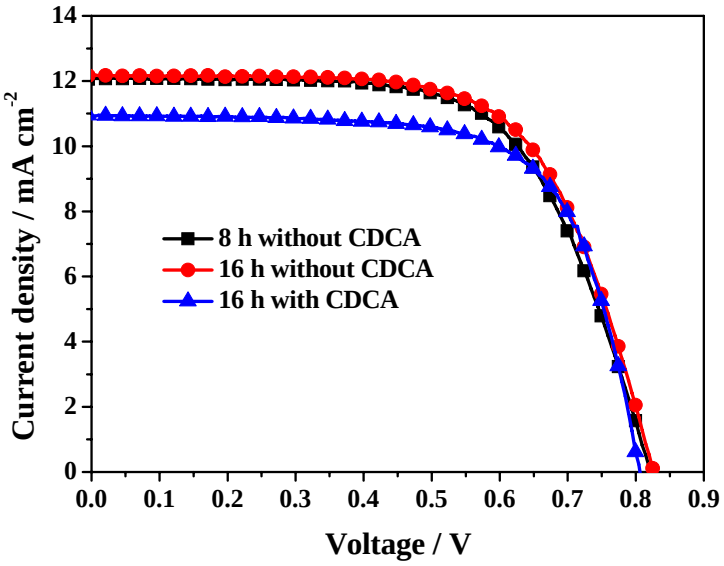

Fig. S5 Photocurrent density-photovoltage curves of **P3** in the dark.

Table S2 Performance of DSSC under different conditions

Dye	J_{sc}/ mA cm^{-2}	V_{oc}/ mV	η(%)	Fill factor (*ff*)
8 h without CDCA	12.09	822	6.36	0.64
16 h without CDCA	12.18	826	6.55	0.65
16h with CDCA	10.94	806	6.07	0.69

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MS and NMR spectra

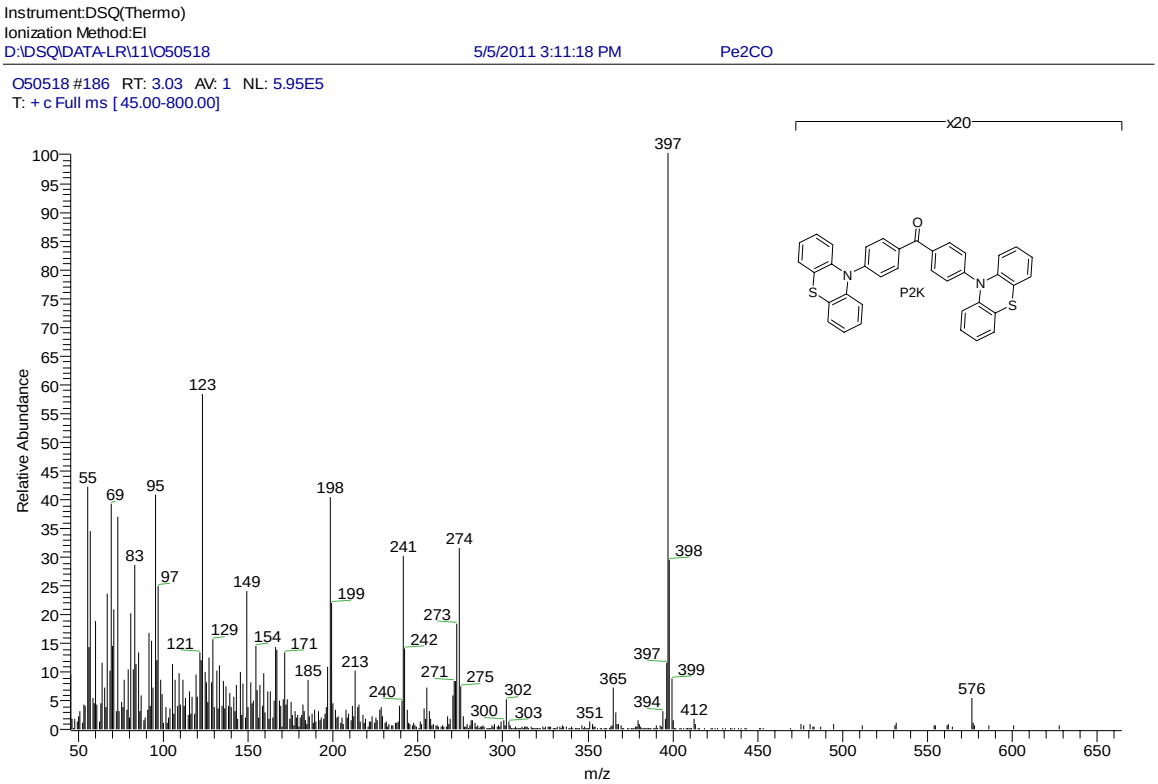

Fig. S6 MS spectrum of **P2K**.

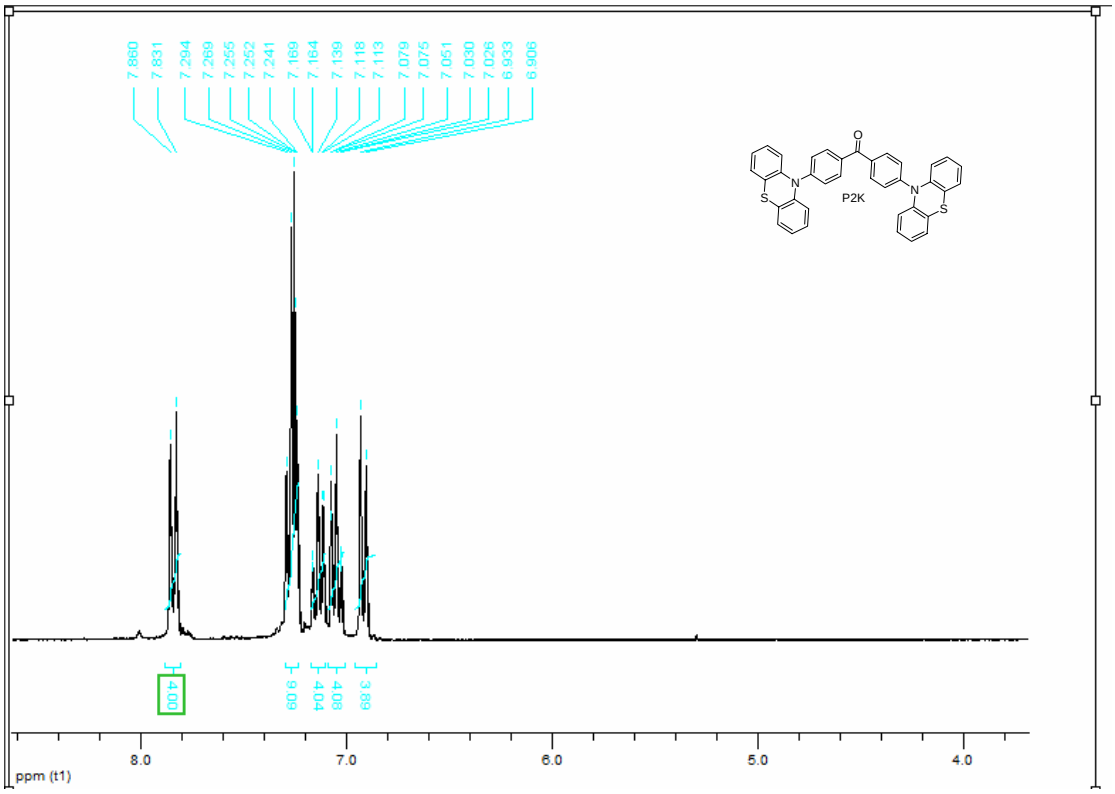

Fig. S7 ^{1}H NMR spectrum of **P2K**.

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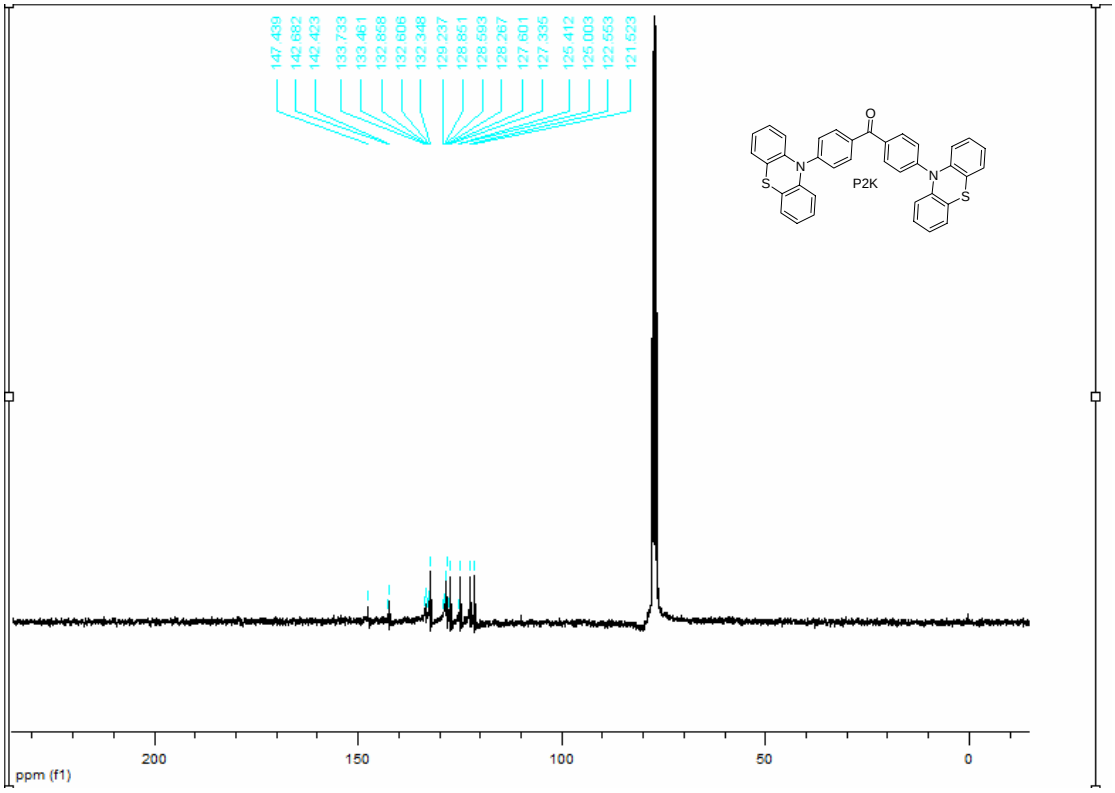

Fig. S8 ^{13}C NMR spectrum of **P2K**.

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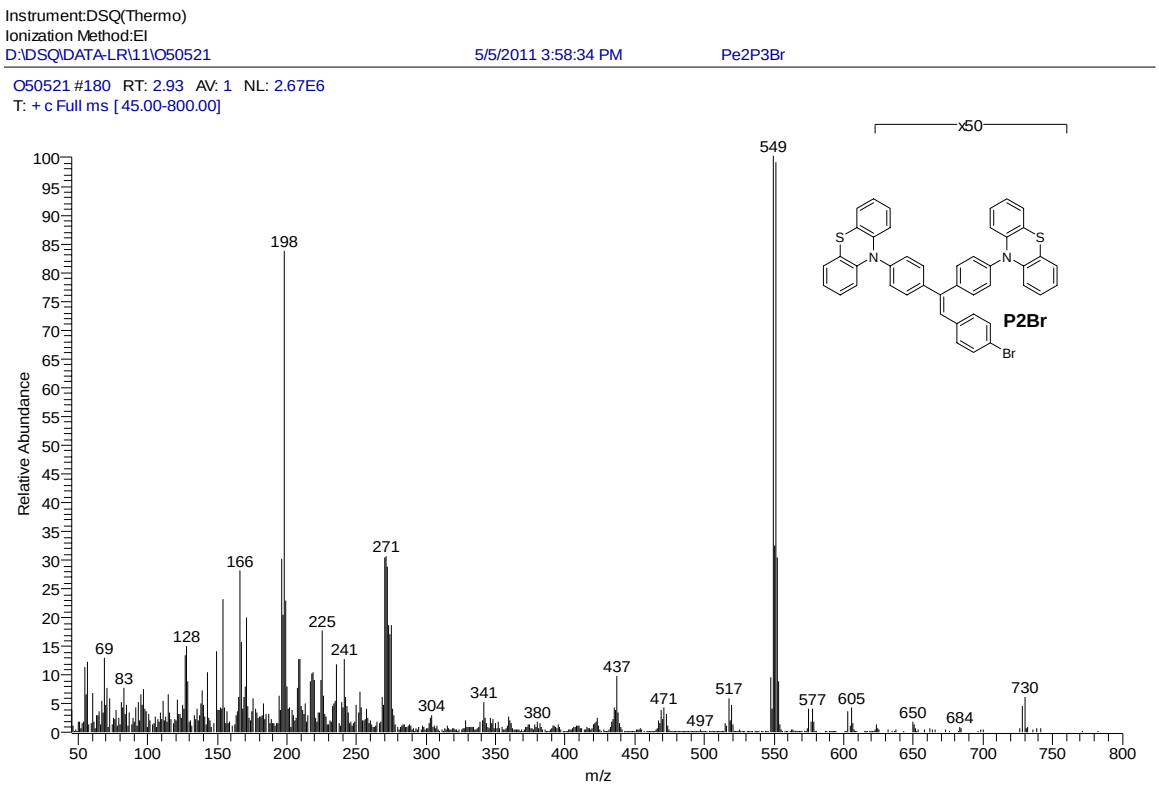

Fig. S9 MS spectrum of **P2Br**.

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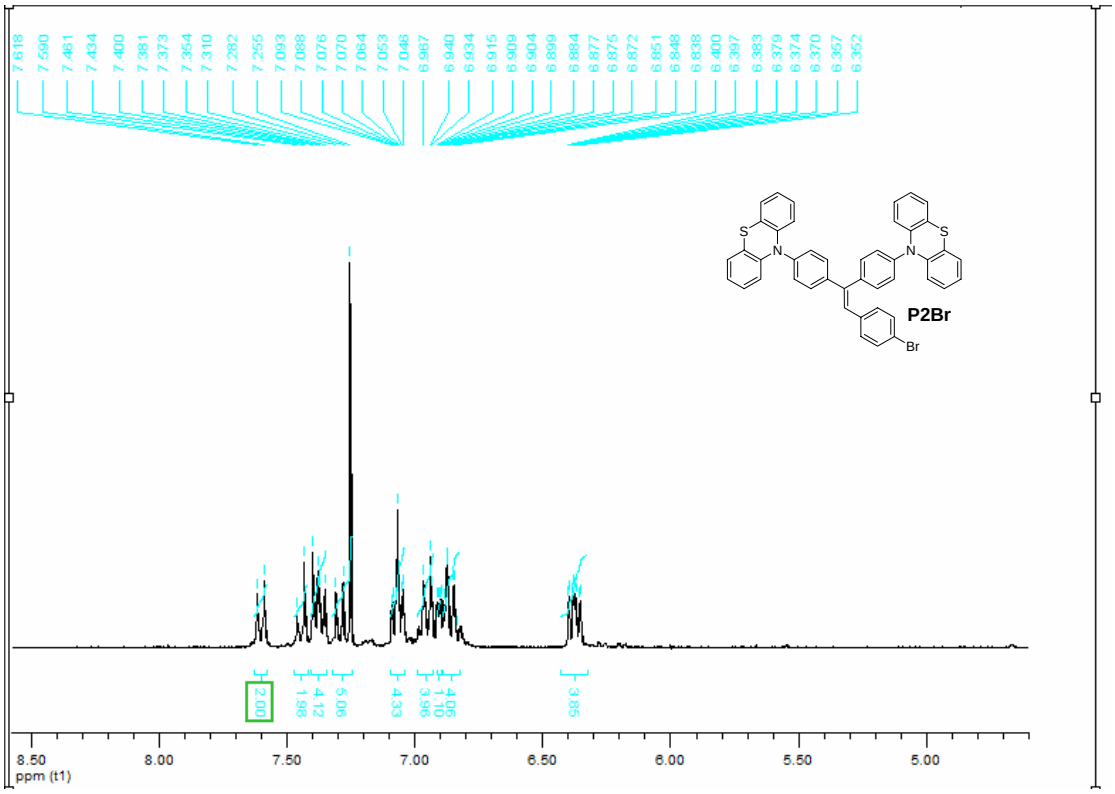

Fig. S10 ^{1}H NMR spectrum of **P2Br**

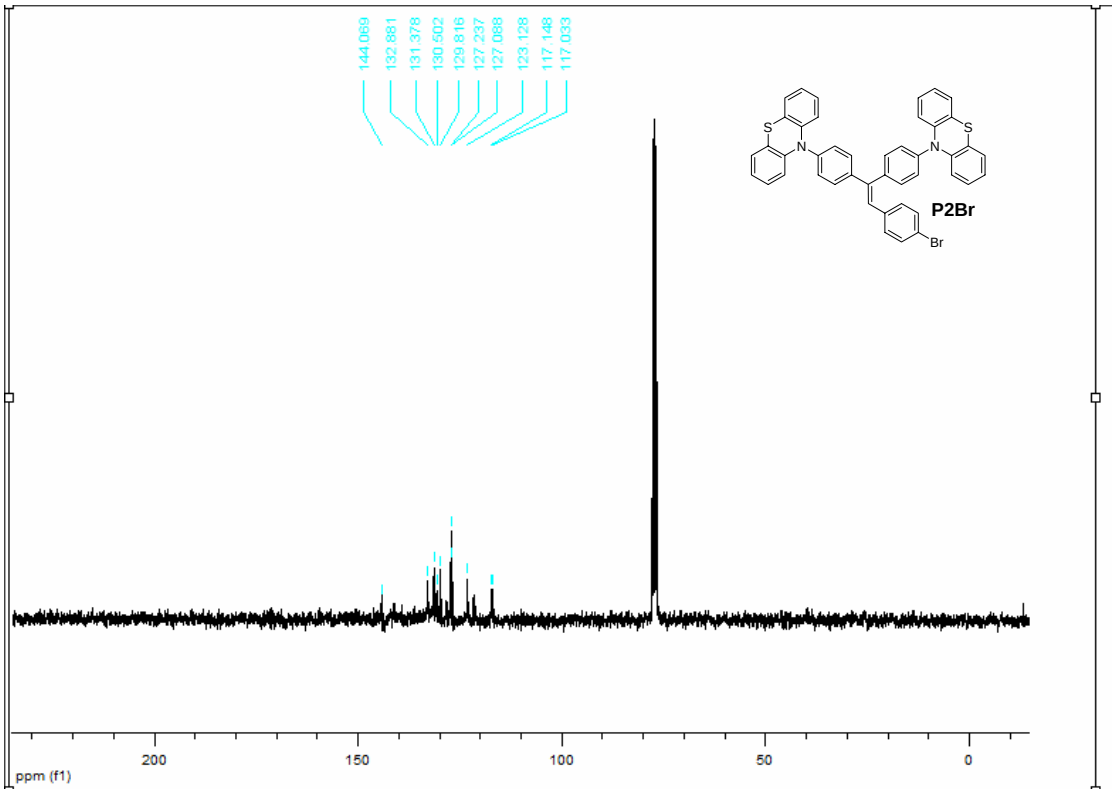

Fig. S11 ^{13}C NMR spectrum of **P2Br**.

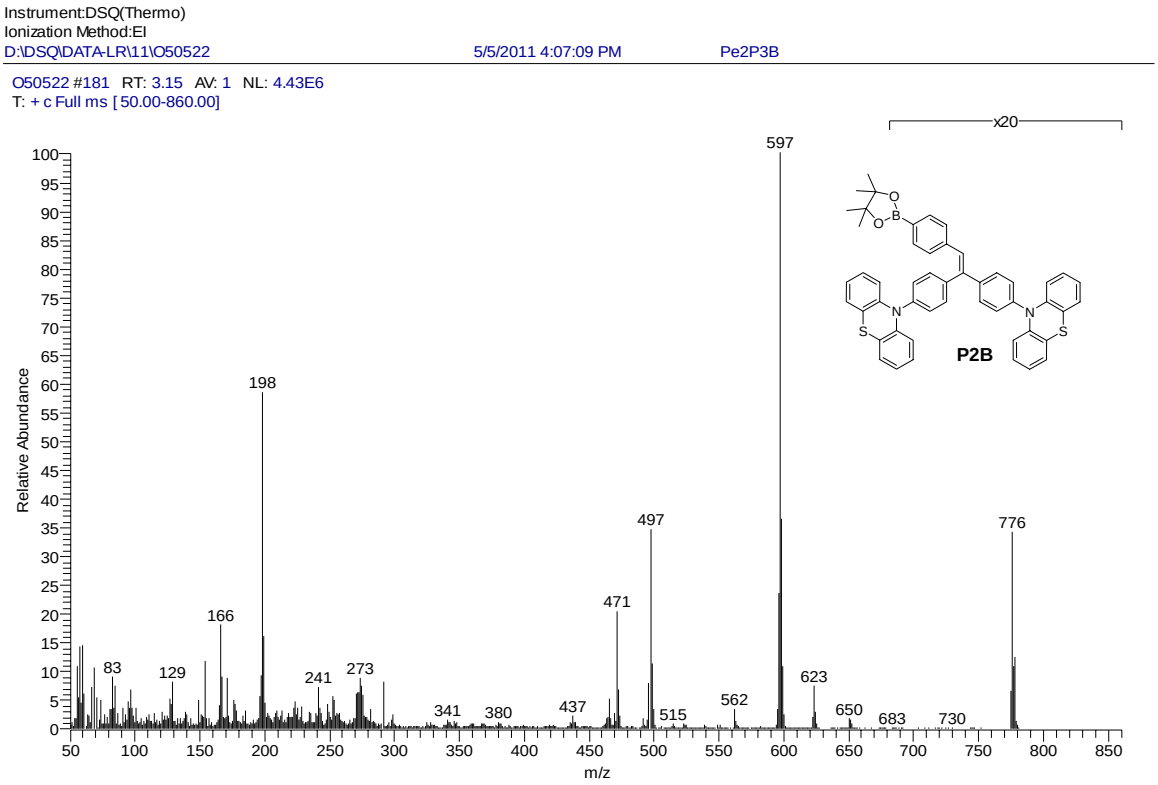

Fig. S12 MS spectrum of **P2B**.

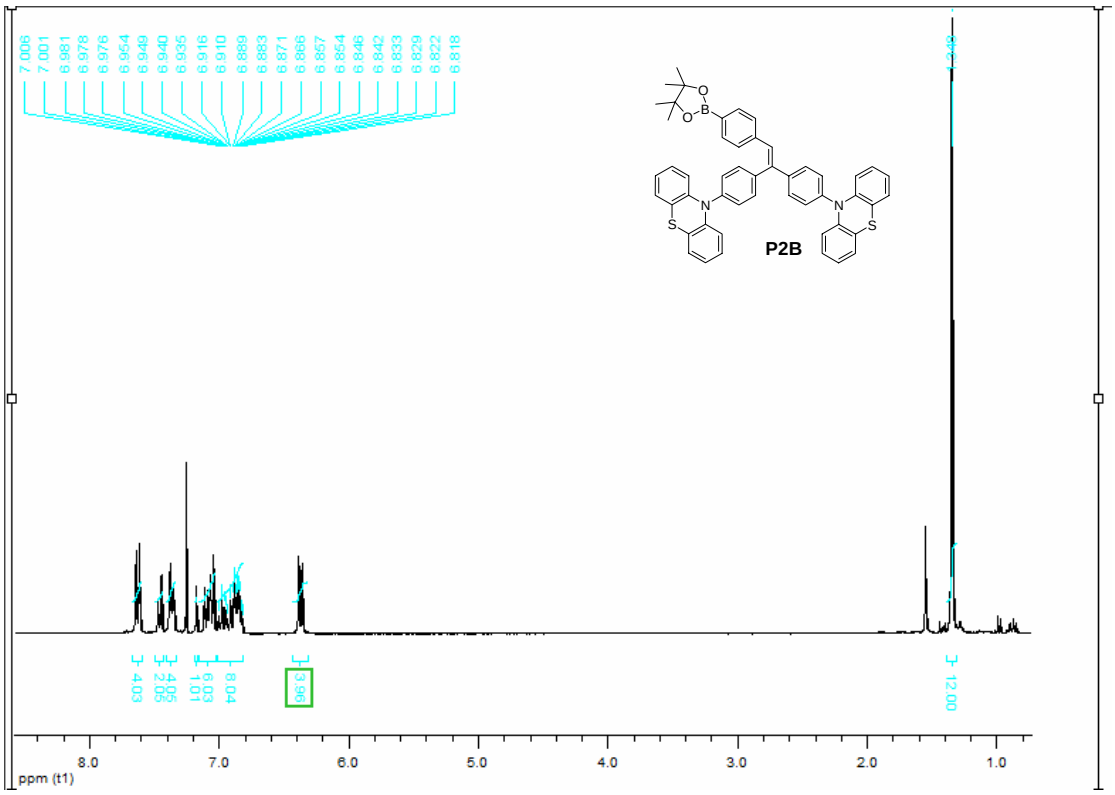

Fig. S13 ^{1}H NMR spectrum of **P2B**.

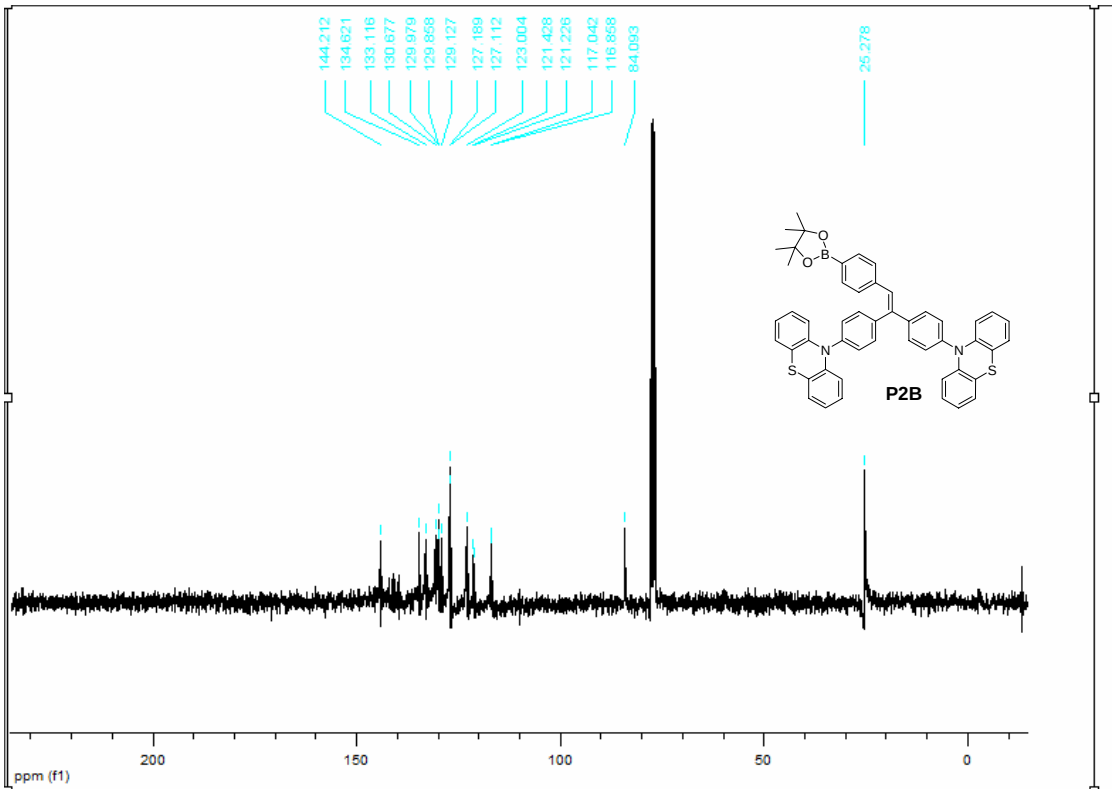

Fig. S14 ^{13}C NMR spectrum of **P2B**.

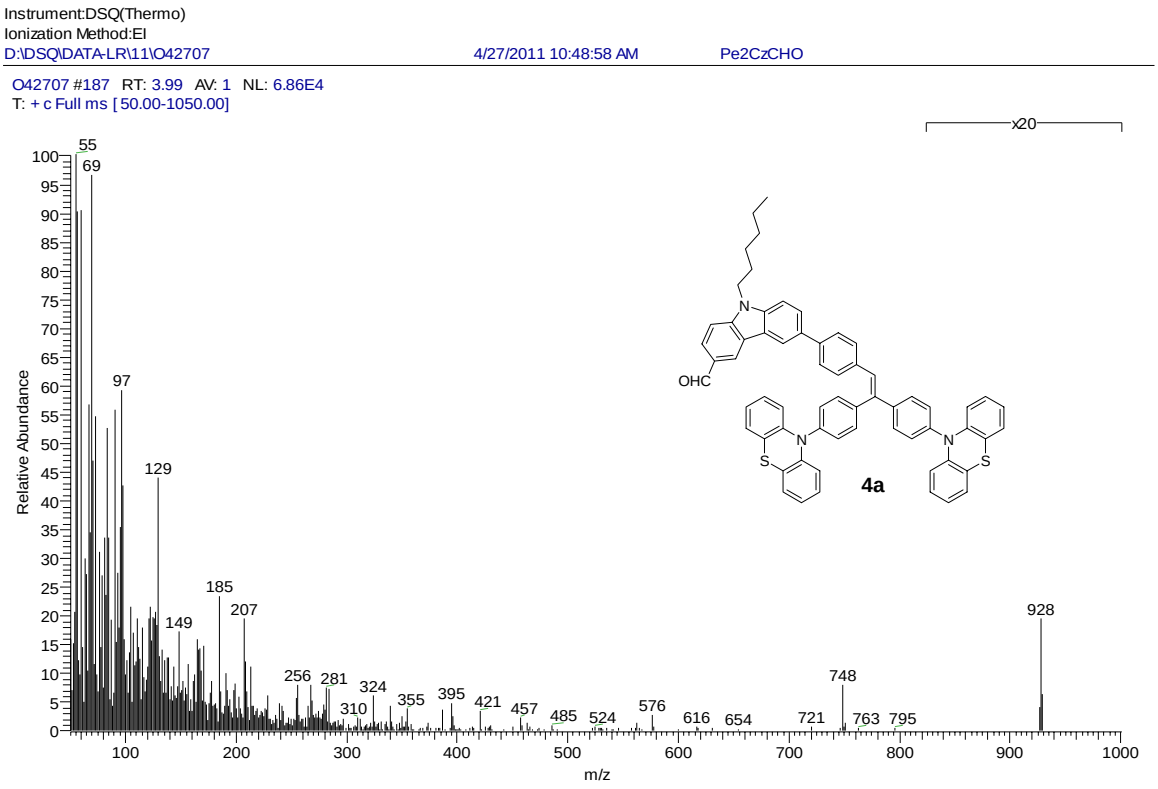

Fig. S15 MS spectrum of **4a**.

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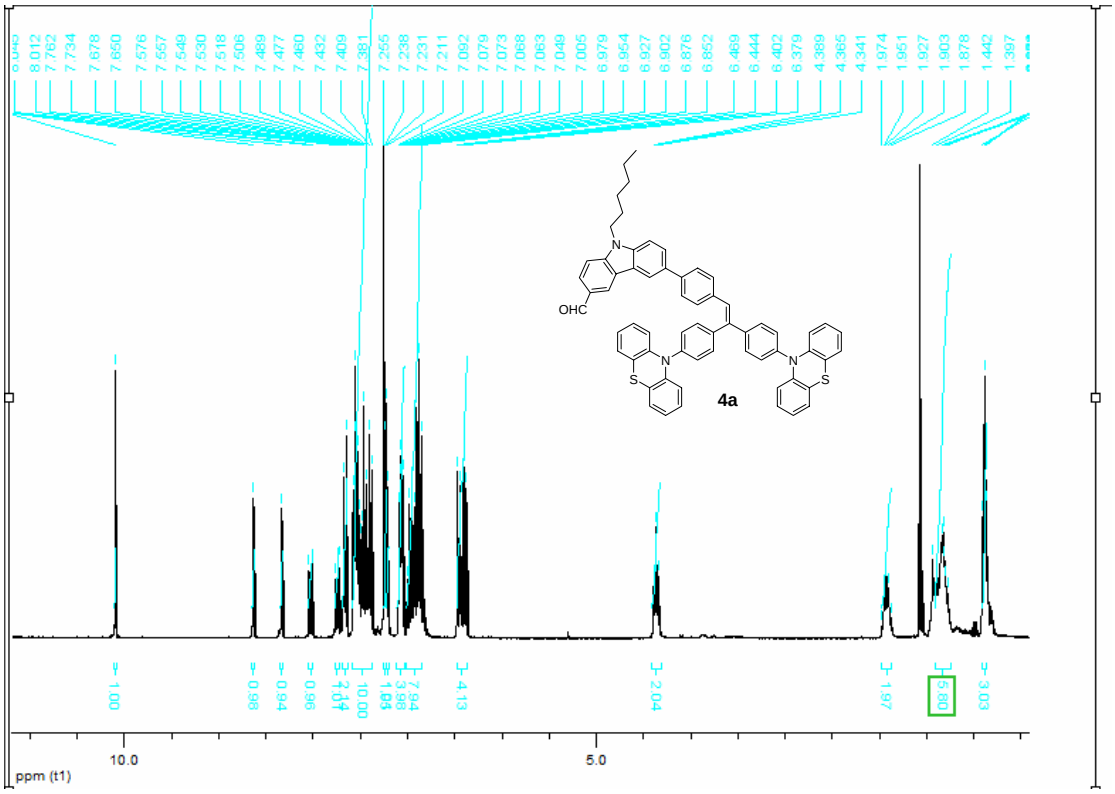

Fig. S16 ^{1}H NMR spectrum of **4a**.

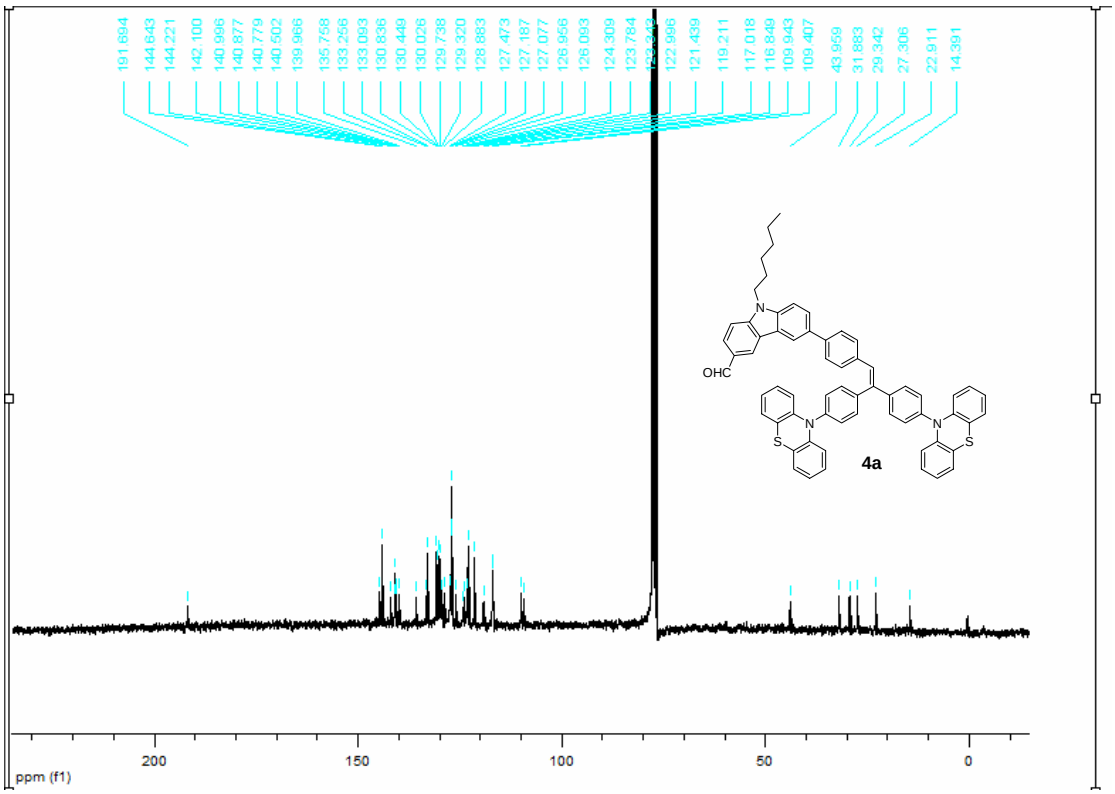

Fig. S17 ^{13}C NMR spectrum of **4a**.

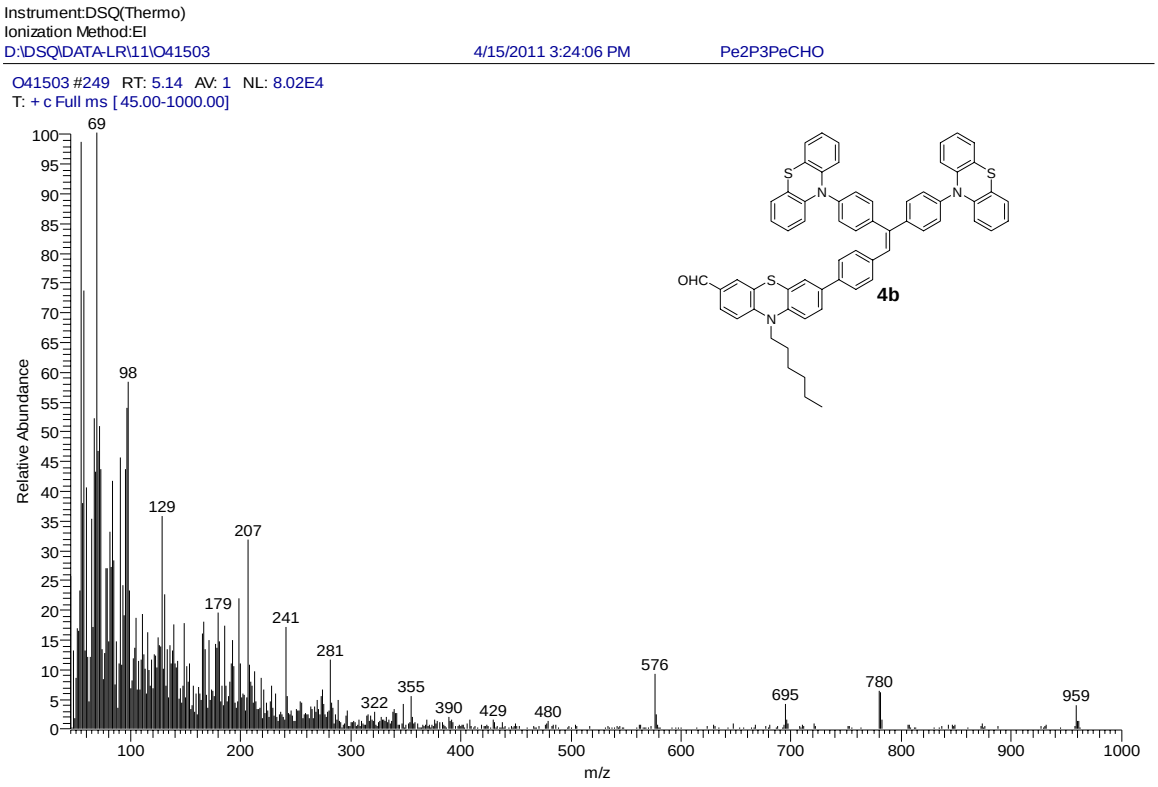

Fig. S18 MS spectrum of **4b**.

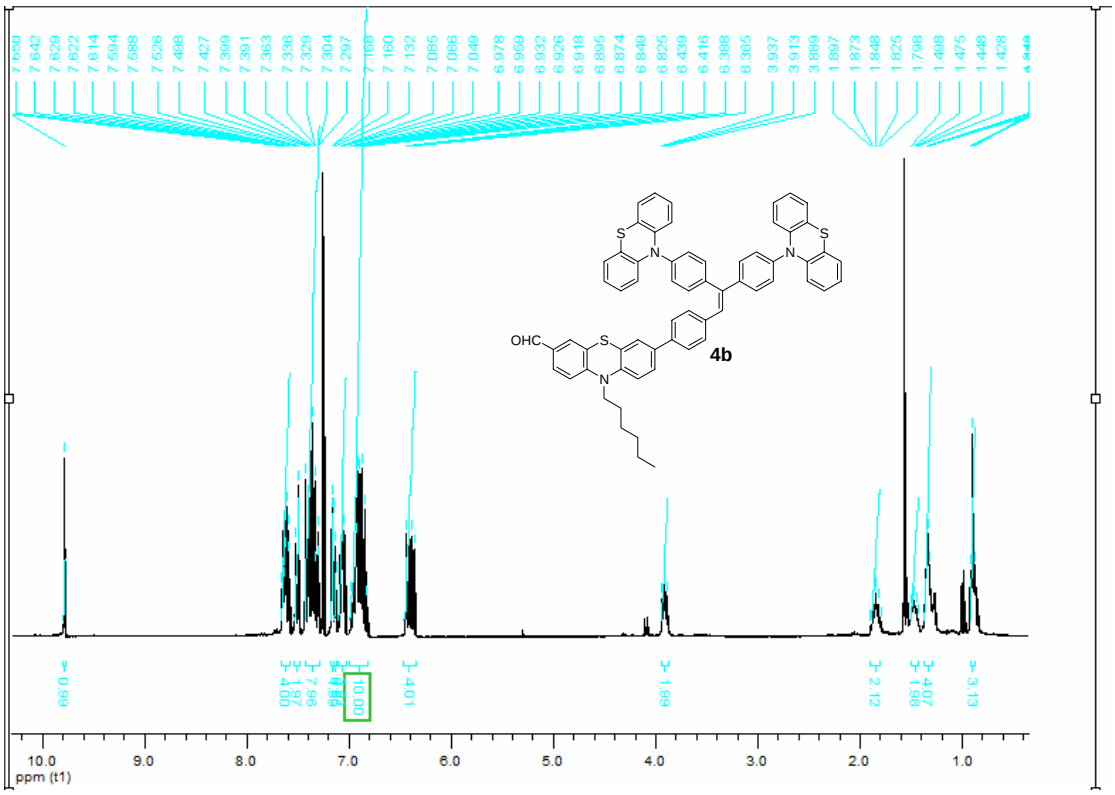

Fig. S19 ^{1}H NMR spectrum of **4b**.

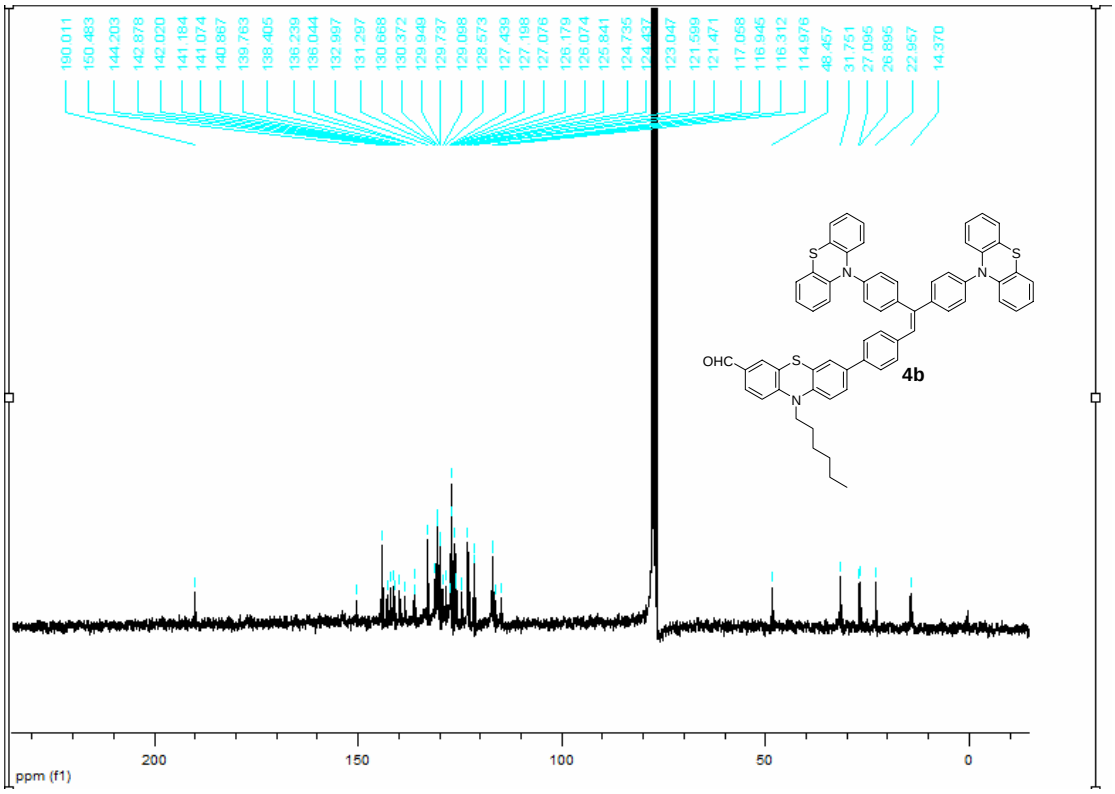

Fig. S20 ^{13}C NMR spectrum of **4b**.

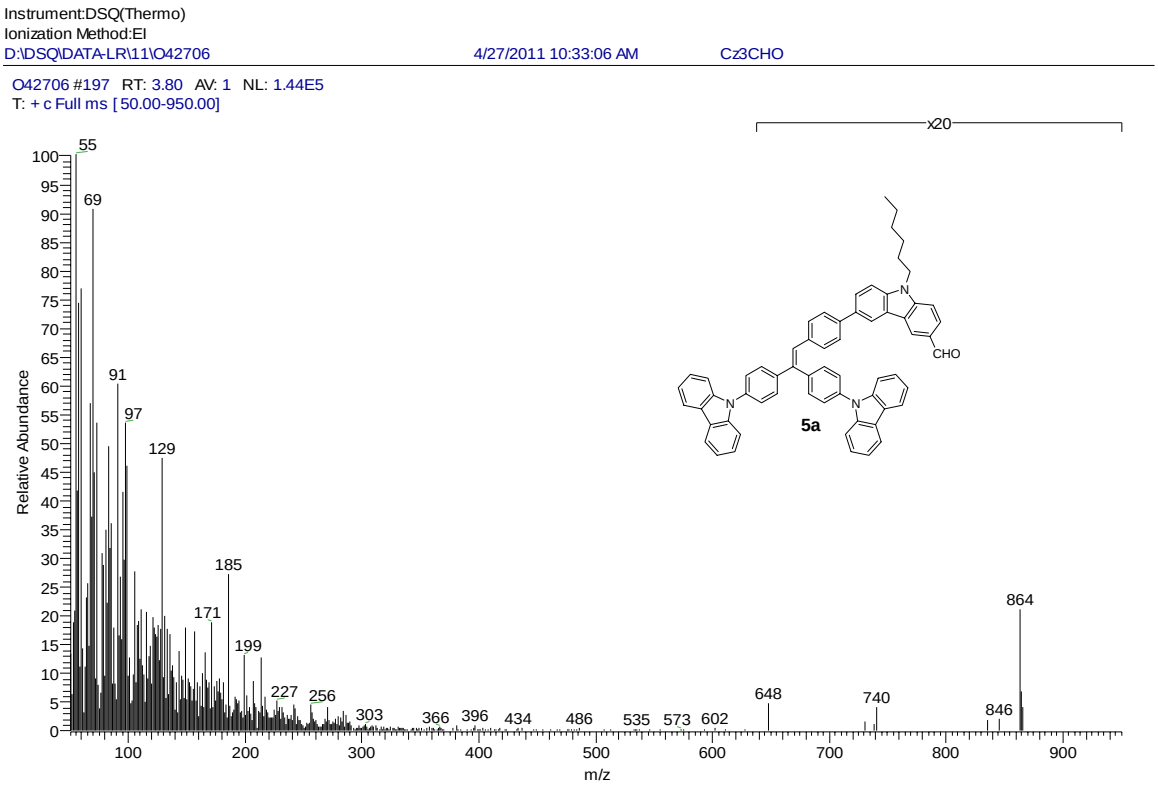

Fig. S21 MS spectrum of **5a**.

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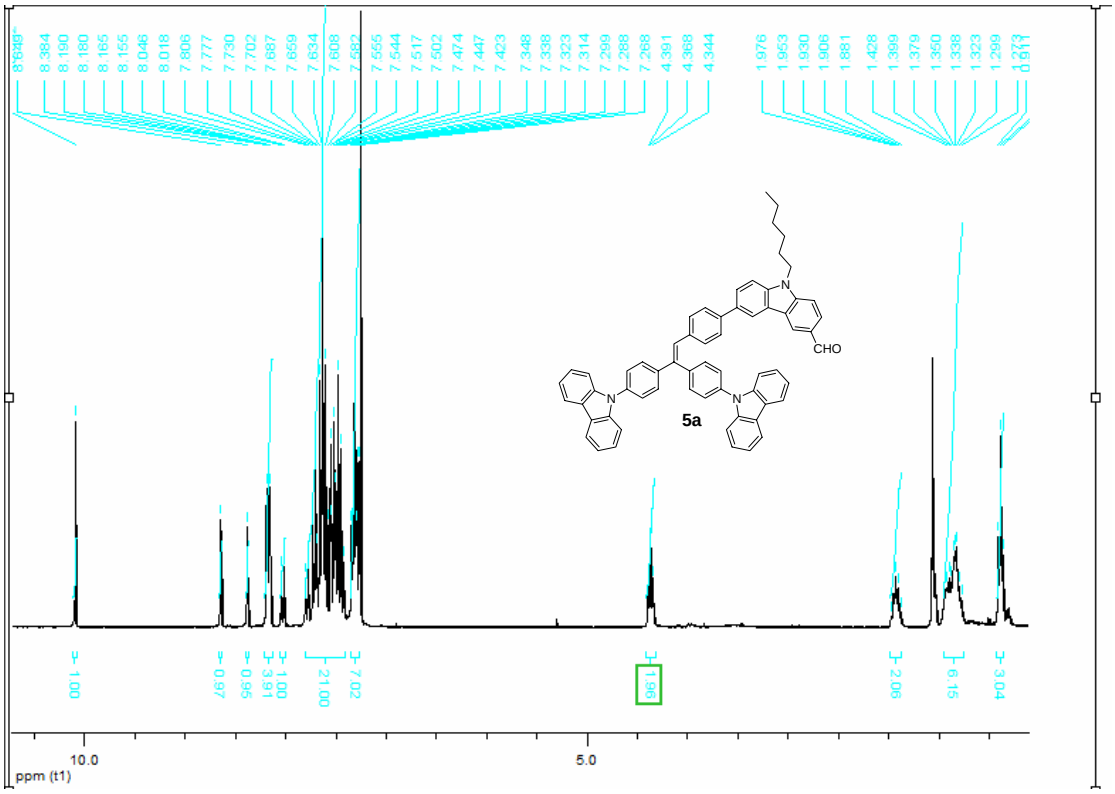

Fig. S22 ^{1}H NMR spectrum of **5a**.

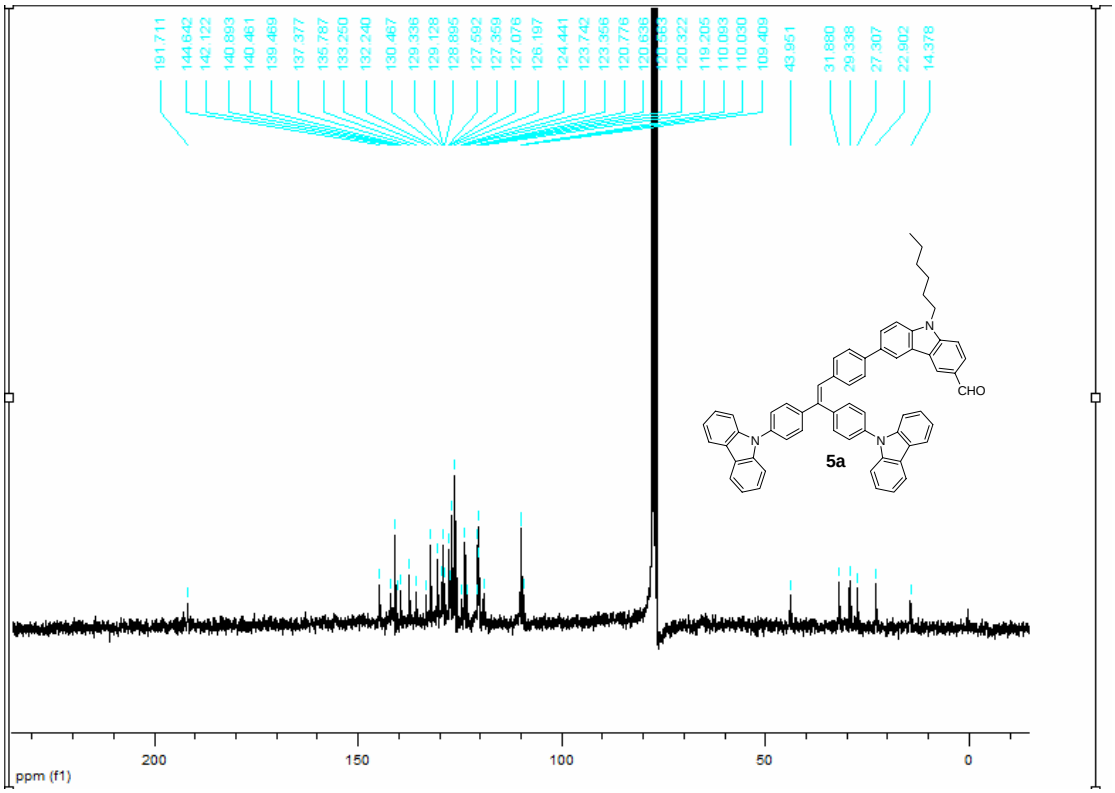

Fig. S23 ^{13}C NMR spectrum of **5a**.

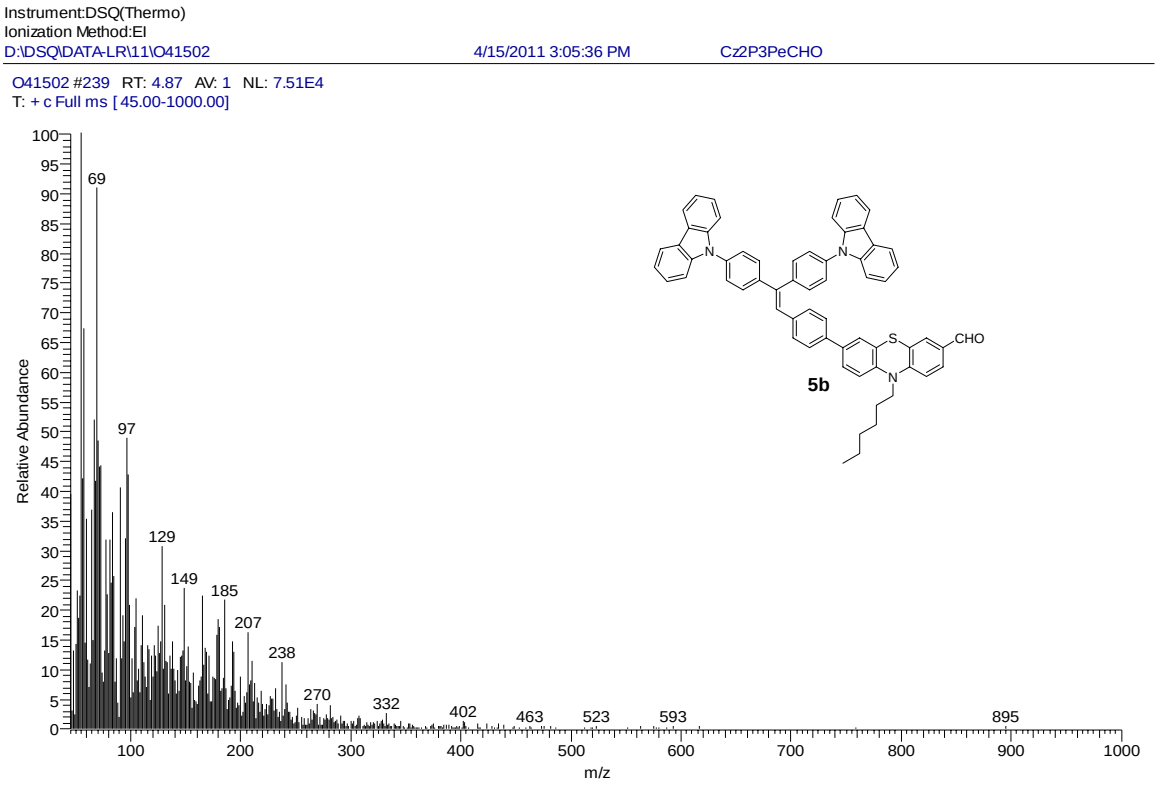

Fig. S24 MS spectrum of **5b**.

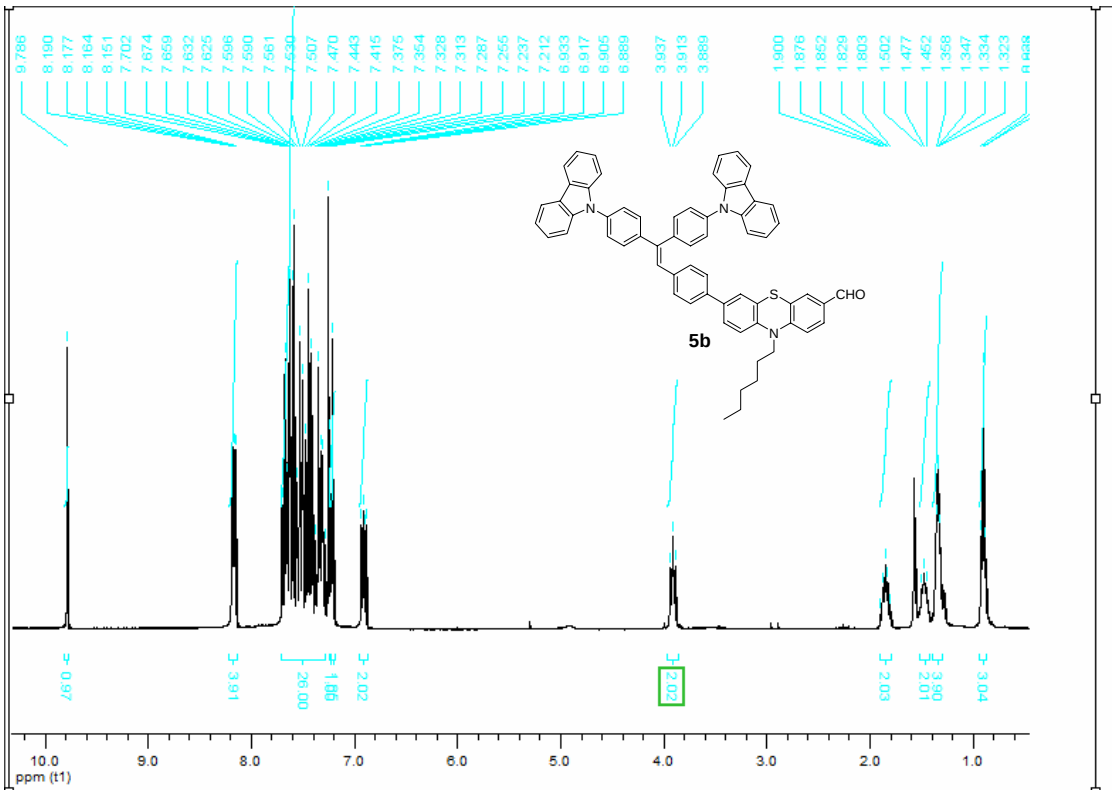

Fig. S25 ^{1}H NMR spectrum of **5b**.

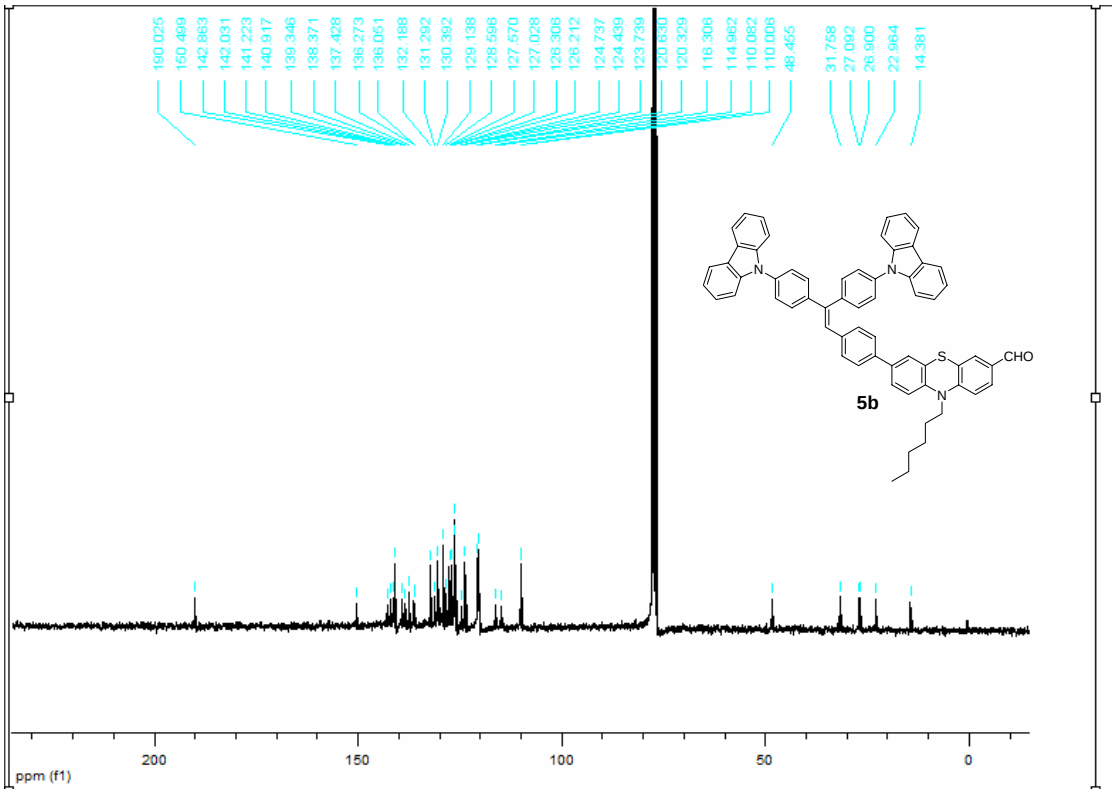

Fig. S26 ^{13}C NMR spectrum of **5b**.

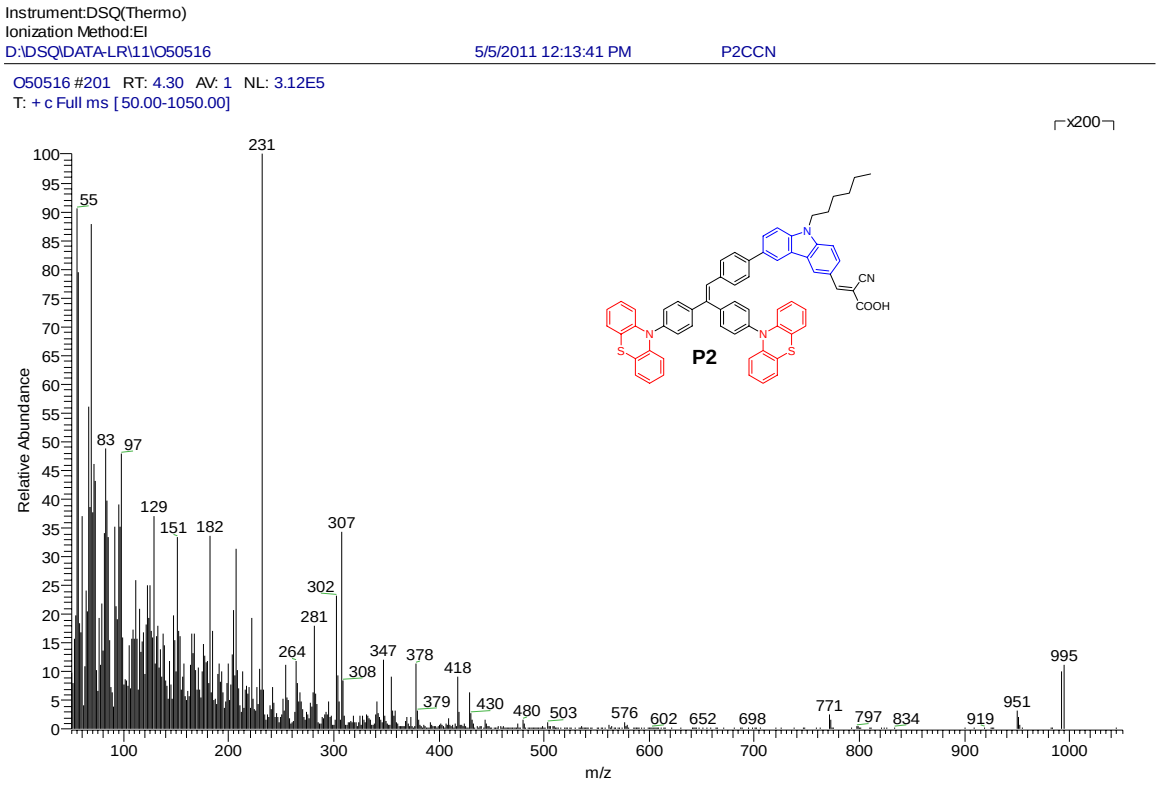

Fig. S27 MS spectrum of **P2**.

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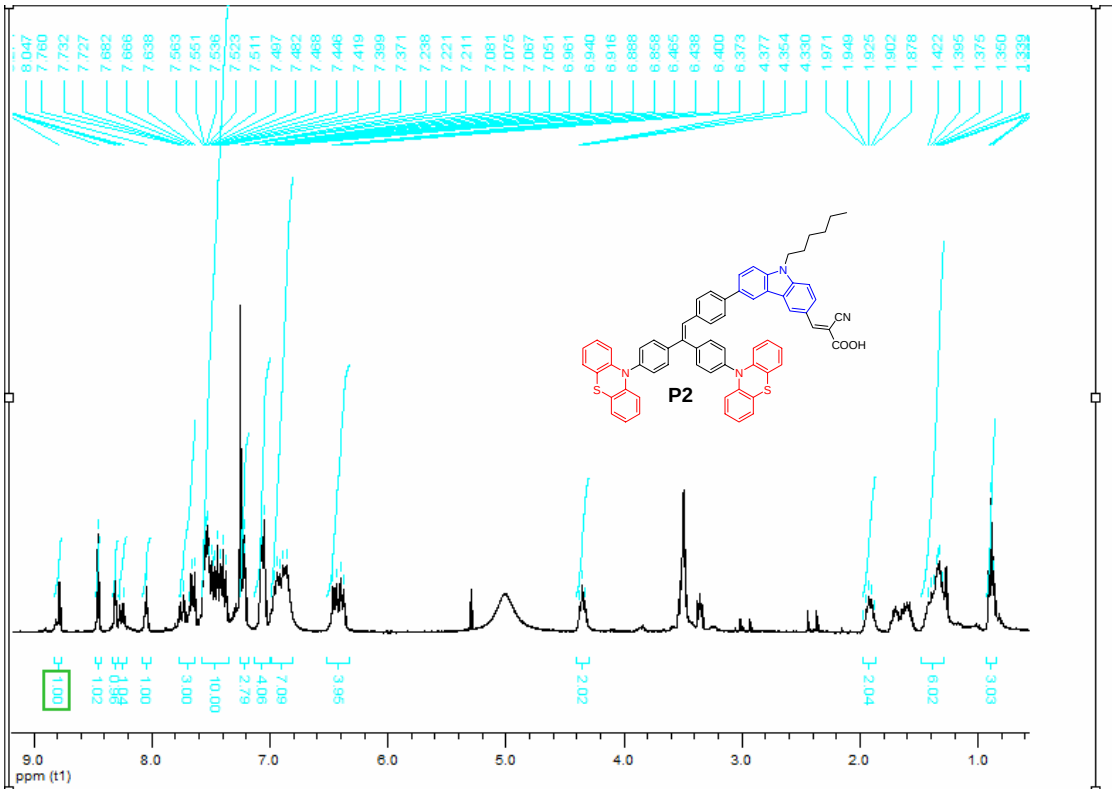

Fig. S28 ^{1}H NMR spectrum of **P2**.

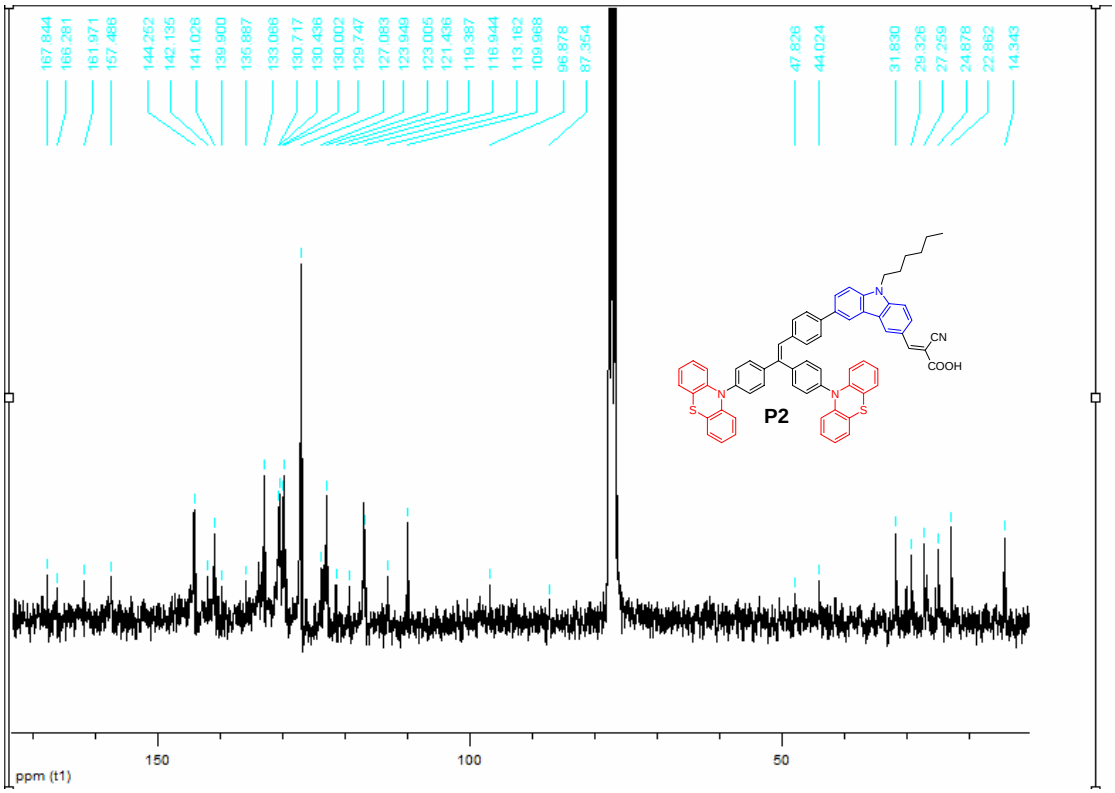

Fig. S29 ^{13}C NMR spectrum of **P2**.

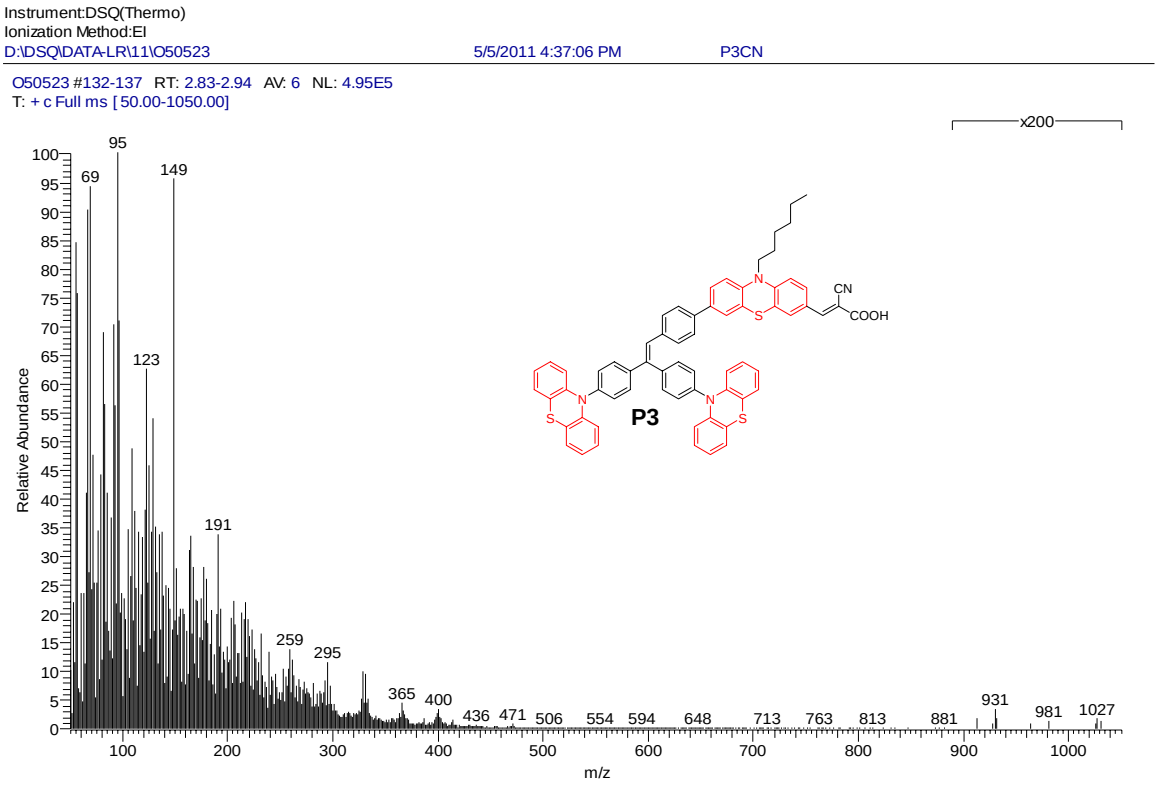

Fig. S30 MS spectrum of **P3**.

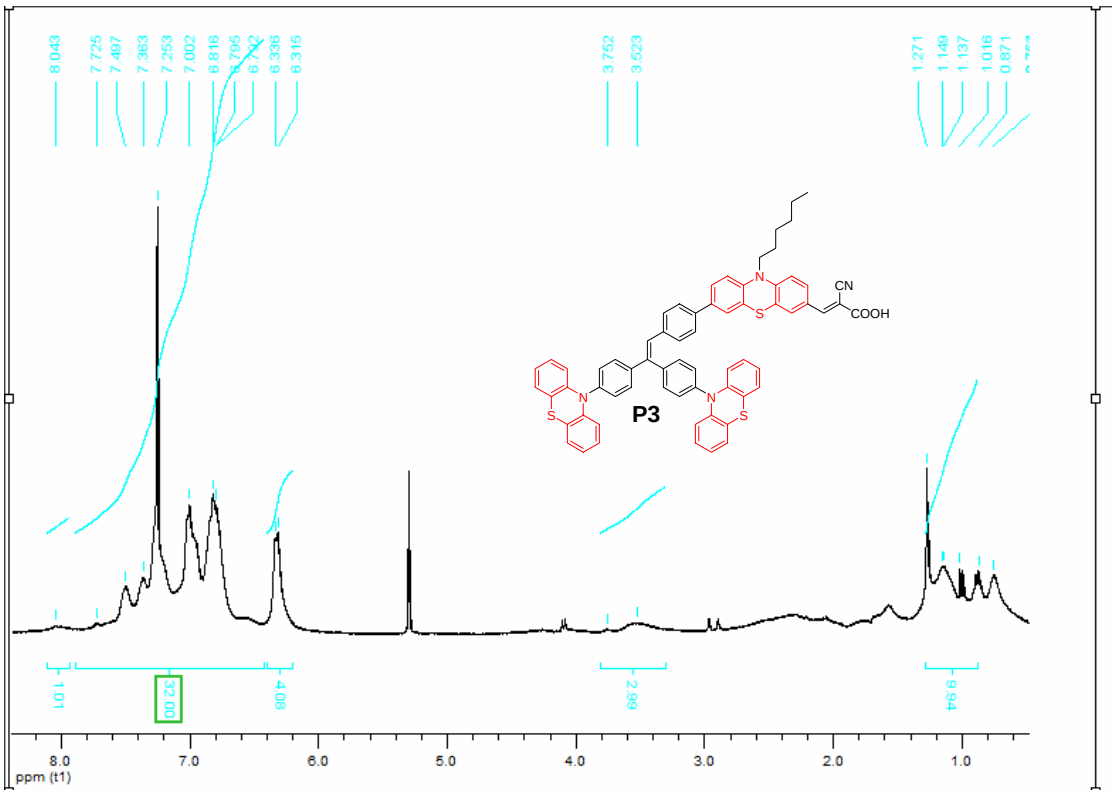

Fig. S31 ^{1}H NMR spectrum of **P3**.

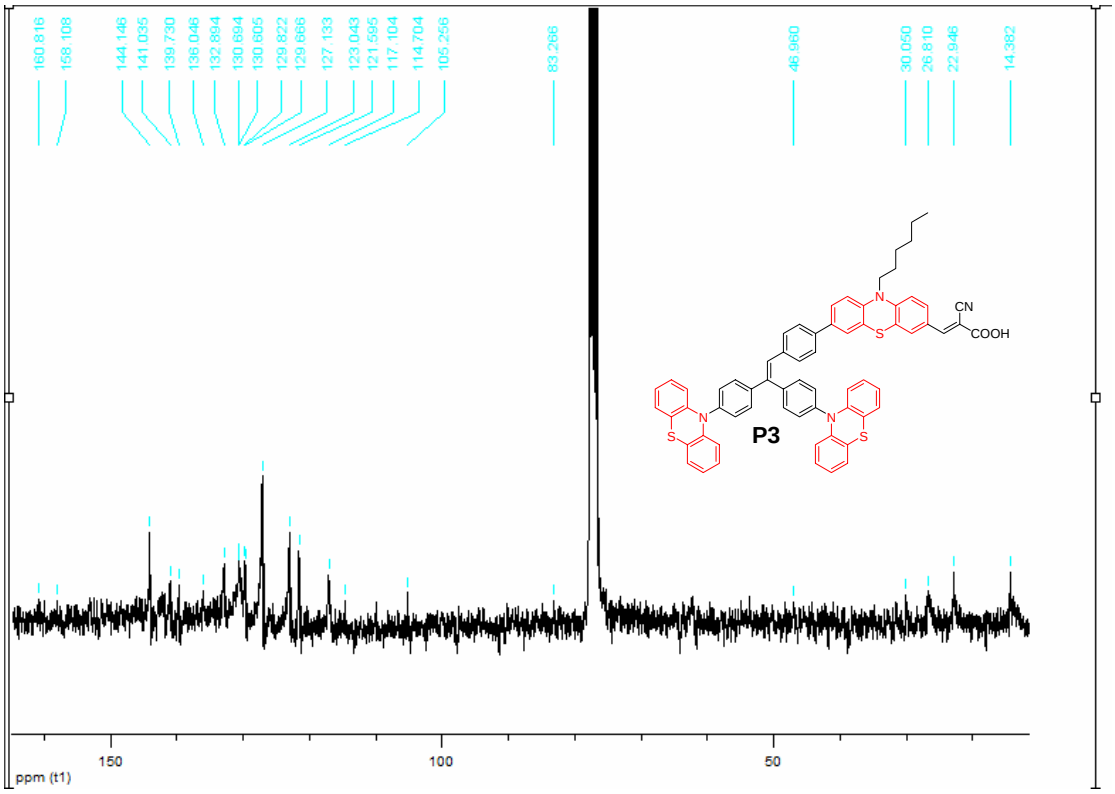

Fig. S32 ^{13}C NMR spectrum of **P3**.

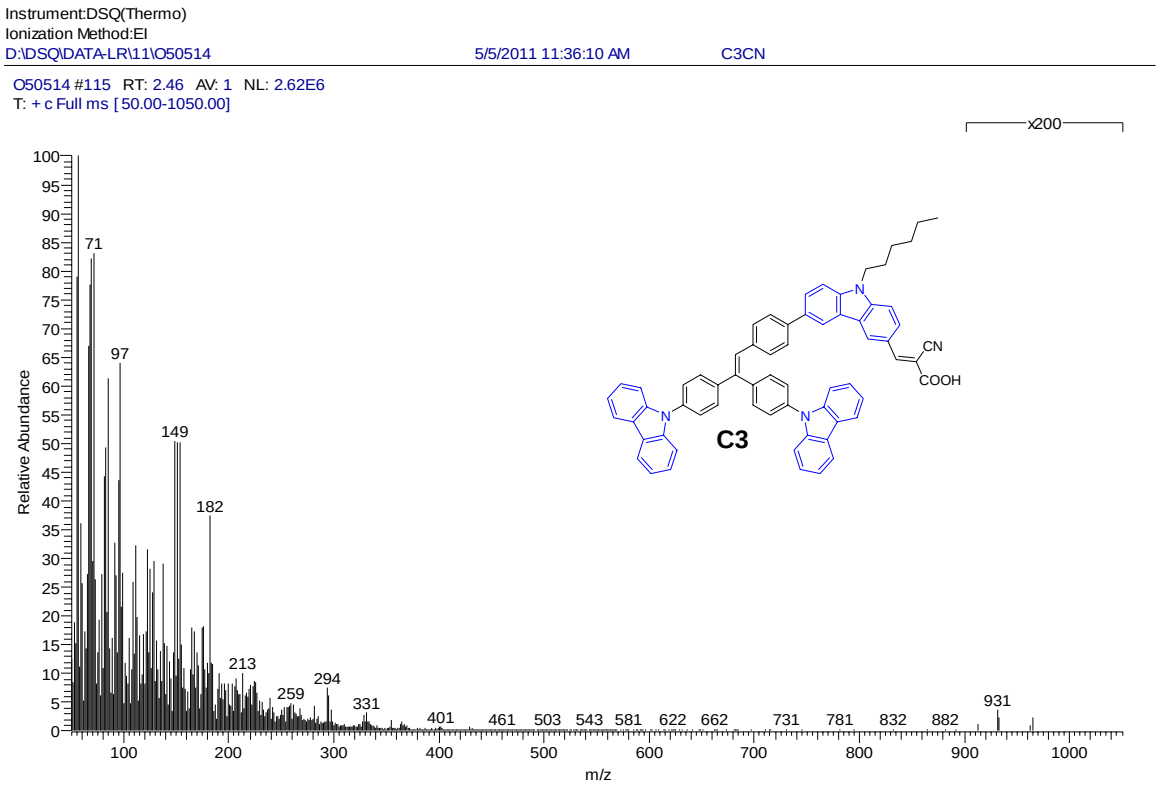

Fig. S33 MS spectrum of **C3**.

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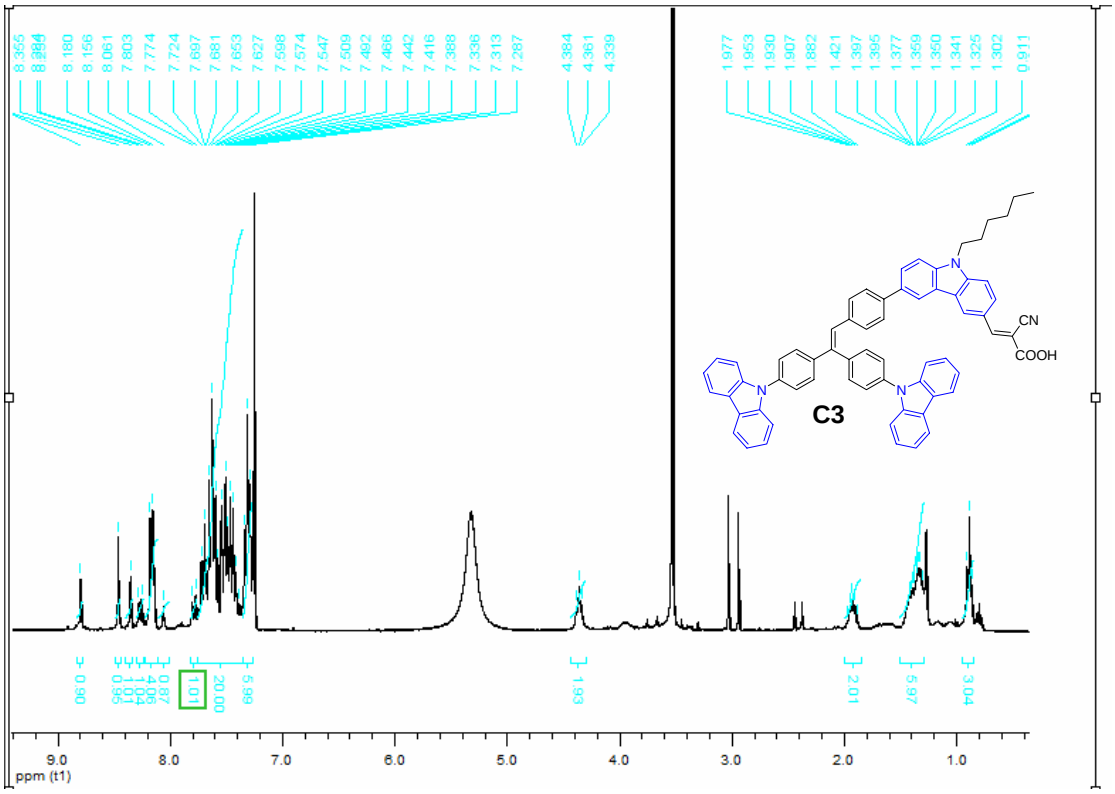

Fig. S34 ^{1}H NMR spectrum of **C3**.

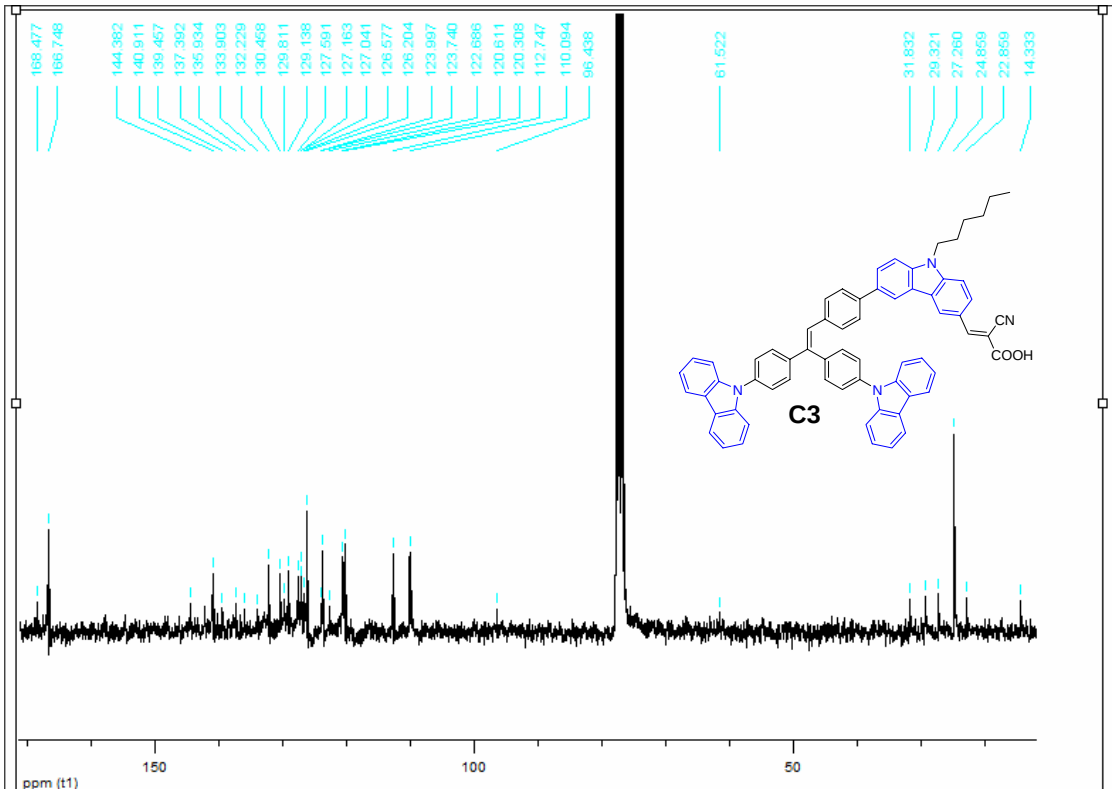

Fig. S35 ^{13}C NMR spectrum of **C3**.

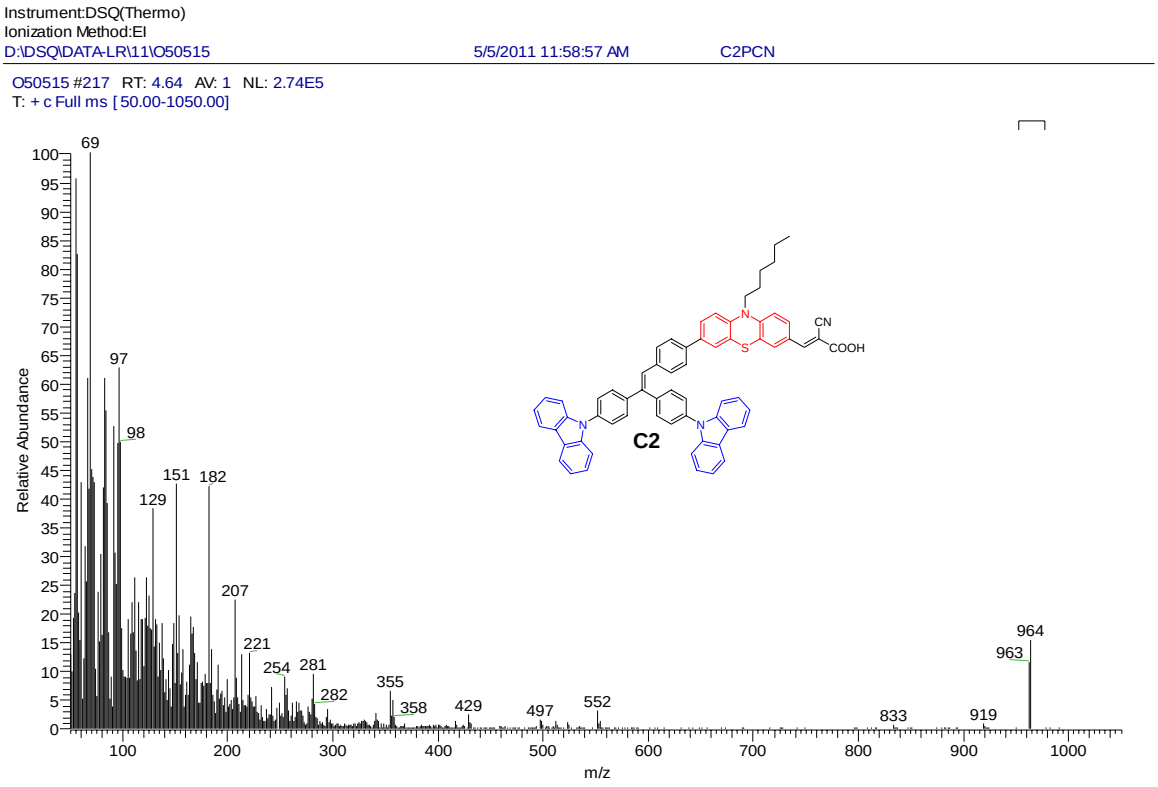

Fig. S36 MS spectrum of **C2**.

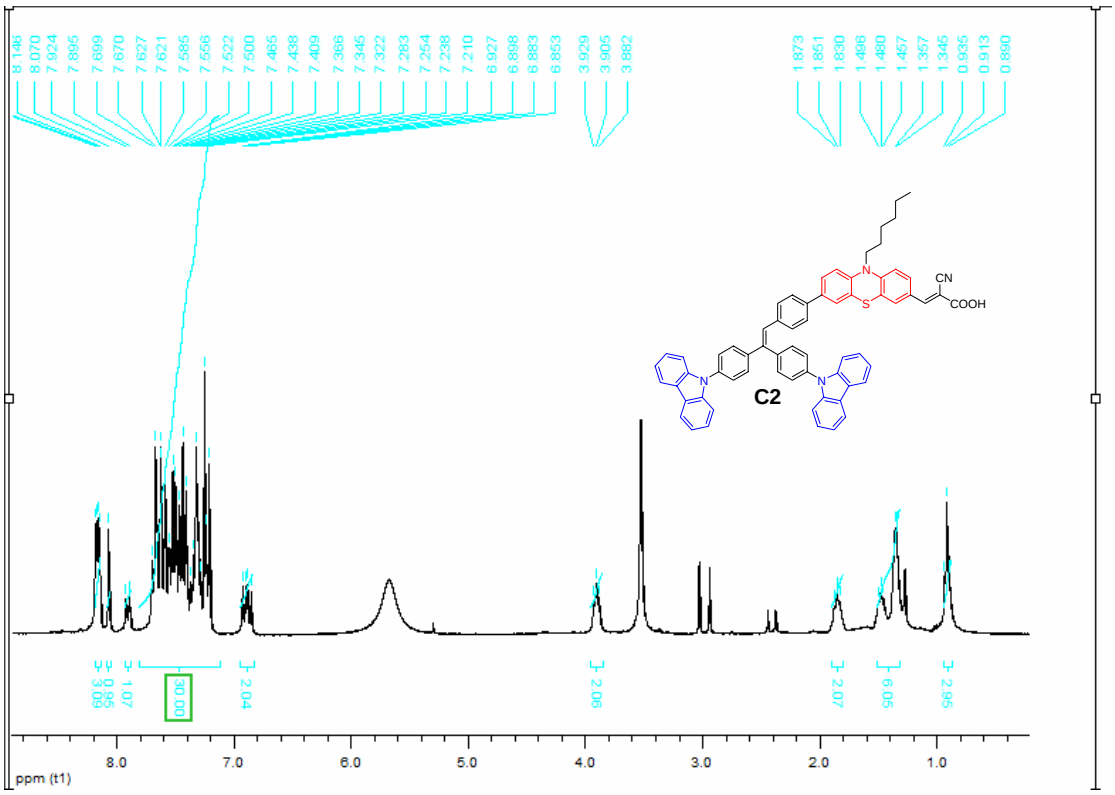

Fig. S37 ^{1}H NMR spectrum of **C2**.

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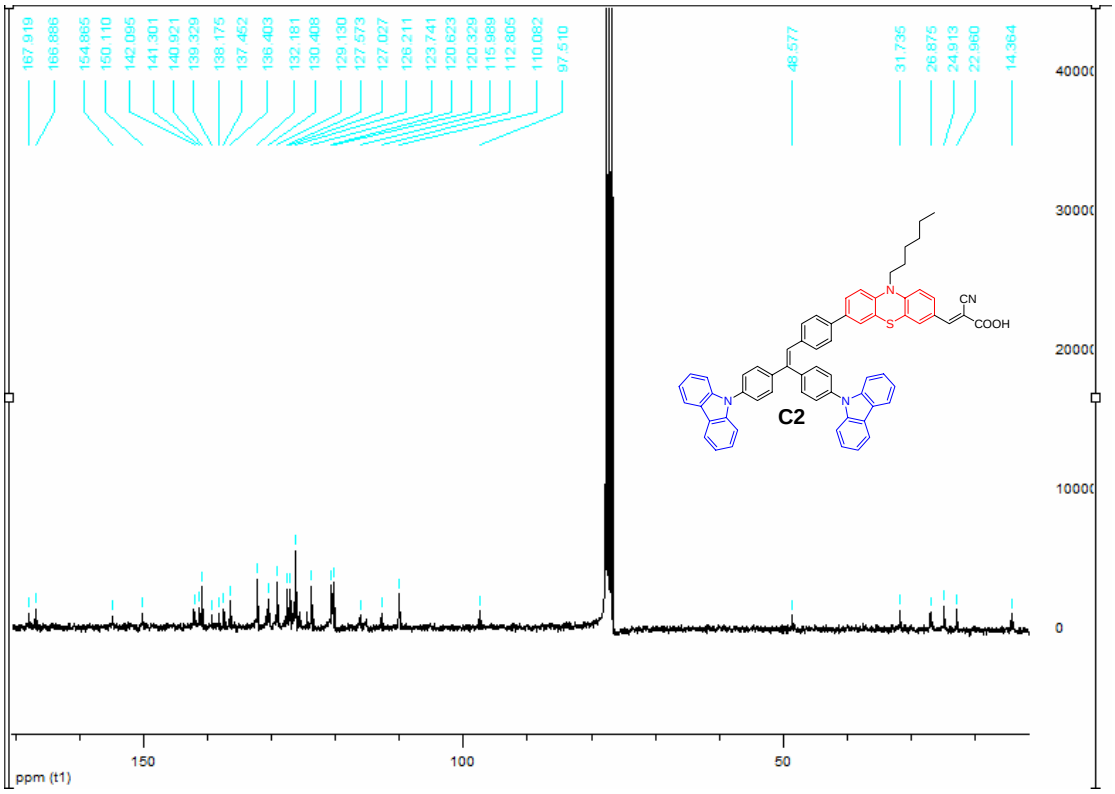

Fig. S38 ^{13}C NMR spectrum of **C2**.