

# Ambipolar PEDOT-perfluorinated porphyrin electropolymer. Application as active material in energy storage systems

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## Table of Contents

Description	Page N°
<b>Experimental Procedures. Materials and Instrumentation</b>	S-3
<b>Figure S1.</b> Spectroelectrochemical cell	S-4
<b>Figure S2.</b> <sup>1</sup> H NMR spectrum of compound TPPF <sub>20</sub>	S-5
<b>Figure S3.</b> <sup>19</sup> F NMR spectrum of compound TPPF <sub>20</sub>	S-6

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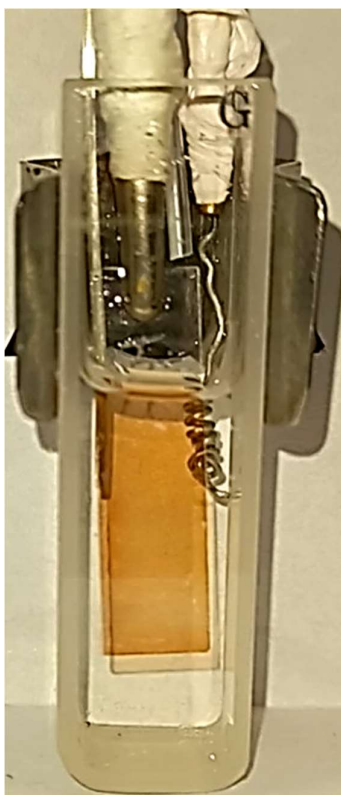
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*E-mail address:* dheredia@exa.unrc.edu.ar (D.A. Heredia).

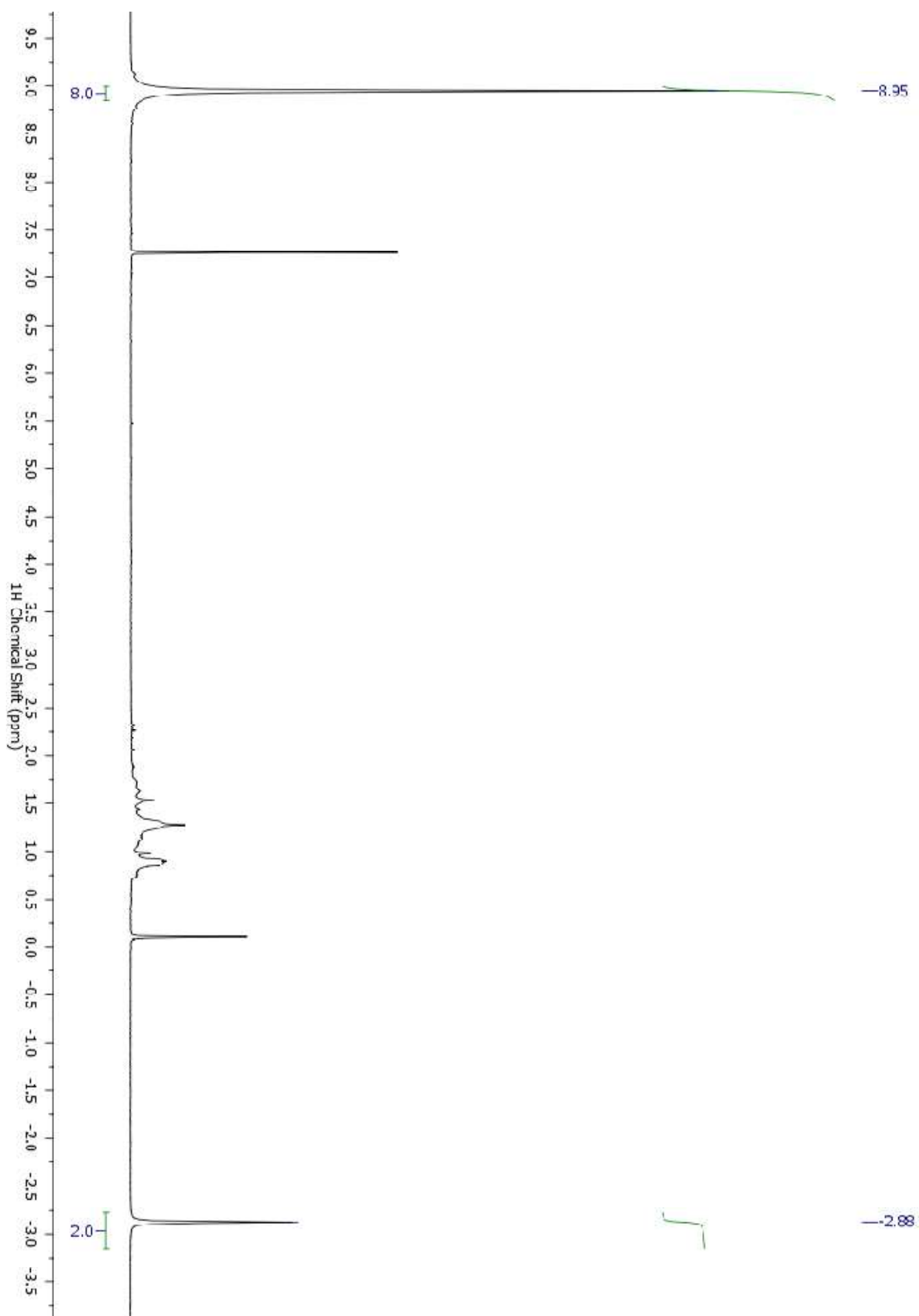
<b>Figure S4.</b> $^1\text{H}$ NMR spectrum of compound <b>EDOT-TPPF<sub>16</sub></b>	S-7
<b>Figure S5.</b> COSY NMR spectrum of compound <b>EDOT-TPPF<sub>16</sub></b>	S-8
<b>Figure S6.</b> $^{19}\text{F}$ NMR spectrum of compound <b>EDOT-TPPF<sub>16</sub></b>	S-9
<b>Figure S7.</b> MALDI-TOF of compound <b>EDOT-TPPF<sub>16</sub></b>	S-10
<b>Figure S8.</b> FTIR spectrum of compound <b>EDOT-TPPF<sub>16</sub></b>	S-11
<b>Figure S9.</b> Fluorescence emission spectra of <b>TPPF<sub>20</sub></b> and <b>EDOT-TPPF<sub>16</sub></b>	S-12
<b>Figure S10.</b> XRD corresponding to PEDOT-TPPF <sub>16</sub> sample.	S-13
<b>Figure S11.</b> Comparative FT-IR spectra (ATR mode) for <b>EDOT-TPPF<sub>16</sub></b> , and <b>PEDOT-TPPF<sub>16</sub></b> .	S-14
<b>Schem S1.</b> PEDOT polymerization mechanism	S-15
<b>References</b>	S-16

## Experimental Procedures. Materials and Instrumentation

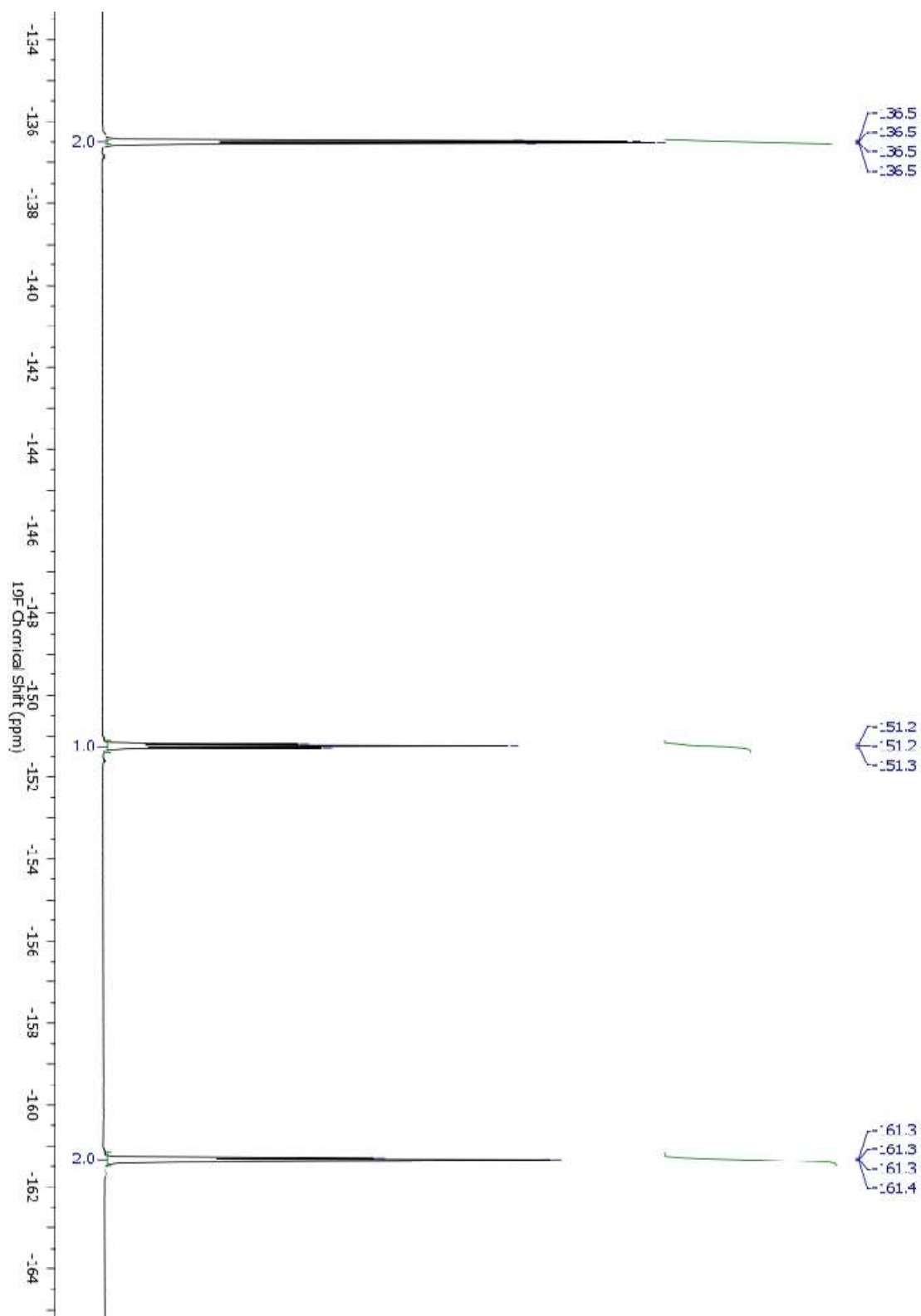
All chemicals were commercially acquired from Sigma-Aldrich and used without further purification. DMF was dried using previously established procedures.<sup>i</sup> DMF, DCE and ACN were stored with 3Å molecular sieves for at least 24 h before use. Molecular sieves were pre-dried at 300 °C for 24 h immediately before use.<sup>ii</sup> Reactions were run under an argon atmosphere with freshly anhydrous distilled solvents and employing oven-dried glassware. The reactions were monitored by TLC (silica gel 60 GF254). Flash column chromatographies were performed in silica gel 60 H (0,040-0,063 mM, 230-400 mesh ASTM, Merck) by gradient elution of mixture of hexane/DCM, under positive pressure of nitrogen. Nuclear magnetic resonance (NMR) spectra were performed on an FT-NMR Bruker Advance DPX400 at 400 MHz (Bruker BioSpin, Rheinstetten, Deutschland) spectrometer. Me<sub>4</sub>Si was used as the internal standard and CDCl<sub>3</sub> as solvent. <sup>1</sup>H spectra were acquired at 400. Resonances of CHCl<sub>3</sub> in CDCl<sub>3</sub>: δ 7.26 for <sup>1</sup>H. The magnitudes of the coupling constants (*J*) are given in Hertz. 2D-NMR (COSY) and <sup>19</sup>F experiment were also recorded. Mass spectrum of was obtained with a Voyager DE STR matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometer in positive ion mode, and *trans,trans*-1,4-diphenyl-1,3-butadiene was used as matrix. Absorption spectra were carried out on a Shimadzu UV-2401PC spectrometer (Shimadzu Corporation, Tokyo, Japan). Absorption spectra and spectroelectrochemical measurements of PEDOT-TPPF<sub>16</sub> were carried out on a UV-Visible Spectrophotometer Hewlett Packard-Diode Matrix 8453. Fluorescence spectra were performed on FluoroMax-4 spectrofluorometer (Horiba Jobin Yvon Inc, Edison, NJ, USA). FTIR measurement was performed using a Bruker Vertex 70 spectrometer in absorption mode under a dry nitrogen purge with a 2 cm<sup>-1</sup> resolution, GloBar MIR source, broadband KBr beamsplitter, and liquid nitrogen cooled MCT detector.



**Figure S1.** Spectroelectrochemical cell. Working electrode: PEDOT-TPPF<sub>16</sub> electrodeposited on ITO. Reference electrode: silver. Counter electrode: platinum.



**Figure S2.**  $^1\text{H}$  NMR spectrum of compound **TPPF<sub>20</sub>** in  $\text{CDCl}_3$ .



**Figure S3.**  $^{19}\text{F}$  NMR spectrum of compound TPPF<sub>20</sub> in CDCl<sub>3</sub>.

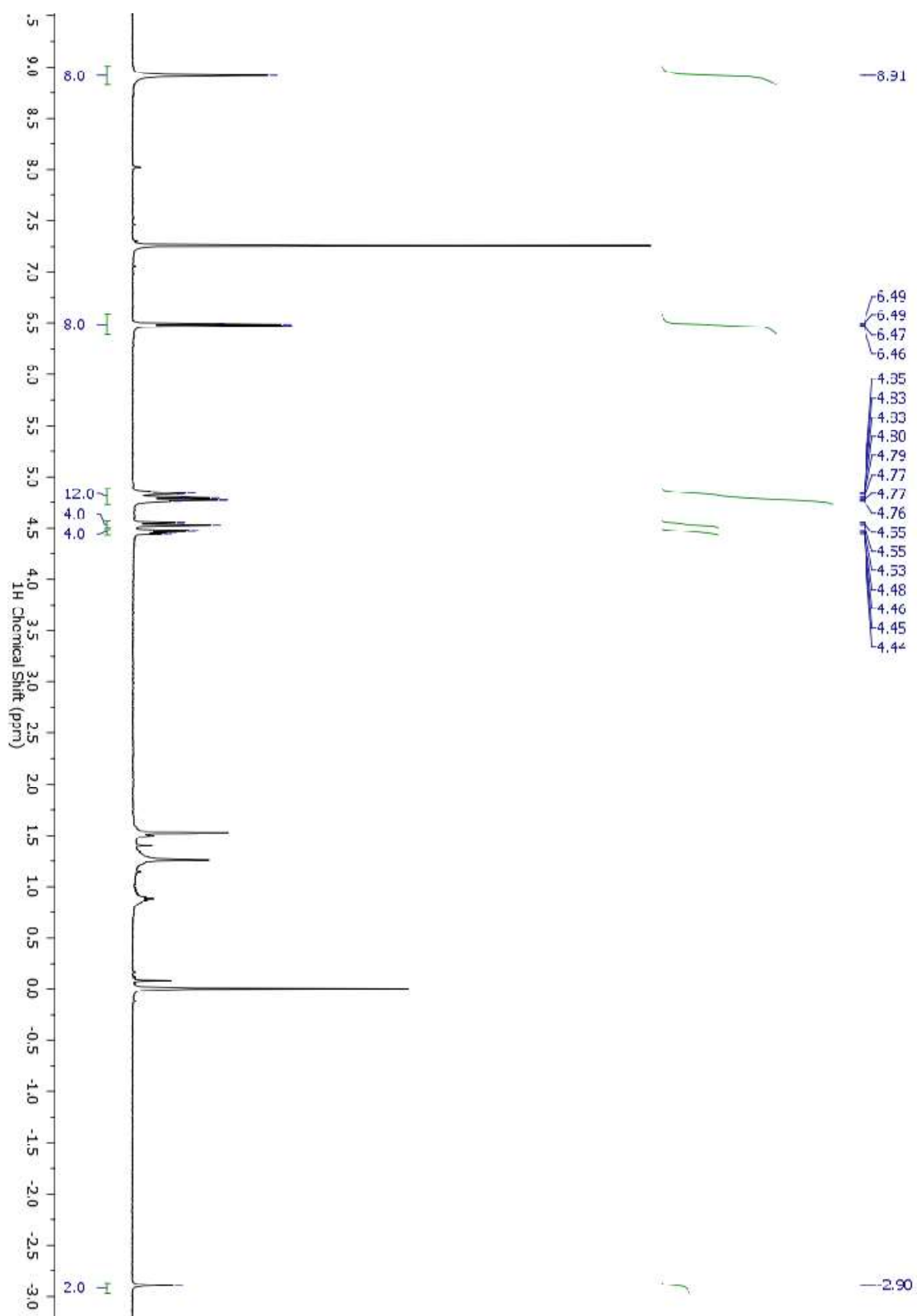
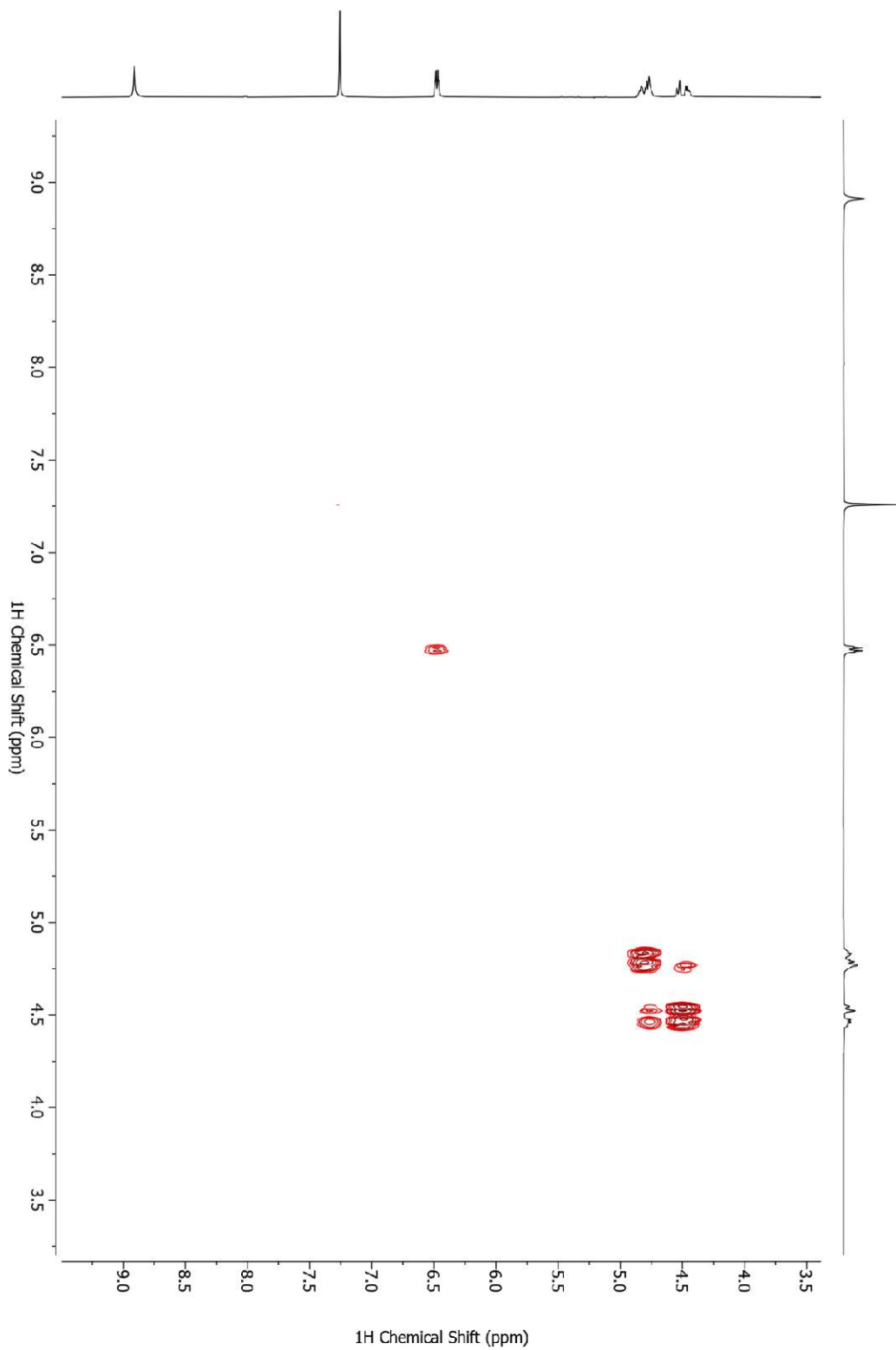


Figure S4.  $^1\text{H}$  NMR spectrum of compound EDOT-TPPF<sub>16</sub> in CDCl<sub>3</sub>.



**Figure S5.** COSY NMR spectrum of compound **EDOT-TPPF<sub>16</sub>** in  $\text{CDCl}_3$ .



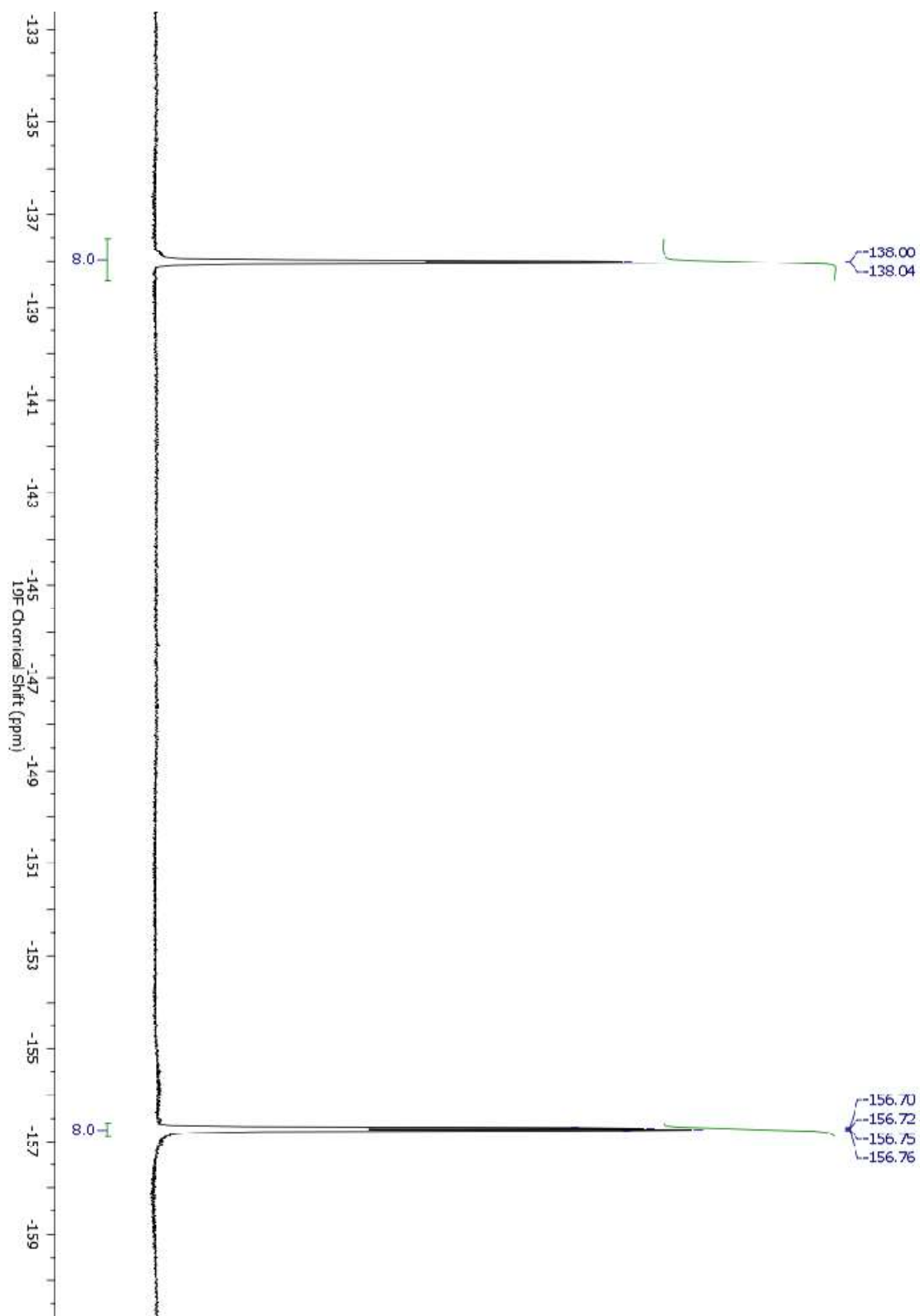
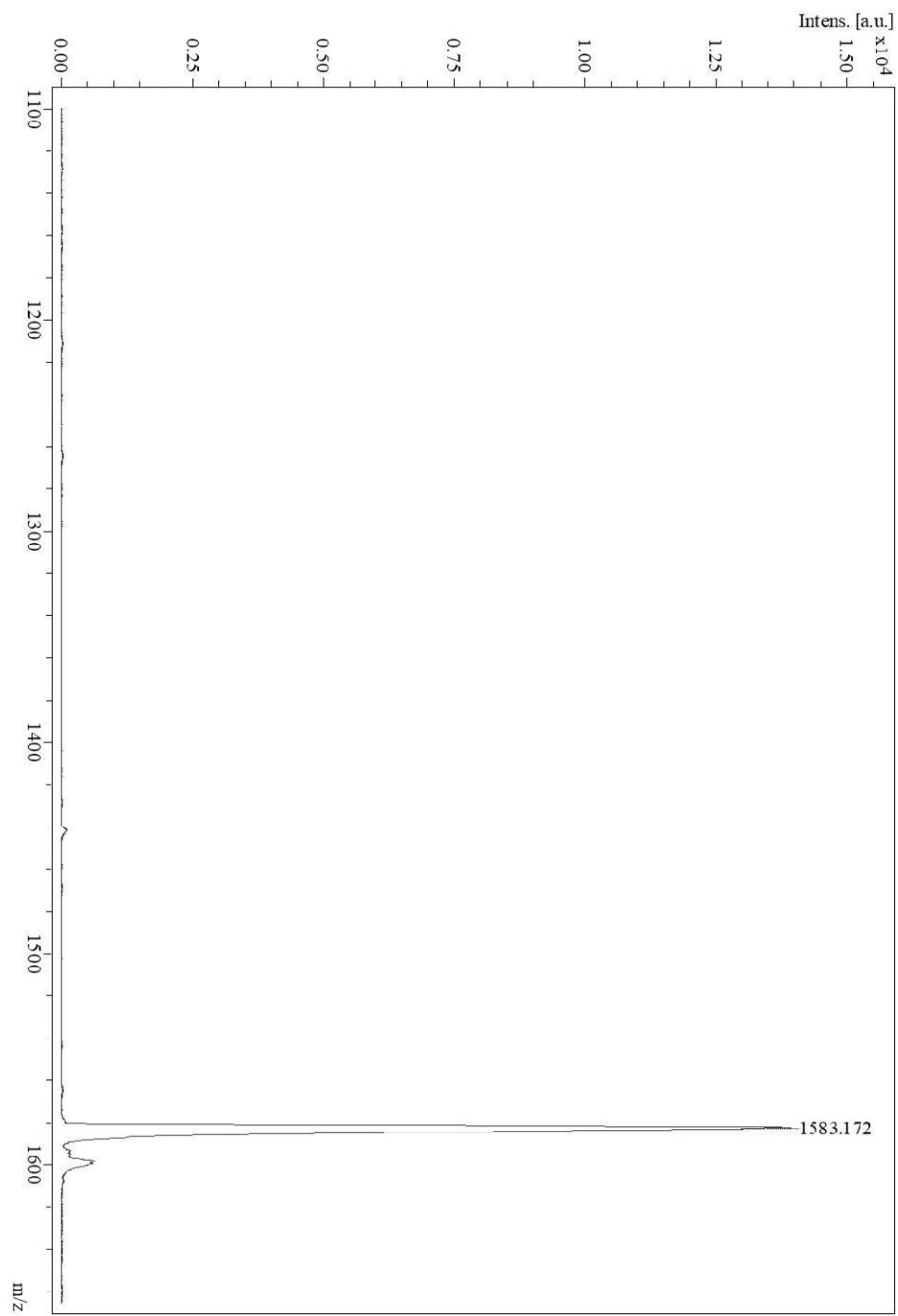
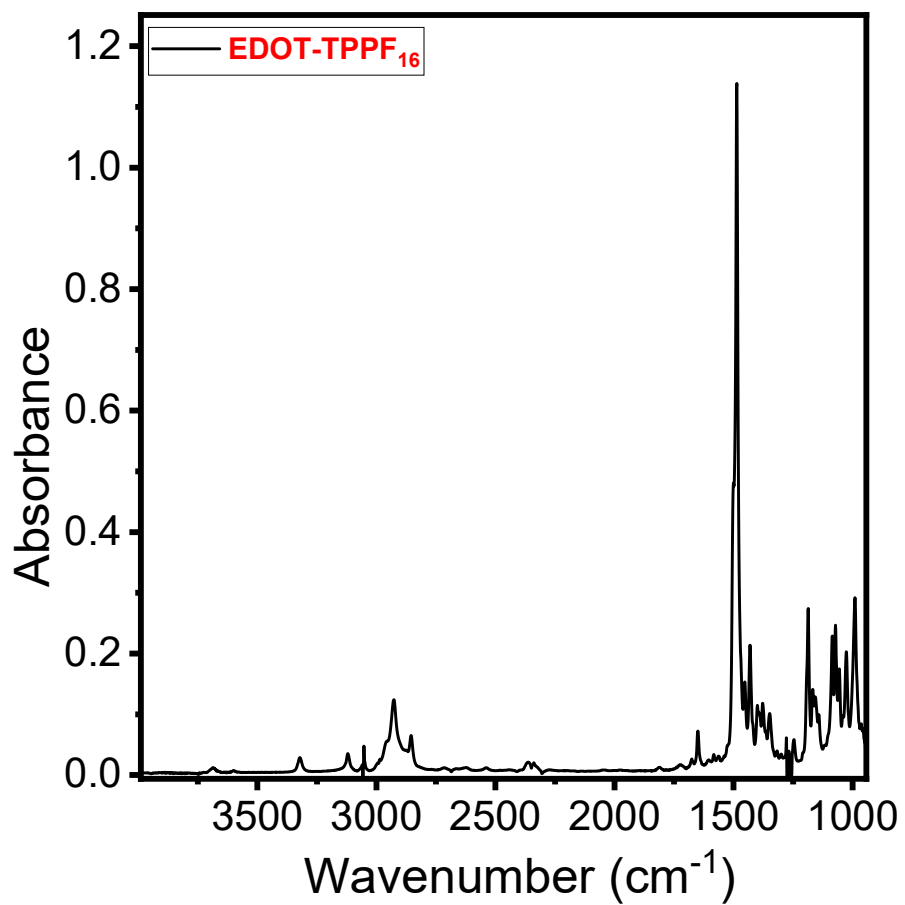


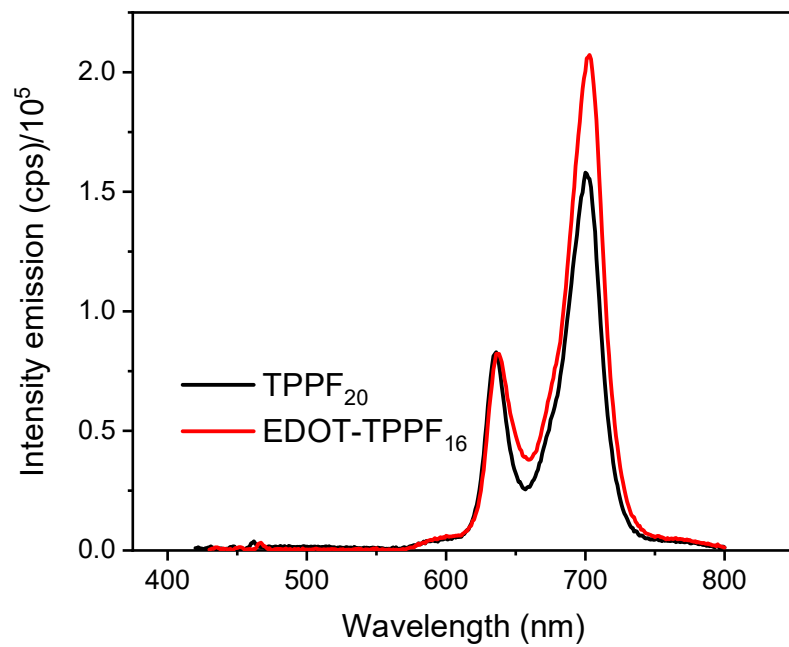
Figure S6.  $^{19}\text{F}$  NMR spectrum of compound EDOT-TPPF<sub>16</sub> in CDCl<sub>3</sub>.



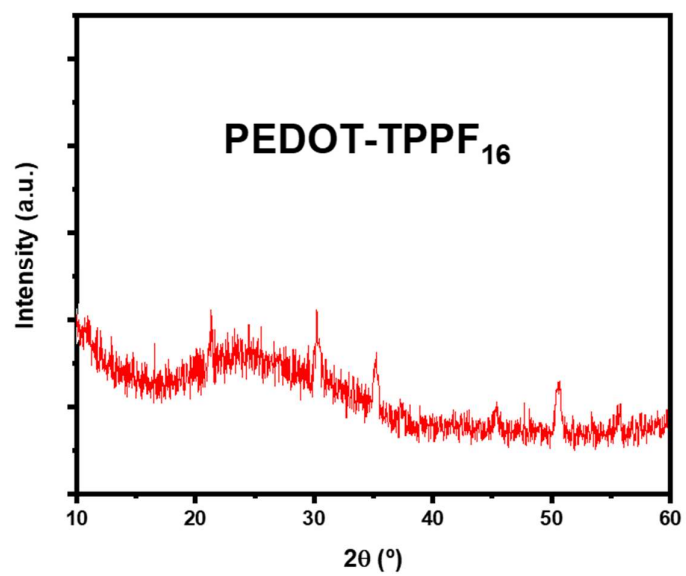
**Figure S7.** MALDI-TOF spectrum of compound **EDOT-TPPF<sub>16</sub>**.



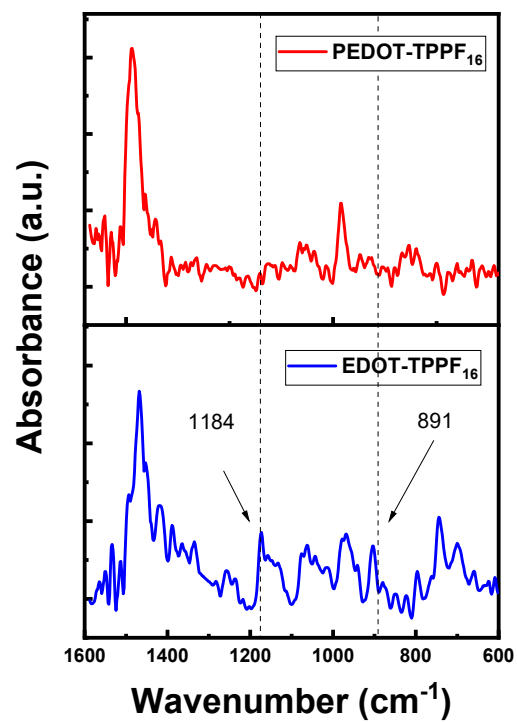
**Figure S8.** FTIR spectrum of compound **EDOT-TPPF<sub>16</sub>** in KBr disks.



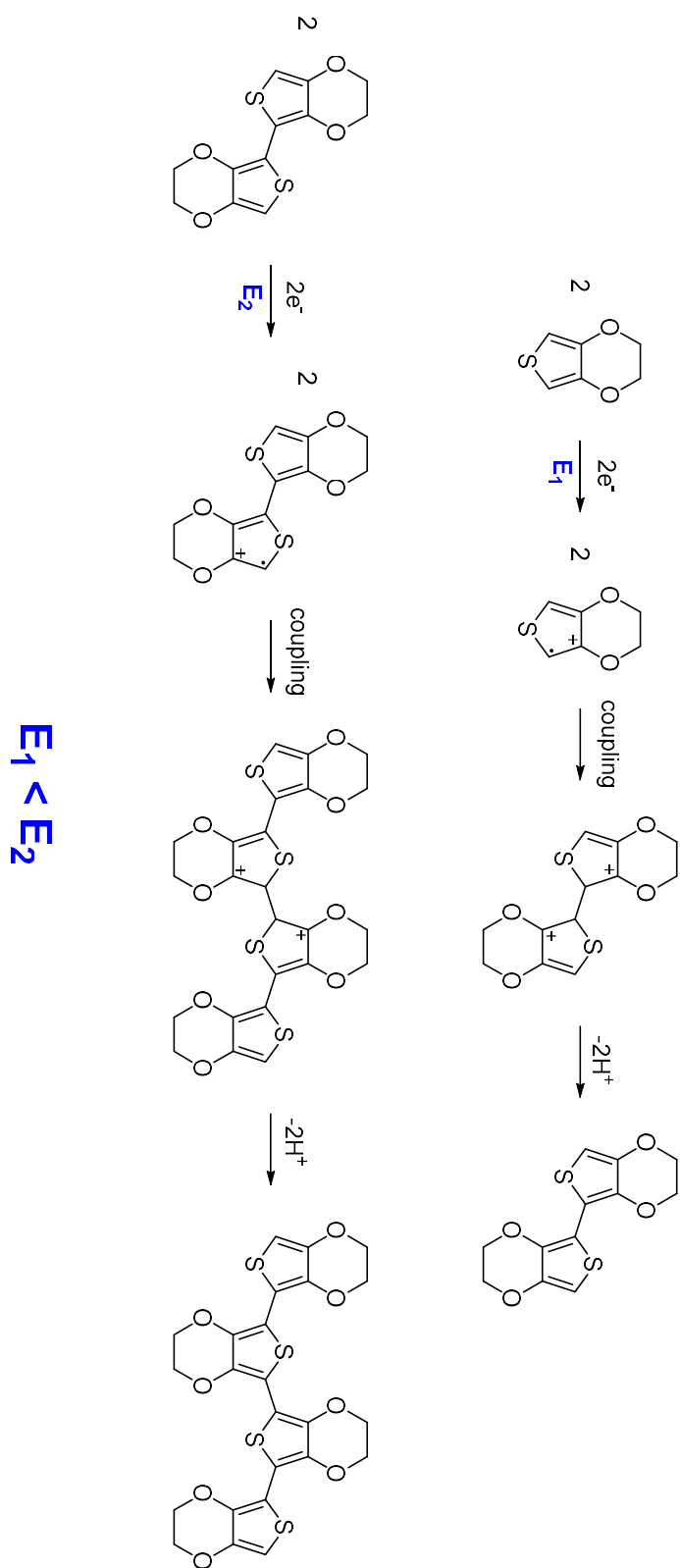
**Figure S9.** Fluorescence emission spectra recorded in diluted acetonitrile solution at room temperature.  $\lambda_{\text{exc}}$ : Soret band. (Abs = 0.1 at Soret band).



**Figure S10.** XRD corresponding to **PEDOT-TPPF<sub>16</sub>** electrodeposited on ITO.



**Figure S11.** Comparative FT-IR spectra (ATR mode) for **EDOT-TPPF<sub>16</sub>**, and **PEDOT-TPPF<sub>16</sub>**.



Scheme S1. PEDOT polymerization mechanism.

## References

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