

Supplementary Materials

# Solvent-Free Reaction for Unsymmetrical Organodisulfides with High Purity and Application as Cathode Active Materials

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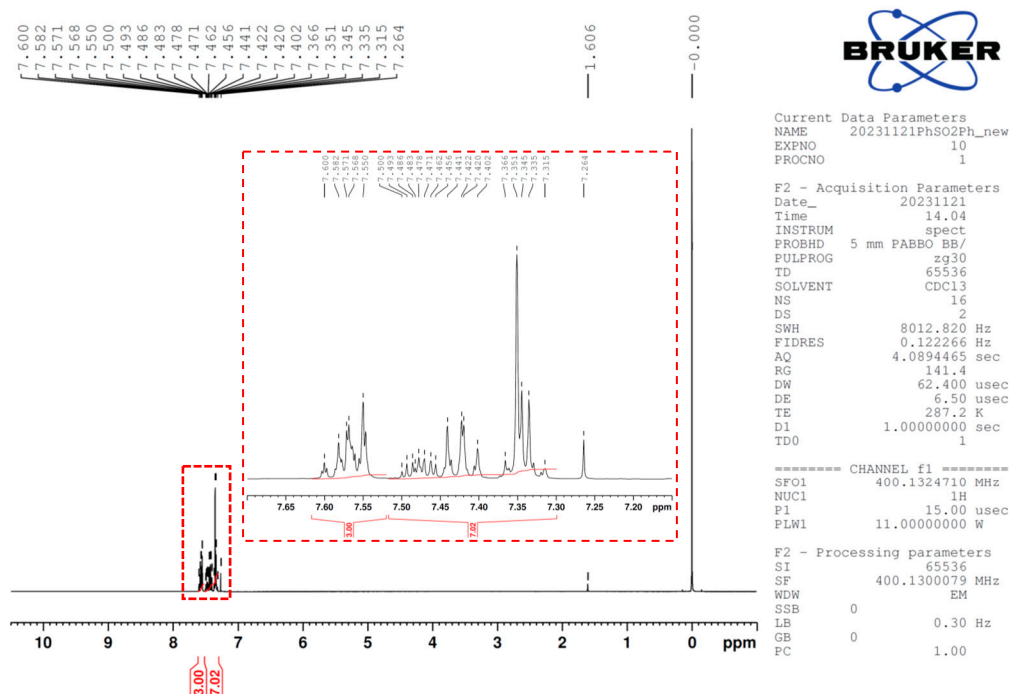
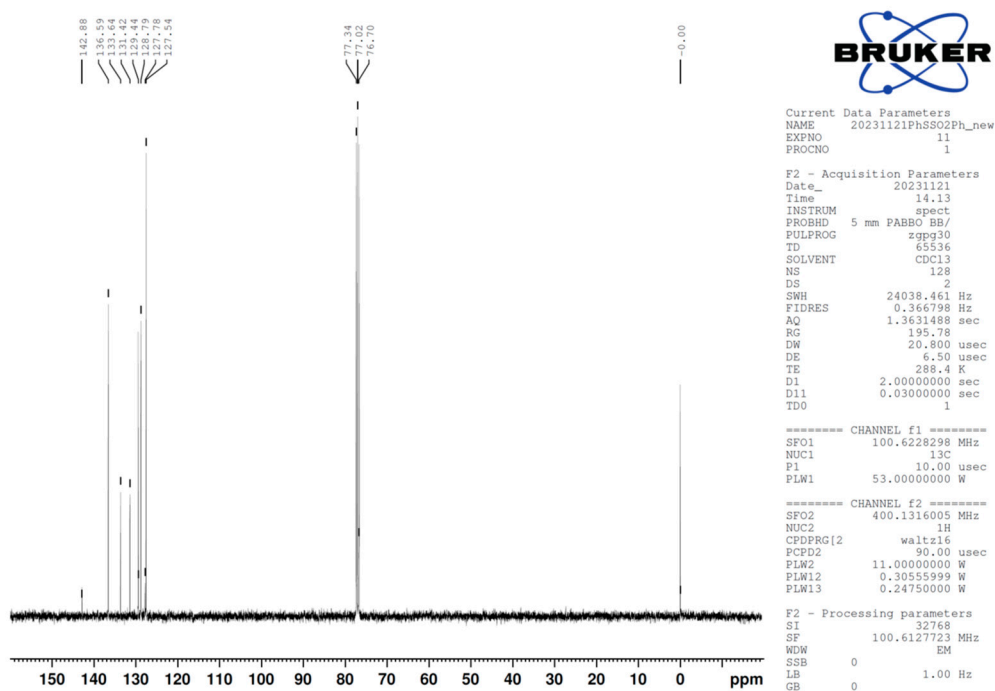
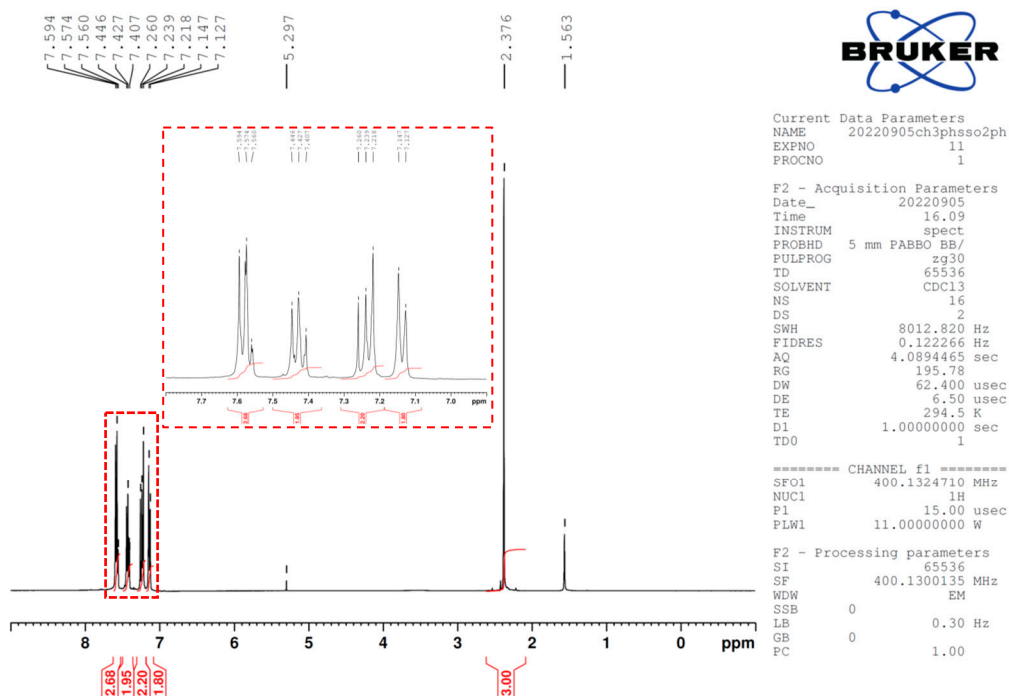
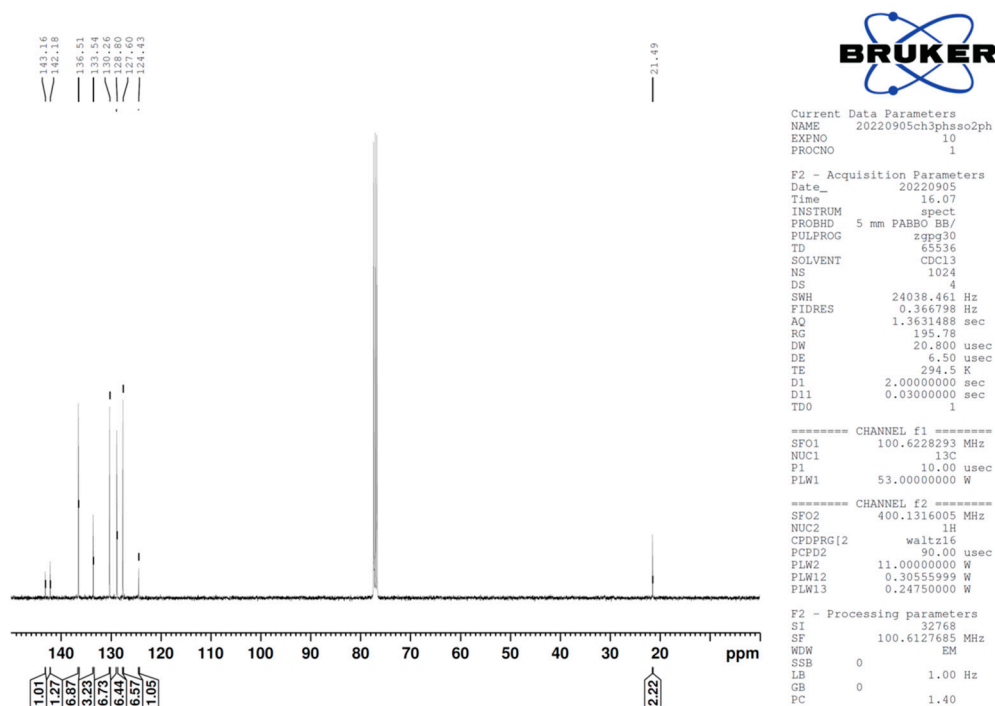
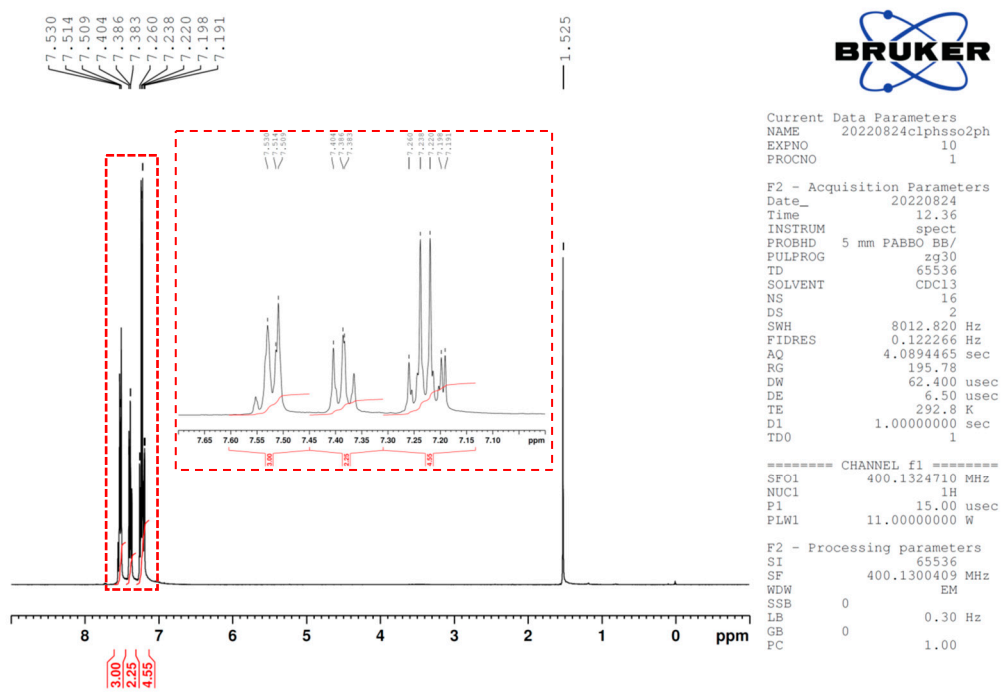
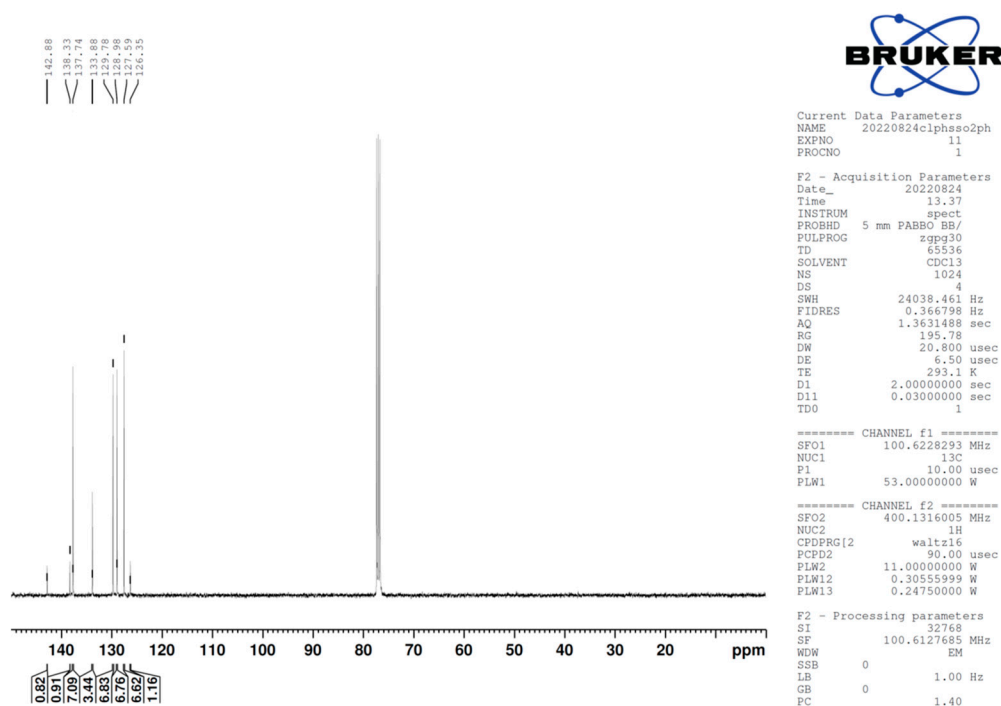


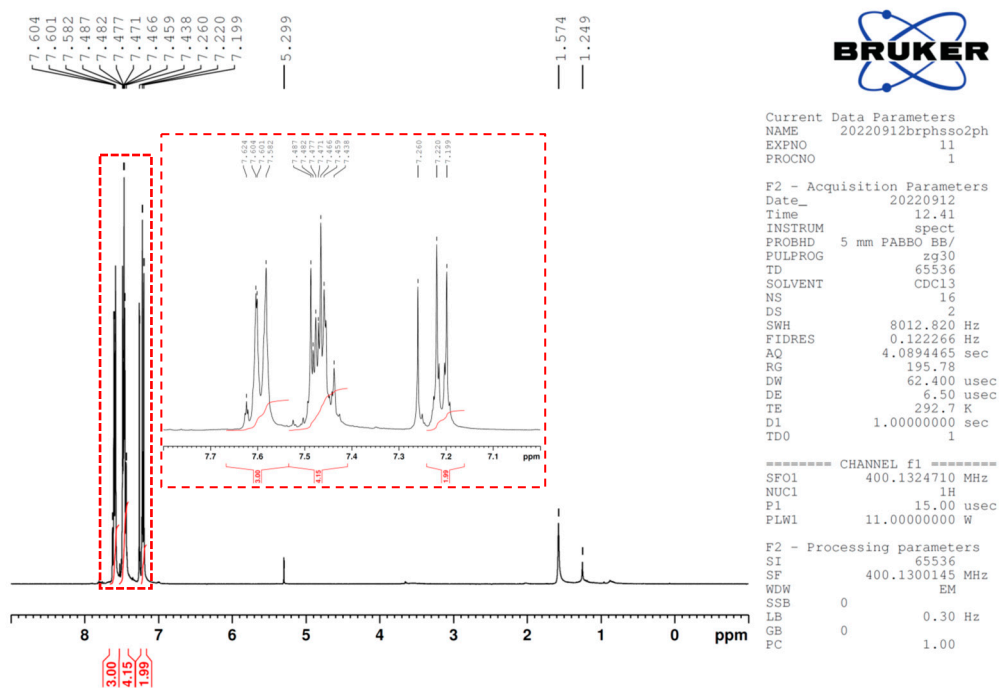
Figure S1.  $^1\text{H}$  NMR spectrum of of **1a**

Figure S2.  $^{13}\text{C}$  NMR spectrum of 1aFigure S3.  $^1\text{H}$  NMR spectrum of 1b

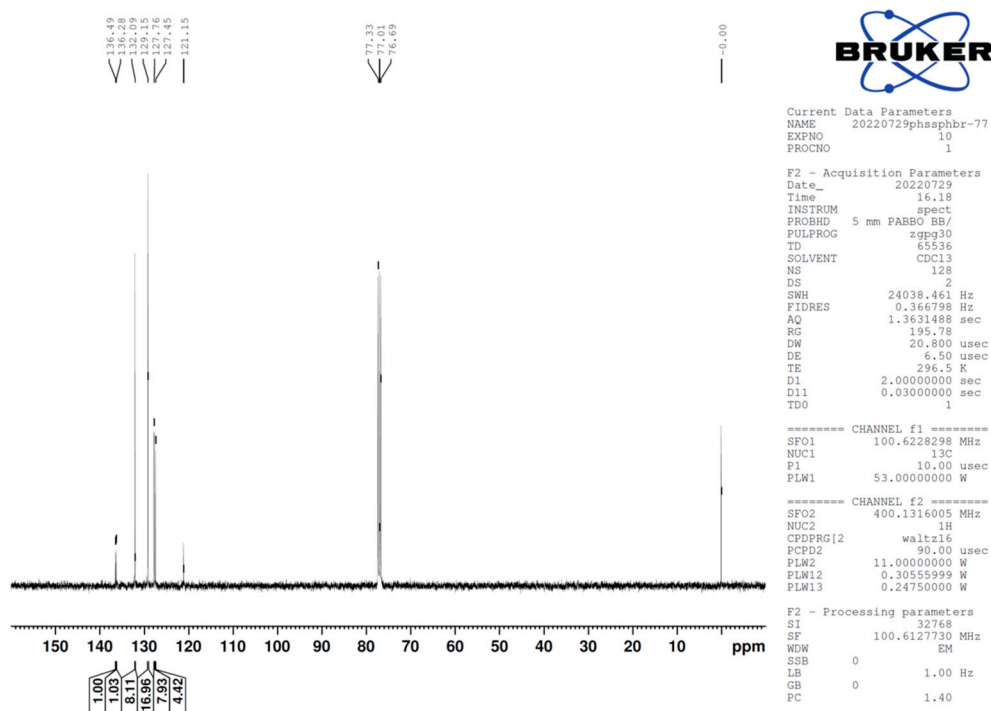
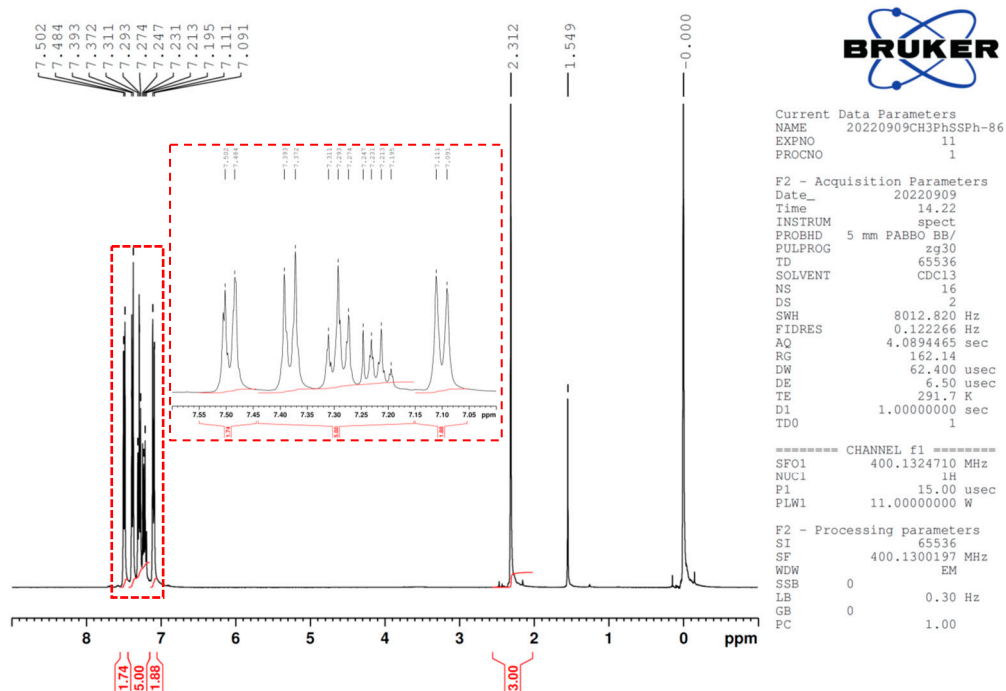
Figure S4.  $^{13}\text{C}$  NMR spectrum of 1bFigure S5.  $^1\text{H}$  NMR spectrum of 1c

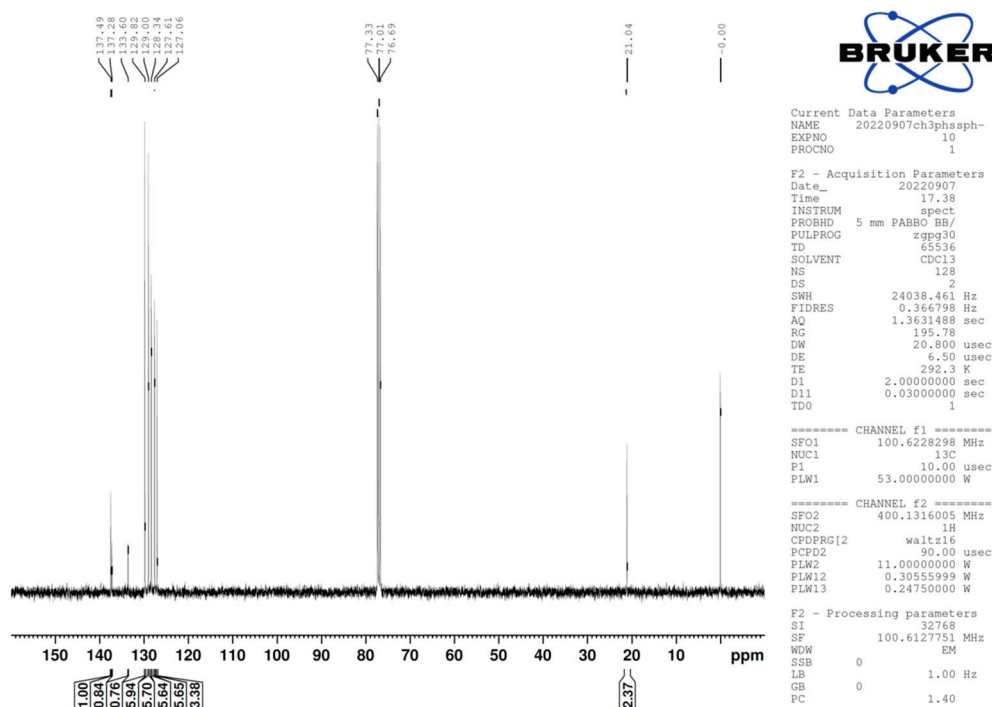
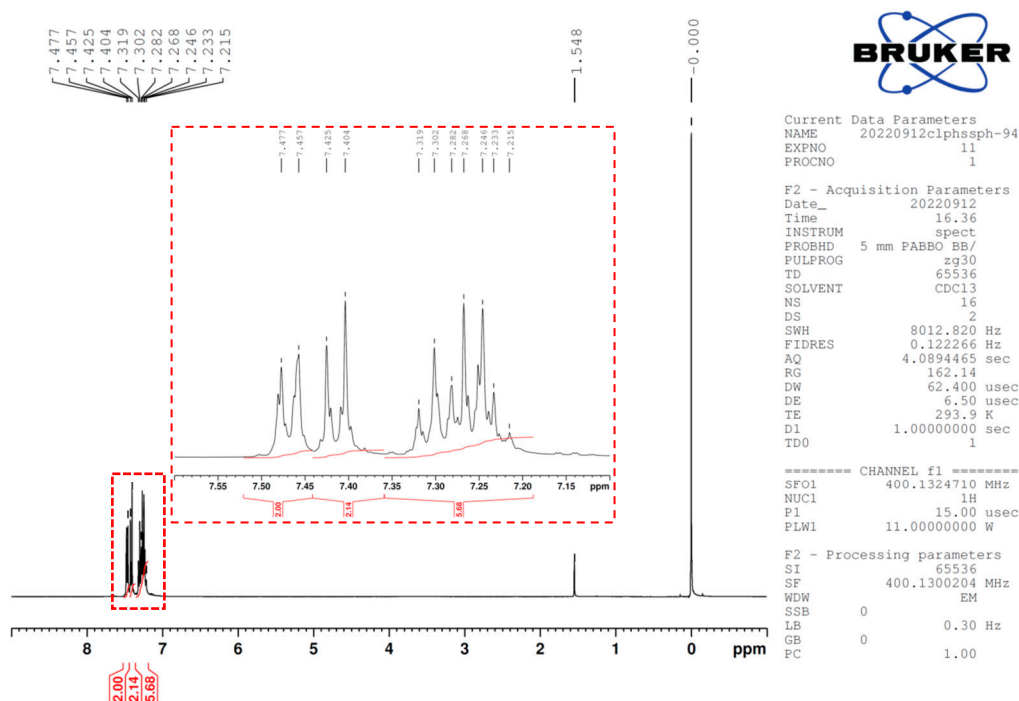


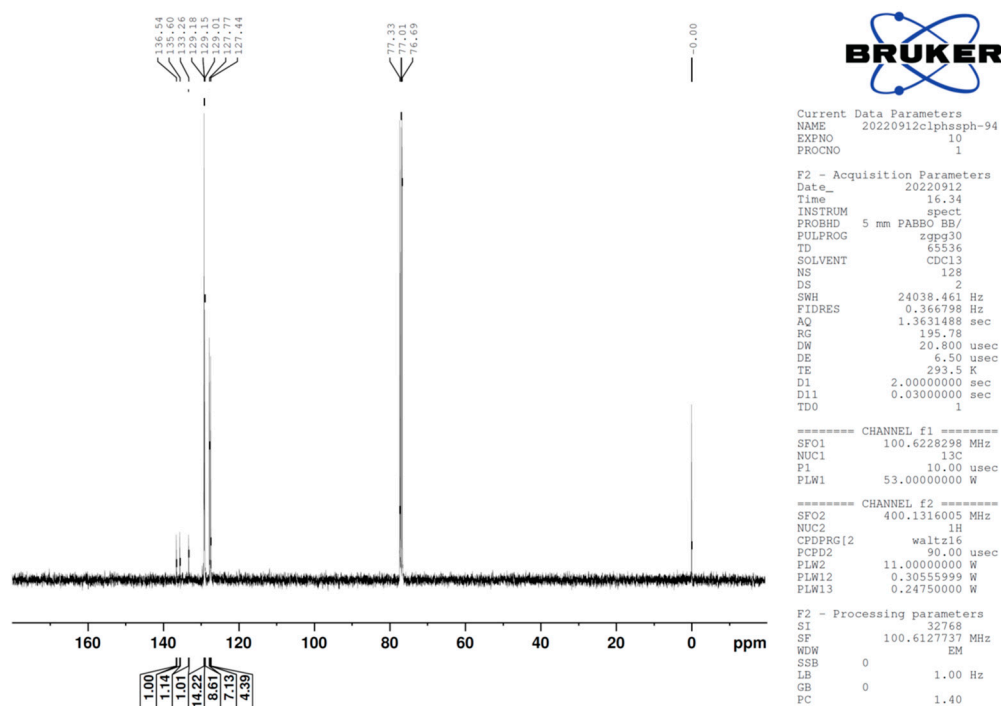
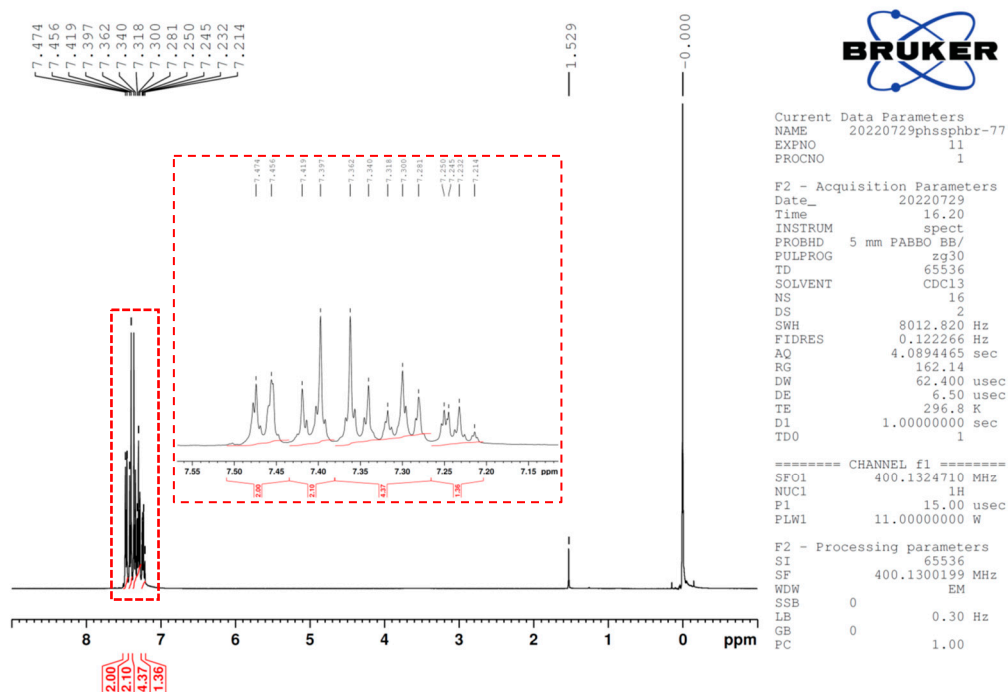
**Figure S6.**  $^{13}\text{C}$  NMR spectrum of **1c**



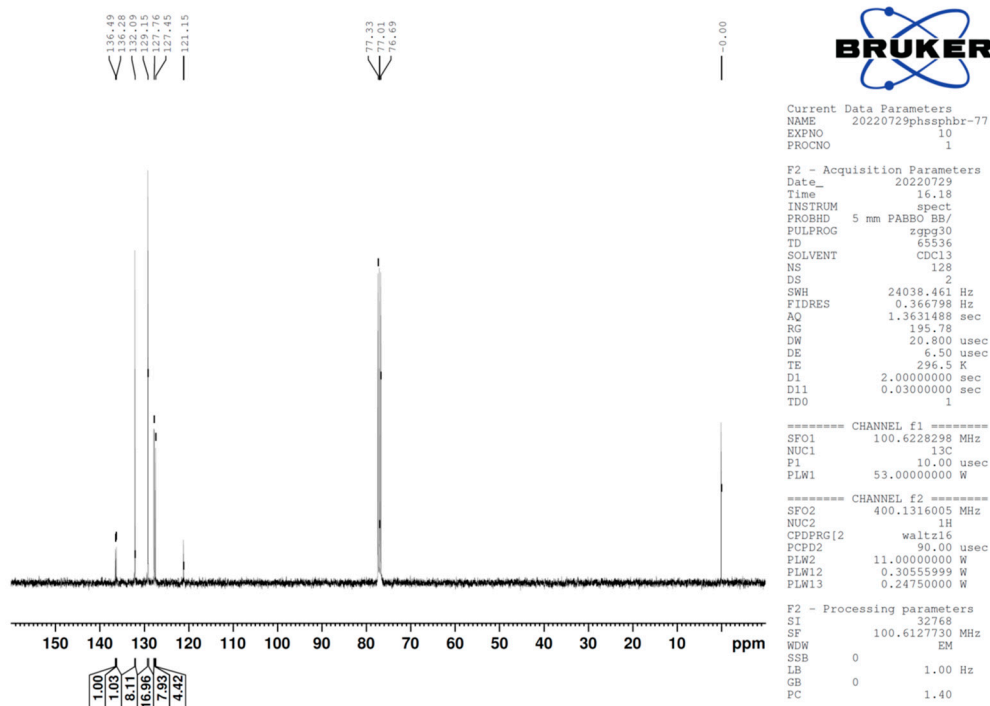
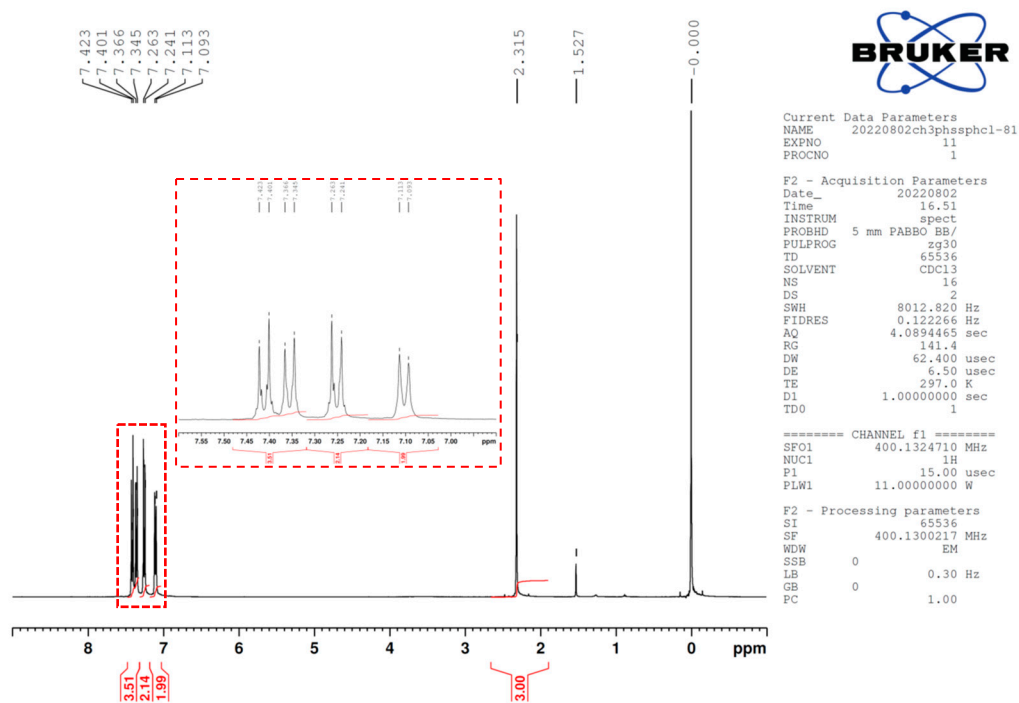
**Figure S7.**  $^1\text{H}$  NMR spectrum of **1d**

Figure S8.  $^{13}\text{C}$  NMR spectrum of 1dFigure S9.  $^1\text{H}$  NMR spectrum of 2a

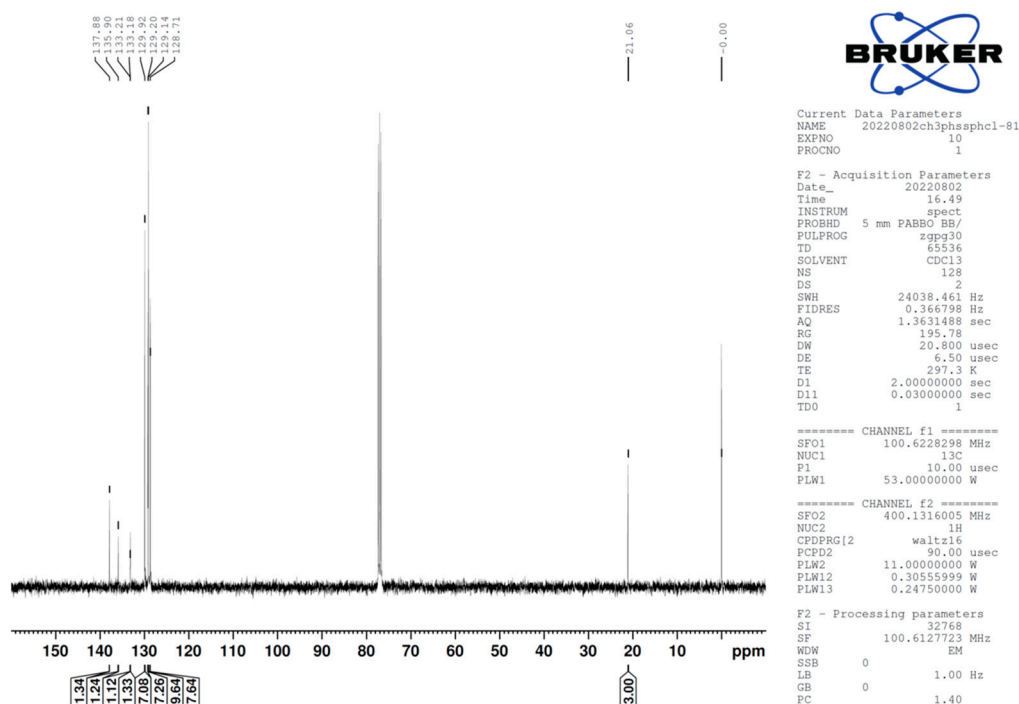
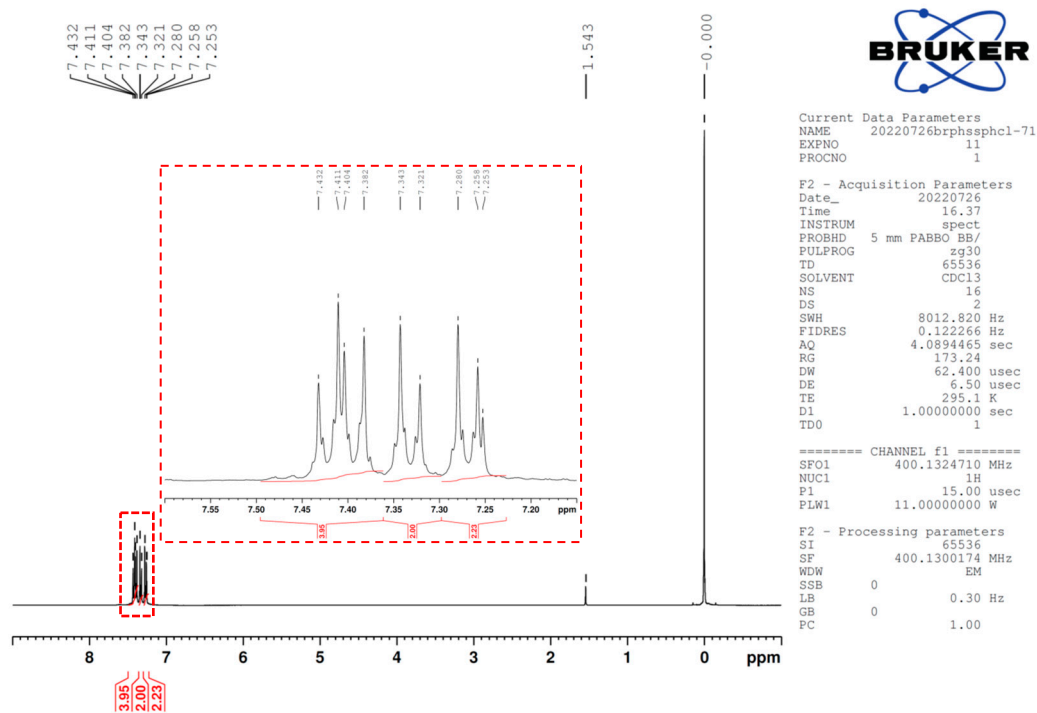
Figure S10.  $^{13}\text{C}$  NMR spectrum of 2aFigure S11.  $^1\text{H}$  NMR spectrum of 2b

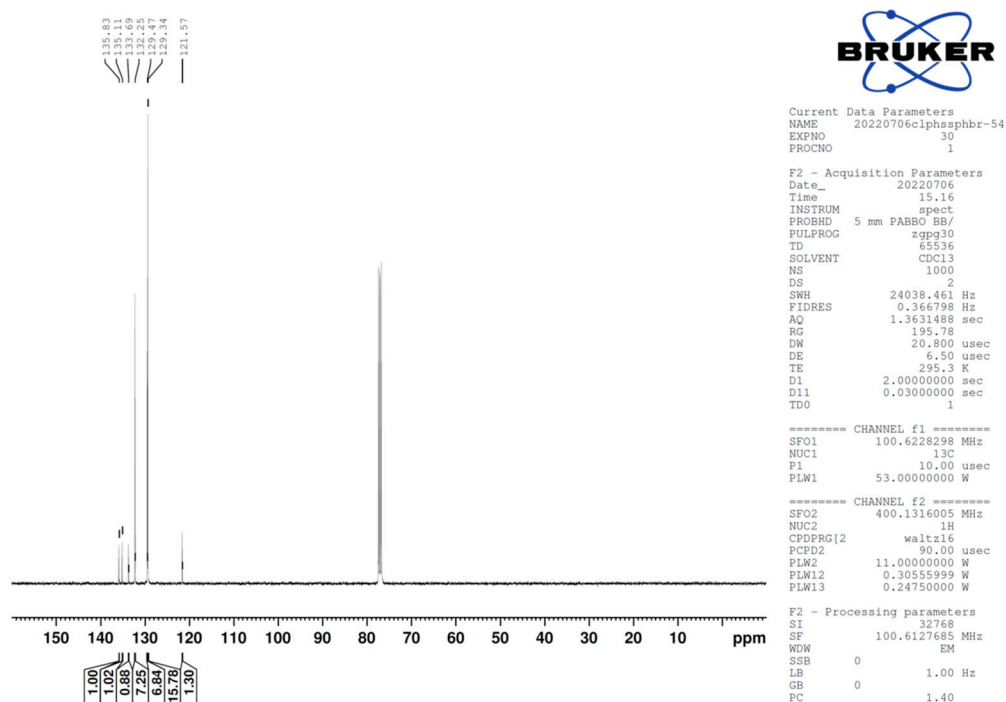
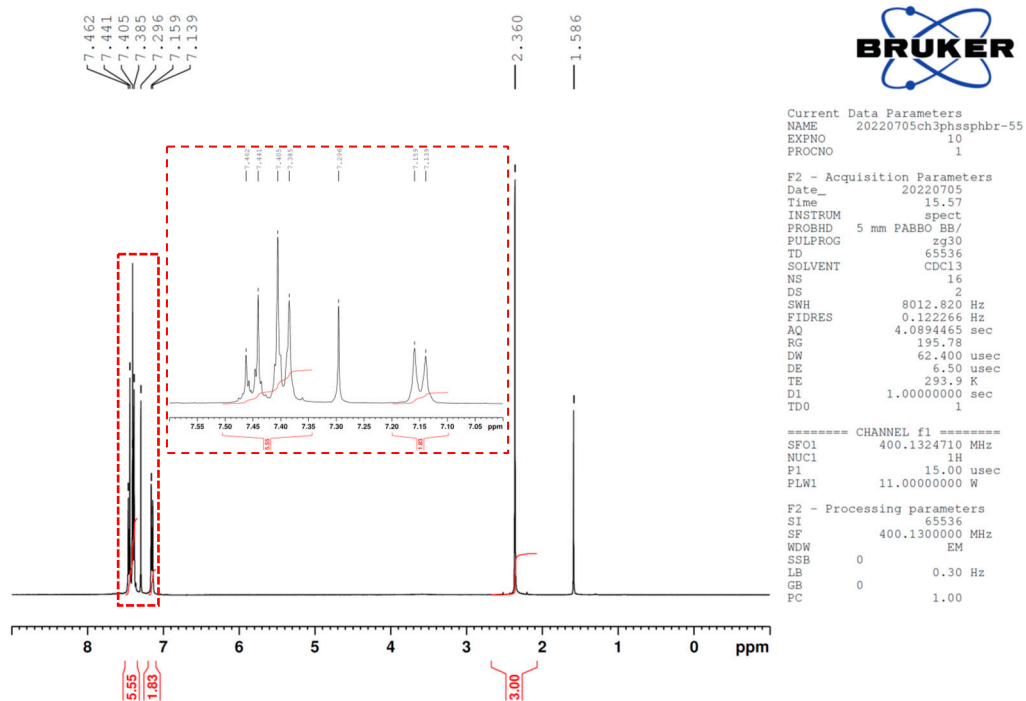
Figure S12.  $^{13}\text{C}$  NMR spectrum of **2b**Figure S13.  $^1\text{H}$  NMR spectrum of **2c**

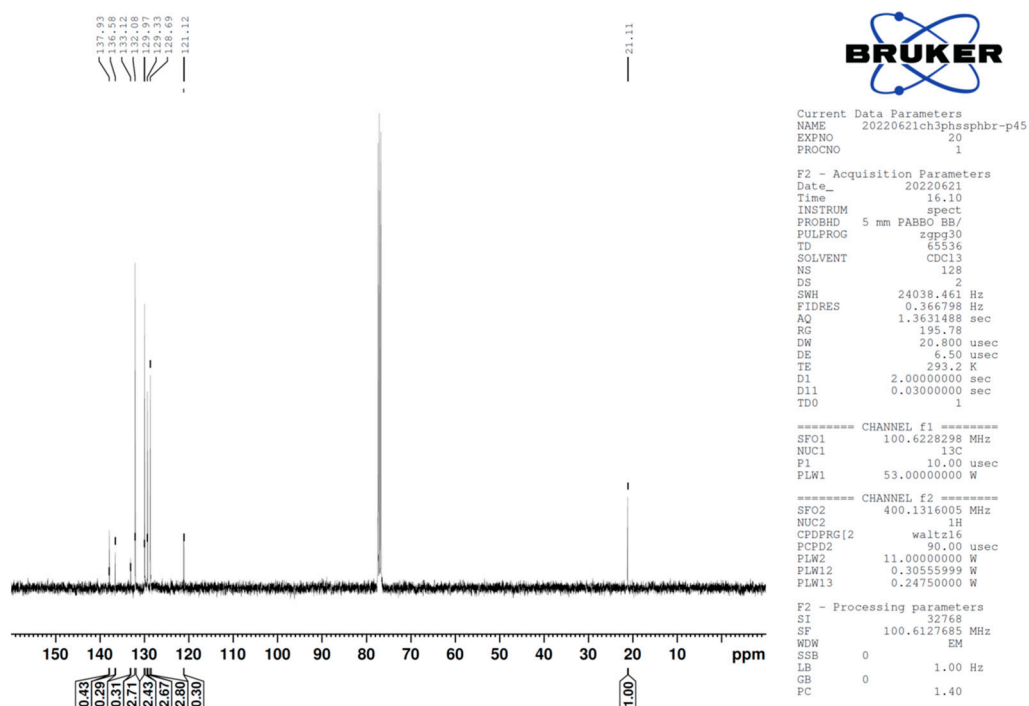
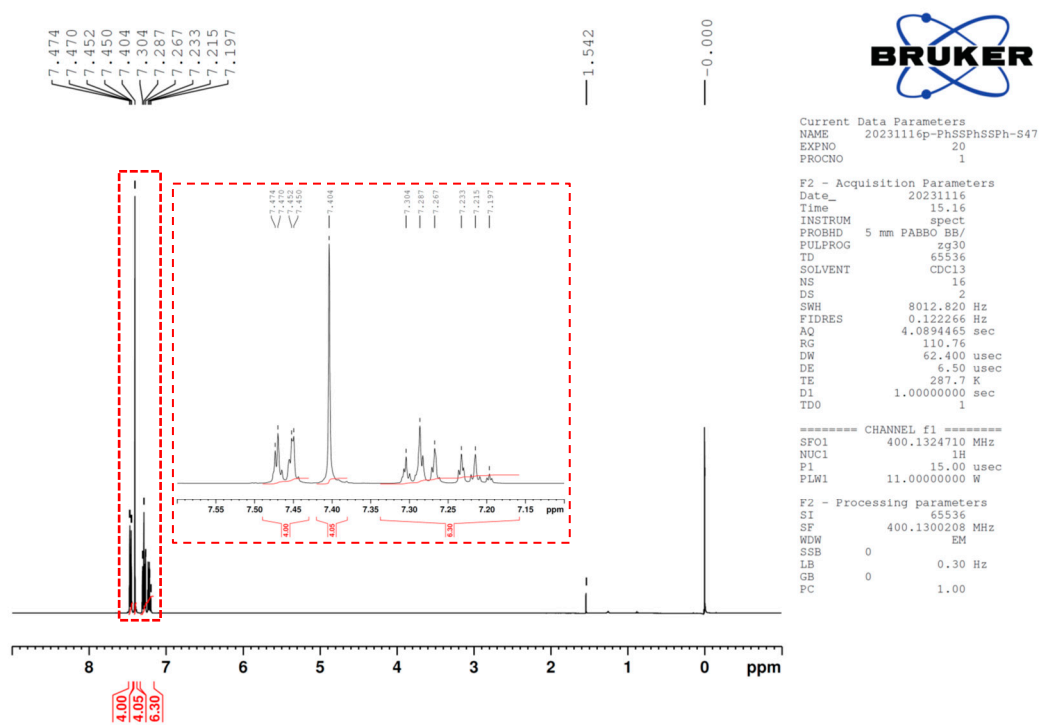


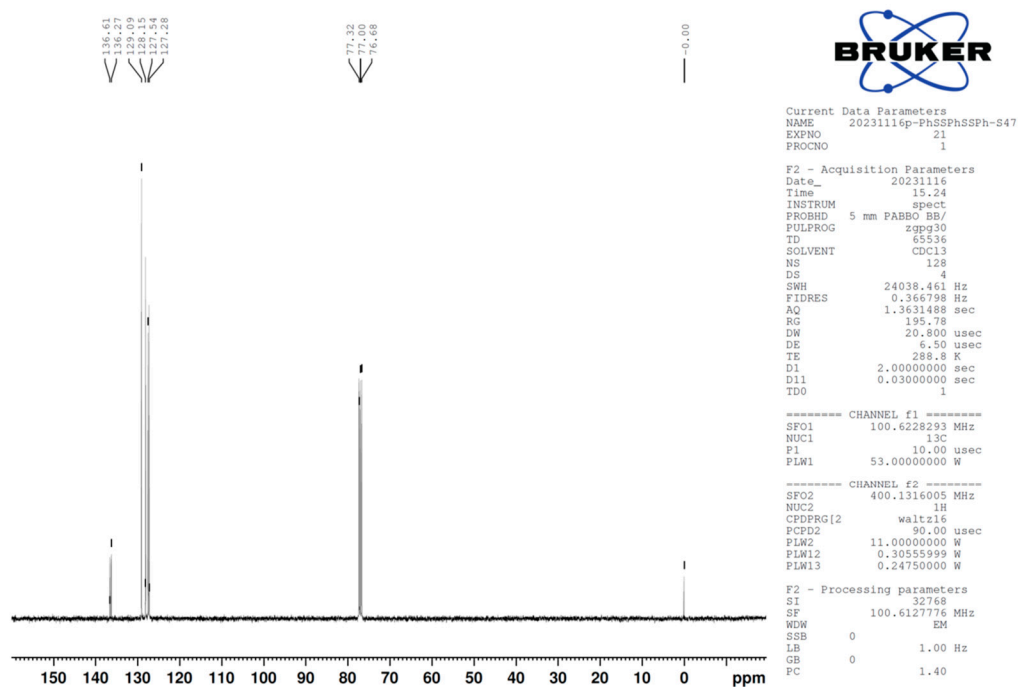
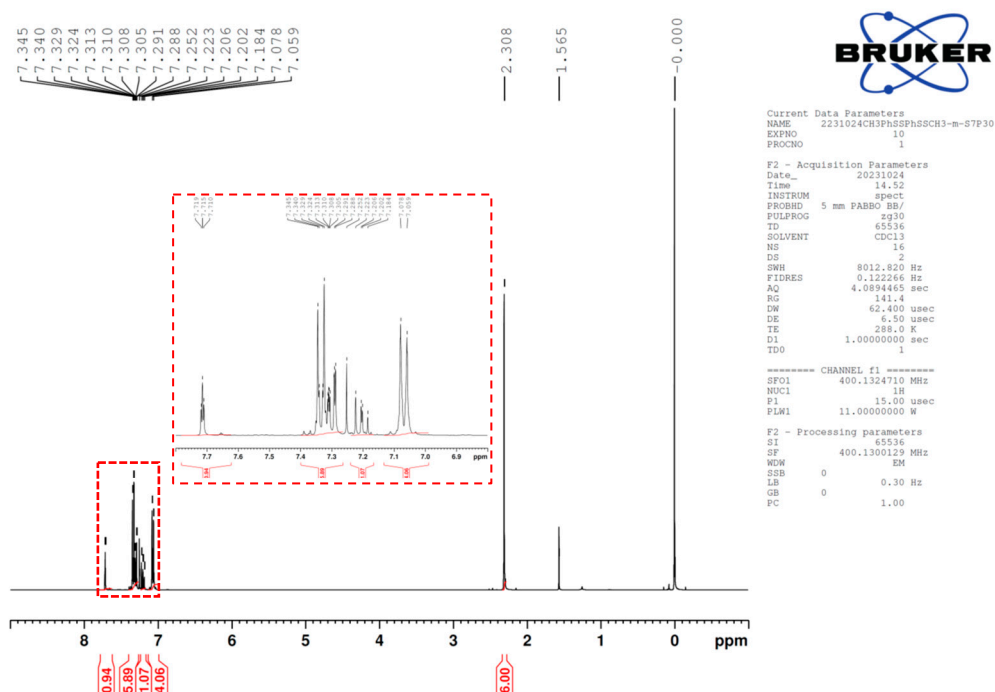
Figure S14.  $^{13}\text{C}$  NMR spectrum of 2cFigure S15.  $^1\text{H}$  NMR spectrum of 2d

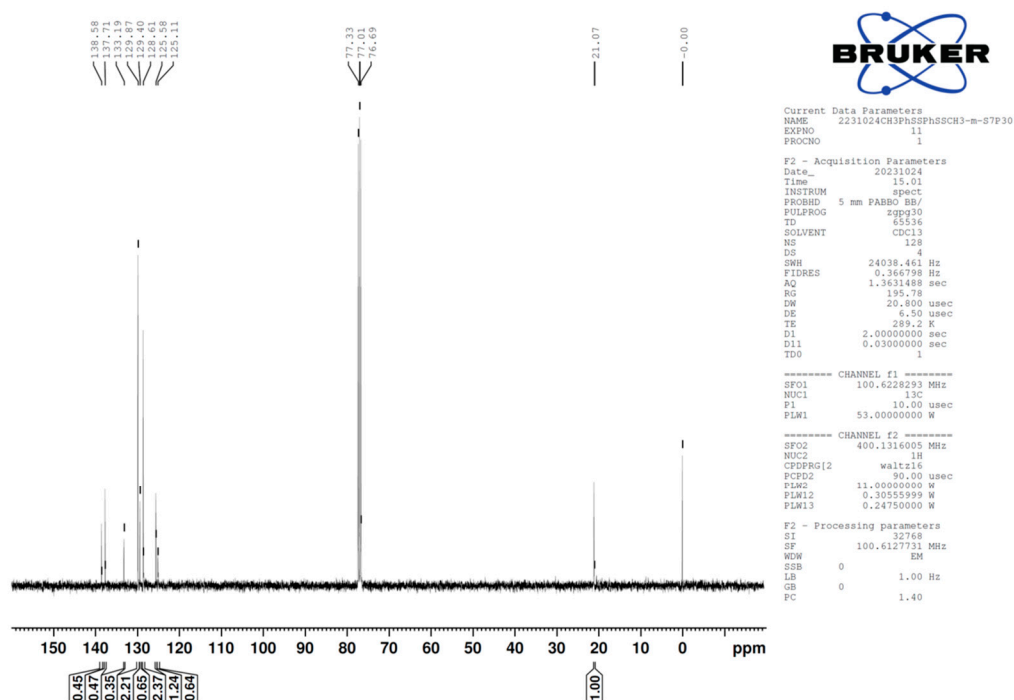
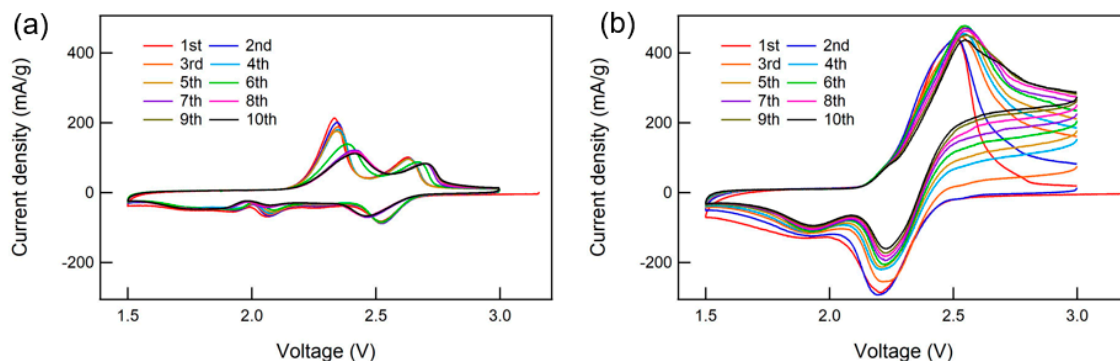
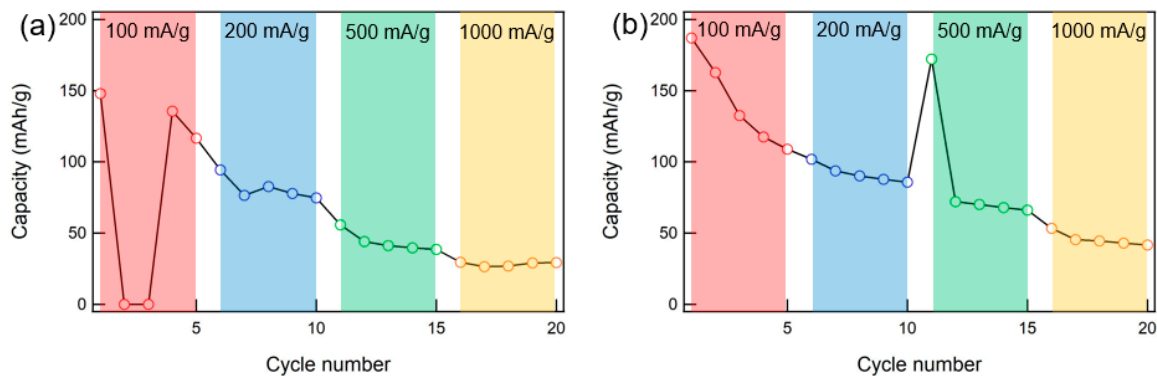


Figure S16.  $^{13}\text{C}$  NMR spectrum of 2dFigure S17.  $^1\text{H}$  NMR spectrum of 2e

Figure S18.  $^{13}\text{C}$  NMR spectrum of **2e**Figure S19.  $^1\text{H}$  NMR spectrum of **2f**

Figure S20.  $^{13}\text{C}$  NMR spectrum of **2f**Figure S21.  $^1\text{H}$  NMR spectrum of **2g**

Figure S22.  $^{13}\text{C}$  NMR spectrum of **2g**Figure S23.  $^1\text{H}$  NMR spectrum of **2h**

Figure S24.  $^{13}\text{C}$  NMR spectrum of **2h**Figure S25. Cyclic voltammograms of **2g** (a) and **2h** (b)Figure S26. Rate performances of **2g** (a) and **2h** (b)

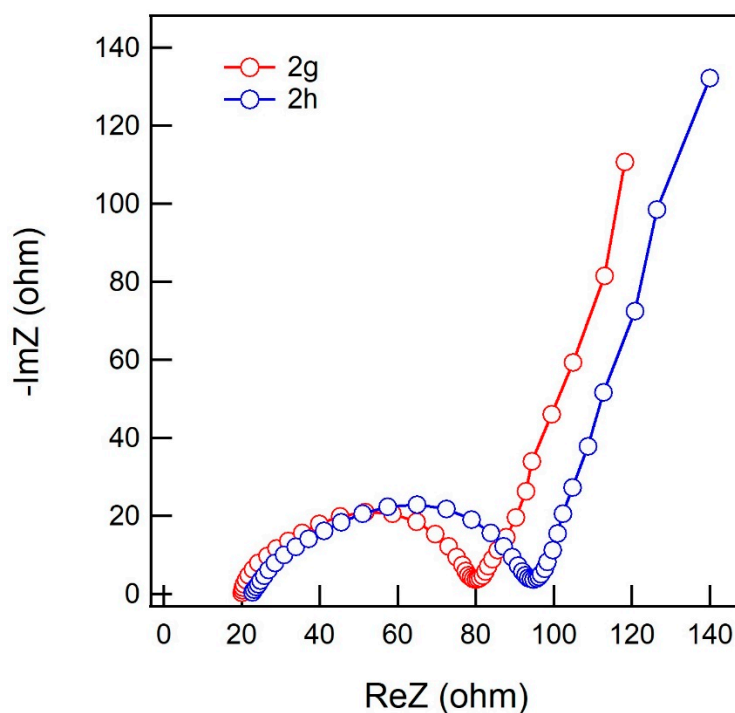
Figure S27. Nyquist plots of **2g** and **2h**

Table S1. Charge transfer resistances of organodisulfides

Organodisulfides	$R_{ct}$ (ohm)	References
2, 2'-((disulfanediy)bis (4,1-phenylene)) bis(azanediyl) bis (naphthalene-1, 4-dione) (MNQ)	160	S1
4, 4''-dithiodianiline (MDS)	336	
2,3,4,6,8,9,10,12-Octathia biscyclopenta[b,c]-5,11- anthraquinone-1,7-dithione (TPQD)	150	S2
<b>2g</b>	60	This work
<b>2h</b>	72	

## References

- S1. Pei Yu, Jiaxuan An, Zhongju Wang, Yongzhu Fu, and Wei Guo, An Organic Molecular Cathode Composed of Naphthoquinones Bridged by Organodisulfide for Rechargeable Lithium Battery, *Small*, **2023**, 2308881.
- S2. Zulipiya Shadike, Hung-Sui Lee, Chuanjin Tian, Ke Sun, Liang Song, Enyuan Hu, Iradwikanari Waluyo, Adrian Hunt, Sanjit Ghose, Yongfeng Hu, Jigang Zhou, Jian Wang, Paul Northrup, Seong-Min Bak, and Xiao-Qing Yang, Synthesis and Characterization of a Molecularly Designed High-Performance Organodisulfide as Cathode Material for Lithium Batteries, *Adv. Energy Mater.* **2019**, 9, 1900705.