

## Synthesis of Siprodithienogermoles with Triphenylamine Units as a Dopant-Free Hole-Transporting Material of Perovskite Solar Cells

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### Supporting Information

**Figure S1.** <sup>1</sup>H and <sup>13</sup>C NMR spectra of **sDTG-tpa** in CDCl<sub>3</sub>.

**Figure S2.** <sup>1</sup>H and <sup>13</sup>C NMR spectra of **sDTG-dmap** in CDCl<sub>3</sub>.

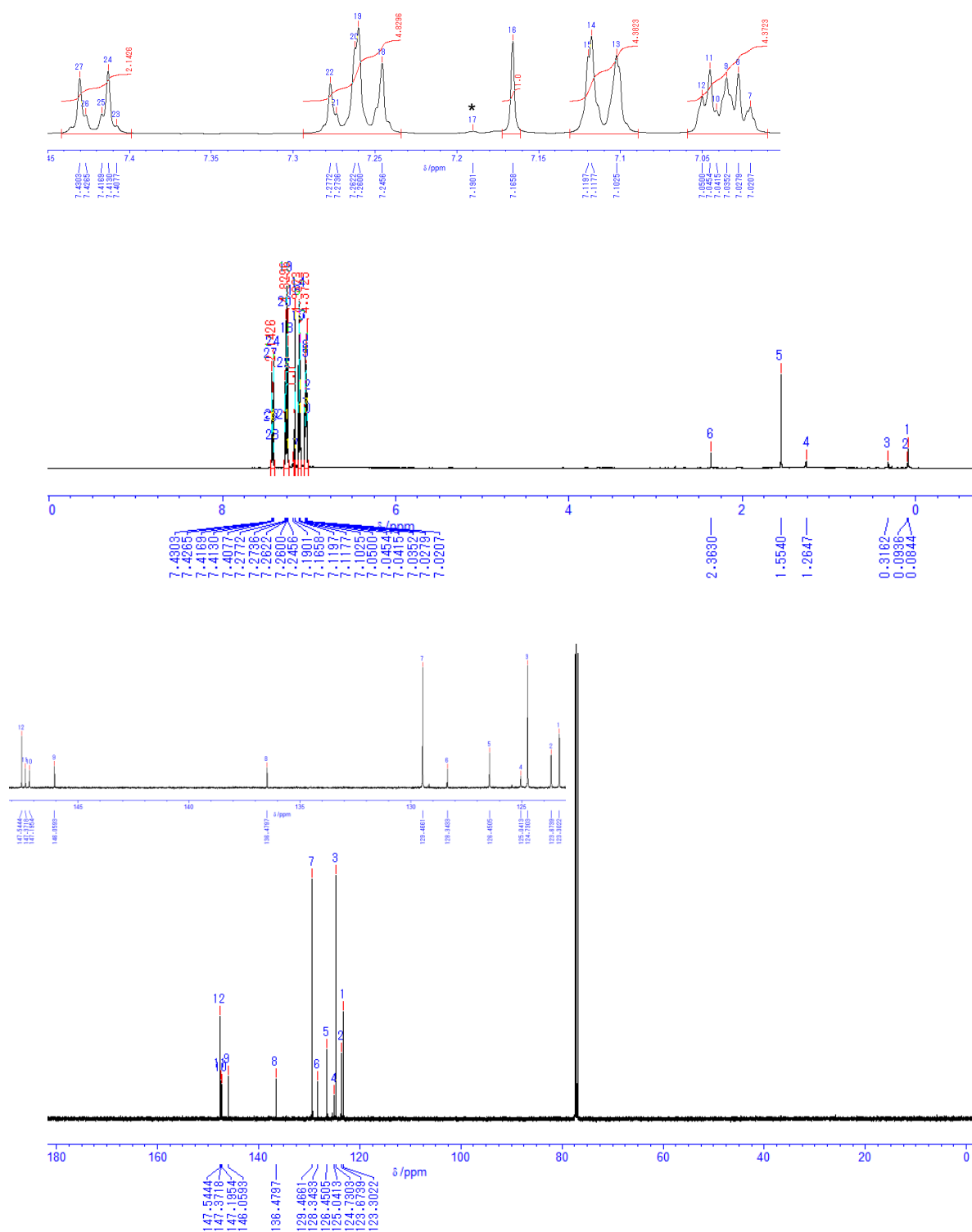
**Figure S3.** <sup>1</sup>H and <sup>13</sup>C NMR spectra of **sDTG-mop** in CDCl<sub>3</sub>.

**Figure S4.** <sup>1</sup>H and <sup>13</sup>C NMR spectra of **m1** in CDCl<sub>3</sub>.

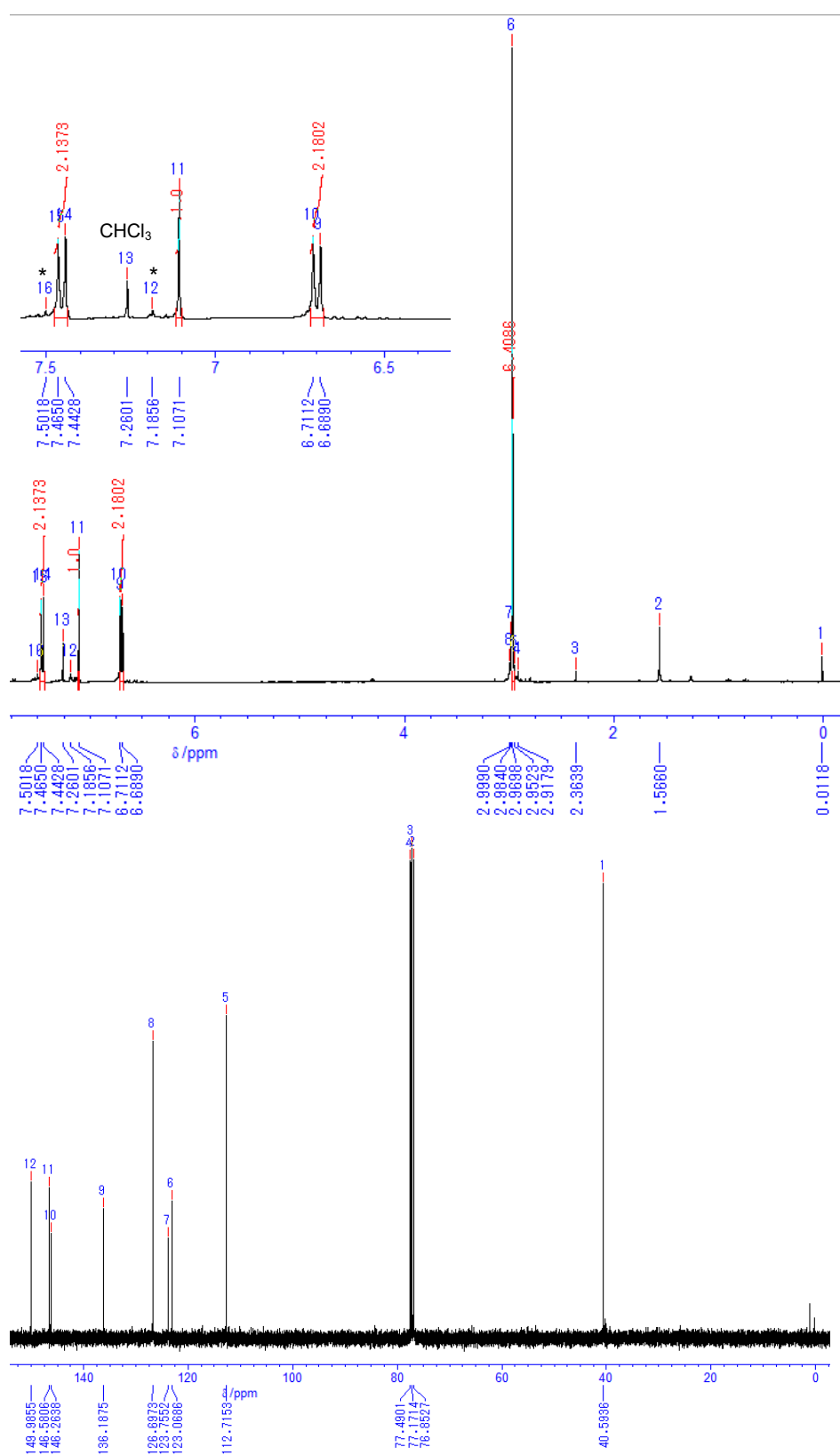
**Figure S5.** <sup>1</sup>H and <sup>13</sup>C NMR spectra of **m2** in acetone-d<sub>6</sub> and CDCl<sub>3</sub>, respectively.

**Figure S6.** Cyclic voltammograms (CVs) of **sDTG-tpa**, **sDTG-dmap**, **sDTG-mop**, **m1**, and **m2**.

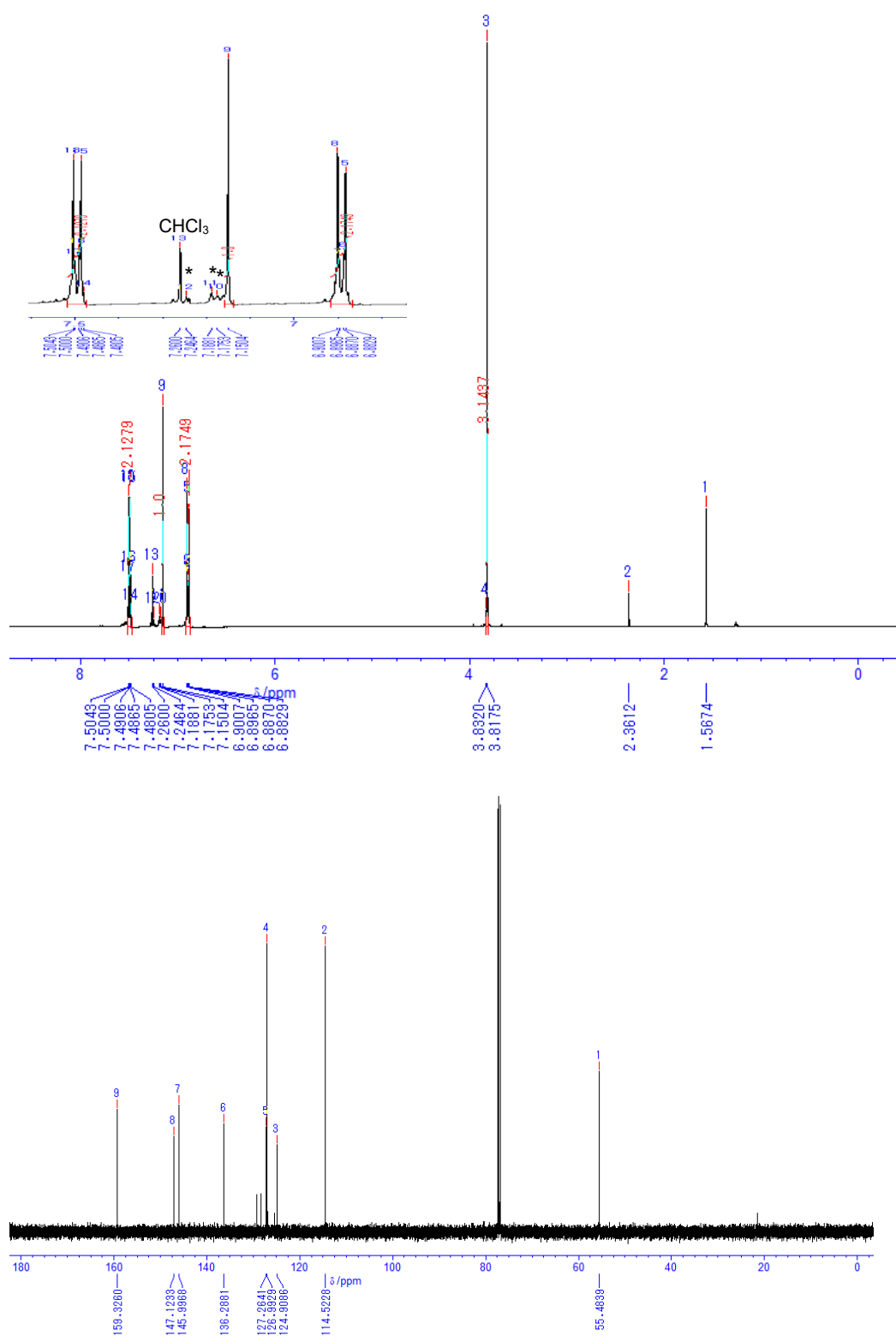
**Figure S7.** HOMO and LUMO profiles of **sDTG-tpa**, derived from DFT calculations at B3LYP/6-31G(d,p).



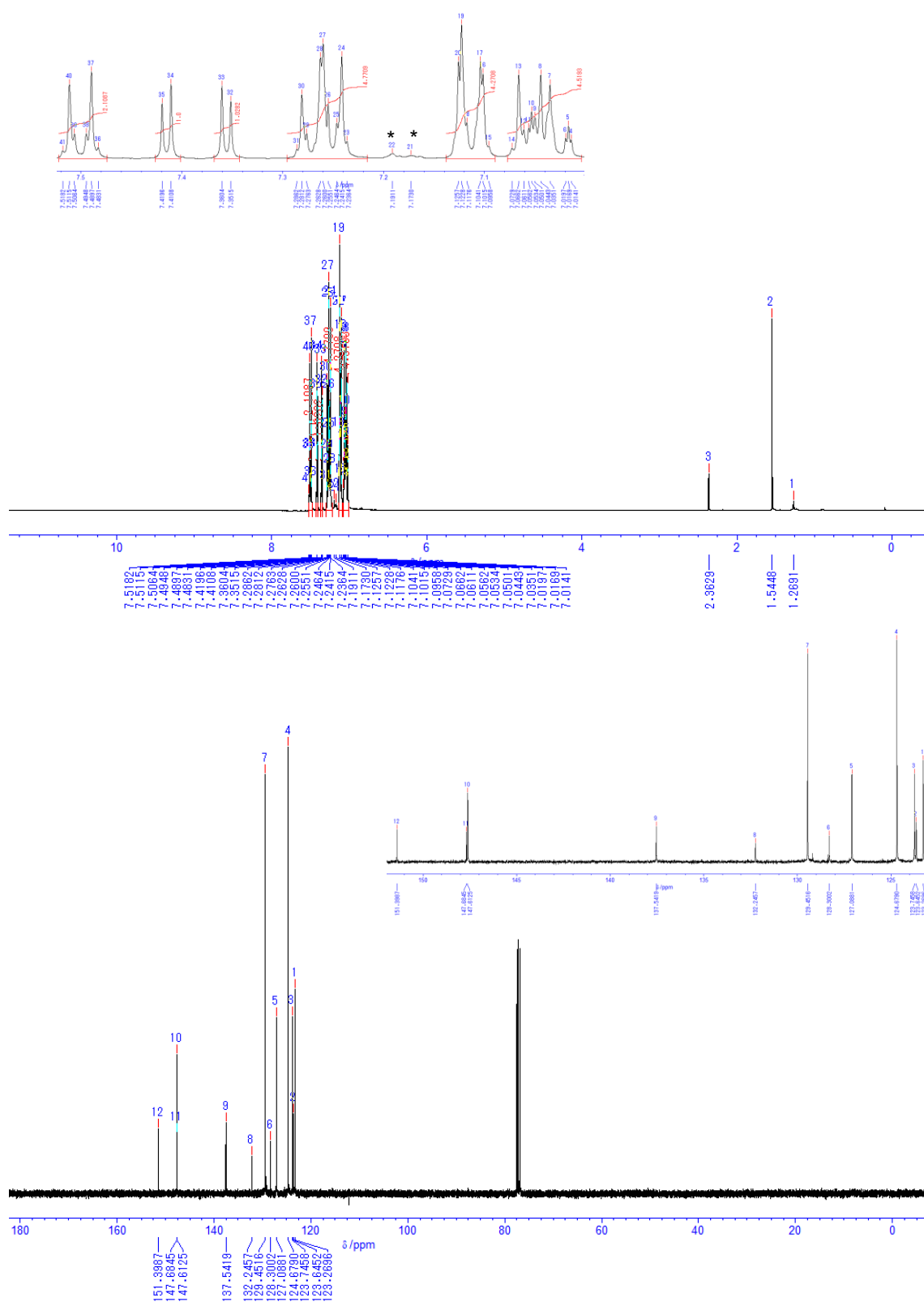
**Figure S1.**  $^1\text{H}$  (top) and  $^{13}\text{C}$  NMR spectra (bottom) of **sDTG-tpa** in  $\text{CDCl}_3$ . An asterisk in the expanded  $^1\text{H}$  NMR spectrum indicates an unidentified signal.



**Figure S2.**  $^1\text{H}$  (top) and  $^{13}\text{C}$  NMR spectra (bottom) of sDTG-dmap in  $\text{CDCl}_3$ . Asterisks in the expanded  $^1\text{H}$  NMR spectrum indicate unidentified signals.



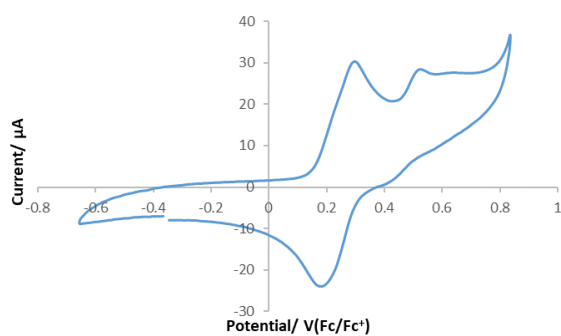
**Figure S3.** <sup>1</sup>H (top) and <sup>13</sup>C NMR spectra (bottom) of **sDTG-mop** in CDCl<sub>3</sub>. Asterisks in the expanded <sup>1</sup>H NMR spectrum indicate unidentified signals.



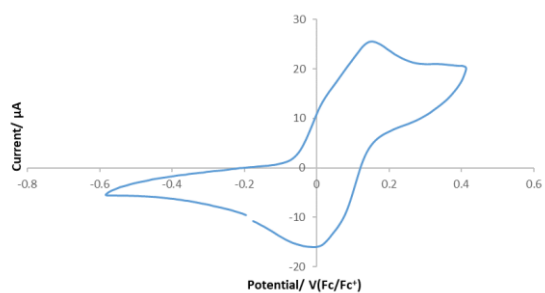
**Figure S4.** <sup>1</sup>H (top) and <sup>13</sup>C NMR spectra (bottom) of **m1** in CDCl<sub>3</sub>. Asterisks in the expanded <sup>1</sup>H NMR spectrum indicate unidentified signals.



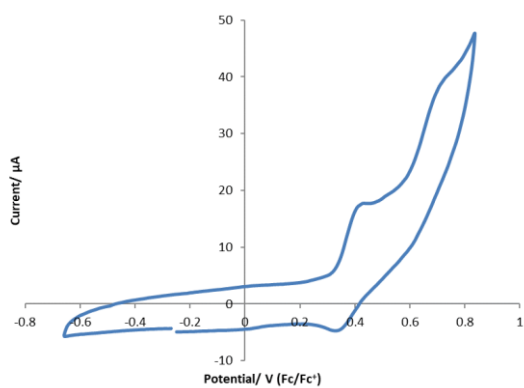
**sDTG-tpa**



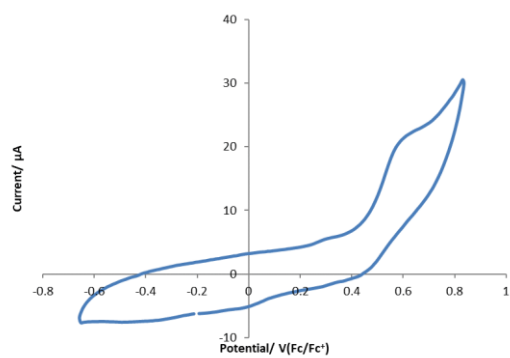
**sDTG-dmap**



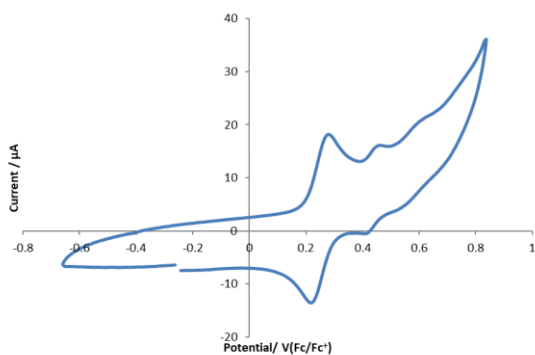
**sDTG-mop**



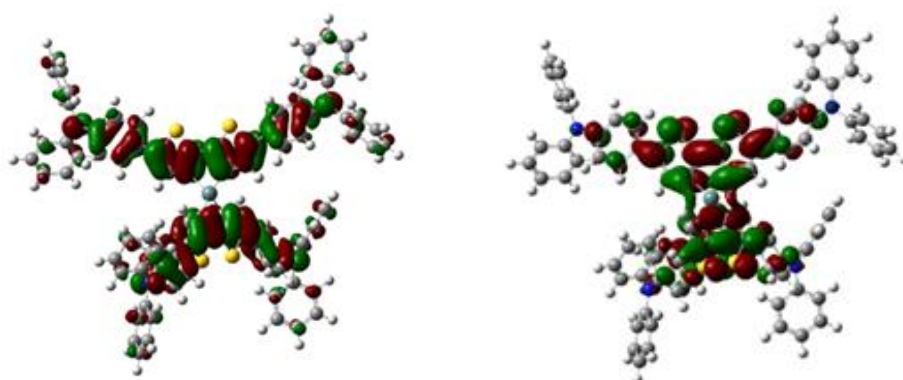
**m1**



**m2**



**Figure S6.** Cyclic voltammograms (CVs) of **sDTG-tpa**, **sDTG-dmap**, **sDTG-mop**, **m1**, and **m2**.



**Figure S7.** HOMO (left) and LUMO (right) profiles of **sDTG-tpa**, derived from DFT calculations at B3LYP/6-31G(d,p).