Oligo(3-hexylthiophene)-Functionalized Dicyano-ethylene Substituted Quinacridone Derivatives: Synthesis, Characterizations and Applications as Acceptors in Photovoltaic Devices

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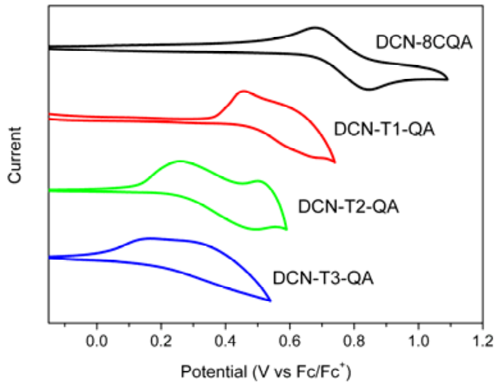

Figure S1. Cyclic voltammograms of DCN-Tn-QA (n = 1–3) in CH_2Cl_2 solution, measured with TBAPF (0.1 M) as a supporting electrolyte at a scan rate of 100 mV s^{-1}.

Table S1. The photovoltaic performances of [ITO/PEDOT:PSS/P3HT:DCN-T2-QA/LiF/Al] spin-coated from different solvent under AM 1.5 G, 100 mW cm^{-2}

Solvent	(V : V)	V_{oc} (V)	J_{sc} (mA cm^{-2})	FF (%)	PCE (%)
o-DCB : $CHCl_3$	1 : 1	0.46	2.80	40	0.51
o-DCB : $CHCl_3$	2 : 1	0.44	2.51	43	0.47
o-DCB		0.46	1.86	46	0.40

The weight ratio of P3HT : DCN-T2-QA is 1 : 1 and the annealing temperature is 60 ℃ (10 min) and the active layer is about 110 nm.

Table S2. The photovoltaic performances of [ITO/PEDOT:PSS/P3HT:DCN-T2-QA/LiF/Al] at different annealing temperature under AM 1.5 G, 100 mW cm^{-2}

Annealing temperature	V_{oc} (V)	J_{sc} (mA cm^{-2})	FF (%)	PCE (%)
Without annealing	0.54	1.52	29	0.24
60 ℃ for 10 min	0.46	2.80	40	0.51
80 ℃ for 10 min	0.44	2.03	37	0.33

The weight ratio of P3HT : DCN-T2-QA is 1 : 1 and the solvent is o-DCB/$CHCl_3$ (1 : 1, V : V) and the active layer is about 110 nm.

Table S3. The photovoltaic performances of [ITO/PEDOT:PSS/P3HT:DCN-T2-QA/LiF/Al] at different ratio of donor/acceptor under AM 1.5 G, 100 mW cm^{-2}

P3HT:DCN-T2-QA (w:w)	V_{oc} (V)	J_{sc} (mA cm^{-2})	FF (%)	PCE (%)
1.0 : 1.5	0.46	2.13	44	0.43
1.0 : 1.0	0.46	2.80	40	0.51
1.5 : 1.0	0.42	1.86	42	0.33

The annealing temperature is 60 ℃ (10 min) and the solvent is o-DCB/$CHCl_3$ (1 : 1, V : V) and the active layer is about 110 nm.

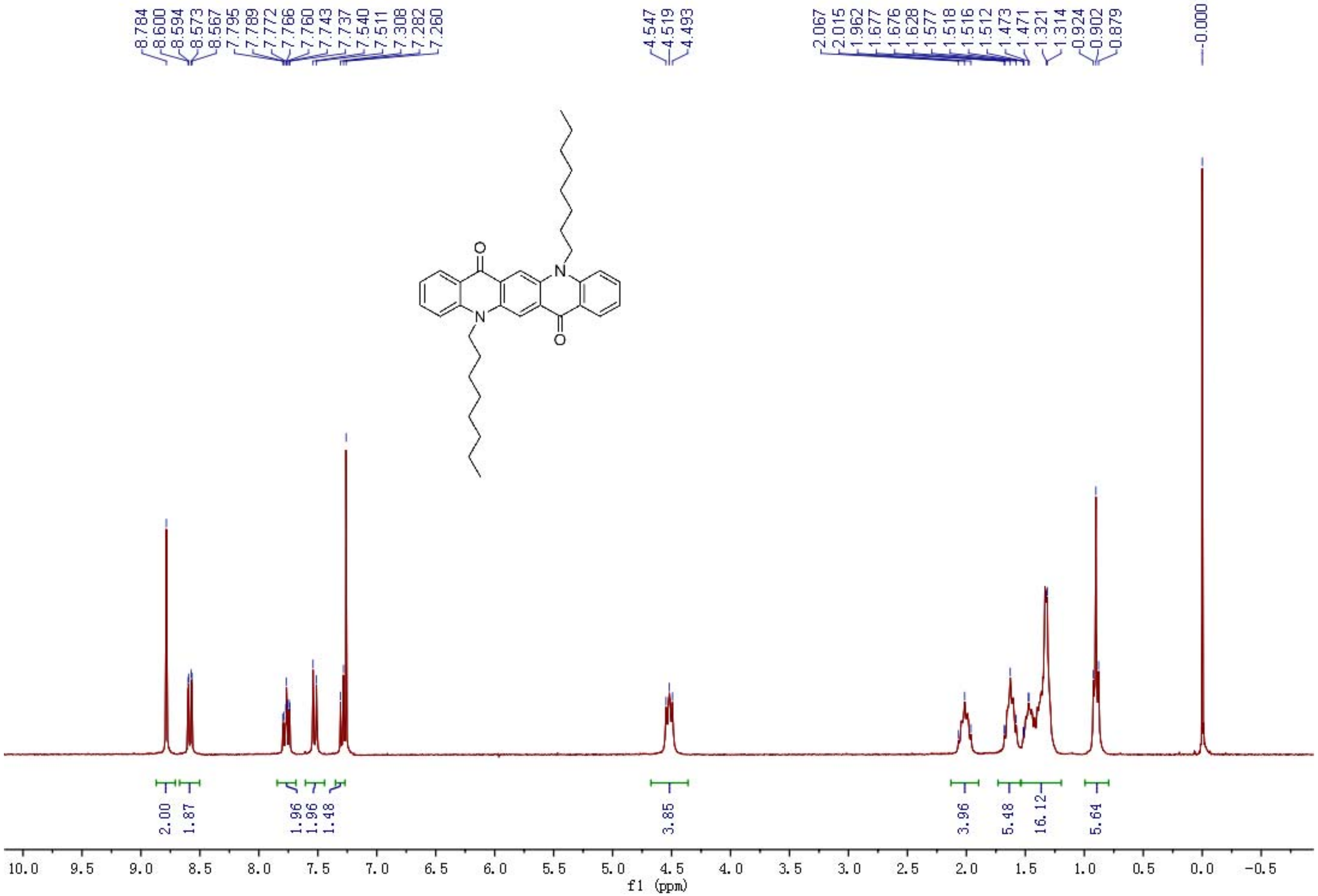

Figure S2. ^{1}H NMR spectra of **1** recorded in $CDCl_3$ (300 M Hz).

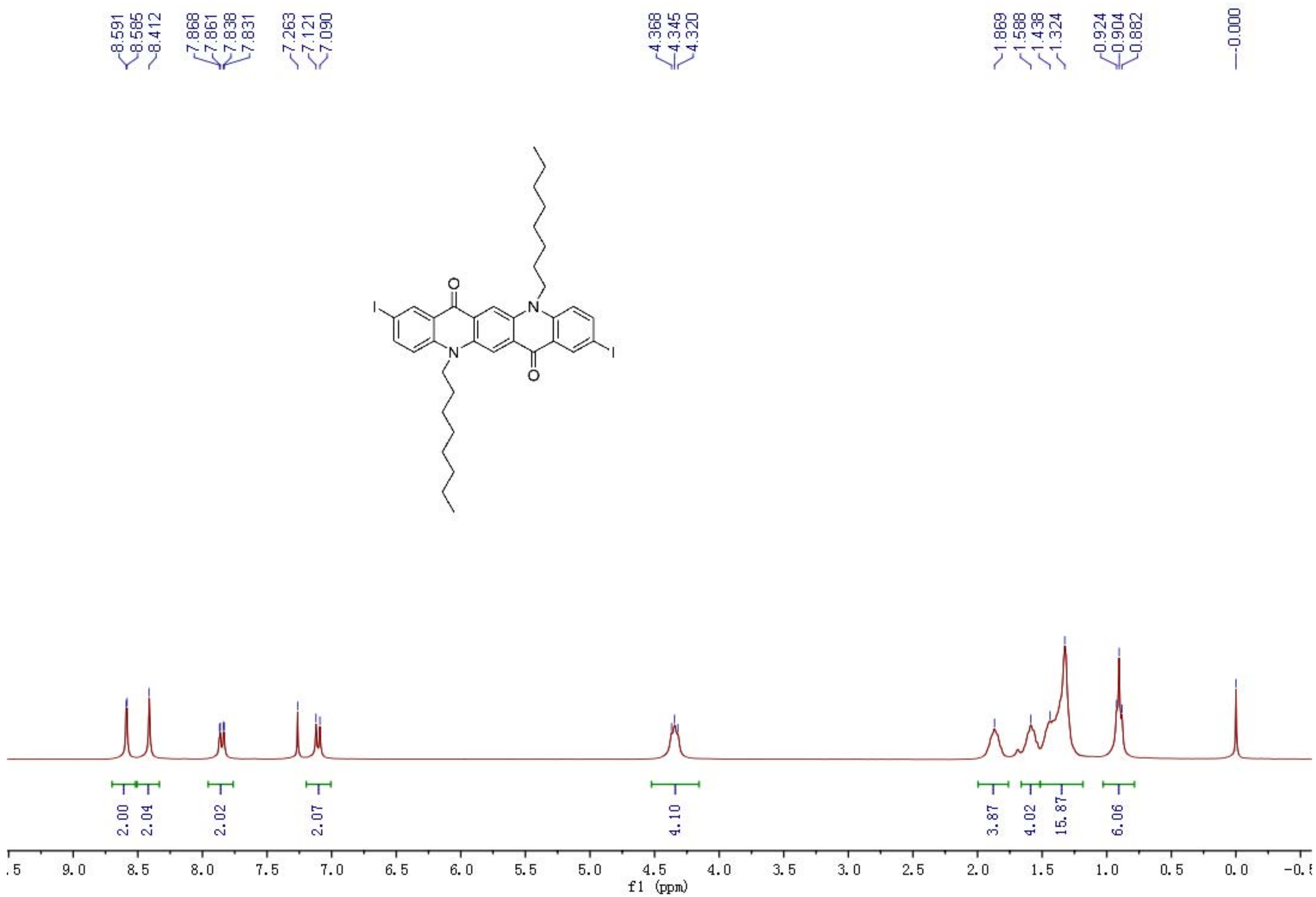

Figure S3. ^{1}H NMR spectra of **2** recorded in $CDCl_3$ (300 M Hz).

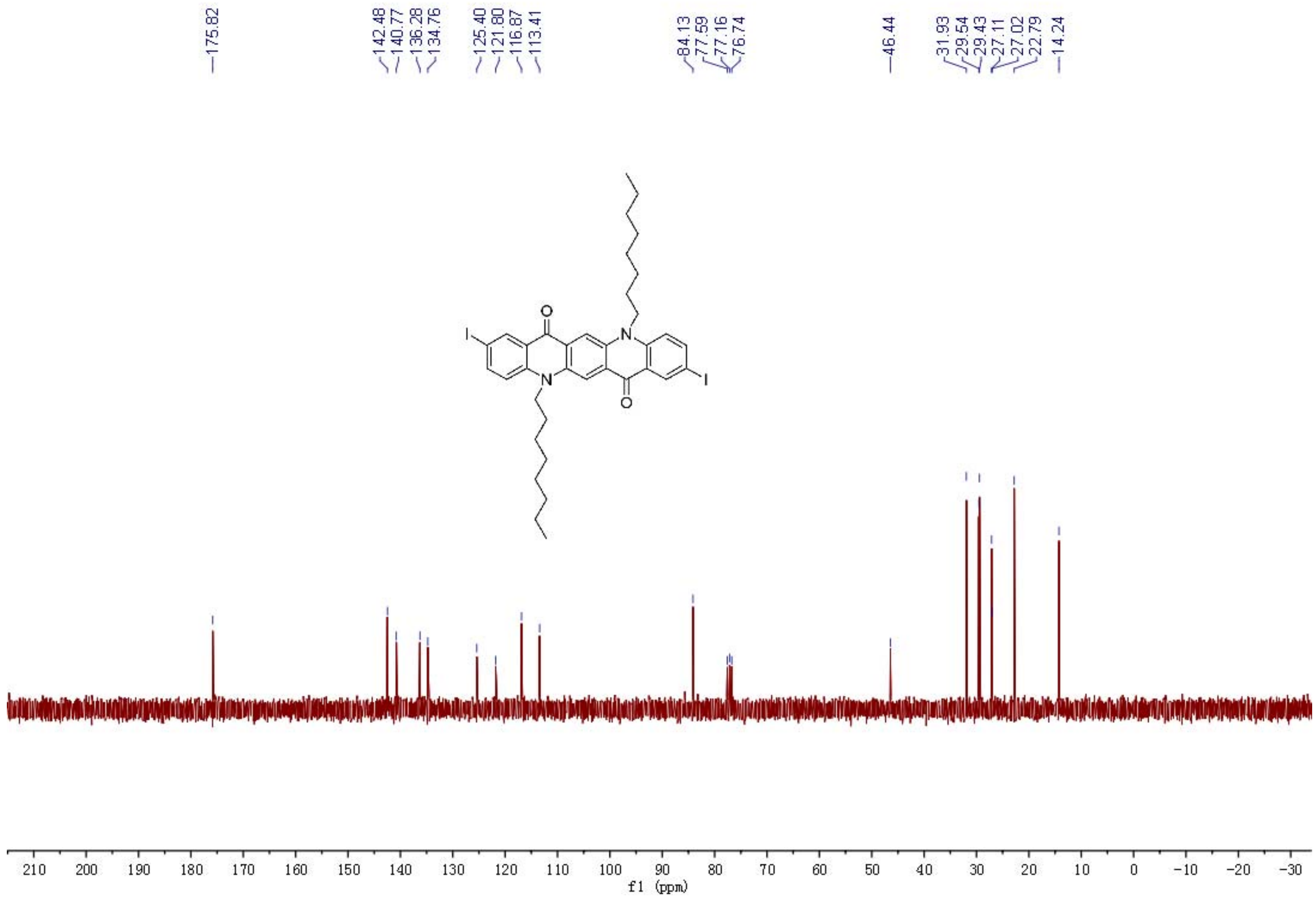

Figure S4. ^{13}C NMR spectra of **2** recorded in $CDCl_3$ (75 M Hz).

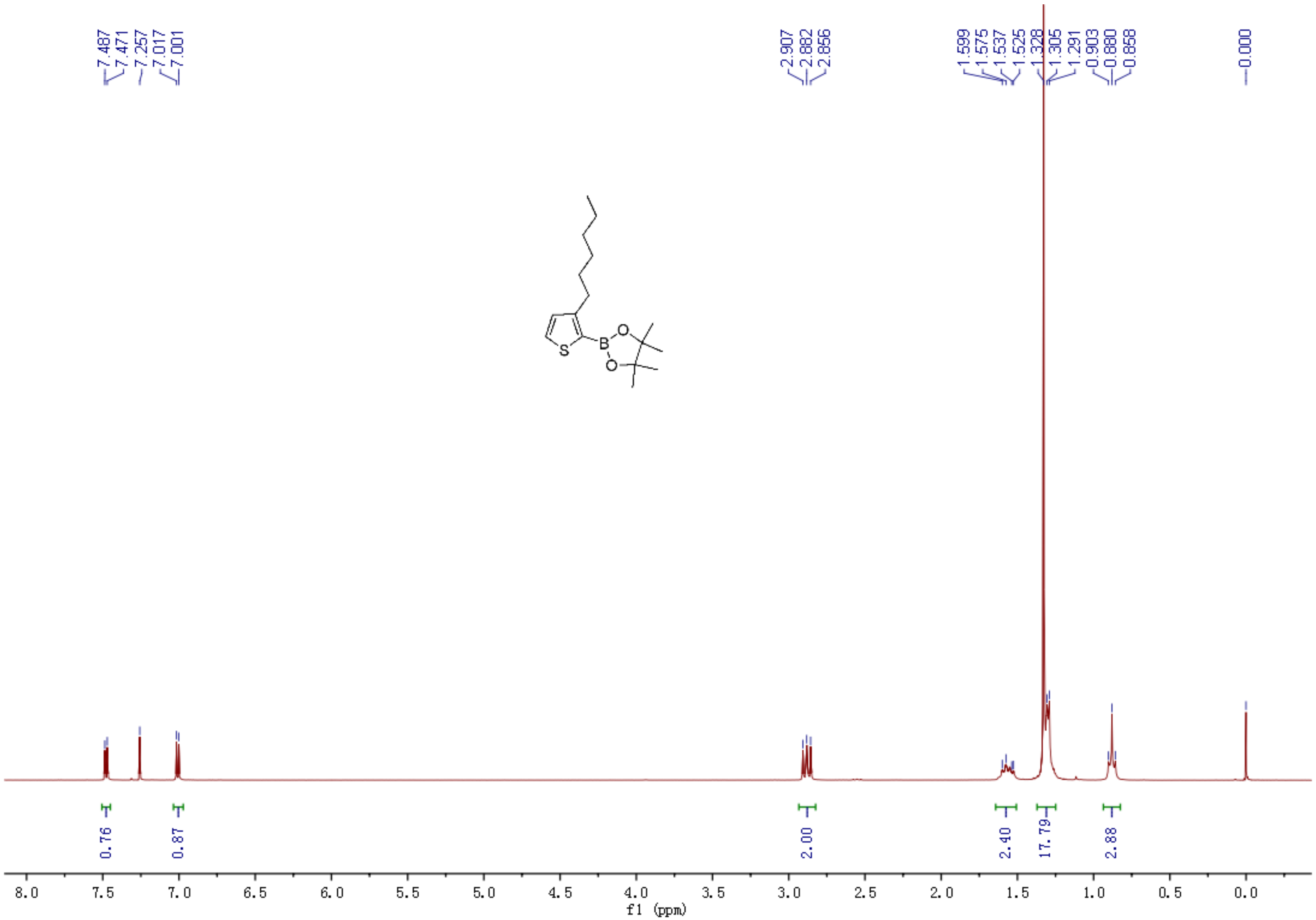

Figure S5. ^{1}H NMR spectra of **3** recorded in $CDCl_3$ (300 M Hz).

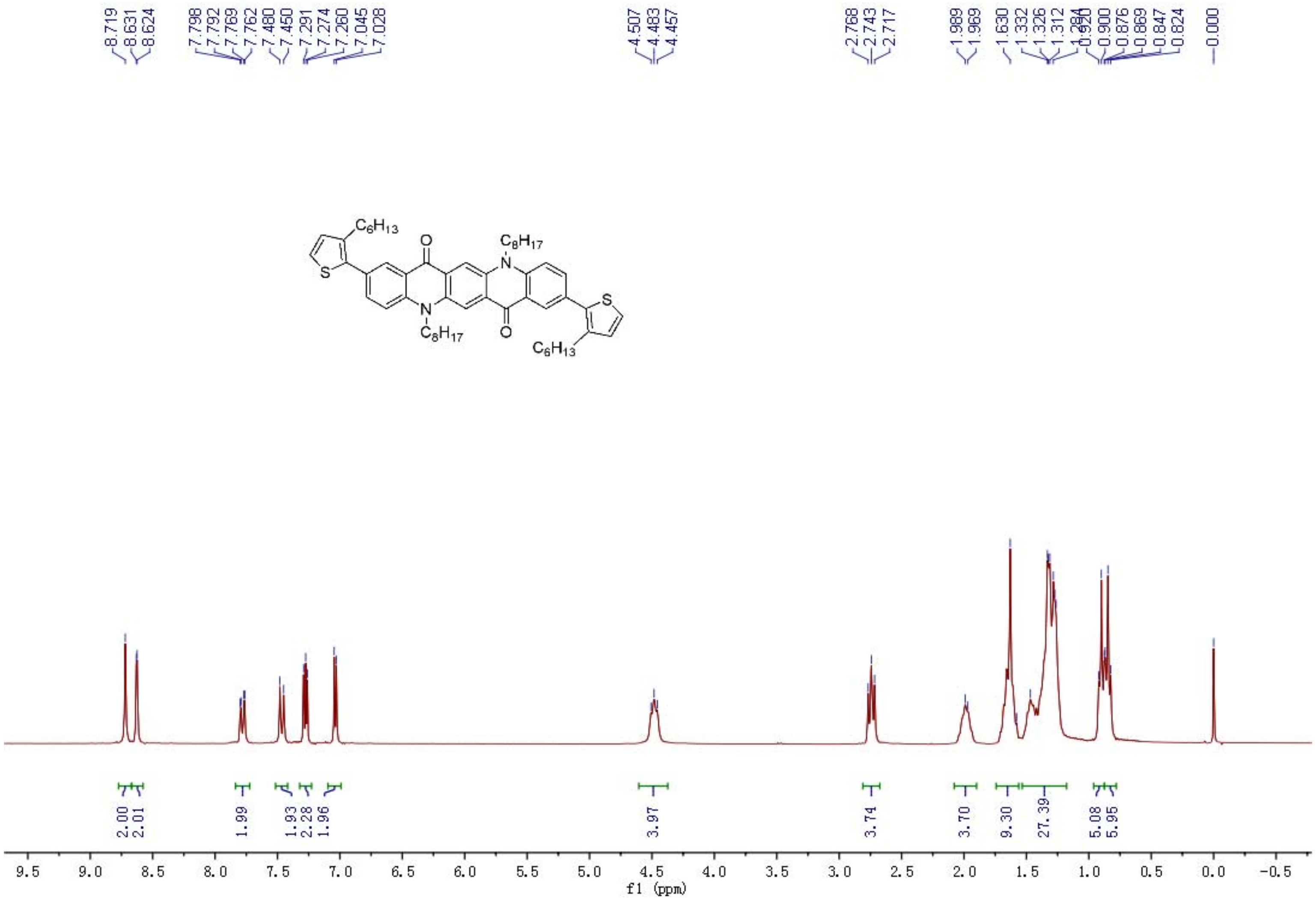

Figure S6. ^{1}H NMR spectra of **4** recorded in $CDCl_3$ (300 M Hz).

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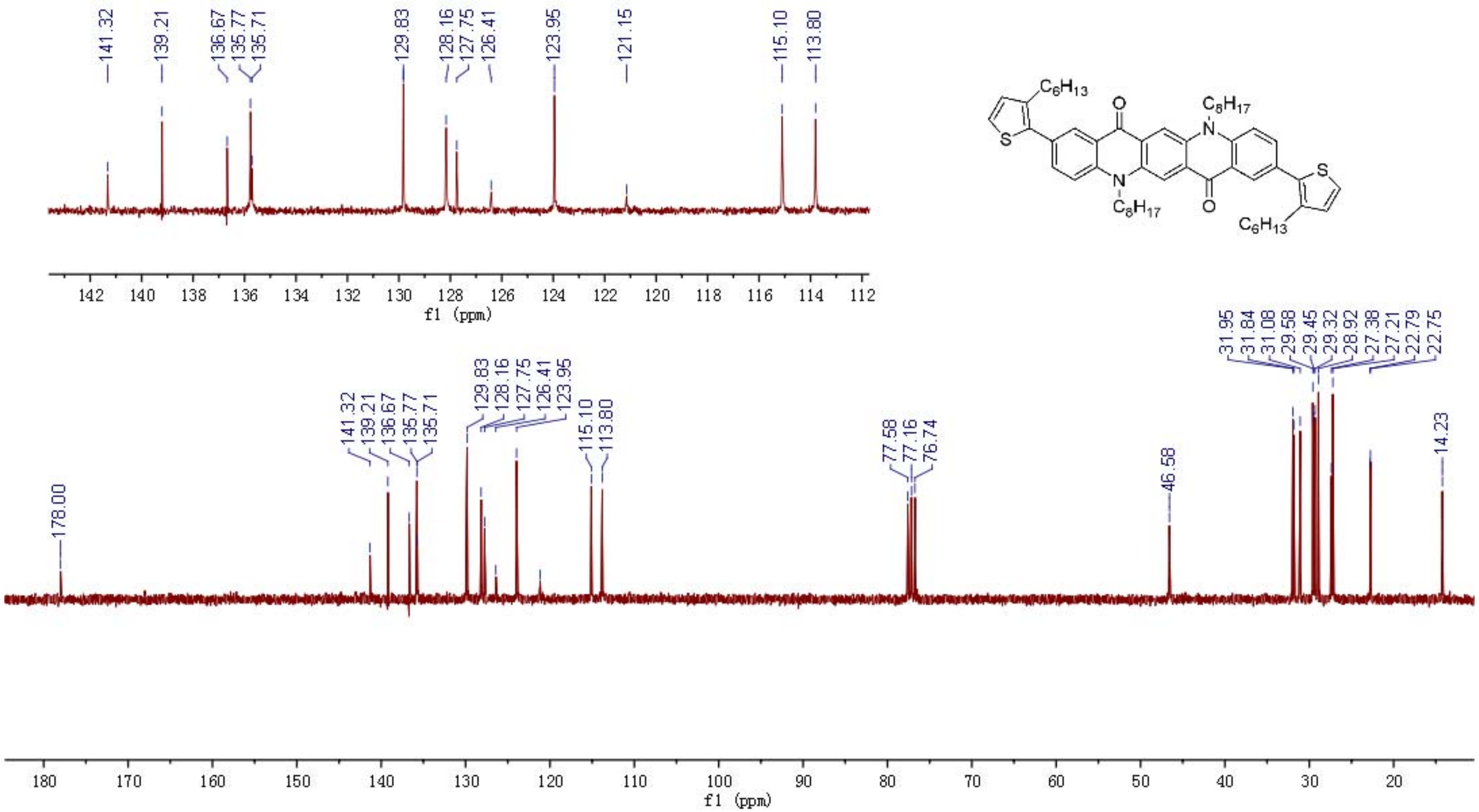

Figure S7. ^{13}C NMR spectra of **4** recorded in $CDCl_3$ (75 M Hz).

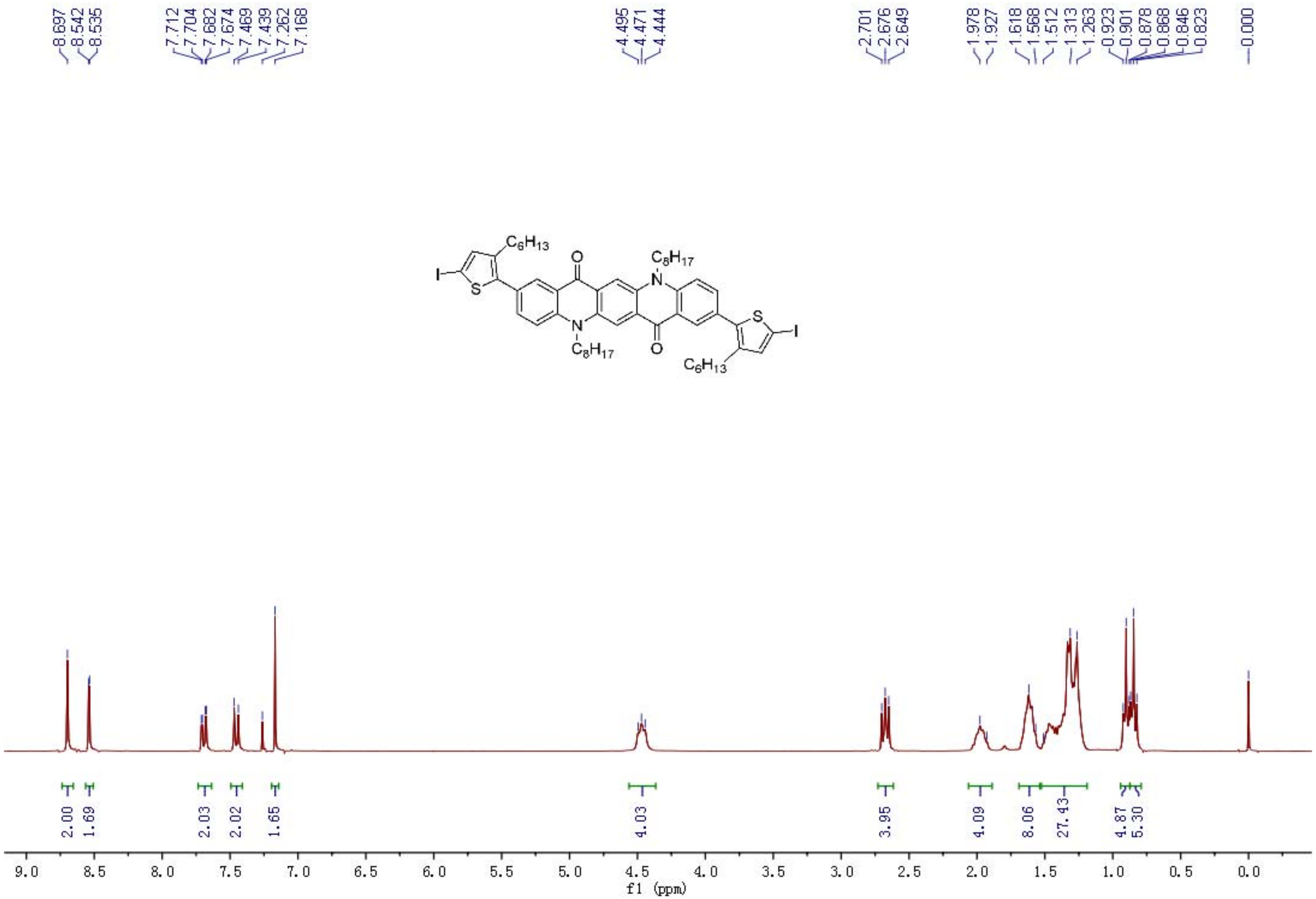

Figure S8. ^{1}H NMR spectra of **5** recorded in $CDCl_3$ (300 M Hz).

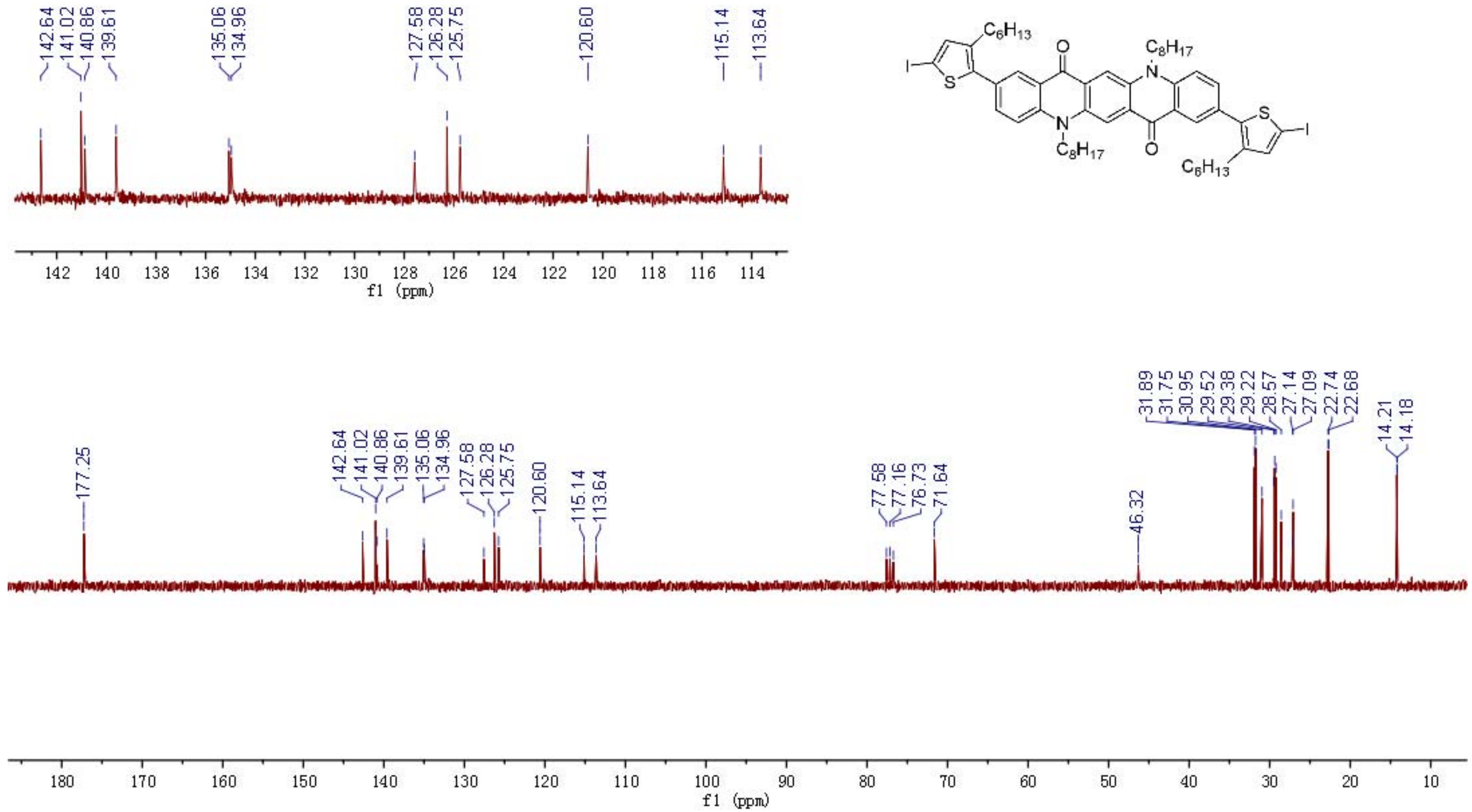

Figure S9. ^{13}C NMR spectra of **5** recorded in $CDCl_3$ (75 M Hz).

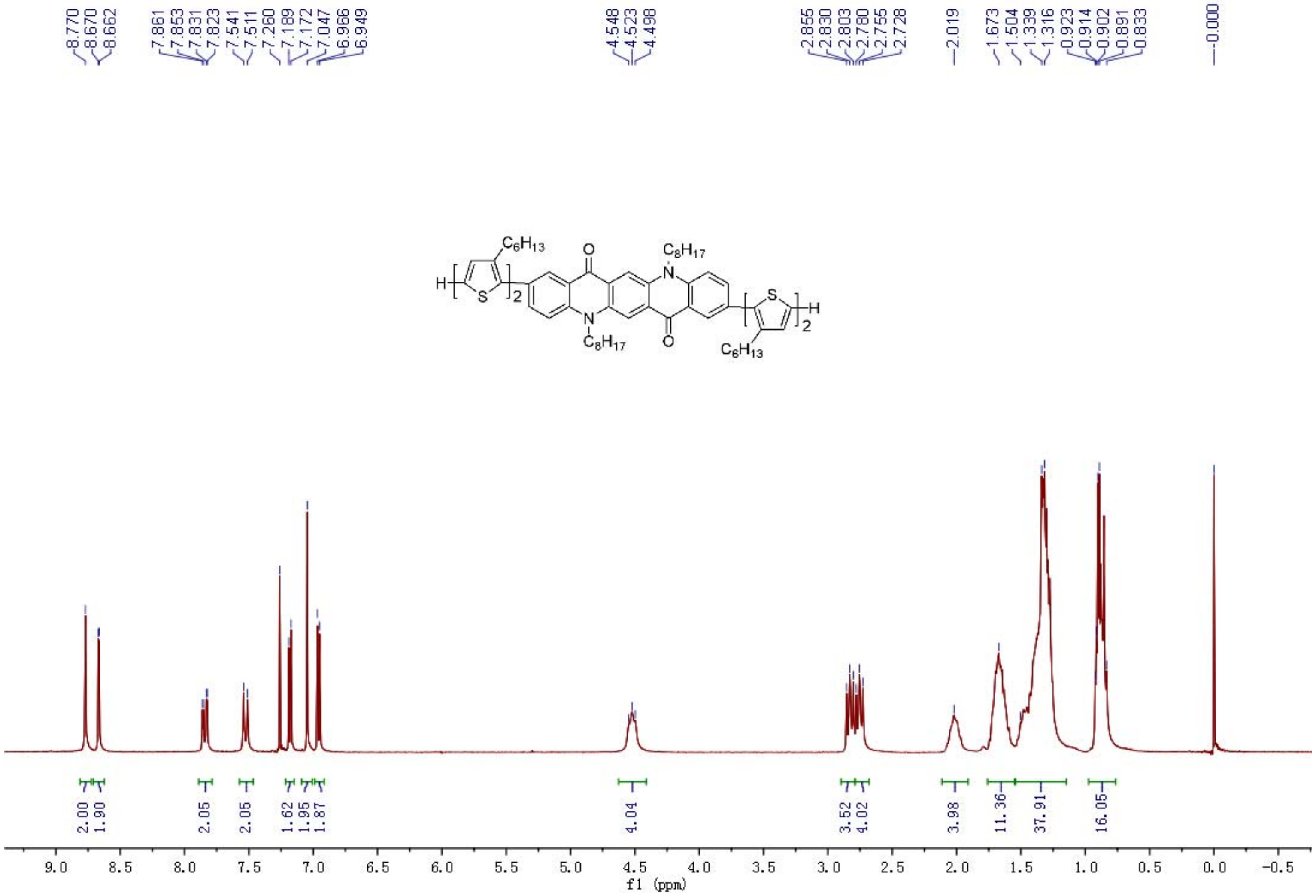

Figure S10. ^{1}H NMR spectra of **6** recorded in $CDCl_3$ (300 M Hz).

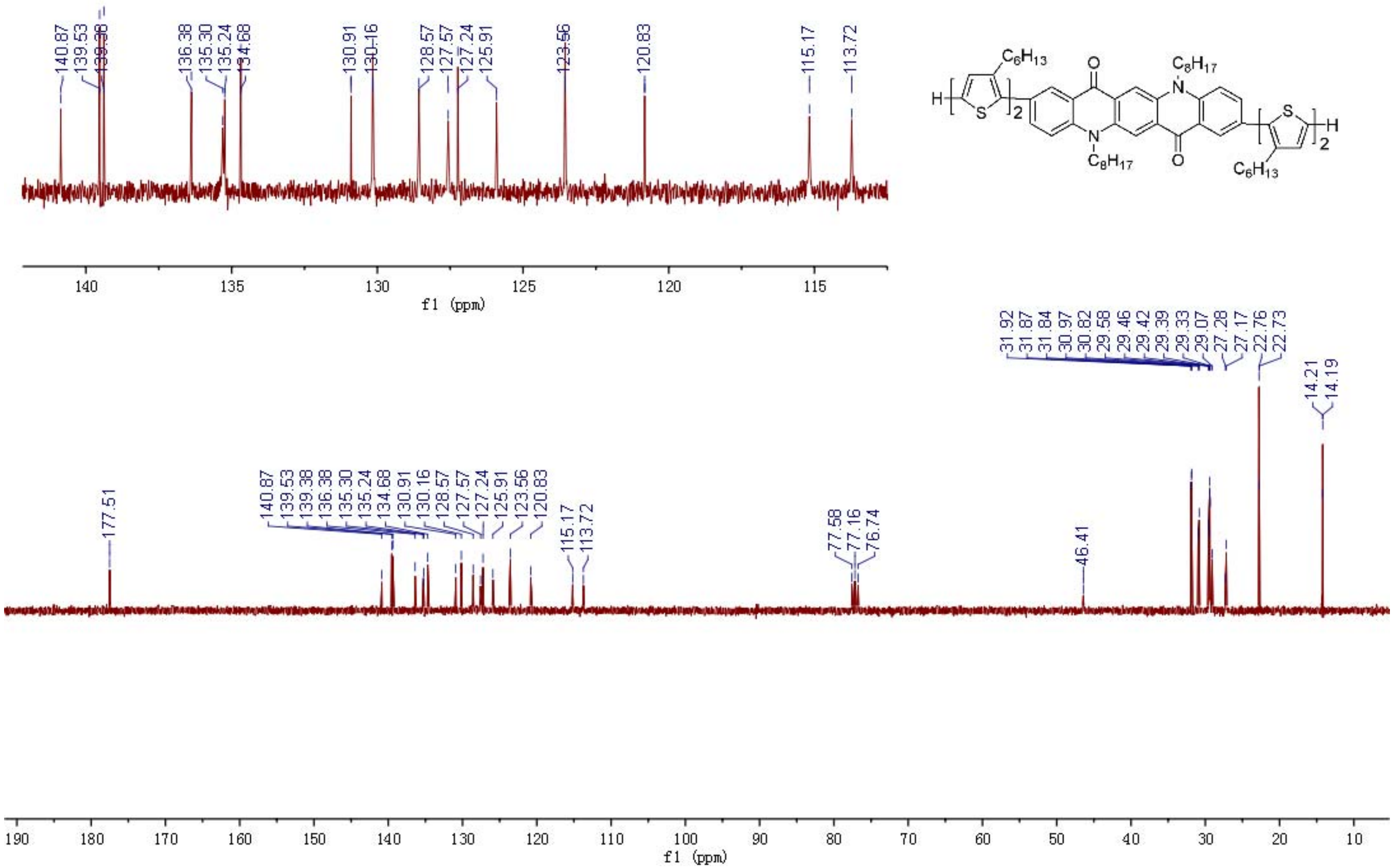

Figure S11. ^{13}C NMR spectra of **6** recorded in $CDCl_3$ (75 M Hz).

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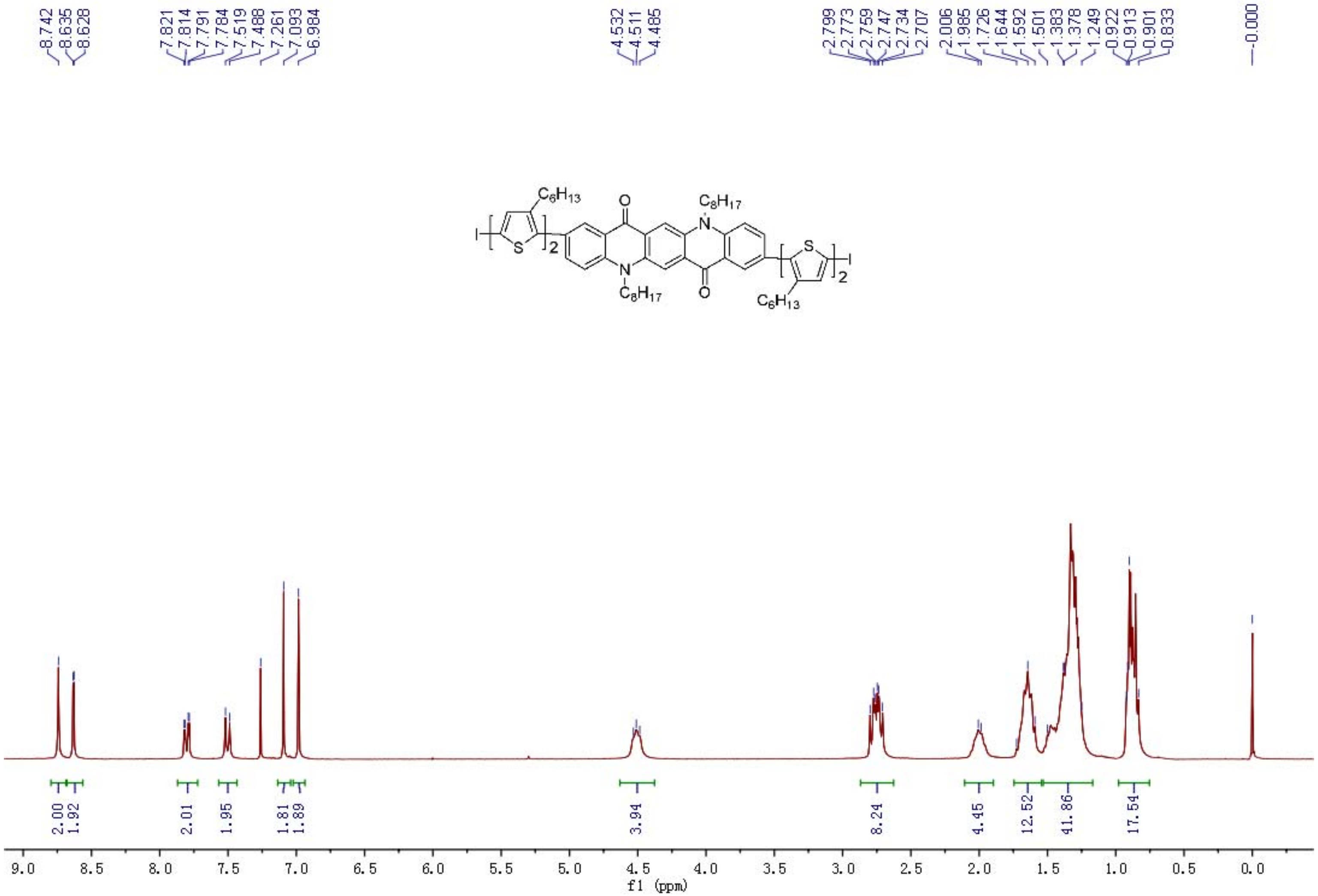

Figure S12. ^{1}H NMR spectra of **7** recorded in $CDCl_3$ (300 M Hz).

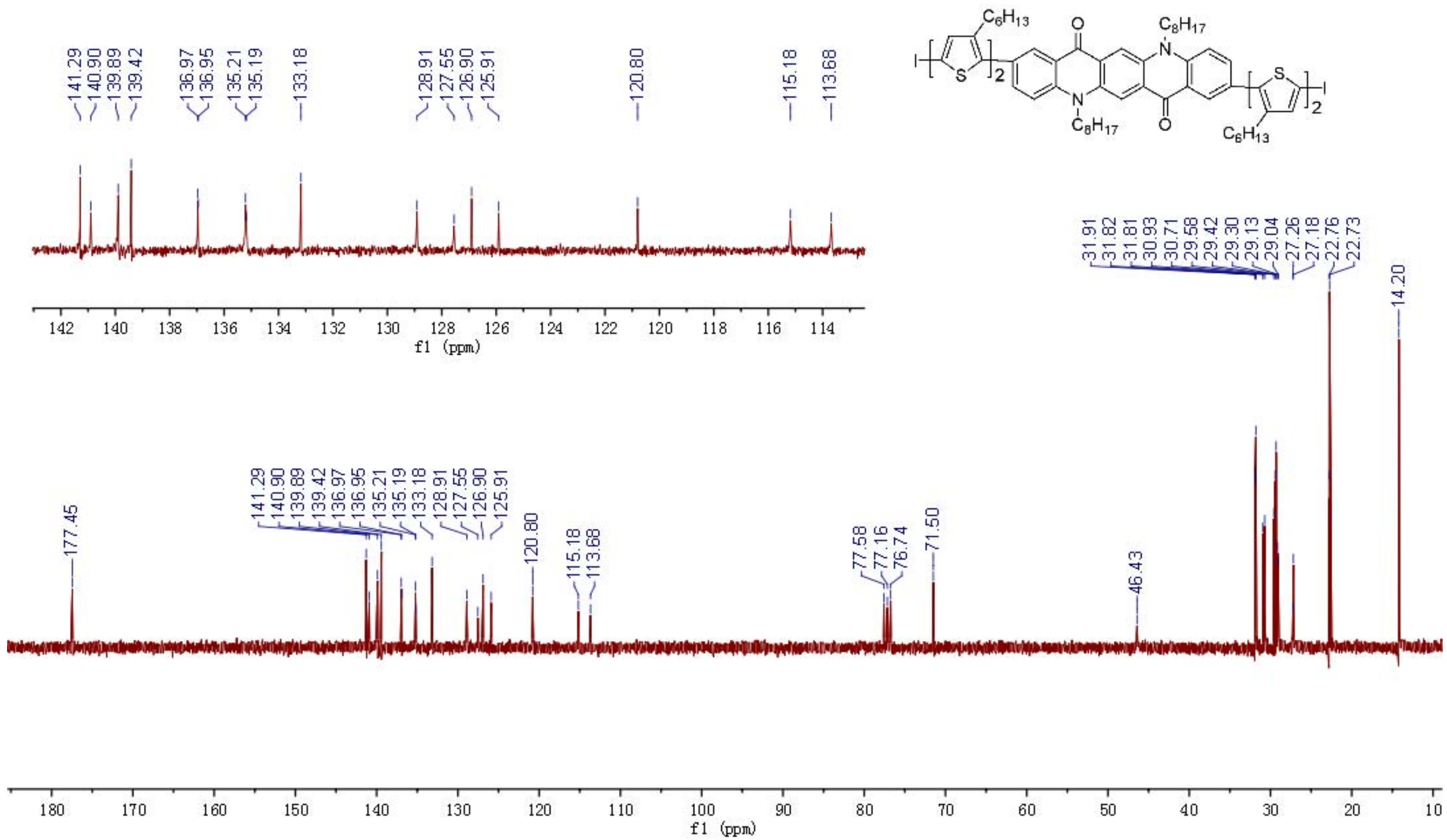

Figure S13. ^{13}C NMR spectra of **7** recorded in $CDCl_3$ (75 M Hz).

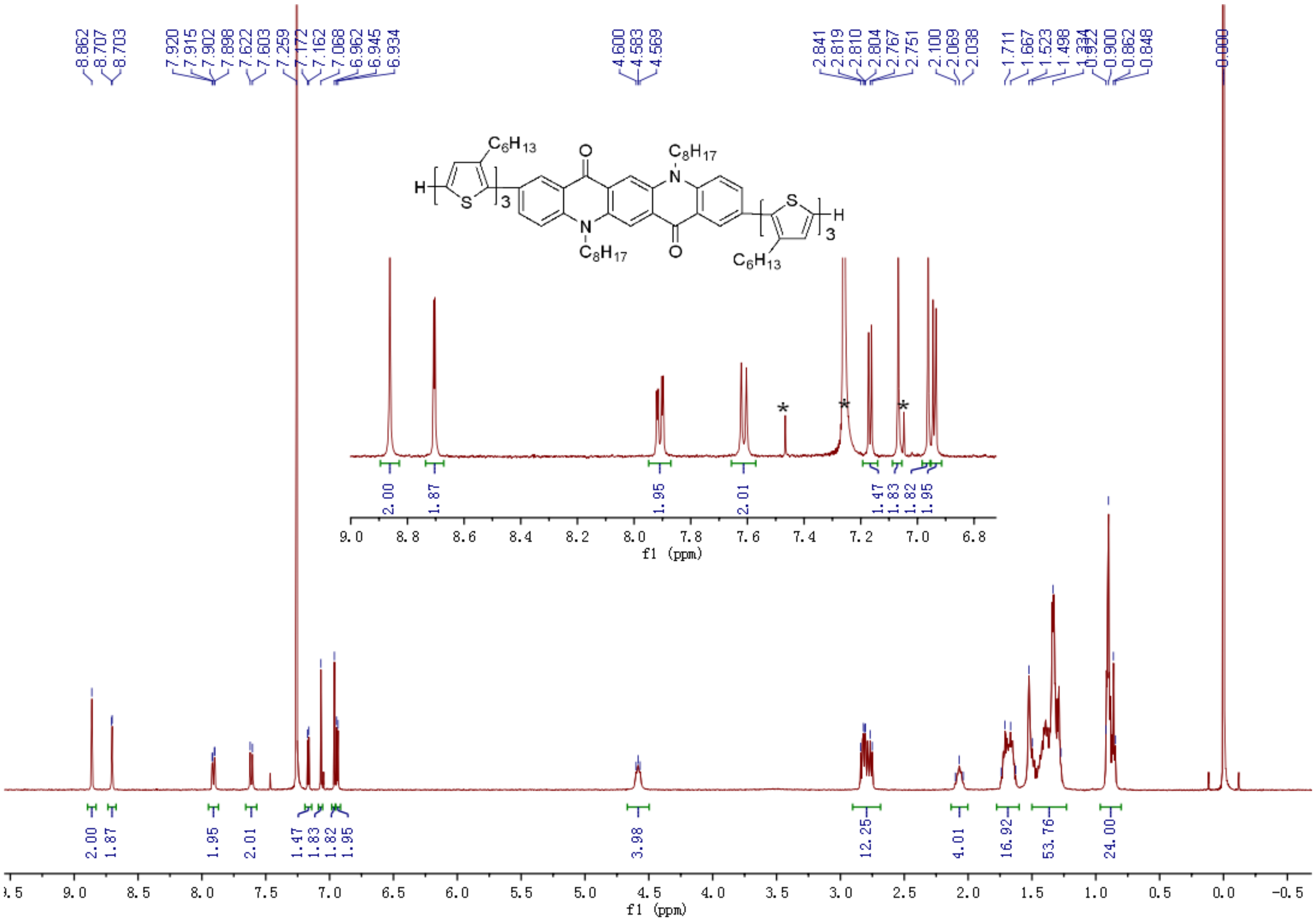

Figure S14. ^{1}H NMR spectra of **8** recorded in $CDCl_3$ (500 M Hz).

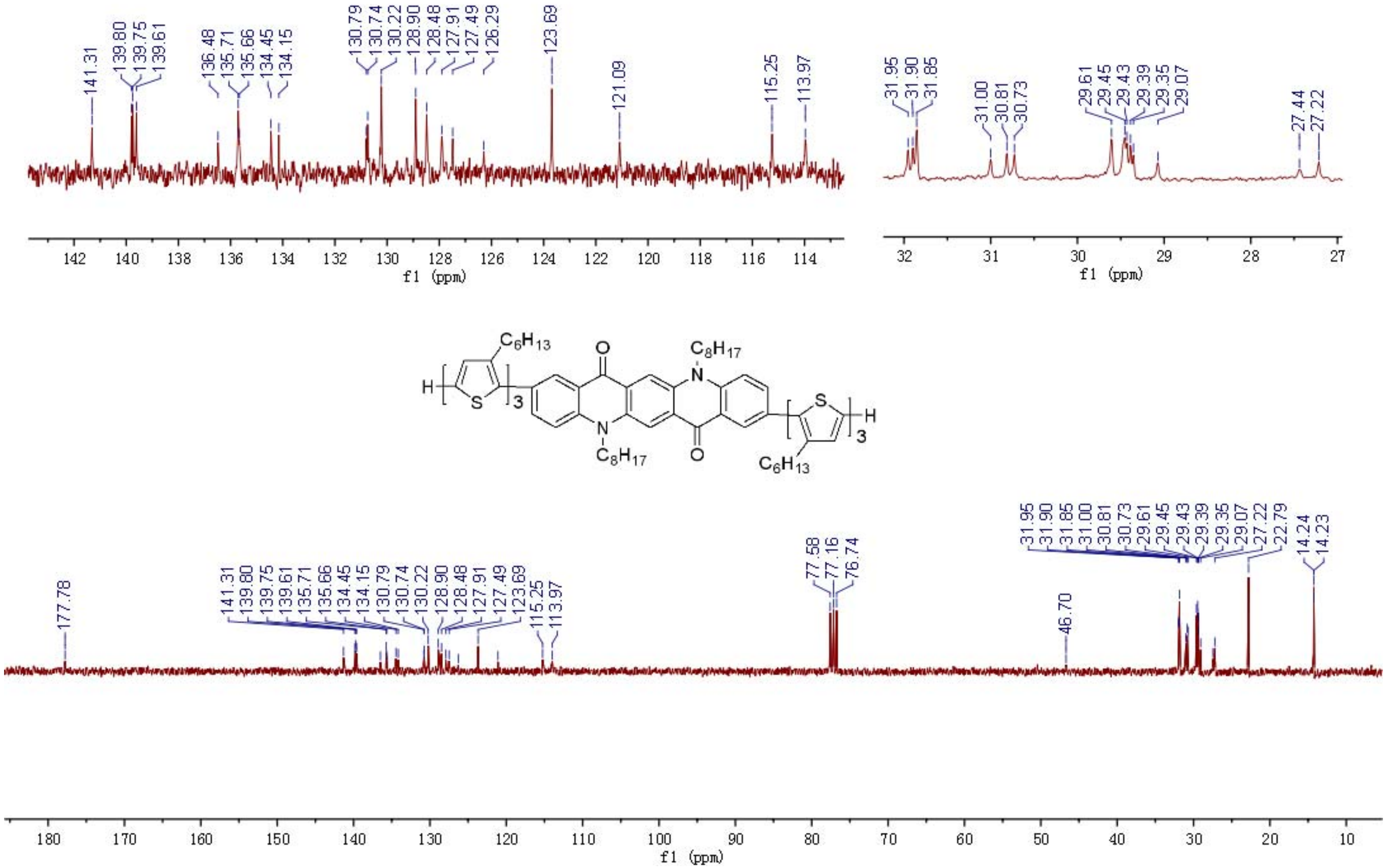

Figure S15. ^{13}C NMR spectra of **8** recorded in $CDCl_3$ (75 M Hz).

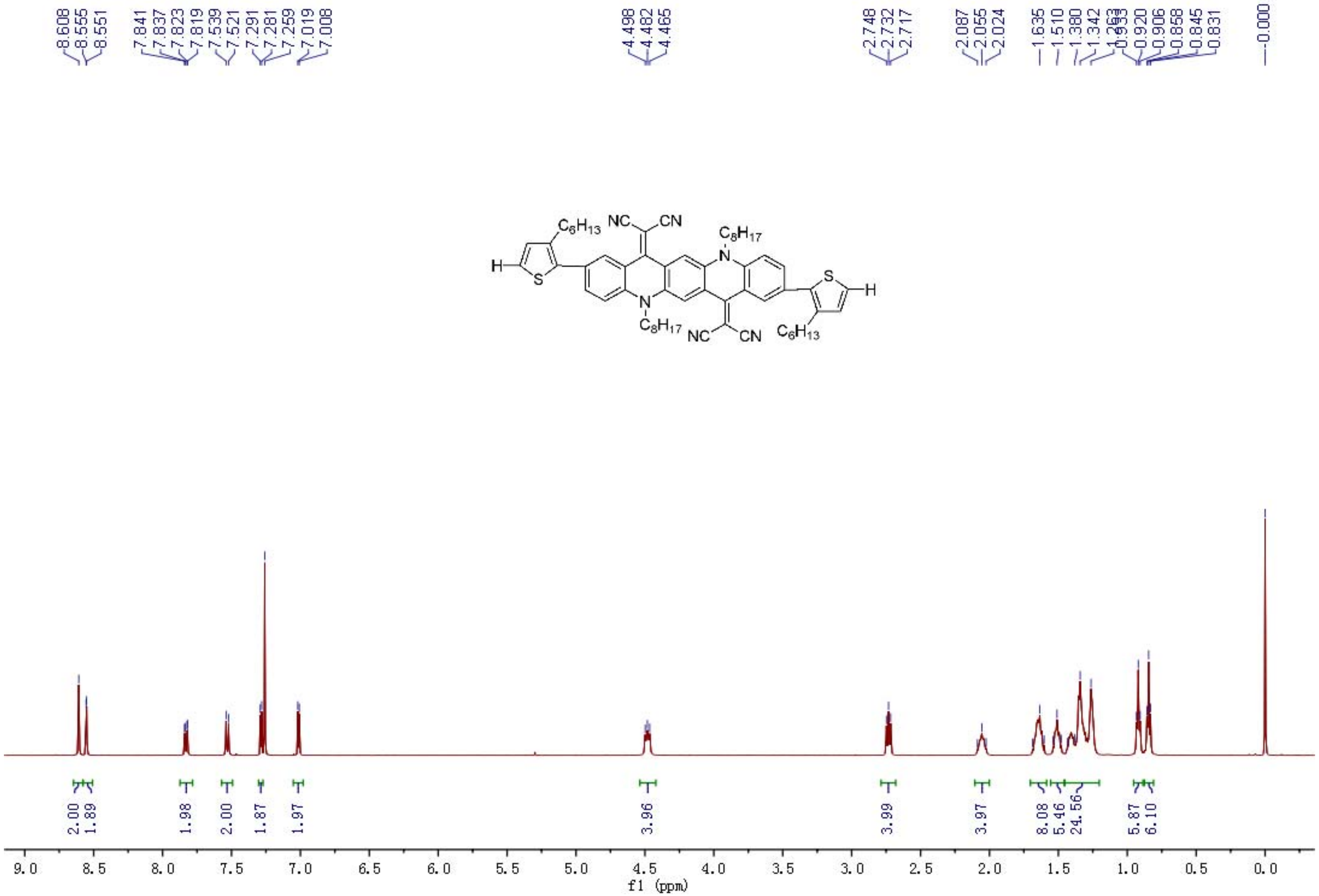

Figure S16. ^{1}H NMR spectra of **DCN-T1-QA** recorded in $CDCl_3$ (500 M Hz).

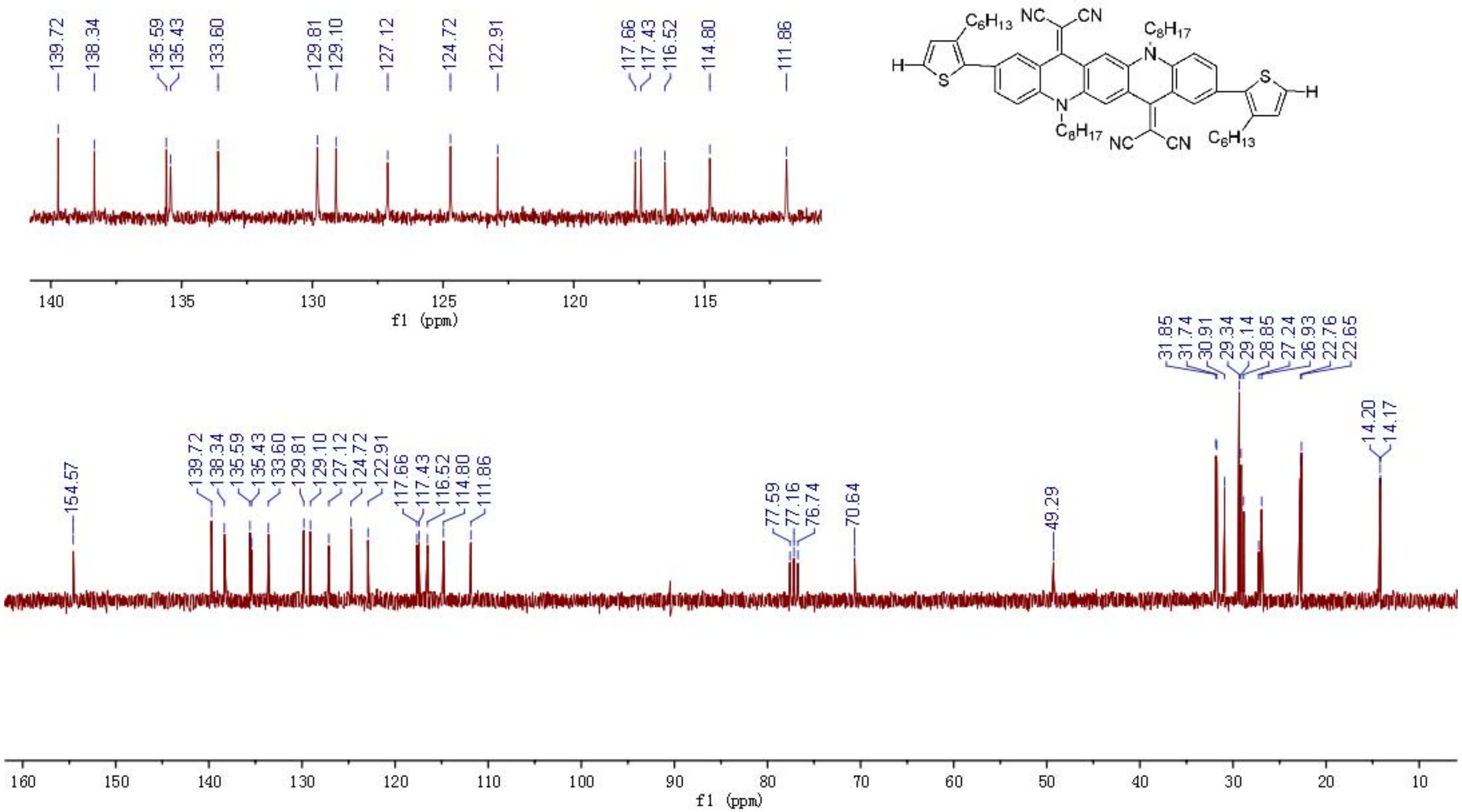

Figure S17. ^{13}C NMR spectra of **DCN-T1-QA** recorded in $CDCl_3$ (75 M Hz).

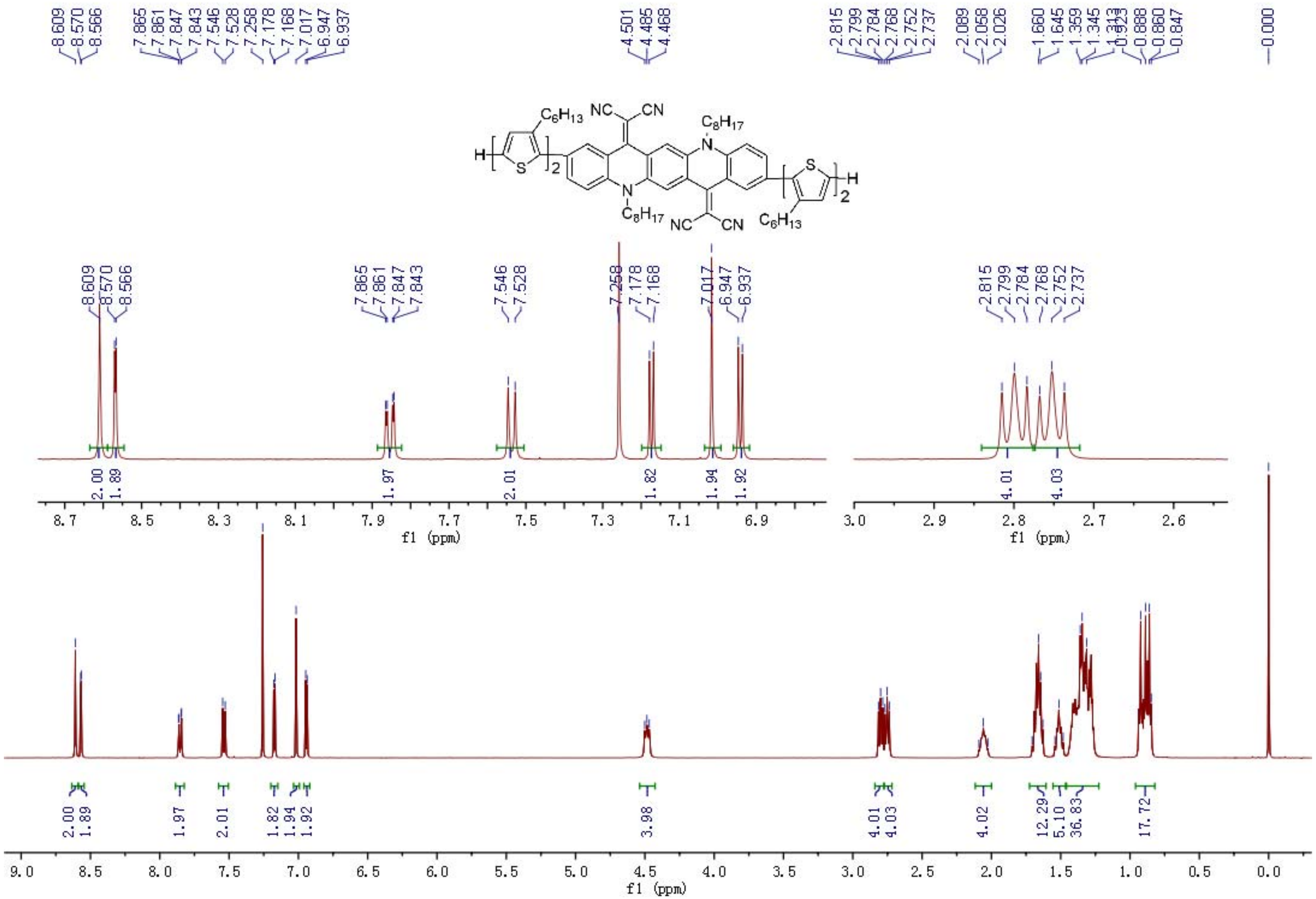

Figure S18. ^{1}H NMR spectra of **DCN-T2-QA** recorded in $CDCl_3$ (500 M Hz).

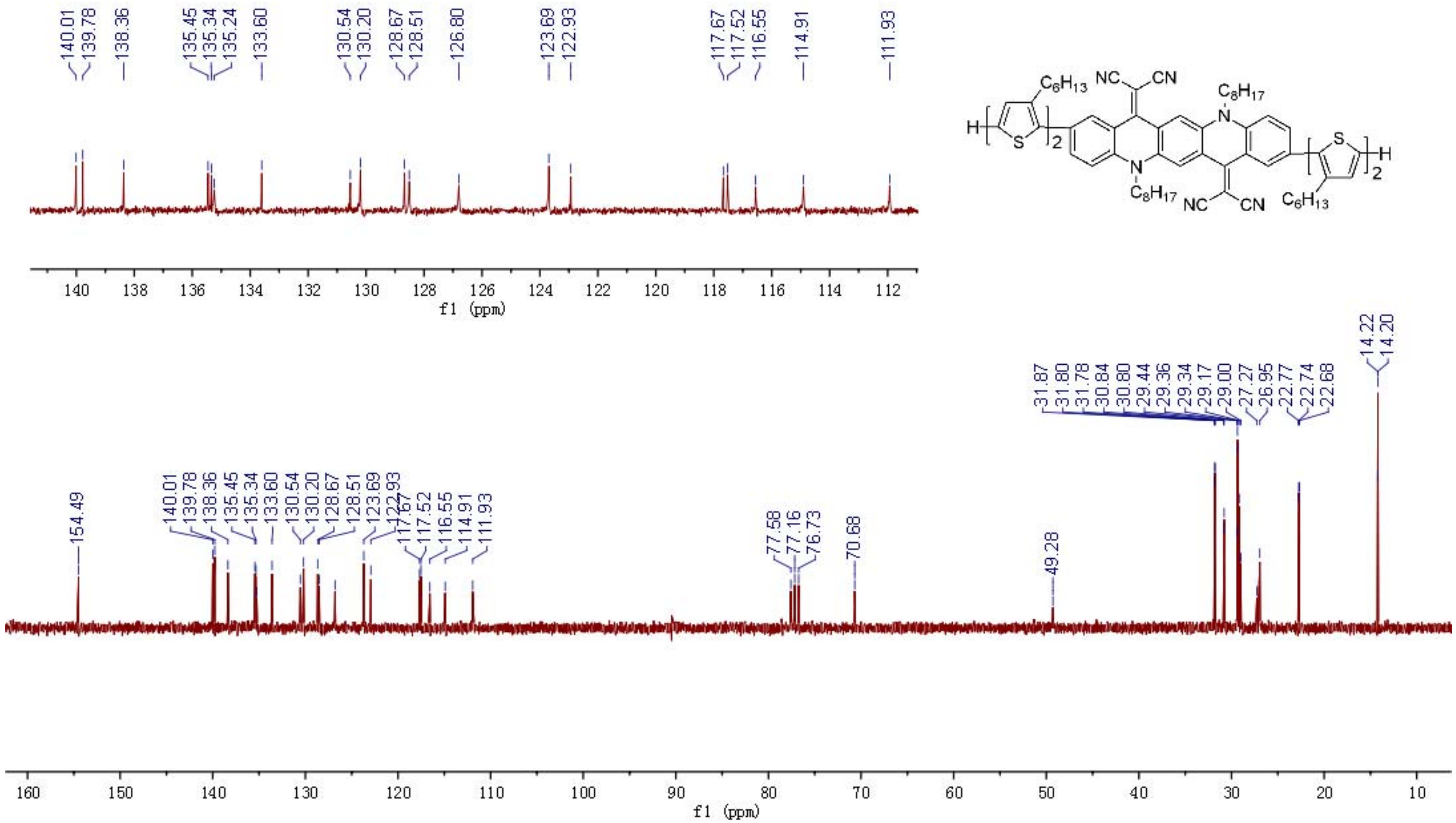

Figure S19. ^{13}C NMR spectra of **DCN-T2-QA** recorded in $CDCl_3$ (75 M Hz).

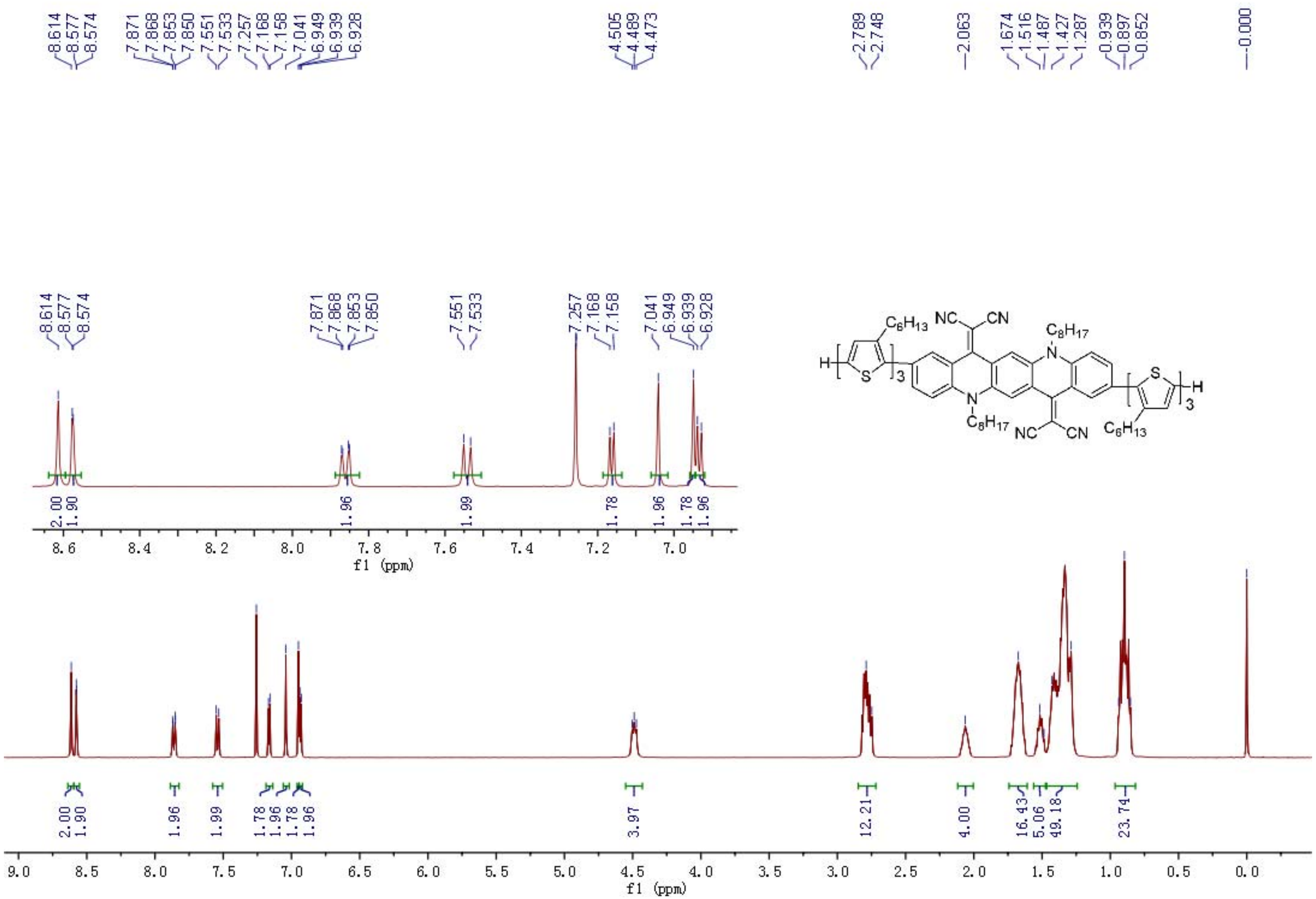

Figure S20. ^{1}H NMR spectra of **DCN-T3-QA** recorded in $CDCl_3$ (500 M Hz).

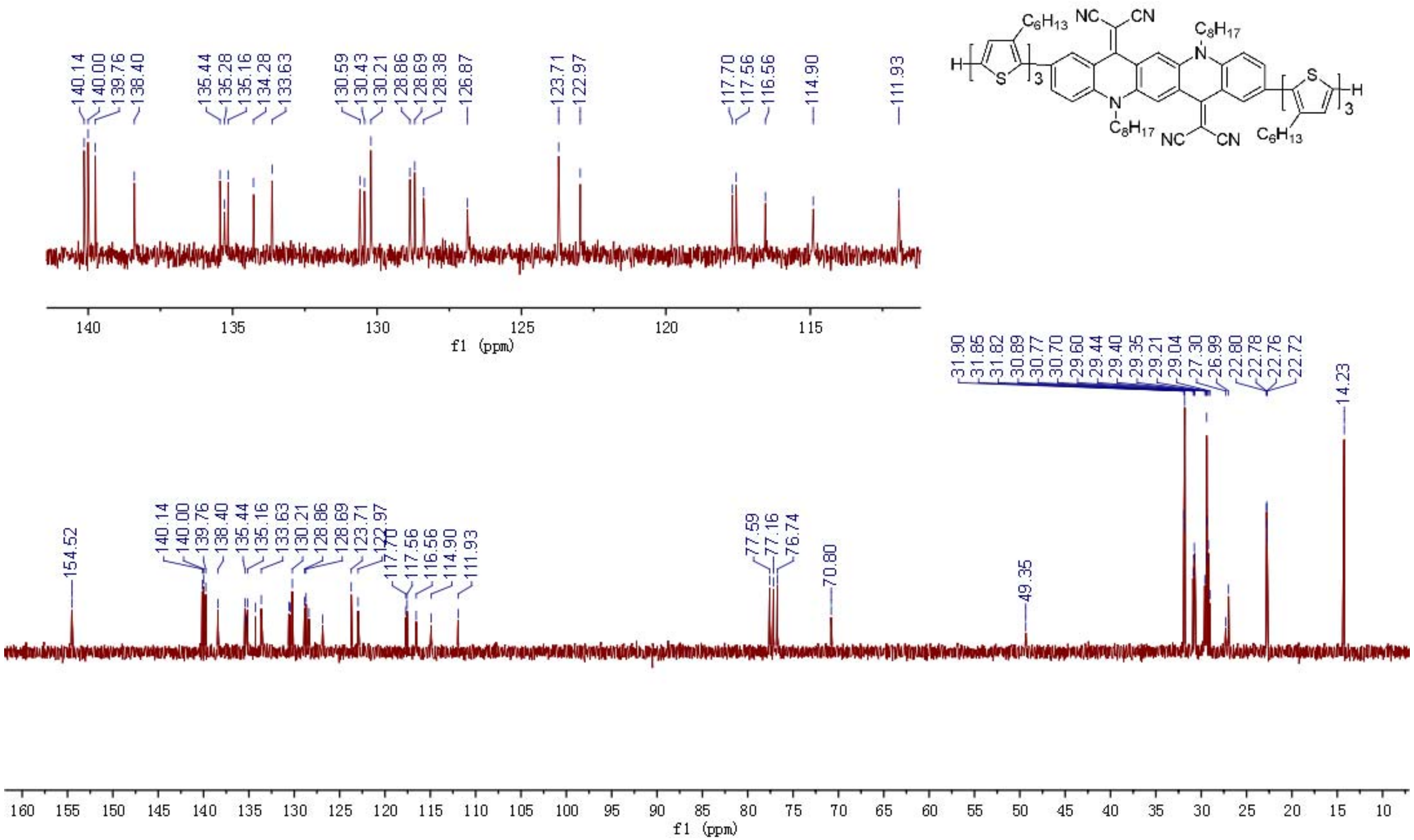

Figure S21. ^{13}C NMR spectra of **DCN-T3-QA** recorded in $CDCl_3$ (75 M Hz).