Electronic supplementary information (ESI)

FTC-containing Molecules: Large Second-Order Nonlinear Optical Performance, Excellent Thermal Stability, and the Key Development of the "Isolation Chromophore" Concept

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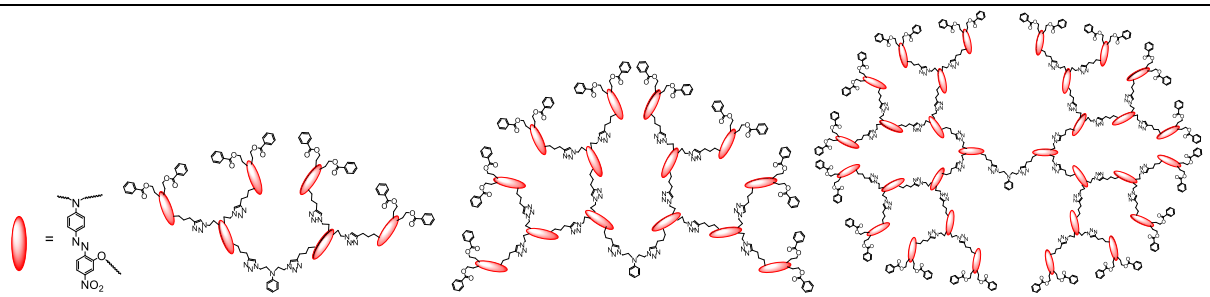
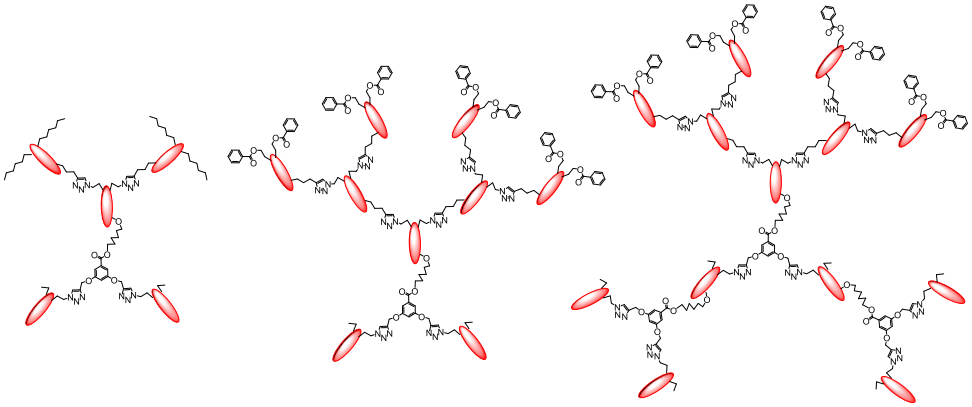
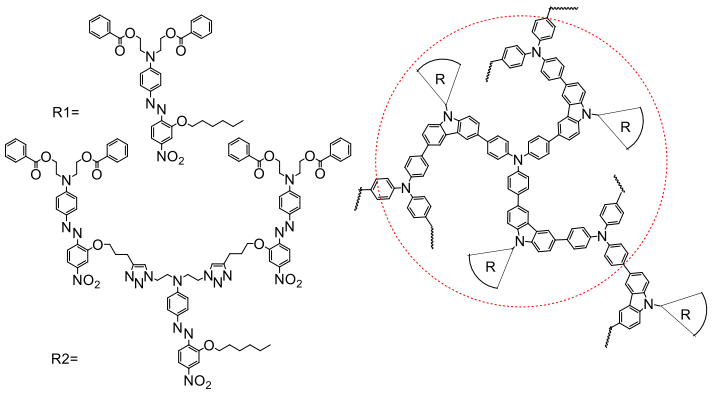
1. Additional data and analysis

Chart S1. Some typical molecules we have synthesized in our preview works.[1-6]

Dendrimers

G2: 108 pm V^{-1} G3: 123 pm V^{-1} G4: 177 pm V^{-1}
"X"-typed dendrimer

X-1: 157 pm V^{-1} X-2: 159 pm V^{-1} X-3: 299 pm V^{-1}
Dendronized hyperbranched polymers

DHP1: 91 pm V^{-1} DHP2: 133 pm V^{-1}

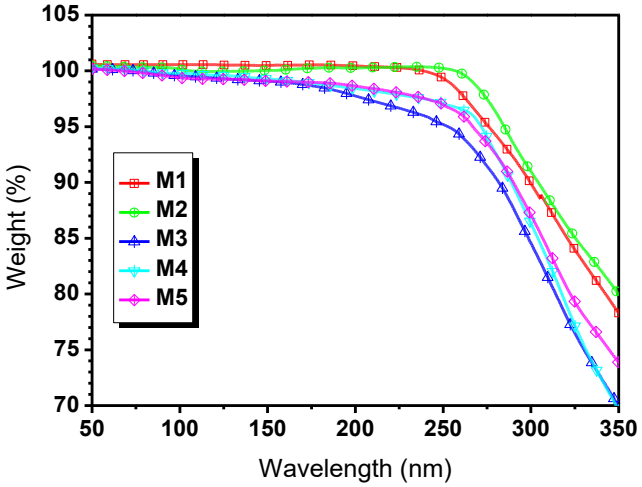


Fig. S1 TGA spectra of six compounds.

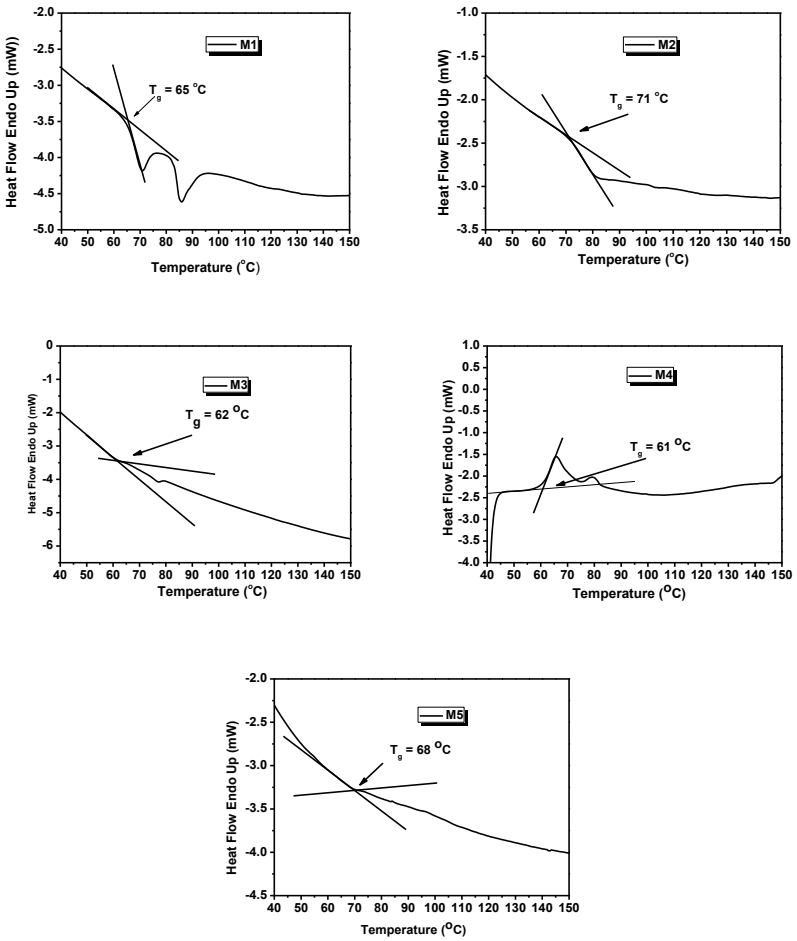


Fig. S2 DSC curves of five molecules.

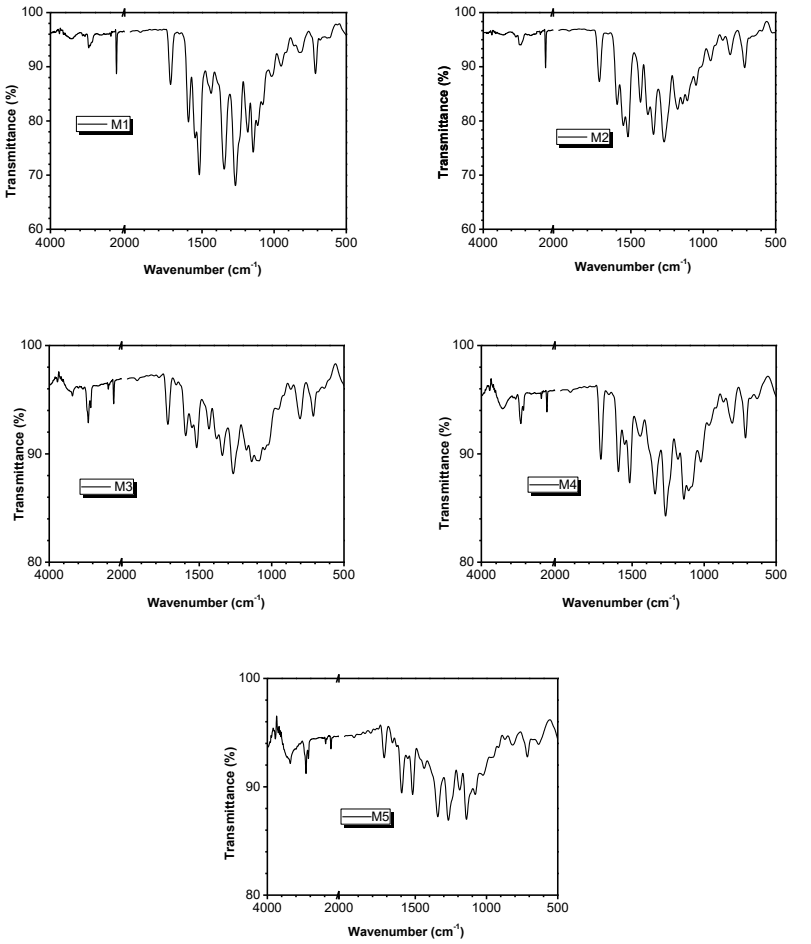


Fig. S3 FT-IR spectra of five molecules.

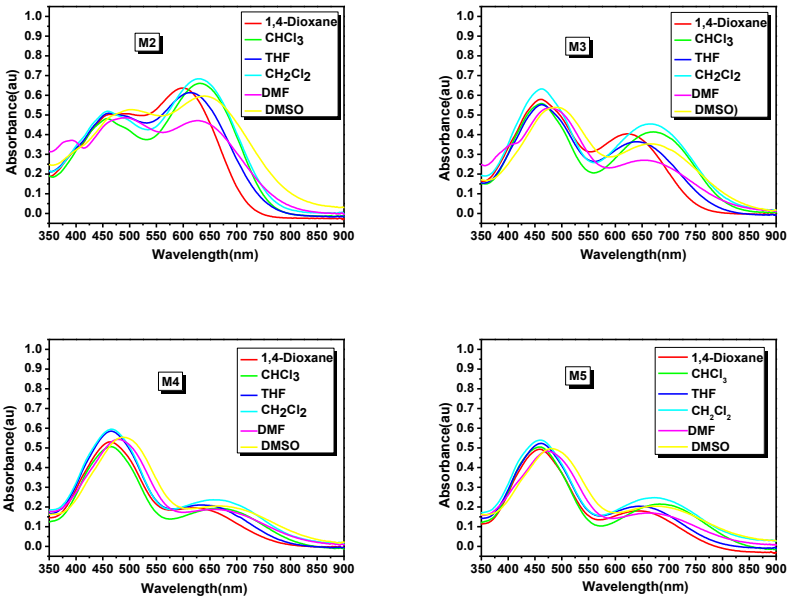


Fig. S4 UV-Vis spectra of **M2-M5.**

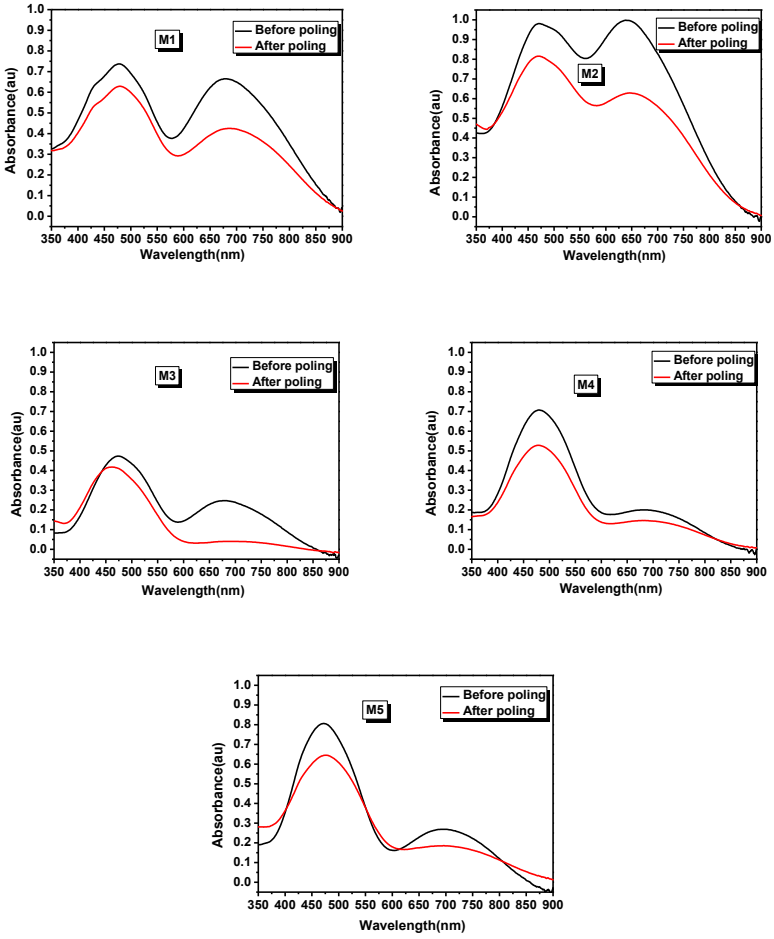


Fig. S5 UV-Vis spectrum of films of **M1**-**M5**.

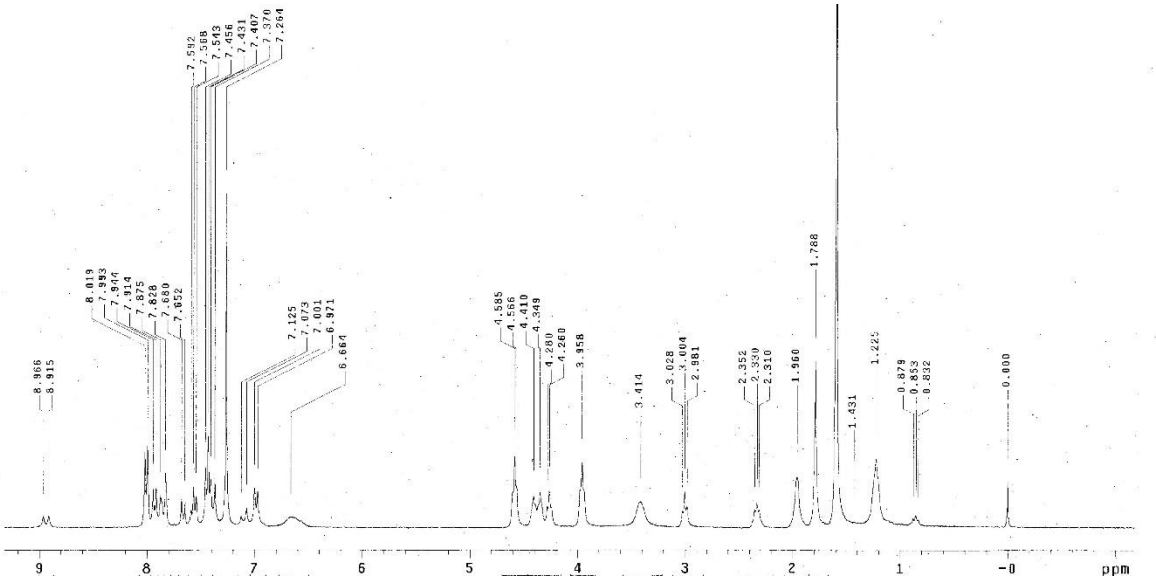


Fig. S6 (A) ^{1}H NMR of **M1**

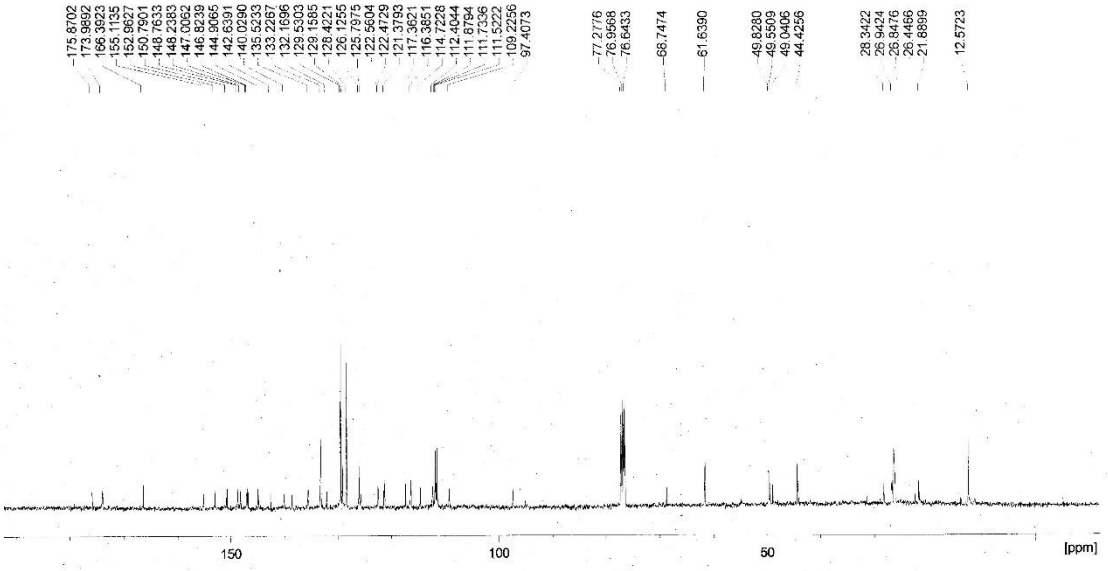


Fig. S6 (B) ^{13}C NMR of **M1**

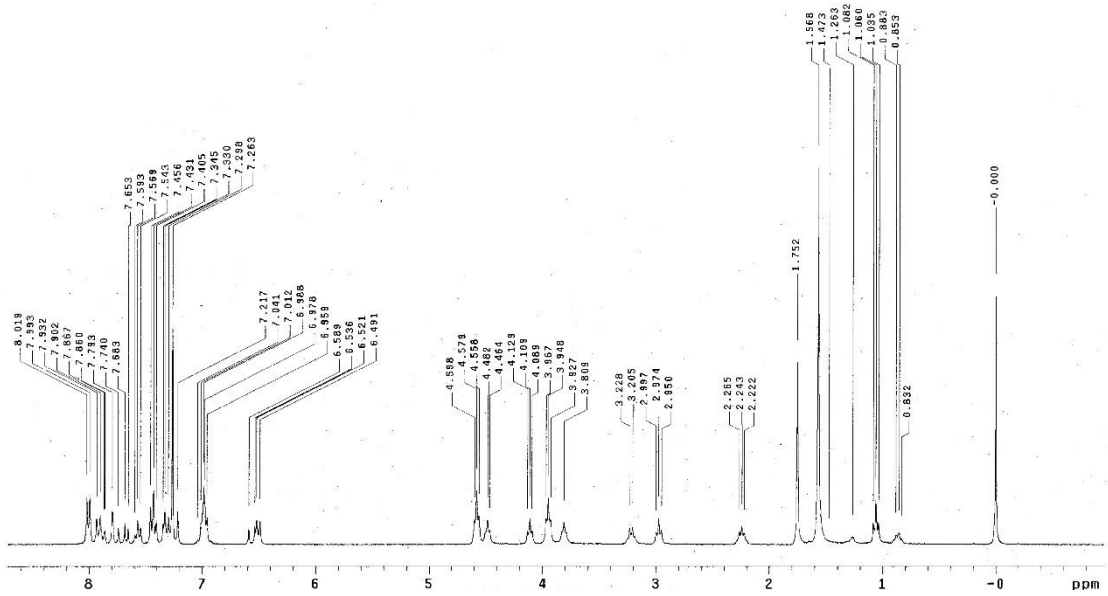


Fig. S6 (C) ^{1}H NMR of **M2**

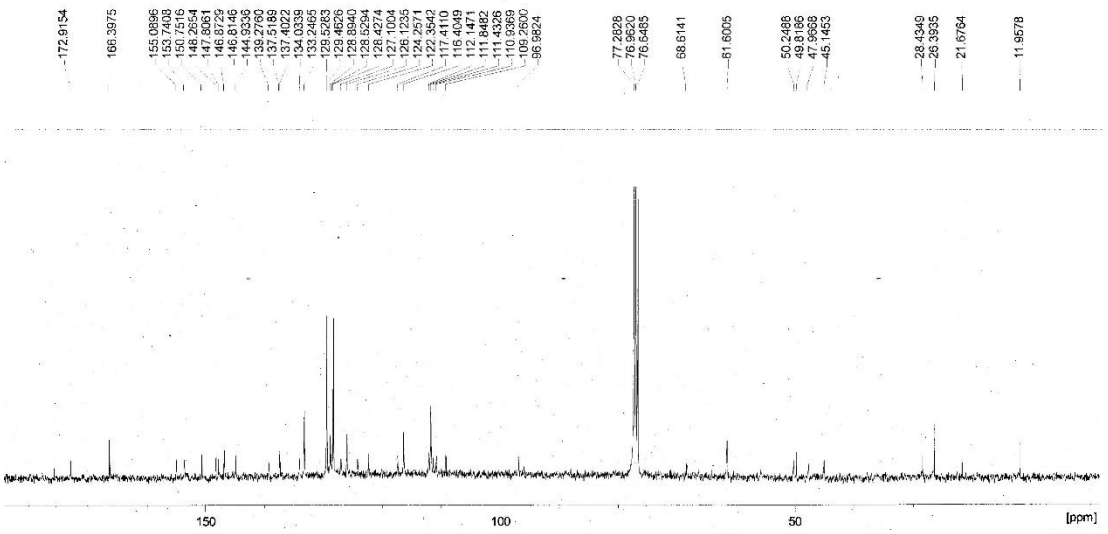


Fig. S6 (D) ^{13}C NMR of **M2**

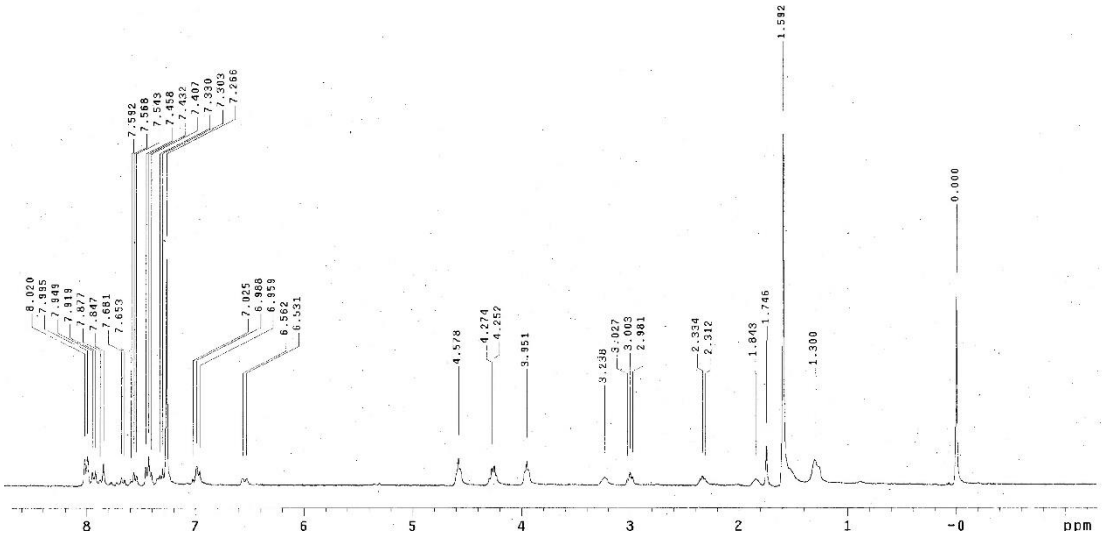


Fig. S6 (E) ^{1}H NMR of **M3**

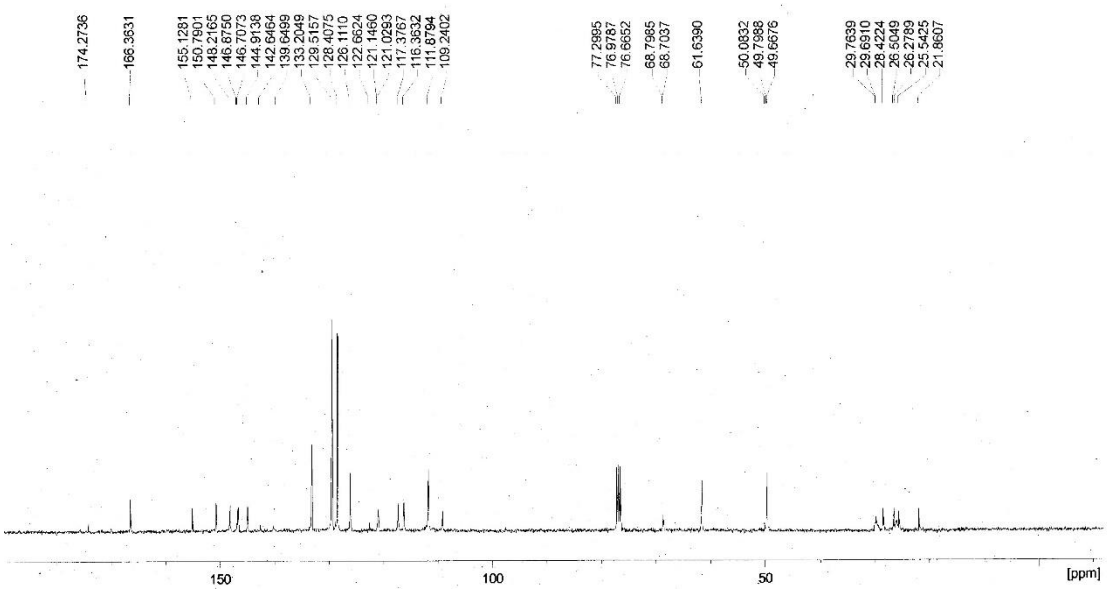


Fig. S6 (F) ^{13}C NMR of **M3**

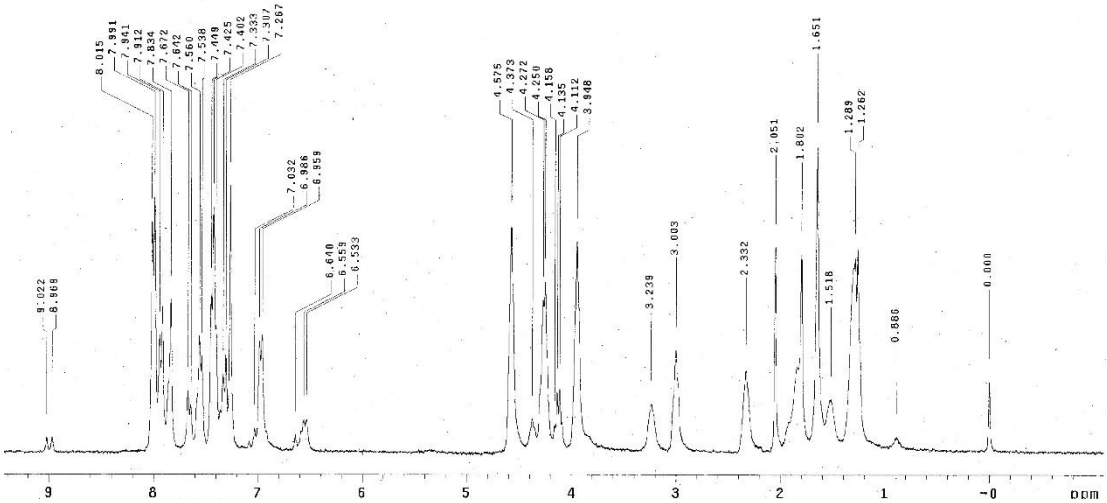


Fig. S6 (H) ^{1}H NMR of **M4**

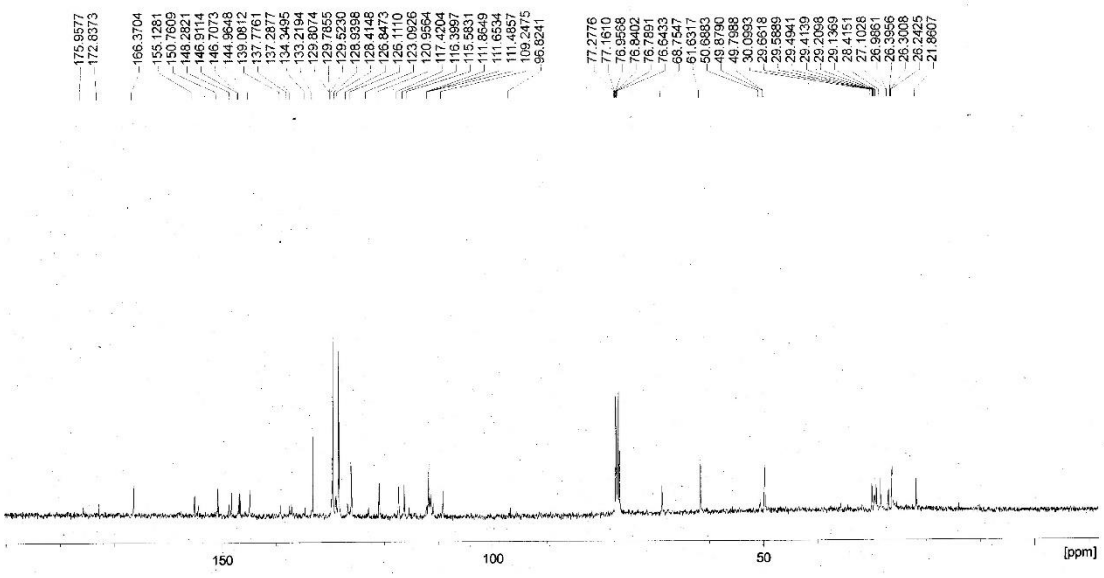


Fig. S6 (I) ^{13}C NMR of **M4**

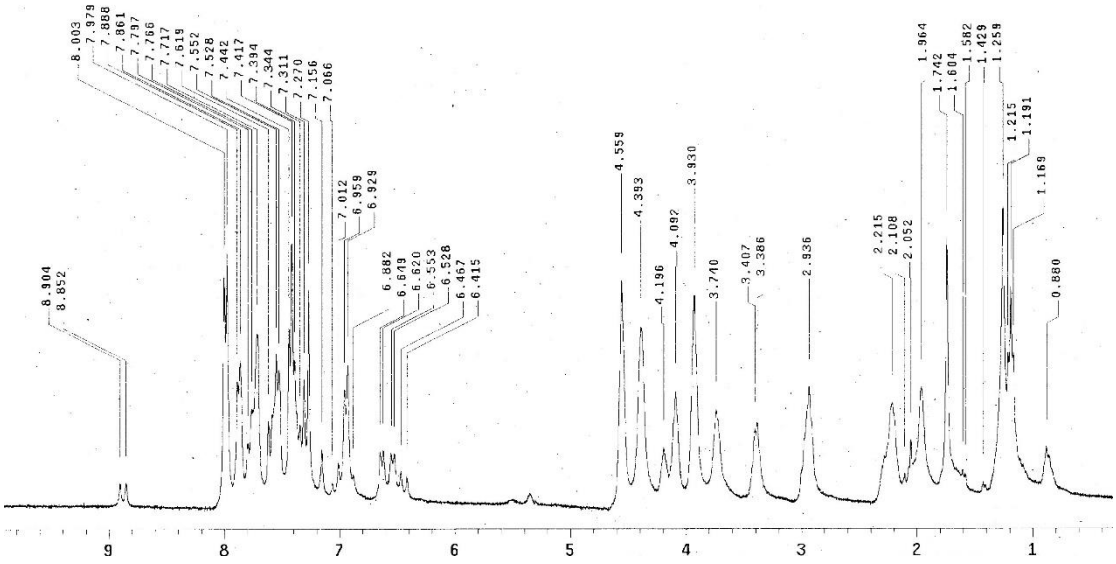


Fig. S6 (J) ^{1}H NMR of **M5**

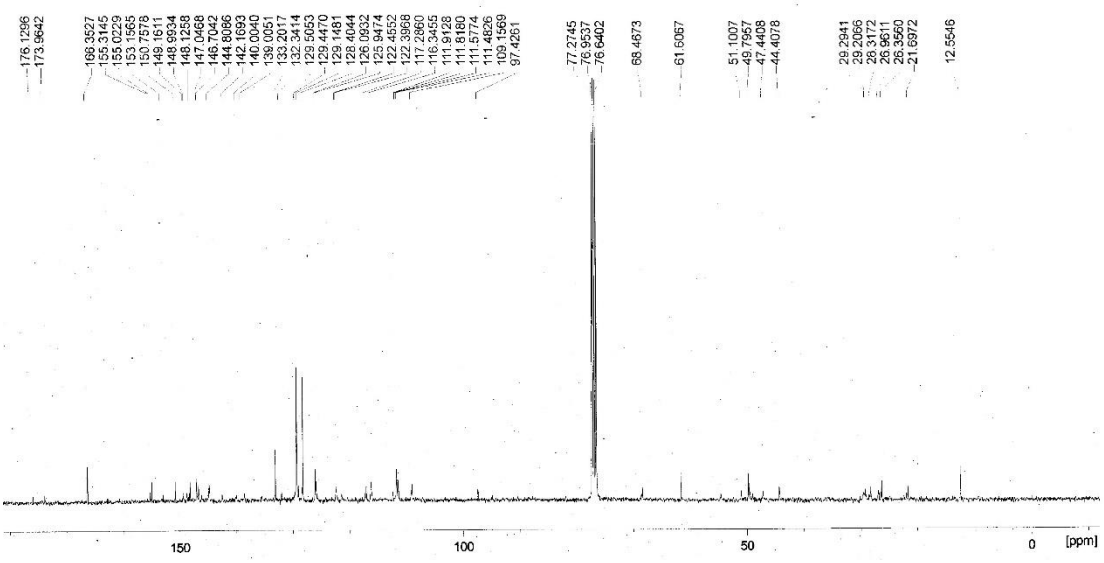
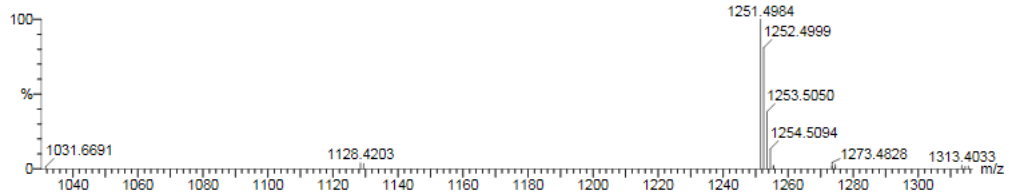
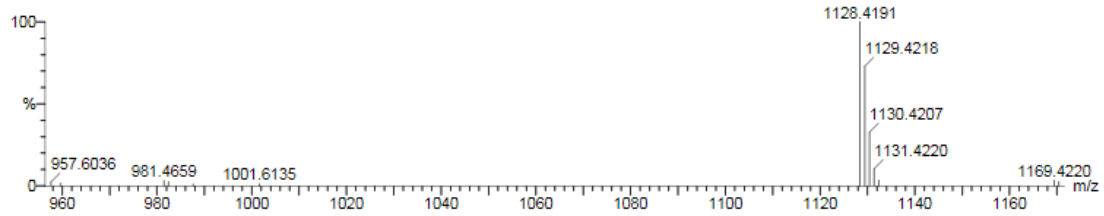


Fig. S6 (K) ^{13}C NMR of **M5**



Minimum:				-1.5			
Maximum:		300.0	50.0	100.0			
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	i-FIT (Norm)	Formula
1251.4984	1251.4987	-0.3	-0.2	43.5	12.6	0.0	C69 H67 N14 O8 S

Fig. S7 (A) HRMS of **M1**



Minimum:				-1.5			
Maximum:		300.0	50.0	100.0			
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	i-FIT (Norm)	Formula
1128.4191	1128.4191	0.0	0.0	40.5	13.0	0.0	C63 H58 N11 O8 S

Fig. S7 (B) HRMS of **M2**

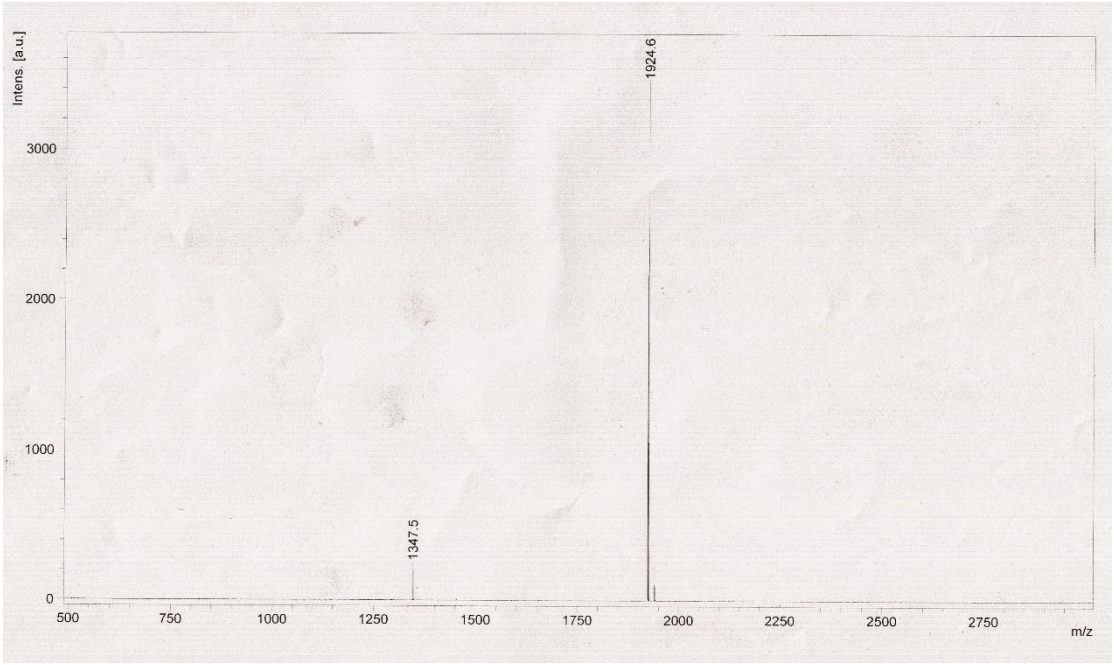


Fig. S7 (C) TOF of **M3**

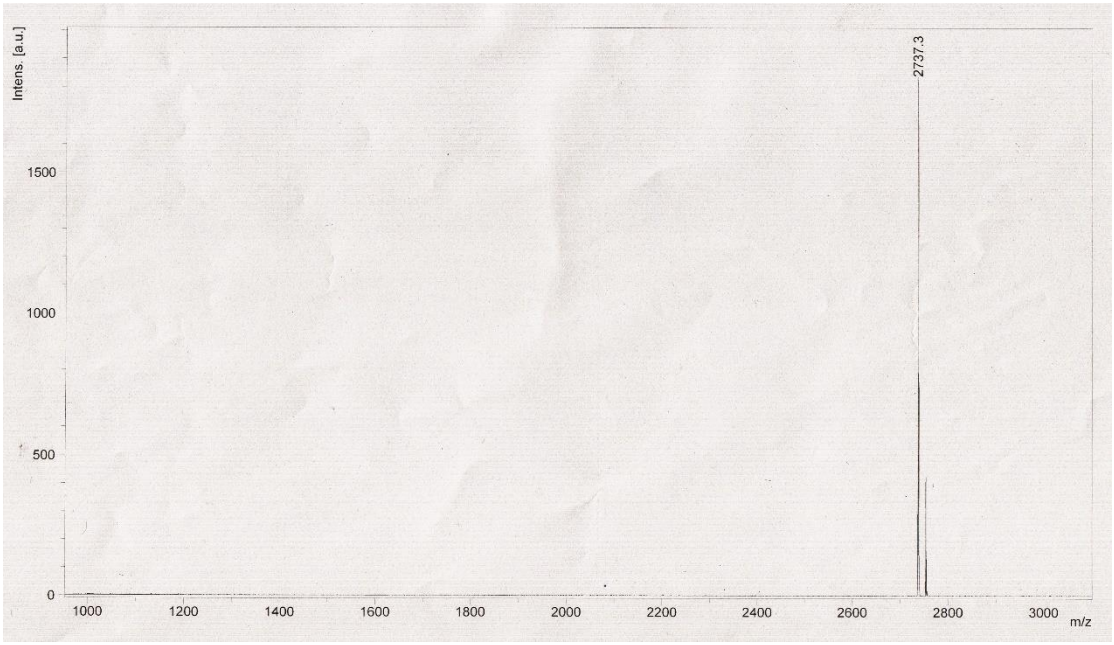


Fig. S7 (D) TOF of **M4**

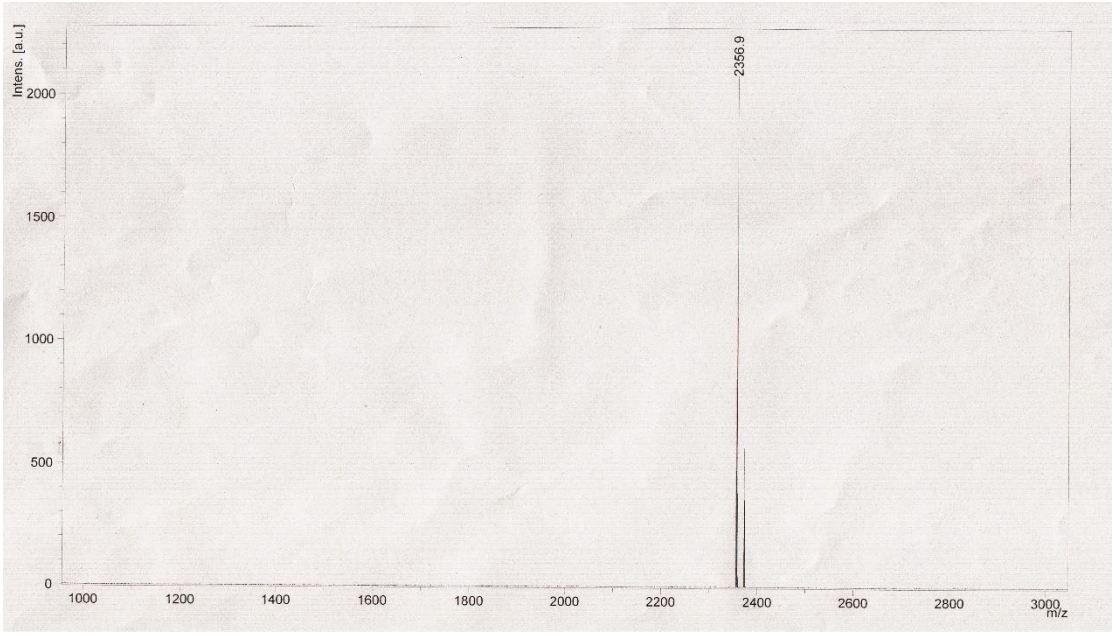


Fig. S7 (E) TOF of **M5**

Table S1 Order parameter of the five films

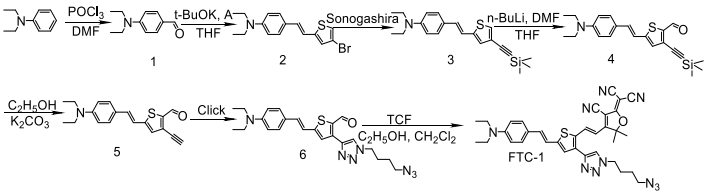
Films	Φ^a	Φ^b
M1	0.14	0.36
M2	0.11	0.36
M3	0.11	-
M4	0.25	0.27
M5	0.19	0.3

Φ=1-A1/A0, where A1 and A0 are the absorbance of the film after and before corona poling, respectively. [a] The order parameter at the short λ_{max}. [b] The order parameter at the long λ_{max}.

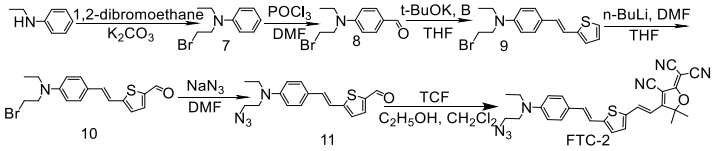
2. Experimental details

In this paper, we have synthesized 32 kinds of intermediate products. Compound A, B, E and F were synthesized according to literatures.[7, 8] Compound C, D and compound **1**-**22** were synthesized according to the synthetic routes and procedures presented below.

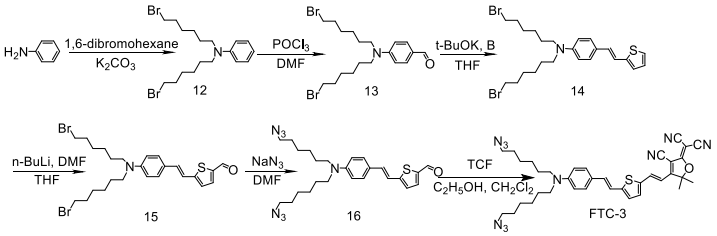
A: Synthetic route of **FTC-1**



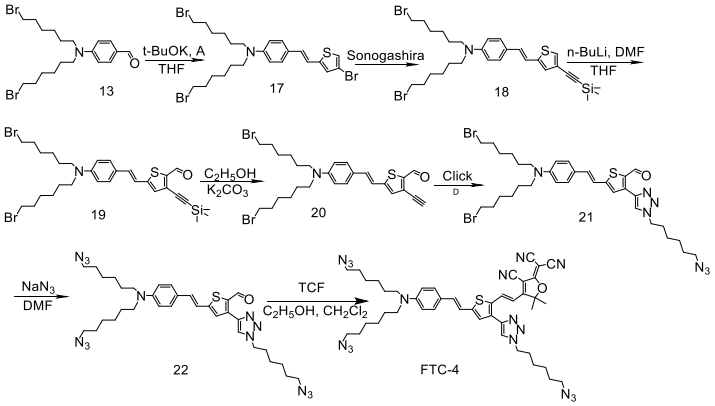
B: Synthetic route of **FTC-2**



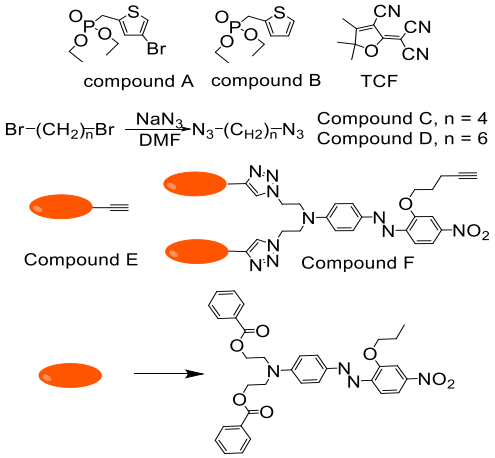
C: Synthetic route of **FTC-3**



D: Synthetic route of **FTC-4:**



E: The structure of compound A, B, **C**, **D**, E, F, TCF and synthetic routes of compound **C** and **D**



Scheme S1 Synthetic route of **FTC-1**to **FTC-4**

1,4-diazidobutane:

A solution of 1,4-dibromobutane (4.31 g, 20 mol) and sodium azide (3.9 g, 60 mmol) in DMF (20 mL) was stirred at 80 ^{o}C for 12 h. Then the reaction mixture was poured into of chloroform (60 mL). The mixture solution was washed with water to remove DMF. The reaction mixture was extracted by dichloromethane (50 mL×3). Then the organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation. The residue was purified by column spectroscopy on silica gel using CH_2Cl_2/petroleum ether (1:10) as eluent to give a colorless transparent liquid (2.37 g, 84.6%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 3.30- 3.25 (m, 4H, -CH_2-), 1.61-1.57 (m, 4H, -CH_2-), 1.43-1.41 (m, 4H, -CH_2-).

1,6-diazidohexane:

1,6-diazidohexane was synthesized in a similar manner described above. The product is a colorless transparent liquid (3.2 g, 77.3%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 3.33 (m, 4H, -CH_2-), 1.70-1.67 (m, 4H, -CH_2-).

Compound **1**:

DMF (20 mL) was cooled to 0 ^{o}C and maintained at this temperature during the dropwise addition of phosphorus oxychloride (11.5 g, 75 mmol). The solution was kept stirred at 0 ^{o}C for 3 h and the temperature was kept constant during the dropwise addition of a solution of *N*,*N*-diethylaniline (7.46 g, 50 mmol) into DMF (20 mL). The solution was stirred for 2 h and gradually warmed to room temperature and stirred for 12 h at 80 ^{o}C before being poured into a 100 mL solution of potassium carbonate (10%) for quenching. The reaction mixture was extracted by dichloromethane (50 mL×3), washed with brine. The organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation. The resultant crude product was purified by column chromatography with DCM/PE (1:1) as an eluent to give the product as a yellow oil (5.4 g, 92.1%). ^{1}H NMR (300 MHz,

$CDCl_3$, 298 K), δ (TMS, ppm): 9.70 (s, H, -CHO), 7.72-7.69 (d, *J* = 8.4 Hz, 2H, ArH), 7.69-7.66 (d, *J* = 8.1 Hz, 2H, ArH), 3.47-3.40 (m, 4H, $-CH_2-$), 1.23-1.19 (t, *J* = 6.9 Hz, 6H, $-CH_3$).

Compound **2**:

Under an atmosphere of nitrogen, a solution of potassium *tert*-butoxide (1.25 g, 11 mmol) in THF (15 mL) was added to a mixture of compound **1** (1.68 g, 9.5 mmol), compound A (2.97 g, 9.5 mmol) in THF (15 mL) over 10 min under magnetic stirring. Stirring was continued for 10 min after the addition, and the reaction mixture was poured into water. After separation of the organic layer, the aqueous phase was extracted with CH_2Cl_2 (50 mL × 3). The combined organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation. The residue was purified by column spectroscopy on silica gel using CH_2Cl_2/petroleum ether (1:10) as eluent to give the product (2.53 g, 79.3%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.33 -7.30 (d, *J* = 8.1 Hz, 2H, ArH), 6.98-6.90 (m, 4H, -CH=CH-, ArH), 6.65-6.60 (d, *J* = 8.7 Hz, 2H, ArH), 3.41-3.36 (m, 4H, $-CH_2-$), 1.20-1.15 (t, *J* = 6.9 Hz, 6H, $-CH_3$).

Compound **3**:

Under an atmosphere of nitrogen, a solution of compound **2** (0.80 g, 2.45 mmol), CuI (11.2 mg, 0.059 mmol), $Pd(PPh_3)_2Cl_2$(6.9 mg, 0.0098 mmol), PPh_3 (10.3 mg, 0.039 mmol) in Et_3N (10 mL) was cooled to 0 ^{o}C and maintained at this temperature during the dropwise addition of ethynyltrimethylsilane (0.36 g, 3.7 mmol). The solution was stirred for 2 h and gradually warmed to room temperature and stirred for 12 h at 80 ^{o}C. Then the solution was condensed via rotary evaporation. The resultant crude product was purified by column chromatography with DCM/PE (1:3) as an eluent to give a yellow powder (0.81 g, 100%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.33-7.30 (d, *J* = 8.1 Hz, 2H, ArH), 6.96-6.79 (m, 4H, -CH=CH-, ArH), 6.65-6.62 (d,

J = 8.1 Hz, 2H, ArH), 3.38-3.36 (m, 4H, -CH_2-), 1.19-1.15 (t, *J* = 6.6 Hz, 6H, -CH_3), 0.23 (s, 9H, -CH_3).

Compound **4**:

Under an atmosphere of nitrogen, a solution of compound **3** (447 mg, 1.33 mmol) in THF (15 mL) was cooled to -78 ^oC and maintained at this temperature during the dropwise addition of *N*-butyllithium (1.74 mmol, 1.05 mL, 1.65 M in hexane). Stirring was continued for another 1 h, then anhydrous DMF (0.13 mL) was added through syringe over 5 min. The mixture was heated to room temperature and stirred for 30 min. Then the reaction mixture was poured into water. After separation of the organic layer, the aqueous phase was extracted with CH_2Cl_2 (50 mL × 2). The combined organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation. The residue was purified by column spectroscopy on silica gel usingCH_2Cl_2/petroleum ether (1:3) as eluent to give a red solid (306 mg, 40.4%). ^1H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 10.01 (s, H, -CHO), 7.37-7.34 (d, *J* = 8.7 Hz, 2H, ArH), 7.08-6.84 (m, 3H, -CH=CH-, ArH), 6.65-6.63 (d, *J* = 8.7 Hz, 2H, ArH), 3.43-3.36 (m, 4H, -CH_2-), 1.21-1.16 (t, *J* = 6.6 Hz, 6H, -CH_3), 0.27 (s, 9H, -CH_3).

Compound **5**;

Under an atmosphere of nitrogen, a solution of compound **4** (300 mg, 0.786 mmol) and potassium carbonate (158 mg, 0.865 mmol) in C_2H_5OH (20 mL) was stirred at room temperature for 1 h. Then the solution was condensed via rotary evaporation. The resultant crude product was purified by column chromatography with DCM/PE (1:3) as an eluent to give a red solid (260 mg, 100%). ^1H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 10.02 (s, H, -CHO), 7.37-7.35 (d, *J* = 8.4 Hz, 2H, ArH), 7.09-6.86 (m, 3H, -CH=CH-, ArH), 6.66-6.63 (d, *J* = 8.4 Hz, 2H, ArH), 3.43-3.36 (m, 4H,

-CH_2-, -C≡CH), 1.21-1.16 (t, *J* = 6.9 Hz, 6H, -CH_3).

Compound **6**:

Under an atmosphere of nitrogen, a solution of compound **5** (86 mg, 0.28 mmol), 1,4-diazidobutane (47 mg, 0.33 mmol), copper sulfate pentahydrate (7 mg, 0.028 mmol), sodium bicarbonate (5 mg, 0.056 mmol), Sodium L-ascorbate (10 mg, 0.056 mmol) in THF/H_2O (1/0.2 mL) was stirred at 28-30 ^oC for 3 h. Then the reaction mixture was poured into water. After separation of the organic layer, the aqueous phase was extracted with CH_2Cl_2 (50 mL × 2). The combined organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation. The resultant crude product was purified by column spectroscopy on silica gel using CH_2Cl_2/PE (1:3) as eluent to give a red solid (69 mg, 55.2%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 10.29 (s, H, -CHO), 8.08 (s, H, -CH=), 7.43 (s, H, ArH), 7.39-7.36 (d, *J* = 8.4 Hz, 2H, ArH), 7.14-6.93 (m, 2H, -CH=CH-), 6.73-6.64 (d, *J* = 8.7 Hz, 2H, ArH), 4.51-4.46 (m, 4H, -CH_2-), 3.43-3.36 (m, 4H, -CH_2-), 2.11 -2.06 (m, 2H, -CH_2-), 1.69-1.61 (m, 2H, -CH_2-,), 1.21-1.17 (t, *J* = 7.5 Hz, 6H, -CH_3).

FTC-1:

Under an atmosphere of nitrogen, a solution of compound **5** (67 mg, 0.15 mmol), TCF (39 mg, 0.195 mmol) and ammonium acetate in C_2H_5OH/DCM (3/0.6 mL) was stirred at room temperature for 12 h. Then the solution was condensed via rotary evaporation. The resultant crude product was purified by column chromatography with DCM/EA (10:1) as an eluent to give a blue powder (54 mg, 55.6%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 9.03-8.98 (d, *J* = 15.3 Hz, H, -CH=), 7.92 (s, H, -CH=), 7.41-7.38 (d, *J* = 8.4 Hz, 2H, ArH), 7.13-6.94 (m, 2H, -CH=CH), 6.68-6.63 (m, 3H, ArH), 4.51-4.46 (m, 2H, -CH_2-), 3.43-3.36 (m, 4H, -CH_2-), 2.12-2.07 (m, 2H, -CH_2-), 1.82 (s, 6H, -CH_3), 1.68-1.63 (m, 4H, -CH_2-), 1.23-1.19 (t, *J* = 6.3 Hz, 6H, -CH_3).

Compound **7**:

A solution of N-ethylaniline (4.4 g, 36.3 mmol), 1,2-dibromoethane (13.6 g, 72.6 mmol) and potassium carbonate (2.5 g, 18.1 mmol) was stirred at 80 ^{o}C for 12 h. Then the reaction mixture was poured into water. After separation of the organic layer, the aqueous phase was extracted with CH_2Cl_2 (50 mL × 2). The combined organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation and reduced pressure distillation. The resultant crude product was purified by column spectroscopy on silica gel using CH_2Cl_2/PE (1:5) as eluent to give a yellow oil (6.03 g, 72.8%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.23-7.21 (m, 2H, ArH), 6.73-6.67 (m, 3H, ArH), 3.70-3.65 (m, 2H, -CH_2-), 3.45-3.38 (m, 4H, -CH_2-), 1.20-1.56 (t, *J* = 6.9 Hz, 3H, -CH_3).

Compound **8**:

Compound **8** was synthesized in a similar manner as compound **1**, the product is a yellow oil (4.2 g, 62.4%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 9.75 (s, H, -CHO), 7.76-7.73 (d, *J* = 7.8 Hz, 2H, ArH), 6.73-6.70 (d, *J* = 7.8 Hz, 2H, ArH), 3.72-3.70 (m, 2H, -CH_2-), 3.66-3.64 (m, 2H, -CH_2-), 3.53-3.51 (m, 2H, -CH_2-), 1.20-1.16 (t, *J* = 5.4 Hz, 3H, -CH_3).

Compound **9**:

A solution of potassium *tert*-butoxide (1.33 g, 11.8 mmol) in THF (20 mL) was added to a mixture of compound **8** (2.63 g, 10.3 mmol), compound **B** (2.53 g, 10.8 mmol) in THF (20 mL) over 10 min under magnetic stirring. Stirring was continued for 10 min after the addition, and the reaction mixture was poured into water and extracted with CH_2Cl_2 (50 mL × 3). The combined organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation. The resultant crude product was purified by column spectroscopy on silica gel using CH_2Cl_2/PE (1:10) as

eluent to give a yellow solid (1.85 g, 53.6%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.37-7.34 (d, *J* = 8.4 Hz, 2H, ArH), 7.12-6.82 (m, 4H, ArH), 6.68-6.65 (d, *J* = 8.1 Hz, 2H, ArH), 3.63 (m, 4H, -CH_2-), 3.48-3.41 (m, 2H, -CH_2-), 1.22-1.17 (t, *J* = 6.9 Hz, 3H, -CH_3).

Compound **10**:

Compound **10** was synthesized in a similar manner described as compound **4**, the product was a red solid (1.5g, 81%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 9.82 (s, H, -CHO), 7.64-7.63 (m, H, ArH), 7.41-7.38 (d, *J* = 8.7 Hz, 2H, ArH), 7.11-6.97 (m, 3H, ArH), 6.68-6.65 (d, *J* = 9.0 Hz, 2H, ArH), 3.67-3.60 (m, 4H, -CH_2-), 3.50-3.43 (m, 2H, -CH_2-), 1.23-1.18 (t, *J* = 7.2 Hz, 3H, -CH_3).

Compound **11**:

Under an atmosphere of nitrogen, a solution of compound **10** (1.4 g, 3.8 mmol) and sodium azide (0.38 g, 5.7 mmol) in DMF (20 mL) was stirred at 80 ^{o}C for 6 h. Then the reaction mixture was poured into water. $CHCl_3$ (60 mL) was added. The DMF was removed by washing with water. After separation of the organic layer, the aqueous phase was extracted with CH_2Cl_2 (50 mL × 2). The combined organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation. The residue was purified by column spectroscopy on silica gel using CH_2Cl_2/PE (1:1) as eluent to give a red solid (1.16 g, 92.8%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 9.81 (s, H, -CHO), 7.63-7.62 (m, H, ArH), 7.40-7.37 (d, *J* = 8.4 Hz, 2H, ArH), 7.11-6.96 (m, 3H, ArH), 6.70-6.67 (d, *J* = 8.4 Hz, 2H, ArH), 3.53-3.43 (m, 6H, -CH_2-), 1.22-1.17 (t, *J* = 7.5 Hz, 3H, -CH_3).

FTC-2:

FTC-2 was synthesized in a similar manner described as **FTC-1**, the product was a blue powder

(300 mg, 41%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.79-7.74 (d, *J* = 15.3 Hz, H, -CH=), 7.42-7.39 (d, *J* = 9.0 Hz, 2H, ArH), 7.37-7.36 (m, H, ArH), 7.11-6.98 (m, 3H, -CH=CH-, ArH), 6.71-6.68 (d, *J* = 9.0 Hz, 2H, ArH), 6.60-6.54 (d, *J* = 15.6 Hz, H, -CH=), 3.55-3.45 (m, 6H, $-CH_2-$), 1.74 (s, 6H, $-CH_3$), 1.23-1.19 (t, *J* = 10.2 Hz, 3H, $-CH_3$).

Compound **12**:

A solution of aniline (4.66 g, 50 mmol), 1,6-dibromohexane (73.2 g, 300 mmol) and potassium carbonate (13.8 g, 100 mmol) was stirred at 80 ^{o}C for 12 h. Then the reaction mixture was poured into water. After separation of the organic layer, the aqueous phase was extracted with CH_2Cl_2 (50 mL × 2). The combined organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation and reduced pressure distillation. The residue was purified by column spectroscopy on silica gel using CH_2Cl_2/PE (1:5) as eluent to give a yellow oil (10.0 g, 47.8%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.23-7.18 (m, 2H, ArH), 6.64-6.61 (m, 3H, ArH), 3.44-3.39 (m, 4H, $-CH_2-$), 3.28-3.23 (m, 4H, $-CH_2-$), 1.92-1.82 (m, 4H, $-CH_2-$), 1.64-1.54 (m, 4H, $-CH_2-$), 1.50-1.43 (m, 4H, $-CH_2-$), 1.39-1.34 (m, 4H, $-CH_2-$)

Compound **13**:

Compound **13** was synthesized in a similar manner described as compound **1**, the product was a yellow oil (5.0g, 68.7%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 9.70 (s, H, -CHO), 7.72-7.69 (d, *J* = 9.0 Hz, 2H, ArH), 6.65-6.62 (d, *J* = 8.7 Hz, 2H, ArH), 3.57-3.53 (m, 4H, $-CH_2-$), 3.38-3.33 (m, 4H, $-CH_2-$), 1.82-1.75 (m, 4H, $-CH_2-$), 1.66-1.56 (m, 4H, $-CH_2-$), 1.53-1.46 (m, 4H, $-CH_2-$), 1.42-1.37 (m, 4H, $-CH_2-$).

Compound **14**:

A solution of potassium *tert*-butoxide (0.15 mg, 1.31 mmol) in THF (10 mL) was added to a mixture of compound B (0.30 g, 1.25 mmol) and compound 13 (510 mg, 1.14 mmol), in THF (10 mL) over 10 min under magnetic stirring. Stirring was continued for 10 min after the addition, and the reaction mixture was poured into water. After separation of the organic layer the aqueous phase was extracted with CH_2Cl_2 (50 mL × 2). The combined organic solution was dried over anhydrous sodium sulfate and condensed via rotary evaporation. The residue was purified by column spectroscopy on silica gel using CH_2Cl_2/PE (1:1) as eluent to give a yellow solid (510 mg, 84.8%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.33-7.31 (d, *J* = 8.4 Hz, 2H, ArH), 7.11-7.09 (m, 1H, ArH), 7.03-6.81 (m, 3H, -CH=CH-, ArH), 6.60-6.58 (d, *J* = 8.7 Hz, 2H, ArH), 3.56-3.52 (m, 4H, -CH_2-), 3.30-3.25 (m, 4H, -CH_2-), 1.81-1.74 (m, 4H, -CH_2-), 1.60-1.54 (m, 4H, -CH_2-), 1.51-1.44 (m, 4H, -CH_2-), 1.37-1.35 (m, 4H, -CH_2-).

Compound **15**:

Compound **15** was synthesized in a similar manner described as compound **4**, the product was a red solid (400 mg, 41%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 9.81 (s, H, ArH), 7.64-7.62 (m, 1H, ArH), 7.38-7.35 (d, *J* = 8.7 Hz, 2H, ArH), 7.11-6.94 (m, 3H, -CH=CH-, ArH), 6.62-6.59 (d, *J* = 9.0 Hz, 2H, ArH), 3.57-3.53 (m, 4H, -CH_2-), 3.33-3.28 (m, 4H, -CH_2-), 1.84-1.75 (m, 4H, -CH_2-), 1.61-1.55 (m, 4H, -CH_2-), 1.52-1.45 (m, 4H, -CH_2-), 1.38-1.36 (m, 4H, -CH_2-).

Compound **16**:

Compound **16** was synthesized in a similar manner described as compound **11**, the product was a red solid (350 mg, 99%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 9.81 (s, H, ArH), 7.64-7.62 (m, 1H, ArH), 7.38-7.35 (d, *J* = 8.7 Hz, 2H, ArH), 7.11-6.94 (m, 3H, -CH=CH-, ArH), 6.61-6.58 (d, *J* = 8.4 Hz, 2H, ArH), 3.33-3.26 (m, 8H, -CH_2-), 1.62 (m, 8H, -CH_2-), 1.40 (m, 8H,

-CH_2-).

FTC-3:

FTC-3 was synthesized in a similar manner described as **FTC-1**, the product was a blue powder (200 mg, 81%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.79-7.73 (d, *J* = 15.6 Hz, H, -CH=), 7.40-7.37 (m, 3H, ArH), 7.11-6.96 (m, 3H, -CH=CH-, ArH), 6.63-6.60 (d, *J* = 8.4 Hz, 2H, ArH), 6.58-6.53 (d, *J* = 15.9 Hz, H, -CH=), 3.35-3.26 (m, 8H, -CH_2-), 1.75 (s, 6H, -CH_3), 1.64-1.58 (m, 8H, -CH_2-), 1.40 (m, 8H, -CH_2-).

Compound **17**:

Compound **17** was synthesized in a similar manner described as compound **2**, the product was a yellow solid (4.0g, 65.2%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.32-7.29 (d, *J* = 8.1 Hz, 2H, ArH), 6.98 (s, 1H, ArH), 6.92-6.79 (m, 3H, -CH=CH-, ArH), 6.60-6.57 (d, *J* = 8.4 Hz, 2H, ArH), 3.57-3.52 (m, 4H, -CH_2-), 3.31-3.26 (m, 4H, -CH_2-), 1.83-1.74 (m, 4H, -CH_2-), 1.63-1.58 (m, 4H, -CH_2-), 1.51-1.44 (m, 4H, -CH_2-), 1.37-1.35 (m, 4H, -CH_2-).

Compound **18**:

Compound **18** was synthesized in a similar manner described as compound **3**, the product was a yellow solid (3.1 g, 63.3%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 7.32-7.29 (d, *J* = 8.4 Hz, 2H, ArH), 7.26 (s, H, ArH), 6.96 (s, H, ArH), 6.92-6.78 (m, 2H, -CH=CH-), 6.61-6.58 (d, *J* = 8.7 Hz, 2H, ArH), 3.56-3.52 (m, 4H, -CH_2-), 3.30-3.26 (m, 4H, -CH_2-), 1.81-1.76 (m, 4H, -CH_2-), 1.60-1.58 (m, 4H, -CH_2-), 1.51-1.46 (m, 4H, -CH_2-), 1.37-1.35 (m, 4H, -CH_2-), 0.23 (s, 9H, -CH_3).

Compound **19**:

Compound **19** was synthesized in a similar manner described as compound **4**, the product was a red

solid (2.0 g, 81.0%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 10.01 (s, H, -CHO), 7.36-7.33 (d, *J* = 8.7 Hz, 2H, ArH), 7.08-6.84 (m, 3H, -CH=CH-, ArH), 6.61-6.58 (d, *J* = 8.7 Hz, 2H, ArH), 3.56-3.52 (m, 4H, -CH_2-), 3.32-3.28 (m, 4H, -CH_2-), 1.82-1.77 (m, 4H, -CH_2-), 1.61-1.56 (m, 4H, -CH_2-), 1.52-1.49 (m, 4H, -CH_2-), 1.38-1.36 (m, 4H, -CH_2-), 0.27 (s, 9H, -CH_3).

Compound 20:

Compound **20** was synthesized in a similar manner described as compound **5**, the product was a red solid (1.2 g, 93.0%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 10.02 (s, H, -CHO), 7.37-7.34 (d, *J* = 9.0 Hz, 2H, ArH), 7.08-6.84 (m, 3H, -CH=CH-, ArH), 6.61-6.58 (d, *J* = 8.4 Hz, 2H, ArH), 3.57-3.53 (m, 4H, -CH_2-), 3.42 (s, -C≡CH), 3.33-3.28 (m, 4H, -CH_2-), 1.82-1.77 (m, 4H, -CH_2-), 1.59 (m, 4H, -CH_2-), 1.55-1.45 (m, 4H, -CH_2-), 1.38-1.36 (m, 4H, -CH_2-).

Compound **21**:

Compound **21** was synthesized in a similar manner described as compound **6**, compound **21** was synthesized from compound **20** and **1,6-diazidohexane**, the product was red solid (610 mg, 78.7%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 10.31 (s, H, -CHO), 8.05 (s, H, -CH=), 7.43 (s, H, ArH), 7.38-7.35 (d, *J* = 8.7 Hz, 2H, ArH), 7.13-6.93 (m, 2H, -CH=CH-), 6.62-6.59 (d, *J* = 8.7 Hz, 2H, ArH), 4.44-4.42 (m, 2H, -CH_2-), 3.56-3.55 (m, 4H, -CH_2-), 3.30-3.28 (m, 6H, -CH_2-), 1.99 (m, 2H, -CH_2-), 1.81-1.77 (m, 4H, -CH_2-), 161 (m, 2H, -CH_2-), 1.49-1.39 (m, 12H, -CH_2-).

Compound **22:**

Compound **22** was synthesized in a similar manner described as compound **16**, the product was a red solid (450 mg, 92.9%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 10.32 (s, H, -CHO), 8.04 (s, H, -CH=), 7.42 (s, H, ArH), 7.38-7.35 (d, *J* = 8.7 Hz, 2H, ArH), 7.13-6.92 (m, 2H,

-CH=CH-), 6.62-6.59 (d, *J* = 8.7 Hz, 2H, ArH), 4.44-4.41 (m, 2H, -CH_2-), 3.31-3.25 (m, 12H, -CH_2-), 2.04-1.97 (m, 2H, -CH_2-), 1.62-1.60 (m, 4H, -CH_2-), 1.40 (m, 2H, -CH_2-), 1.49-1.39 (m, 16H, -CH_2-).

FTC-4:

FTC-4 was synthesized in a similar manner described as **FTC-1**, the product was a dark solid (320 mg, 85.0%). ^{1}H NMR (300 MHz, $CDCl_3$, 298 K), δ (TMS, ppm): 9.06-9.01 (d, *J* = 15.3 Hz, H, -CH=), 7.90 (s, H, -CH=), 7.41-7.38 (d, *J* = 7.8 Hz, 2H, ArH), 7.13-6.95 (m, 2H, -CH=CH-), 6.70-6.61 (m, 3H, ArH), 4.45 (m, 2H, -CH_2-), 3.13-3.29 (m, 8H, -CH_2-), 2.00 (m, 2H, -CH_2-), 1.82 (s, 6H, -CH_3), 1.59 (m, 14H, -CH_2-), 1.42 (m, 10H, -CH_2-).

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