

## Supporting Information

### **Tuning the Dimensionality of Semiconducting Nanostructures by Self-assembled Tetraphenylethylene Substituted Corroles**

Swathi Nenavath,<sup>†a,b</sup> Nagadatta Pravallika,<sup>†a,b</sup> Neela Sravani,<sup>a,b</sup> Seelam Prasanthkumar,<sup>\*a,b</sup>  
Lingamallu Giribabu<sup>\*a,b</sup>

*<sup>a</sup>Department of Polymers & Functional Material, CSIR-Indian Institute of Chemical Technology (IICT), Tarnaka, Hyderabad, Telangana 500007, India,*

*<sup>b</sup>Academy of Scientific and Innovation Research (AcSIR)  
Ghaziabad 201 002, India*

Corresponding Author E-mail: [prasanth@iict.res.in](mailto:prasanth@iict.res.in); [giribabu@iict.res.in](mailto:giribabu@iict.res.in)

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## 1. Experimental Details:

**Materials:** Commercially available reagents and chemicals were procured from Sigma-Aldrich or Merck. Analytical reagent (AR) grade solvents were used for the reactions, while laboratory reagent (LR) grade solvents were used for sample purification and column chromatography. ACME silica gel (60-120 and 100-200 mesh) was used for column chromatography. Thin layer chromatography was performed on Merck-precoated silica gel 60-F254 plates. Either gravity or flash chromatography was performed for the purification of all compounds. All the reactions were carried out under nitrogen or an argon atmosphere using dry and degassed solvents.

**Characterization Techniques:**  $^1\text{H}$  and  $^{13}\text{C}$  Nuclear magnetic resonance (NMR) spectra 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor were carried out with a 400 MHz INOVA spectrometer using  $\text{CDCl}_3$  as an internal reference. Shimadzu Biotech Axima Performance 2.9.3.20110624: Mode Reflectron-HiRes, Power: 85 was probed to analyze the matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectrometry of all samples.

**Preparation of aggregates by methanol vapour diffusion method:** 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor was dissolved in 1 mL of DCM with a concentration of  $1 \times 10^{-4}$  M and placed in methanol environment for 24 h to study the aggregation phenomenon. As a result, aggregates were formed and studied systematically using UV-visible absorption, microscopic images, PXRD, and electrochemical impedance analyses.

**UV-visible and Fluorescence Measurements:** Shimadzu (Model UV-3600) spectrophotometer was employed for measuring the UV-vis absorption spectral studies of 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor. Steady-state fluorescence spectra of solutions were measured on a Fluorolog-3 spectrofluorometer (Spex model, Jobin Yvon) at the excitation wavelength of 315 and 412 nm. Photoluminescence decay profiles were recorded on a picoseconds time-correlated single photon (TCSPC) setup (Fluorolog-3-Triple Illuminator, IBH Horiba Jobin Yvon) employing a picoseconds light emitting diode laser (Nano LED,  $\lambda_{\text{exc}} = 405$  nm). All the analyses were performed in DCM in a 1 cm cuvette at 25 °C.

**Electrochemical Studies:** Cyclic voltammetry experiments of 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor were performed on a PC-controlled CH instruments model CHI 620C electrochemical analyzer in DCM at a scan rate of 200 mV/s using 0.1 M tetrabutylammonium hexafluorophosphate

(NBu<sub>4</sub>PF<sub>6</sub>). The working electrode is glassy carbon, the saturated calomel electrode (SCE) is the reference electrode and the platinum wire is an auxiliary electrode.

**Powder X-ray Diffraction (PXRD) Analysis:** Aggregates of 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor were transferred onto a glass slide and recorded on a Simens D5000 X-ray diffractometer using Cu K $\alpha$  radiation.

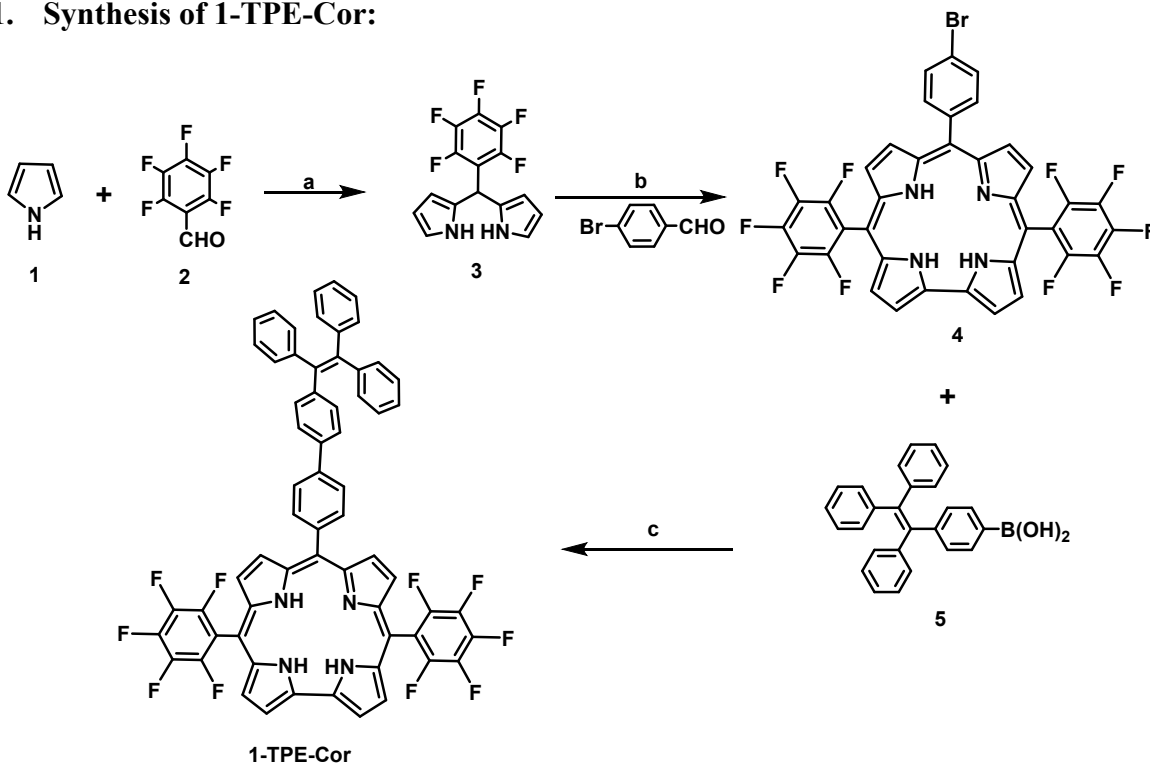
**Microscopic Analysis:** Scanning electron microscopy (SEM) measurements of 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor aggregates were performed using FESEM (JEOL 7610F FESEM equipped with an OXFORD EDAX detector). Transmission electron microscopy (TEM) measurements were also measured using FEI Talos 120 KV. For measurements, samples were prepared from the DCM/Methanol using the methanol vapour diffusion method and drop-casted aggregates on a copper substrate for SEM and carbon-coated copper grids (200 mesh size) for TEM directly at 25 °C.

**Theoretical calculations:** Density functional theory (Gaussian 09 program package) with B3LYP 6-31g (d,p) level adopted for measuring the optimized structure and frontier molecular orbitals (FMOs) of 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor.

**Electrochemical Impedance Spectroscopy (EIS):** Sample preparation for the experiments was achieved by conducting indium tin oxide (ITO) substrates that provide inert electrical contacts.<sup>1</sup> Selective etching of indium tin oxide (ITO) glass slides (1 cm  $\times$  1 cm) was performed using 1 M HCl/Zn dust on a masked pattern to prefabricate two parallel electrodes set at a distance of  $\sim$ 1.5 mm apart. The samples were then deposited as thin films of the 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor on a pre-masked substrate with the dimensions of length-0.15 cm, width-0.20 cm, and a thickness of 80 nm surfaces to achieve comparable and quantifiable cell geometry. Electrochemical impedance spectroscopy was performed on the deposited thin films employing a Zahner Zennium Electrochemical Workstation equipped with Thales operational software and coupled with a controlled heating chamber to carry out variable temperature measurements during heating. The measurements were carried out at different temperature settings from 25 °C - 65 °C with a stepwise increase in temperature of 10 °C. The temperature was measured with accuracy higher than  $\pm$ 0.1 °C using a K-type thermocouple placed near the sample. The samples were equilibrated at each temperature for 1 h before acquiring the frequency sweep impedance data. The data were collected following a frequency sweep through 1 MHz–1 KHz at an alternating potential with root-mean-square amplitude of  $\pm$ 10 mV across the open-circuit voltage (OCV) of the assembled cells.

## 2. Synthesis of 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor:

### 2.1. Synthesis of 1-TPE-Cor:



**Scheme S1.** Synthesis of **1-TPE-Cor**.

*Reagent and Conditions:* (a) TFA, NaOH, 1 h, 25 °C, N<sub>2</sub> atmosphere. (b) MeOH/H<sub>2</sub>O, CHCl<sub>3</sub>, HCl, DDQ, H<sub>2</sub>O, 3 h, 25 °C, N<sub>2</sub> atmosphere (c) THF:Tol 1:3 (v/v), Pd(dppf)<sub>2</sub>Cl<sub>2</sub>, Na<sub>2</sub>CO<sub>3</sub>/H<sub>2</sub>O, 80 °C, N<sub>2</sub> atmosphere, 12 h Yield: 60%.

**Synthesis of 3:** 1 (45 ml, 0.637 mmol) which was passed through basic alumina previously and pentafluoro benzaldehyde 2 (3 mL, 0.025 mmol) were added to a round-bottomed flask, then flushed with N<sub>2</sub> gas and stirred for 5 min. Then TFA (0.10 eq) was added, and the solution was stirred at room temperature for 30 minutes followed by quenched with 0.1 M NaOH. Ethyl acetate was then added and organic phase was washed with water and dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>. The solvent was removed under reduced pressure to afford the orange oiled type crude product. The crude was subjected to silica gel (100–200 mesh) column chromatography with CH<sub>2</sub>Cl<sub>2</sub>/Hexane (2:8, v/v) as eluent. The titled compound **3** was obtained as yellowish white solid, after several washings with n-hexane.

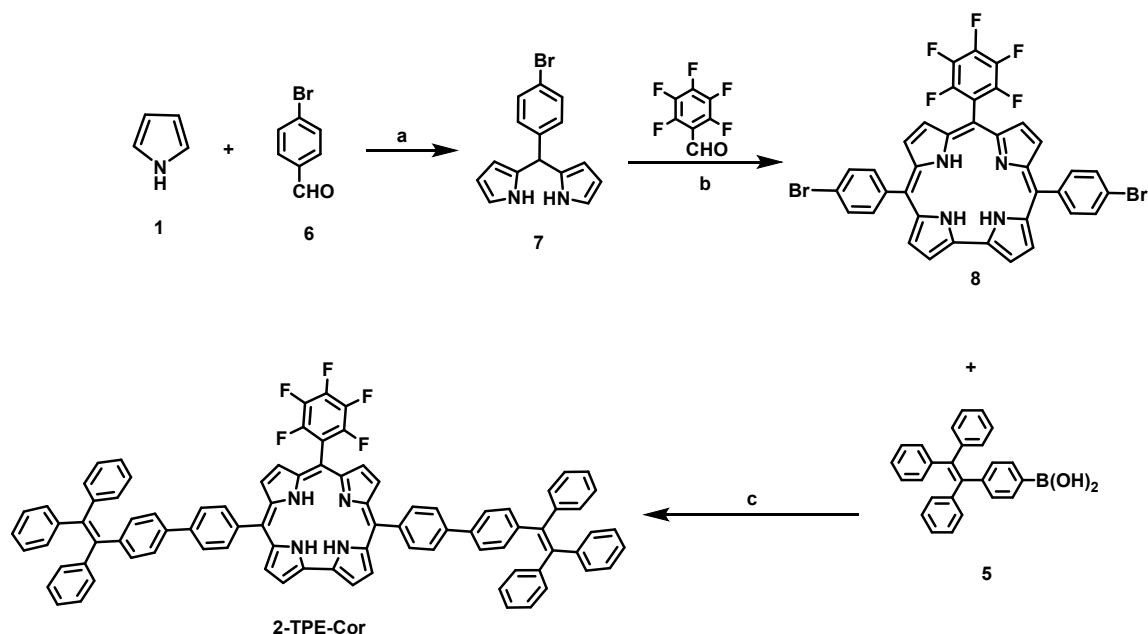
**Synthesis of 4:** 3 (C<sub>6</sub>F<sub>5</sub>-DPM) (1000 mg, 3.205 mmol) and 4-bromo benzaldehyde (296 mg, 1.66 mmol) were dissolved in MeOH (80 mL). To this a mixture of Conc.HCl (6 mL) and water (80 mL) was added drop wise, and the resulting suspension was stirred at room temperature for 3 h. The reaction mixture was extracted with CH<sub>2</sub>Cl<sub>2</sub> (2 × 50 mL), and the organic phase was washed with water (3 × 50 mL) and dried over anhydrous Na<sub>2</sub>SO<sub>4</sub> and then diluted with 80 ml chloroform. To this 2,3-dichloro-5,6-dicyano-1,4-benzoquinone (DDQ) (300 mg, 1.322 mmol) was added, and the mixture was vigorously stirred for 1 h at room temperature. DDQ was removed by silica gel (100–200 mesh) column chromatography with DCM as eluent. The resulting crude compound was further purified by silica gel chromatography (100–200 mesh) with DCM/hexane (7:3, v/v) used as an eluent. The titled compound **4** was obtained as a greenish violet solid after recrystallization from CHCl<sub>3</sub>/hexane.

**Synthesis of 1-TPE-Cor:** **4** (0.100 g, 0.127 mmol) was dissolved in tetrahydrofuran and toluene (5 mL and 15 mL) followed by addition of [1,1'-Bis(diphenylphosphino)ferrocene]dichloropalladium(II) (Pd(dppf)<sub>2</sub>Cl<sub>2</sub>), (10 mg, 0.0127 mmol) and (4-(1,2,2-triphenylvinyl)phenyl)boronic acid **5** (0.100 g, 0.254 mmol) was added and then add Na<sub>2</sub>CO<sub>3</sub> (53 mg, 0.508 mmol) which is dissolved in 2 mL of water to the reaction mixture. Then the reaction mixture was refluxed at 80 °C for 8 h. Then the mixture was poured onto water (50 mL) and extracted with DCM. The organic layers were dried over anhydrous Na<sub>2</sub>SO<sub>4</sub> and the solvent is removed under reduced pressure. The crude product was purified by column chromatography (silica gel, DCM/Hexane = 1:2, v/v). A purple green color solid was obtained; yield 60% (0.079 g, 0.076 mmol).

**<sup>1</sup>H NMR** (500 MHz, CDCl<sub>3</sub>) δ 9.12 (d, *J* = 4.2 Hz, 2H), 8.73 (dd, *J* = 19.4, 4.6 Hz, 4H), 8.57 (s, 2H), 8.21 (d, *J* = 8.1 Hz, 2H), 7.97 (d, *J* = 8.1 Hz, 2H), 7.67 (d, *J* = 8.2 Hz, 2H), 7.24 (s, 1H), 7.22 – 7.15 (m, 10H), 7.13 (t, *J* = 6.1 Hz, 4H), 7.10 (dd, *J* = 7.4, 2.0 Hz, 2H). **<sup>13</sup>C NMR**(126 MHz, CDCl<sub>3</sub>) δ 143.83, 143.79, 143.31, 141.38, 140.58, 140.21, 140.00, 138.38, 135.13, 134.11, 132.12, 131.52, 131.48, 131.42, 127.88, 127.80, 127.73, 127.66, 126.61, 126.44, 125.76, 24.93.

MALDI-TOF-MS (*m/z*): Calculated mass = 1036.2624 (Found=1036.225)

## 2.2. Synthesis of 2-TPE-Cor:



**Scheme S2.** Synthesis of **2-TPE-Cor**.

*Reagent and conditions:* (a) TFA, NaOH, 1 h, 25 °C, N<sub>2</sub> atmosphere. (b) MeOH/H<sub>2</sub>O, CHCl<sub>3</sub>, HCl, DDQ, H<sub>2</sub>O, 3 h, 25 °C, N<sub>2</sub> atmosphere (c) THF:Tol 1:3 (v/v), Pd(dppf)<sub>2</sub>Cl<sub>2</sub>, Na<sub>2</sub>CO<sub>3</sub>/H<sub>2</sub>O, 80 °C, N<sub>2</sub> atmosphere, 12 h Yield: 60%.

**Synthesis of 7:** Pyrrole (1) (40 mL, 0.541 mmol) which was passed through basic alumina previously and 4-bromo benzaldehyde (6) (4 g, 0.022 mmol) were added to a round-bottomed flask, then flushed with N<sub>2</sub> gas and stirred for 5 minutes. To this TFA (0.10 eq) was added, and the solution was stirred at room temperature for 30 min followed by quenched with 0.1 M NaOH. Ethyl acetate was then added and organic phase was washed with water and dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>. The solvent was removed under reduced pressure to afford the orange oiled type crude product. The crude was subjected to silica gel (100–200 mesh) column chromatography with CH<sub>2</sub>Cl<sub>2</sub>/Hexane (2:8, v/v) as eluent. The titled compound **7** was obtained as yellowish white solid, after several washings with n-hexane.

**Synthesis of 8:** **7** (1000 mg, 3.322 mmol) and pentafluoro benzaldehyde (296 mg, 1.66 mmol) were dissolved in MeOH (80 mL). To this a mixture of Conc. HCl (6 mL) and water (80 mL) was added drop wise, and the resulting suspension was stirred at room temperature for 3 h. The reaction

mixture was extracted with  $\text{CH}_2\text{Cl}_2$  ( $2 \times 50$  mL), and the organic phase was washed with water ( $3 \times 50$  mL) and dried over anhydrous  $\text{Na}_2\text{SO}_4$  and then diluted with 80 mL chloroform. To this 2,3-dichloro-5,6-dicyano-1,4-benzoquinone (DDQ) (300 mg, 1.322 mmol) was added, and the mixture was vigorously stirred for 1 h at room temperature. DDQ was removed by silica gel (100–200 mesh) column chromatography with DCM as eluent. The resulting crude compound was further purified by silica gel chromatography (100–200 mesh) with DCM/hexane (7:3, v/v) used as an eluent. The titled compound (**8**) was obtained as a greenish violet solid after recrystallization from  $\text{CHCl}_3$ /hexane. Yield 62% (1.594 g, 2.05 mmol).

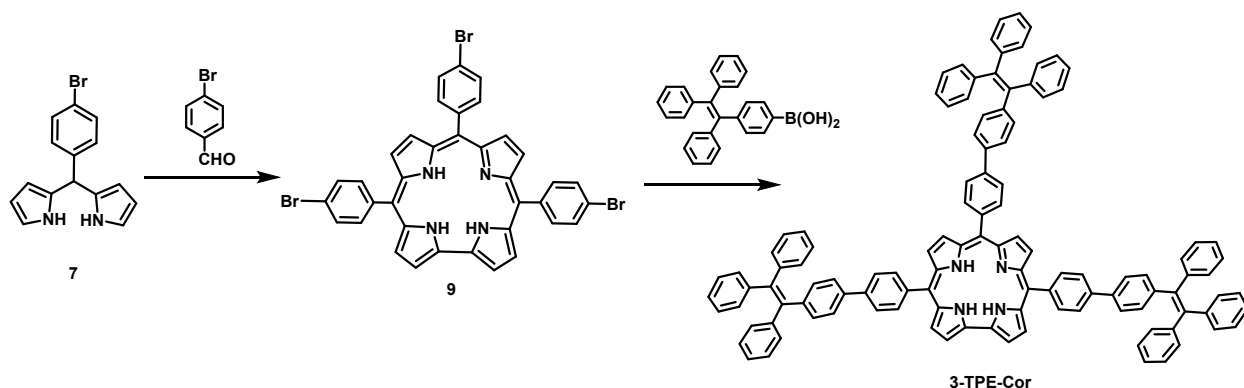
**Synthesis of 2-TPE-Cor:** **8** (0.300 g, 0.387 mmol) was dissolved in tetrahydrofuran and toluene (5 mL and 15 mL) followed by addition of [1,1'-Bis(diphenylphosphino)ferrocene]dichloropalladium(II) ( $\text{Pd}(\text{dppf})_2\text{Cl}_2$ ), (10 mg, 0.0127 mmol) and (4-(1,2,2-triphenylvinyl)phenyl)boronic acid (0.532 g, 1.16 mmol) was added and then add  $\text{Na}_2\text{CO}_3$  (53 mg, 0.508 mmol) which is dissolved in 2 mL of water to the reaction mixture. Then the reaction mixture was refluxed at 80 °C for 8 h. Then the mixture was poured onto water (50 mL) and extracted with DCM. The organic layers were dried over anhydrous  $\text{Na}_2\text{SO}_4$  and the solvent is removed under reduced pressure. The crude product was purified by column chromatography (silica gel, DCM/Hexane = 1:2, v/v). A purple green colour solid was obtained; yield: 58% (0.286 g, 0.225 mmol).

**$^1\text{H}$  NMR** (500 MHz,  $\text{CDCl}_3$ )  $\delta$  9.00 (d,  $J = 4.8$  Hz, 1H), 8.81 (d,  $J = 4.6$  Hz, 1H), 8.24 (d,  $J = 8.3$  Hz, 4H), 7.98 (d,  $J = 8.0$  Hz, 4H), 7.67 (d,  $J = 10.2$  Hz, 4H), 7.54 (d,  $J = 8.1$  Hz, 1H), 7.14 (d,  $J = 9.7$  Hz, 4H).  **$^{13}\text{C}$  NMR** (126 MHz,  $\text{CDCl}_3$ )  $\delta$  143.80, 143.73, 143.41, 140.87, 134.13, 131.47, 131.40, 130.75, 127.82, 127.77, 127.68, 126.62, 126.57, 126.49, 83.75, 29.77, 24.95.

MALDI-TOF-MS (m/z): Calculated mass = 1276.4503 (Found=1277.378).



### 2.3. Synthesis of 3-TPE-Cor:



#### Scheme S3. Synthesis of 3-TPE-Cor.

**Synthesis of 3-TPE-Cor:** 9 were synthesized by the above synthetic procedure of 8.

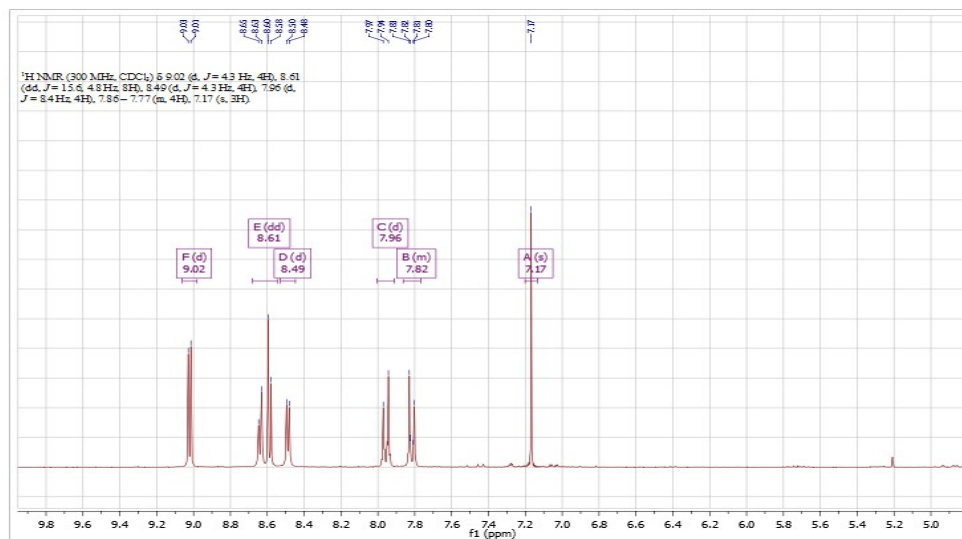
9 (0.100 g, 0.131 mmol) was dissolved in tetrahydrofuran and toluene (5 mL and 15 mL) followed by addition of [1,1'-Bis(diphenylphosphino) ferrocene]dichloropalladium(II) ( $\text{Pd}(\text{dppf})_2\text{Cl}_2$ ), (10 mg, 0.0127 mmol) and (4-(1,2,2-triphenylvinyl)phenyl)boronic acid (0.240 g, 0.524 mmol) was added and then add  $\text{Na}_2\text{CO}_3$  (53 mg, 0.508 mmol) which is dissolved in 2 mL of water to the reaction mixture. Then the reaction mixture was refluxed at 80 °C for 8 hrs. Then the mixture was poured onto water (50 mL) and extracted with DCM. The organic layers were dried over anhydrous  $\text{Na}_2\text{SO}_4$  and the solvent is removed under reduced pressure. The crude product was purified by column chromatography (silica gel, DCM/Hexane = 1:2, v/v). A purple green colour solid was obtained; yield: 55% (0.109 g, 0.072 mmol).

**$^1\text{H}$  NMR** (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.93 (d,  $J$  = 4.4 Hz, 7H), 8.60 (s, 3H), 8.39 (s, 3H), 8.20 (s, 6H), 8.01 (s, 4H), 7.96 (d,  $J$  = 8.2 Hz, 6H), 7.68 (s, 12H), 7.56 (s, 5H), 7.20 – 7.15 (m, 48H), 7.04 (d,  $J$  = 15.0 Hz, 98H).  **$^{13}\text{C}$  NMR** (101 MHz,  $\text{CDCl}_3$ )  $\delta$  149.79, 136.44, 135.94, 132.37, 128.03, 126.15, 123.50, 109.23, 83.71, 83.64, 83.54, 25.06, 24.90.

**MALDI-TOF-MS** ( $m/z$ ): Calculated mass = 1516.6383 (Found=1517.300).

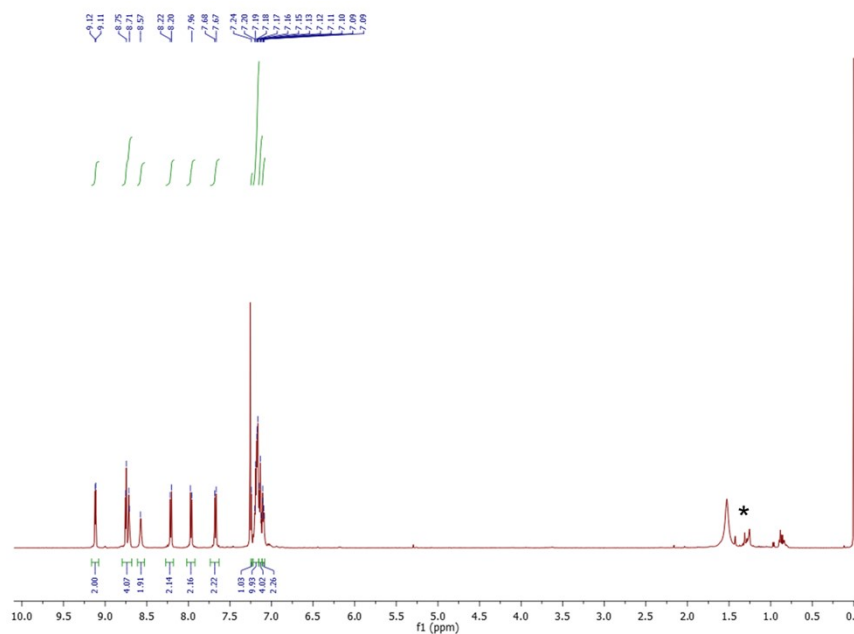
### 3. $^1\text{H}$ NMR Spectra:

#### 3.1. $^1\text{H}$ NMR spectrum of **4**:



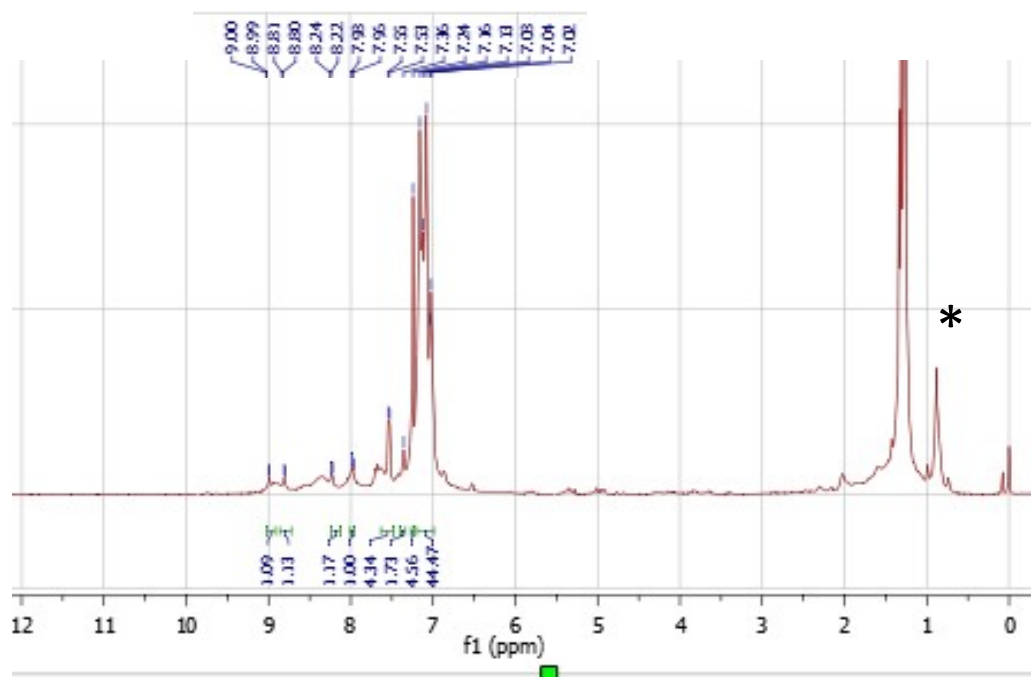
**Figure S1.**  $^1\text{H}$  NMR spectrum of **4** in  $\text{CDCl}_3$  (500 MHz).

#### 3.2. $^1\text{H}$ NMR spectrum of **1-TPE-Cor**:



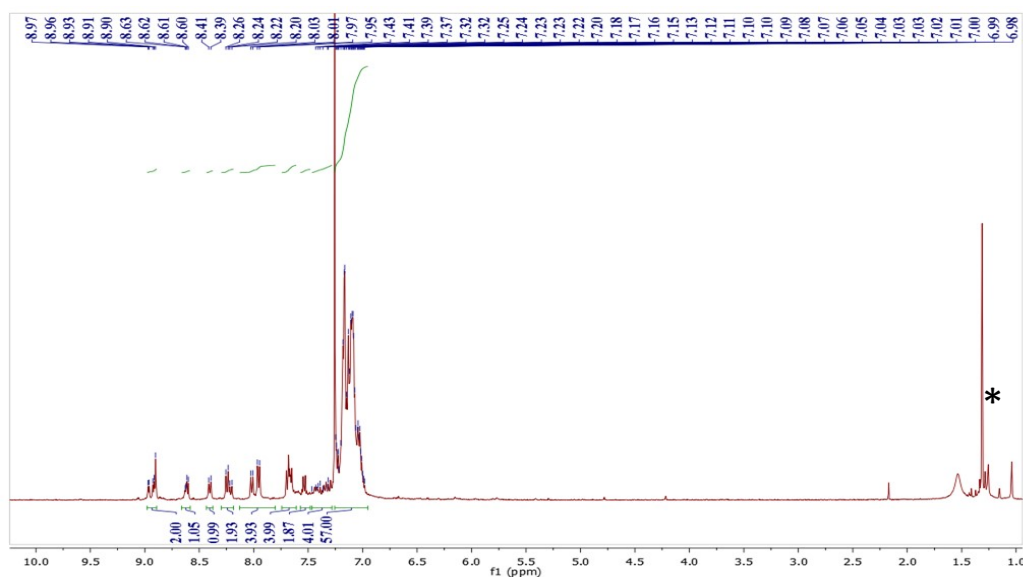
**Figure S2.**  $^1\text{H}$  NMR spectrum of **1-TPE-Cor** in  $\text{CDCl}_3$  (500 MHz). (\* represents solvent residues; Molecular Formula:  $\text{C}_{63}\text{H}_{34}\text{F}_{10}\text{N}_4$ )

### 3.3. $^1\text{H}$ NMR spectrum of 2-TPE-Cor:



**Figure S3.**  $^1\text{H}$  NMR spectrum of **2-TPE-Cor** in  $\text{CDCl}_3$  (500 MHz). (\* represents solvent residues; Molecular Formula  $\text{C}_{89}\text{H}_{57}\text{F}_5\text{N}_4$ )

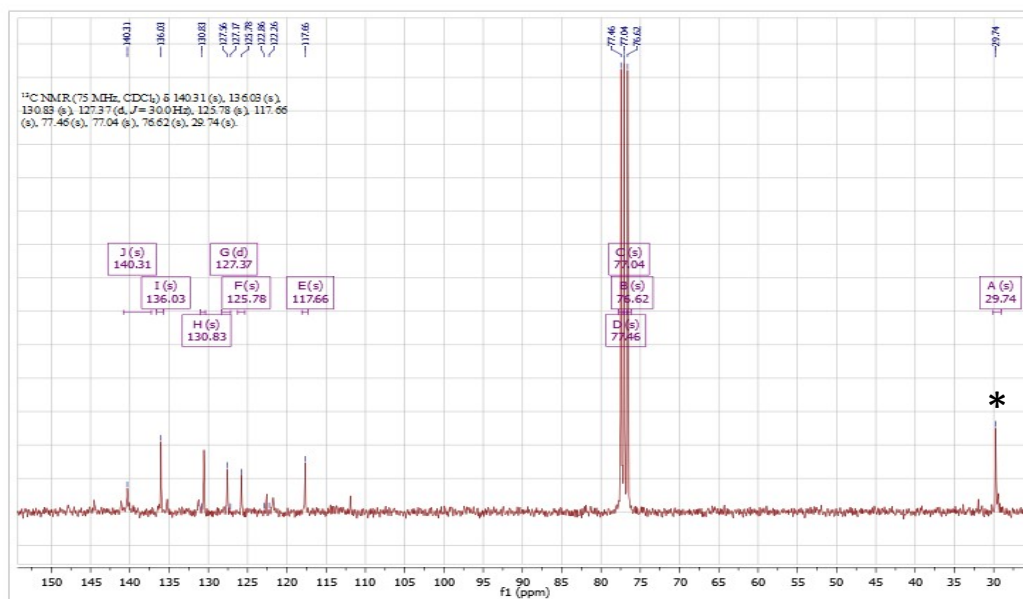
### 3.4. $^1\text{H}$ NMR spectrum of 3-TPE-Cor:



**Figure S4.**  $^1\text{H}$  NMR spectrum of **3-TPE-Cor** in  $\text{CDCl}_3$  (500 MHz). (\* represents solvent residues; Molecular Formula  $\text{C}_{115}\text{H}_{80}\text{N}_4$ )

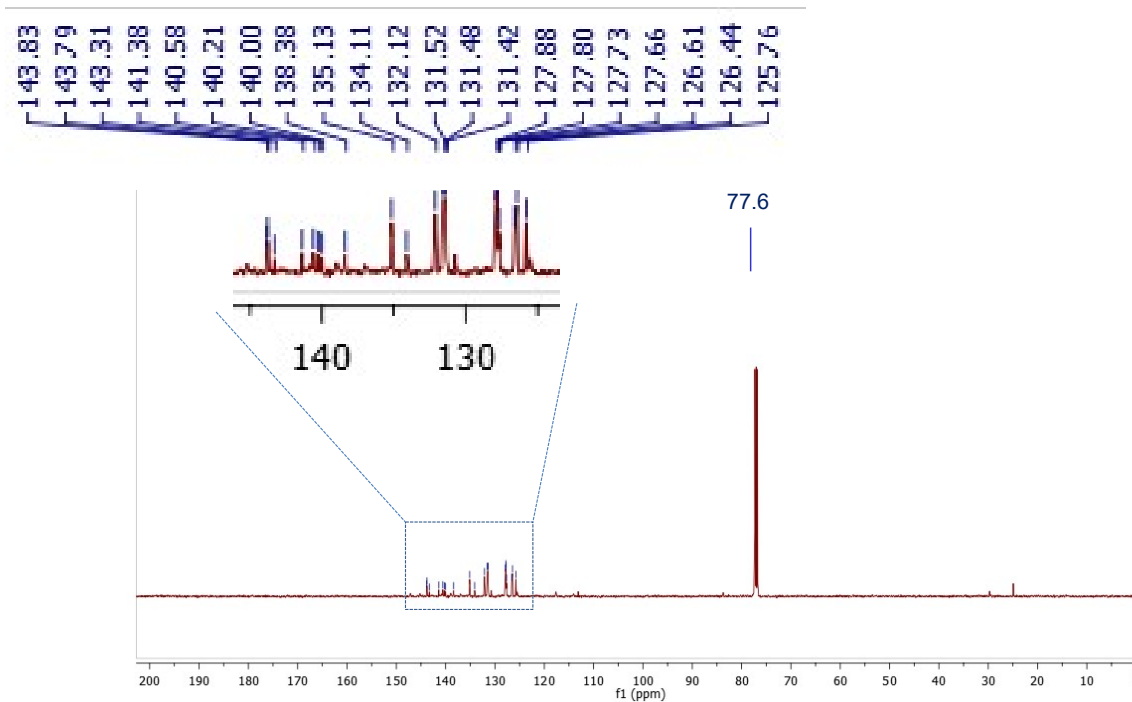
#### 4. $^{13}\text{C}$ NMR Spectra:

##### 4.1. $^{13}\text{C}$ NMR spectrum of 4:



**Figure S5.**  $^{13}\text{C}$  NMR spectrum of **4** in  $\text{CDCl}_3$  (126 MHz) (\* represents solvent residues).

##### 4.2. $^{13}\text{C}$ NMR spectrum of 1-TPE-Cor:



**Figure S6.**  $^{13}\text{C}$  NMR spectrum of **1-TPE-Cor** in  $\text{CDCl}_3$  (126 MHz).

4.3.  $^{13}\text{C}$  NMR spectrum of 2-TPE-Cor:

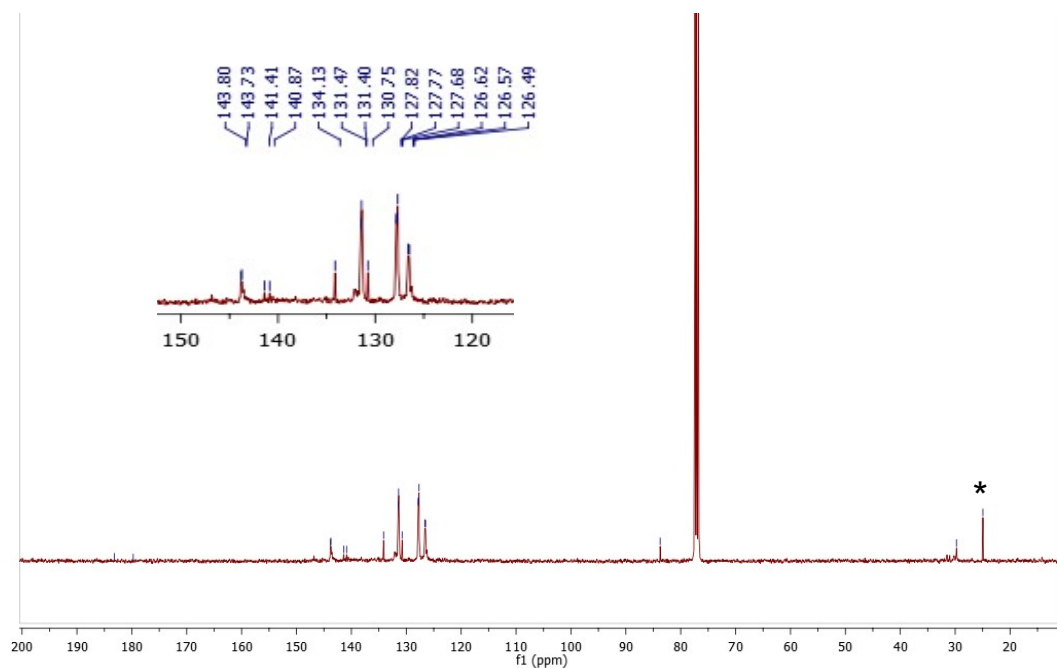


Figure S7.  $^{13}\text{C}$ NMR spectrum of 2-TPE-Cor in  $\text{CDCl}_3$  (126 MHz) (\* represents solvent residues).

4.4.  $^{13}\text{C}$  NMR spectrum of 3-TPE-Cor:

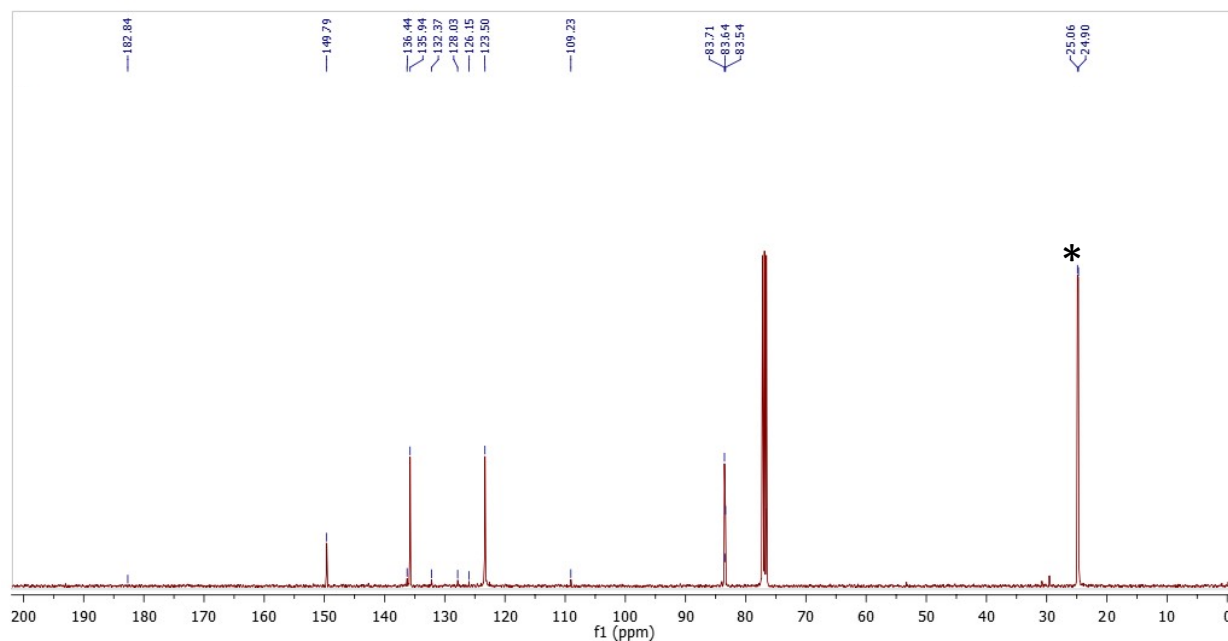
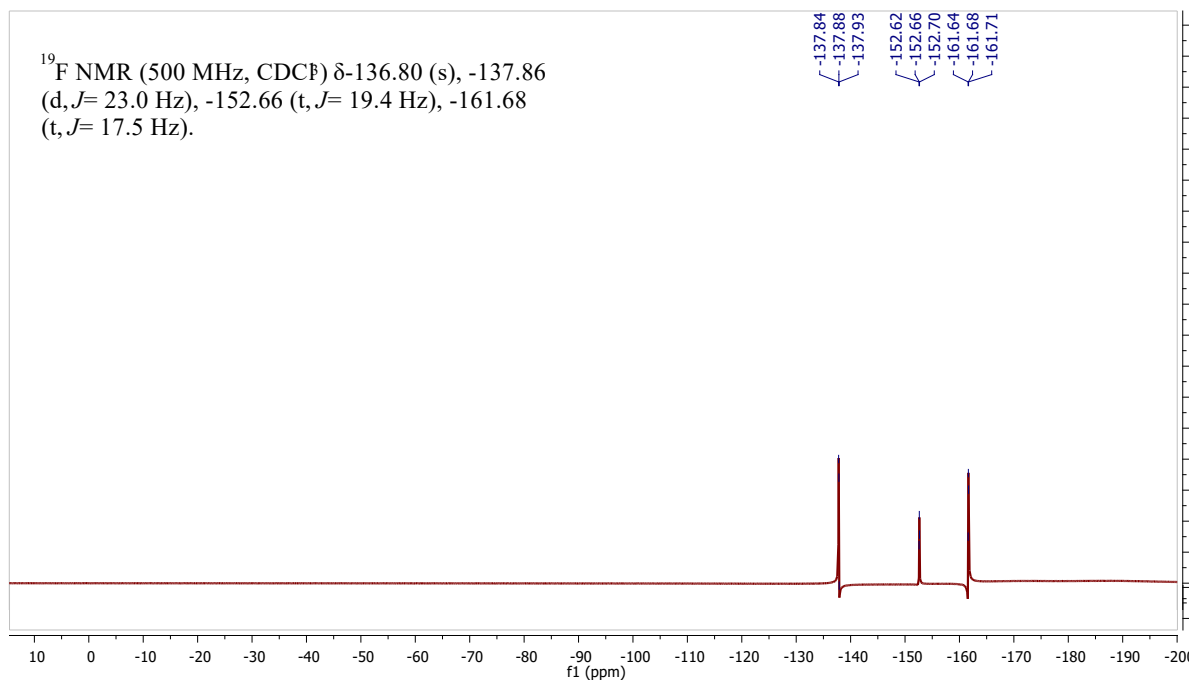


Figure S8.  $^{13}\text{C}$  NMR spectrum of 3-TPE-Cor in  $\text{CDCl}_3$  (126 MHz) (\* represents solvent residues).

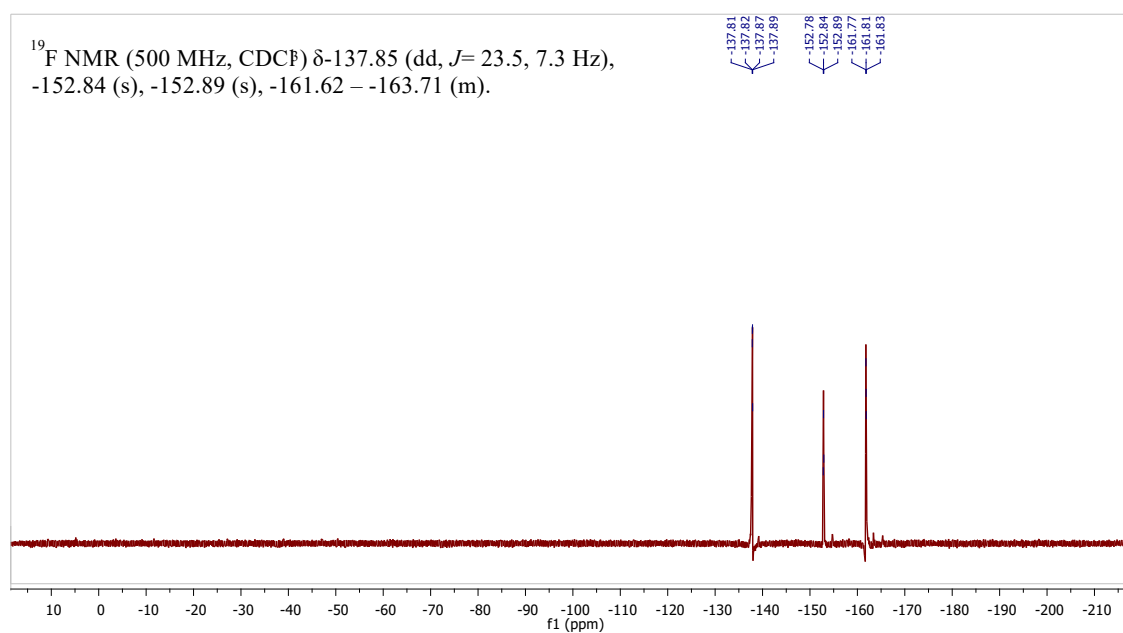
## 5. $^{19}\text{F}$ NMR Spectra

### 5.1 $^{19}\text{F}$ NMR spectrum of 4:



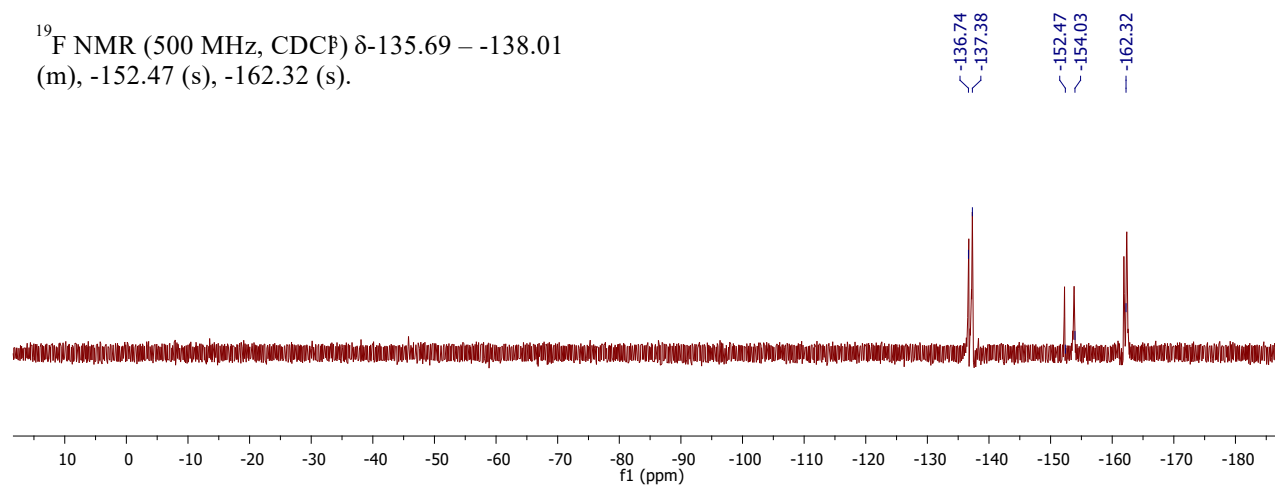
**Figure S9.**  $^{19}\text{F}$  NMR spectrum of **4** in  $\text{CDCl}_3$  (470.4 MHz).

### 5.2 $^{19}\text{F}$ NMR spectrum of 1-TPE-Cor:



**Figure S10.**  $^{19}\text{F}$  NMR spectrum of **1-TPE-Cor** in  $\text{CDCl}_3$  (470.4 MHz).

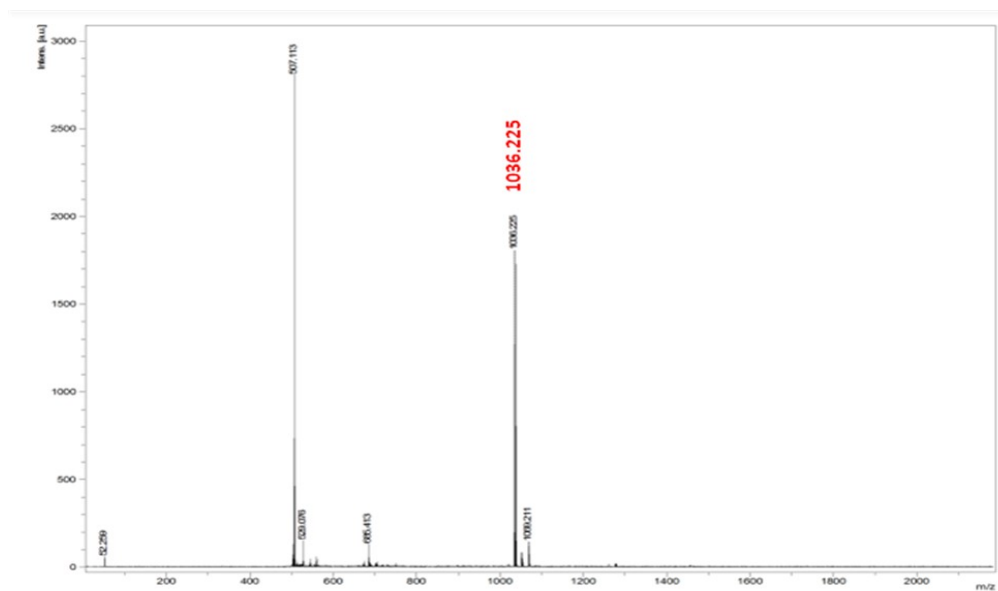
### 5.3 $^{19}\text{F}$ NMR spectrum of 2-TPE-Cor:



**Figure S11.**  $^{19}\text{F}$  NMR spectrum of **2-TPE-Cor** in  $\text{CDCl}_3$  (470.4 MHz).

## 6. MALDI-TOF-MS Spectra:

### 6.1. MALDI-TOF-MS spectrum of 1-TPE-Cor:



**Figure S12.** MALDI-TOF-MS spectrum of **1-TPE-Cor**.

## 6.2. MALDI-TOF-MS spectrum of 2-TPE-Cor:

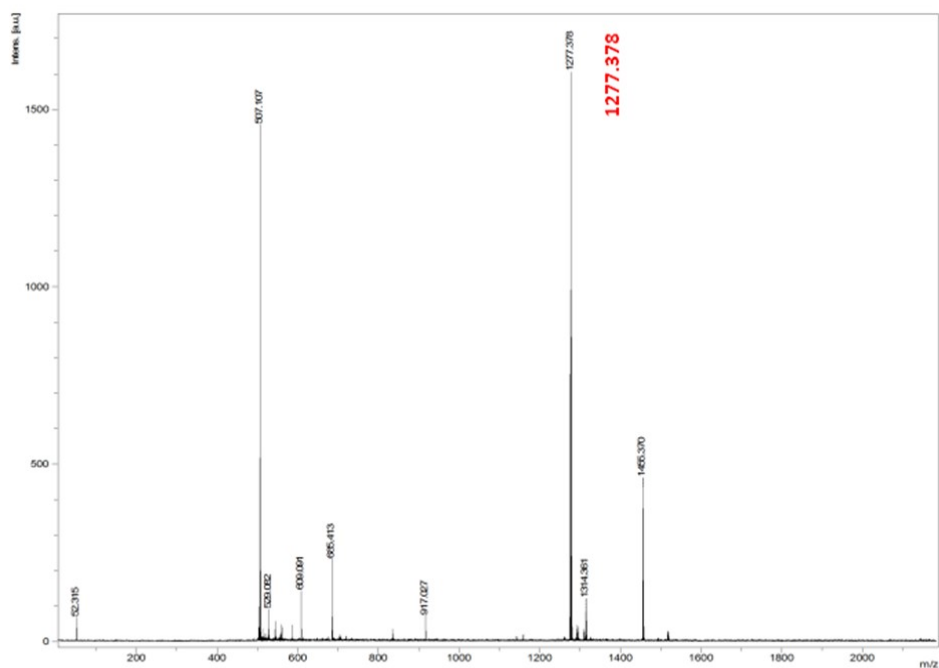


Figure S13: MALDI-TOF-MS spectrum of 2-TPE-Cor.

## 6.3. MALDI-TOF-MS spectrum of 3-TPE-Cor:

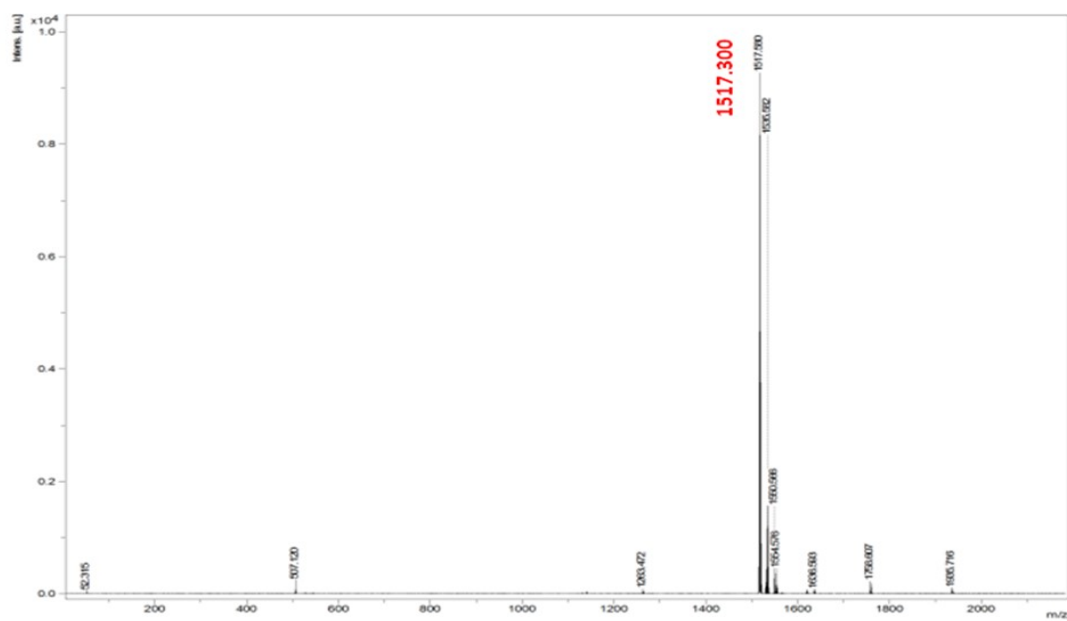
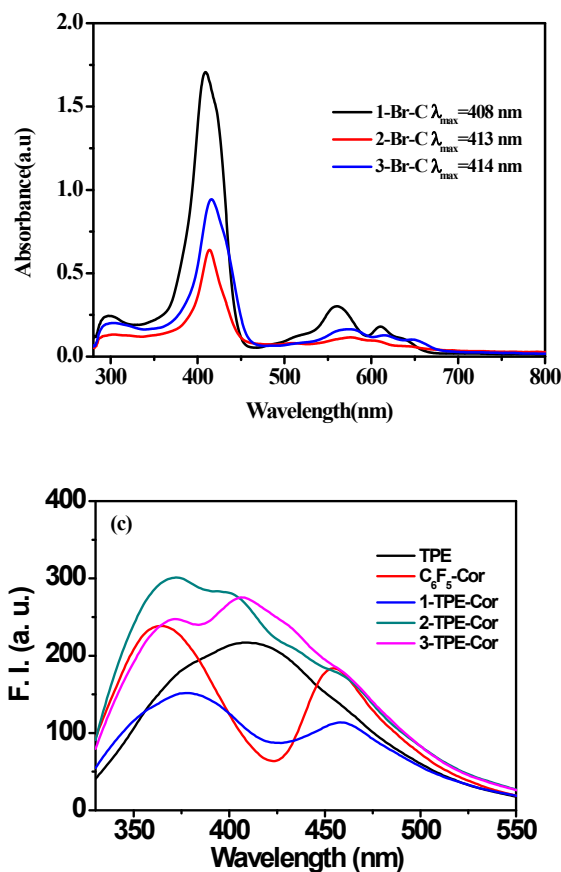


Figure S14: MALDI-TOF-MS spectrum of 3-TPE-Cor.



## 7. Photophysical Studies:

### 7.1. UV and Emission spectra of 1-TPE-Cor, 2-TPE-Cor and 3-TPE-cor with pristine compounds:



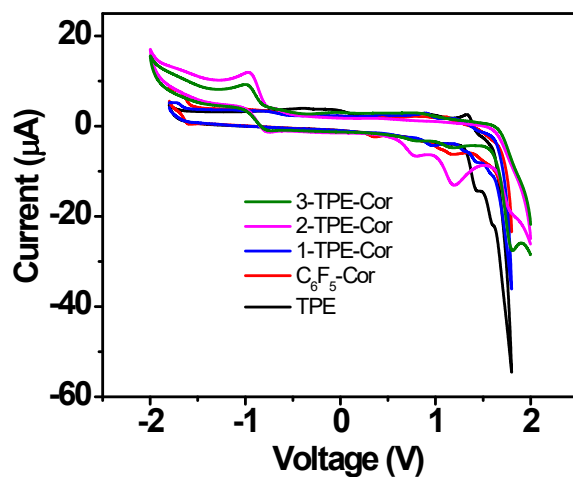
**Figure S15.** a) UV-Visible spectra of pristine compounds. b) Emission spectra of TPE, C<sub>6</sub>F<sub>5</sub>-Cor and TPE-Corroles (1-3) in DCM with a concentration of  $1 \times 10^{-4}$  M at an excitation wavelength of 315 nm.

**7.2. Table S1. Photo physical data of 1-TPE-Cor, 2-TPE-Cor and 3-TPE-Cor with pristine compounds:**

Compound	Absorption $\lambda_{\max}$ nm ( $\epsilon \times 10^3$ , mol <sup>-1</sup> cm <sup>-1</sup> ) <sup>a</sup>	$\lambda_{\text{ex}} = 315$	$\lambda_{\text{ex}} = 412$	$\tau(\text{ns})^d$		Potential V vs. SCE <sup>d</sup>	
		$\lambda_{\text{em}}$ nm ( $\Phi$ Q%) <sup>b</sup>		$\lambda_{\text{ex}} = 301$ nm	$\lambda_{\text{ex}} = 405$ nm	Oxidation	Reduction
TPE	310 (32.25)	374 (0.001)	-	3.13 (32) 13.8 (68)	-	0.91 1.38 1.66	-
C <sub>6</sub> F <sub>5</sub> -Cor	407 (191.41) 560 (30.42) 604 (17.04)	-	650 (0.14)	4.77 (100)		1.15	-0.86 -1.61
1-Br-Cor	297 (25.57) , 408(171.55) , 559(31.48) , 609(19.02)	-		-		-	
2-Br-Cor	302(13.93) , 413(65.08) , 578(12.4) , 607(10.03)	-		-		-	
3-Br-Cor	300(21.18) , 414(95.58) , 570(17.26) , 616(14.16)	-		-		-	
<b>1-TPE-Cor</b>	310 (57.1) 412 (219.4) 560 (34.4) 612 (20.4)	376	660 (0.10, 29)	1.98 (70) 1.08 (30)	3.58 (92) 9.08 (08)	0.94 1.30 1.40	-0.87 -1.69
<b>2-TPE-Cor</b>	315(62.5) 423(181) 584(28.9) 613(26.4)	378	663 (0.09, 35)	3.47 (30) 1.25 (46) 1.10 (24)	6.78 (11) 3.12 (70) 9.13 (19)	0.79 1.19 1.78	-0.76 -1.46
<b>3-TPE-Cor</b>	315(145.9) 425(205.8) 581(30.7) 622(29.5)	378	680 (0.08, 43)	3.01 (35) 1.10 (25) 1.20 (40)	3.43 (09) 2.91 (70) 8.35 (21)	0.76 1.39 1.81	-0.76 -1.67

<sup>a</sup>Solvent: DCM, error limits:  $\lambda_{\max}$ ,  $\pm 1$  nm,  $\epsilon \pm 10\%$ . <sup>b</sup>Error limits:  $\lambda_{\text{em}}$ ,  $\pm 1$  nm. <sup>d</sup>Error limits  $\tau \approx 10\%$ . <sup>e</sup>Solvent: DCM, error limits:  $E_{\text{ox,red}} \pm 0.03$  V, 0.1 M TBAP.

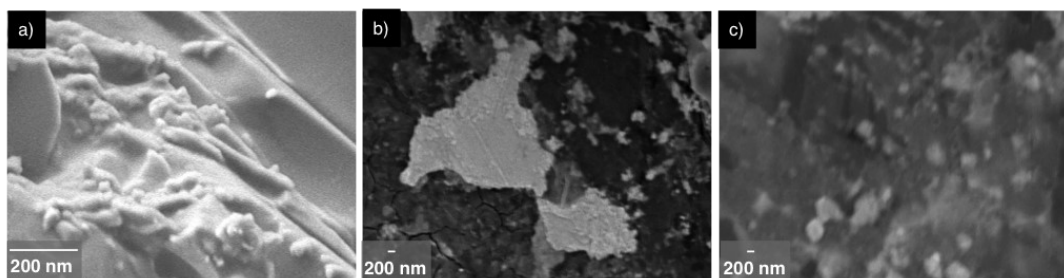
**8. Cyclic Voltammetry Studies:**



**Figure S16.** Cyclic voltammetric graph of TPE, C<sub>6</sub>F<sub>5</sub>-Cor and TPE-Corroles (1-3) in CH<sub>2</sub>Cl<sub>2</sub>.

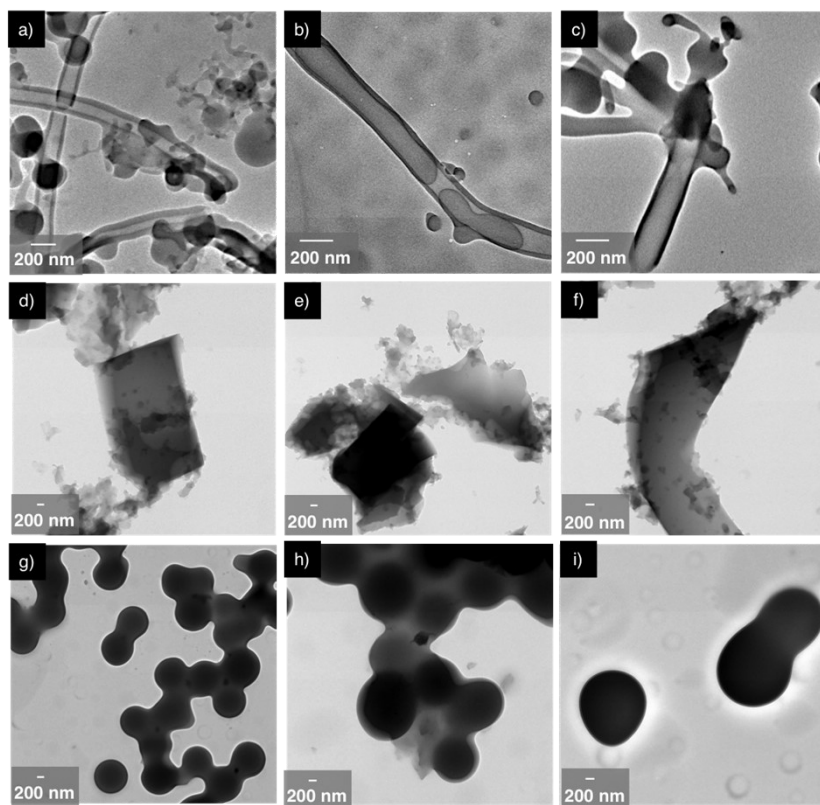
## 9. Microscopic Analyses:

### 9.1. SEM Images of TPE-Corroles (1-3) in aggregated state:



**Figure S17.** SEM images of a) 1-TPE-Cor, b) 2-TPE-Cor, and c) 3-TPE-cor aggregates drop casted from methanol ( $c = 1 \times 10^{-4}$  M).

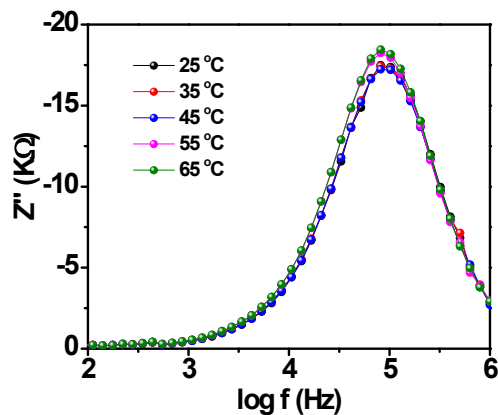
### 9.2. TEM Images of TPE-Corroles (1-3) in aggregated state:



**Figure S18.** TEM images of TPE-corroles at different places: a,b,c) 1-TPE-Cor, d,e,f) 2-TPE-Cor, and g,h,i) 3-TPE-cor aggregates drop casted from methanol ( $c = 1 \times 10^{-4}$  M).

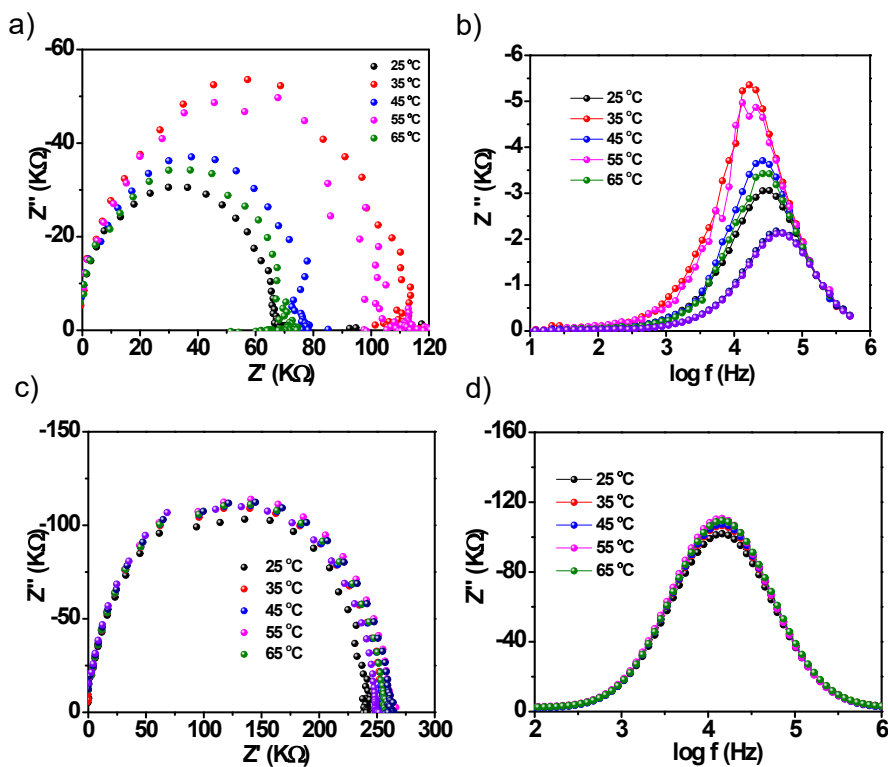
## 10. Electrochemical Impedance Spectral (EIS) analyses of three derivatives:

### 10.1. EIS of 1-TPE-Cor:



**Figure S19.** Temperature-dependent frequency vs imaginary impedance of 1-TPE-Cor.

### 10.2. EIS of 2-TPE-Cor and 3-TPE-Cor



**Figure S20.** Temperature-dependent Nyquist Plot and frequency vs imaginary impedance of a,b ) 2-TPE-Cor and c,d) 3-TPE-Cor.

### 10.3. Table S2: Electrochemical impedance data of three derivatives:

where,  $R_b$  = bulk resistance;  $f_p$  = bulk frequency,  $\sigma$  = specific conductivity,  $C_b$  = bulk capacitance, and  $\tau_b$  = the bulk relaxation time and estimated for the samples at variable temperatures.

Sample	T(°C)	Bulk Resistance ( $R_b$ K $\Omega$ )	Specific Conductivity $\sigma$ (S/Cm)	$f_p$ (M Hz)	Bulk Relaxation Time $\tau_b$ ( $\mu$ s)	Bulk Capacitance $C_b$ (pf)
1-TPE-Cor	25	35.569	3.5	0.082	1.931	0.542
	35	36.731	3.4	0.079	2.006	0.546
	45	37.666	3.3	0.079	2.013	0.534
	55	38.806	3.2	0.079	2.013	0.518
	65	38.978	3.2	0.078	2.039	0.523
2-TPE-Cor	25	117.4	1.064	5.08	0.0272	0.266
	35	159.09	0.785	3.39	0.1047	0.295
	45	85.39	1.463	5.32	0.1655	0.350
	55	126.51	0.988	4.13	0.0052	0.304
	65	74.67	1.674	5.08	0.2237	0.419
3-TPE-Cor	25	263.84	0.473	0.11	1.447	0.005
	35	258.06	0.484	0.161	0.989	0.003
	45	253.08	0.493	0.169	0.942	0.003
	55	261.45	0.478	0.11	1.447	0.005
	65	262.39	0.476	0.14	1.137	0.004

### 11. Reference:

1. A. Ch. Lazanas and M. I. Prodromidis, *ACS Meas. Sci. Au.* 2023, **3**, 162
2. L. Giribabu, K. Sudhakar, G. Sabapathi, and R. K. Kanaparthi. *J. Photochem. Photobiol. A: Chem.* 2014, **284**, 18 – 26.