Electronic Supplementary Information

Rhodium-Catalyzed *Z*-Alkenylation of *gem*-Difluoropropenes: Access to Fluorinated (1*Z*,4*Z*)-Dienes

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I General Information

^{1}H NMR and ^{13}C NMR spectra were recorded on a Bruker Avance 600 MHz instruments. Chemical shifts were reported in parts per million (ppm), and the residual solvent peak was used as an internal reference: proton (chloroform δ 7.26), carbon (chloroform δ 77.16) or tetramethylsilane (TMS δ 0.00) was used as a reference. Multiplicity was indicated as follows: s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet), dd (doublet of doublet), bs (broad singlet). Coupling constants were reported in Hertz (Hz). All high resolution mass spectra (HRMS) were obtained on a Bruker Apex-2. For thin layer chromatography (TLC), Qingdao Haiyang Chemical was used, and compounds were visualized with a UV light at 254 nm. Further visualization was achieved by staining with iodine, or potassium permanganate solution followed by heating using a heat gun. Flash chromatography separations were performed on Qingdao Haiyang Chemical 200-300 mesh silica gel. All reactions were carried out under a nitrogen atmosphere. All commercially available reagents were used as received for the reactions without any purification. All solvents were dried on alumina columns using a solvent dispensing system.

Materials: $[Rh(COD)_2]BF_4$ and LiO^tBu were obtained from commercial suppliers and used without further purification. All Solvents were purified by standard procedure before use. Allylic *gem*-Difluorides,[1-2] allylic alcohols[3-4] are synthesis via the known procedures.

II References

1 Q.-Q. Min, Z. Yin, Z. Feng, W.-H. Guo and X. Zhang, *J. Am. Chem. Soc*. 2014, **136**, 1230-1233.

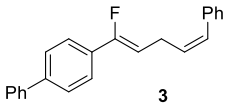
2 T. W Butcher,. J. L. Yang, W. M. Amberg, N. B. Watkins, N. D. Wilkinson and J. F. Hartwig, *Nature* 2020, **583**, 548-553.

3 Loui, H. J.; Schneider, C., *Org. Lett*. 2022, **24**, 1496-1501.

4 X. Wen, X. Shi, X. Qiao, Z. Wu and G. Bai, *Chem. Commun.* 2017, **53**, 5372-5375.

III NMR spectra

^{1}H NMR (600 MHz, $CDCl_3$)



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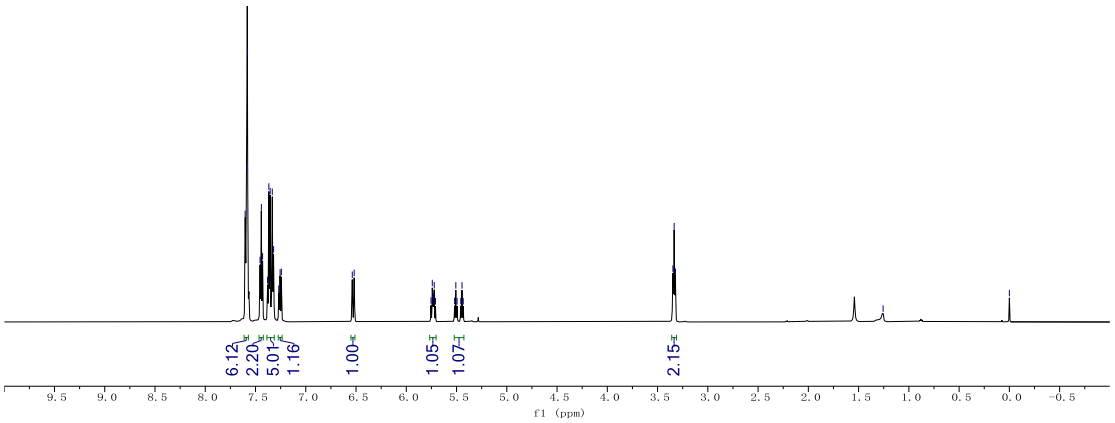

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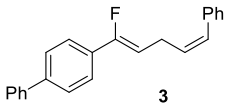

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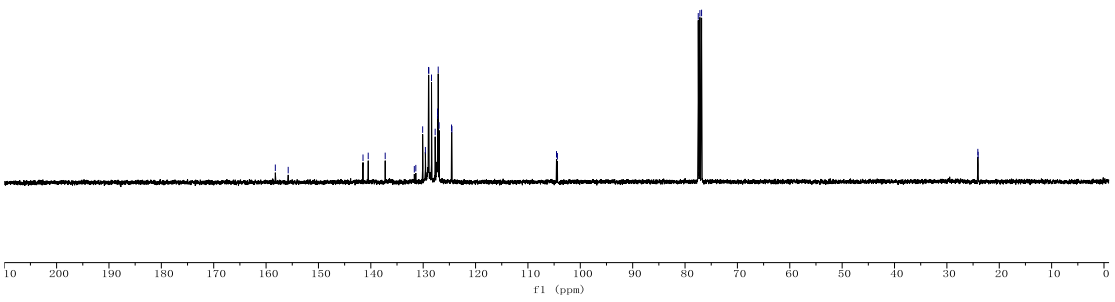
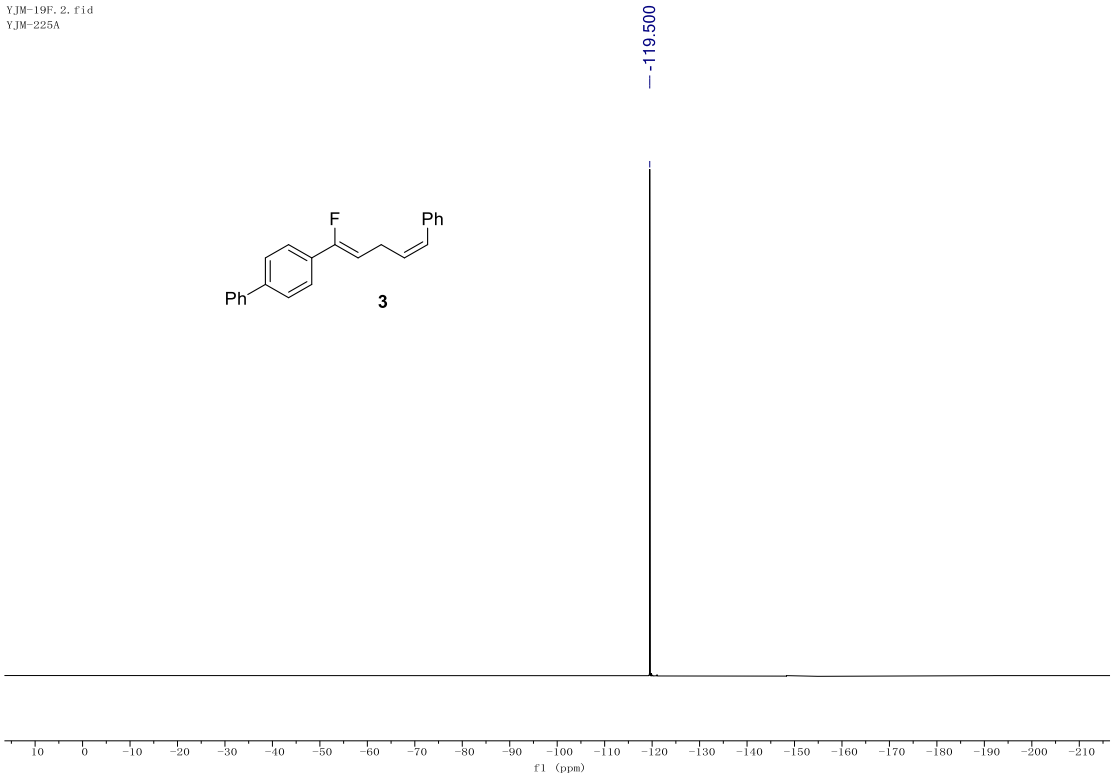


^{19}F NMR (565 MHz, $CDCl_3$)



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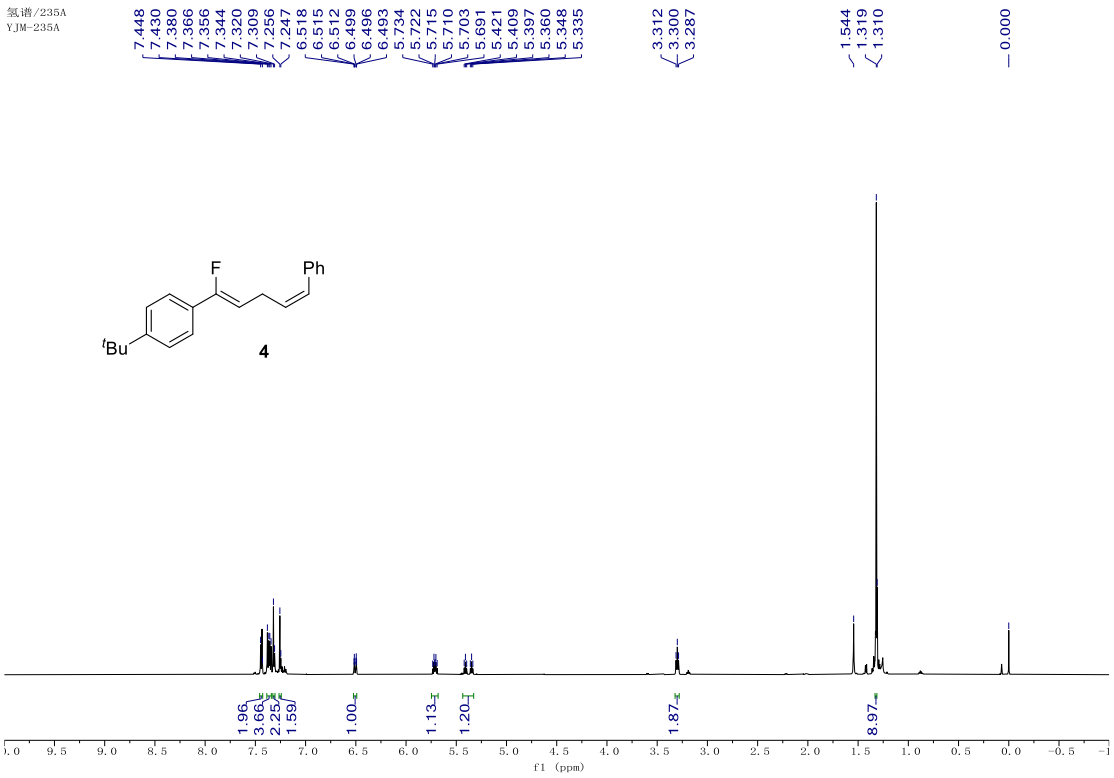
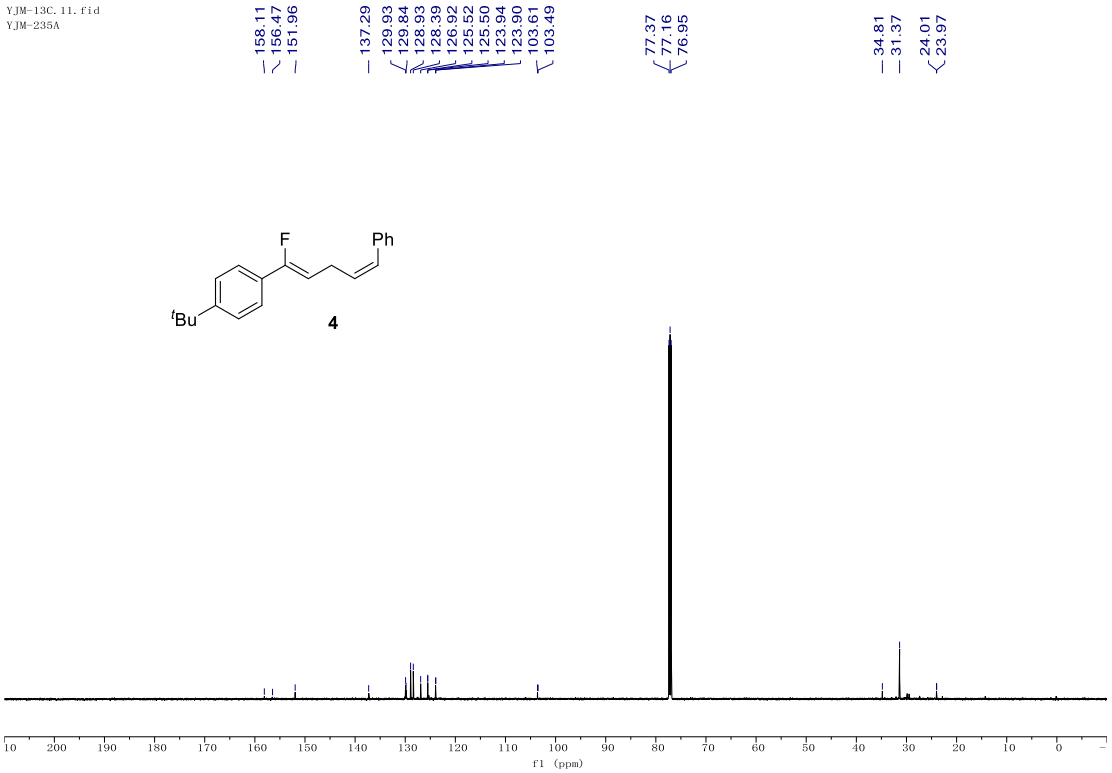


^{13}C NMR (151 MHz, $CDCl_3$)



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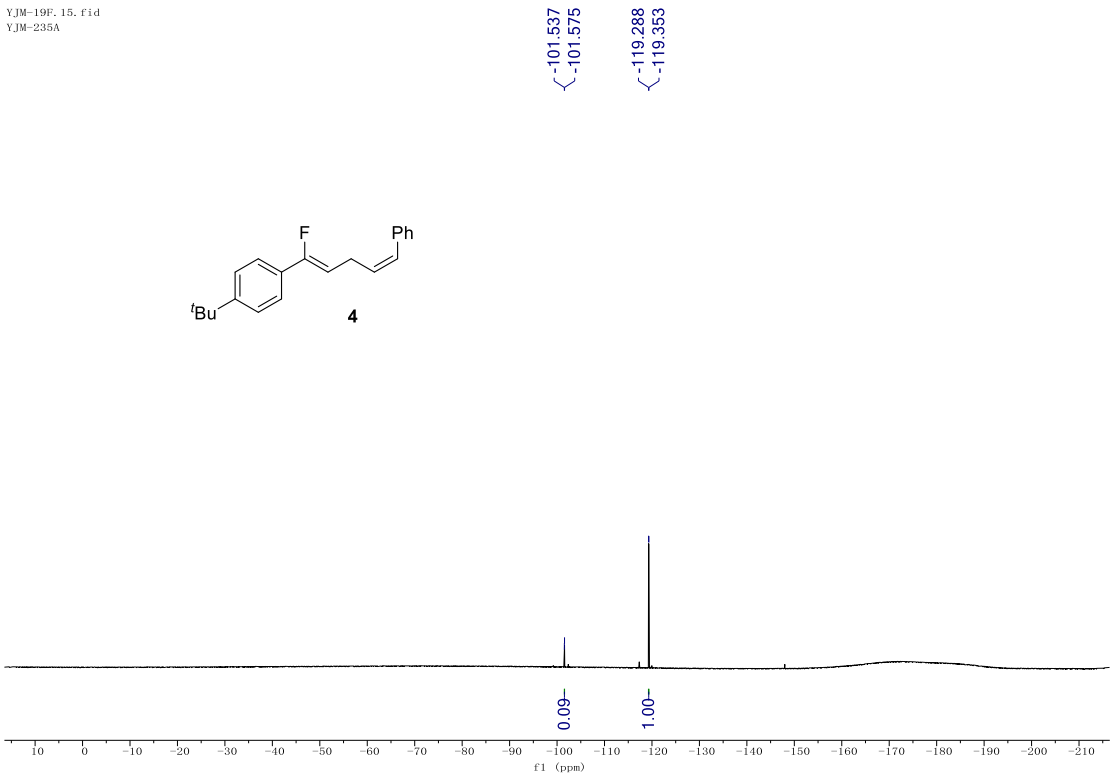

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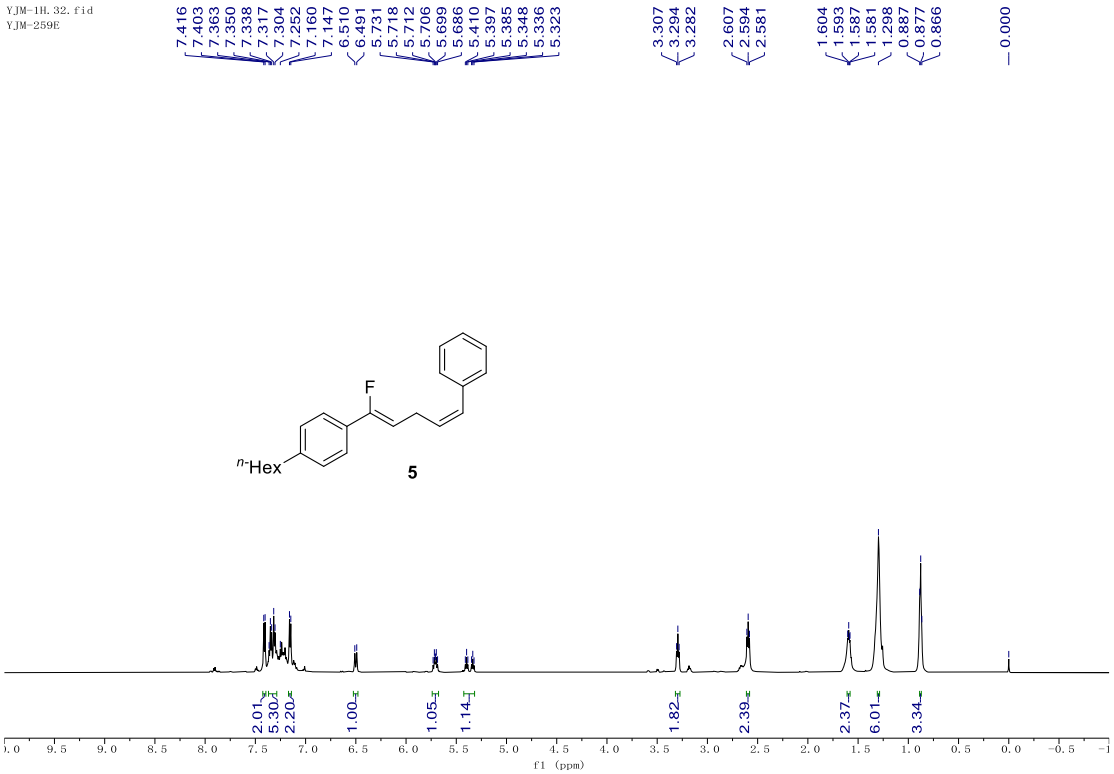

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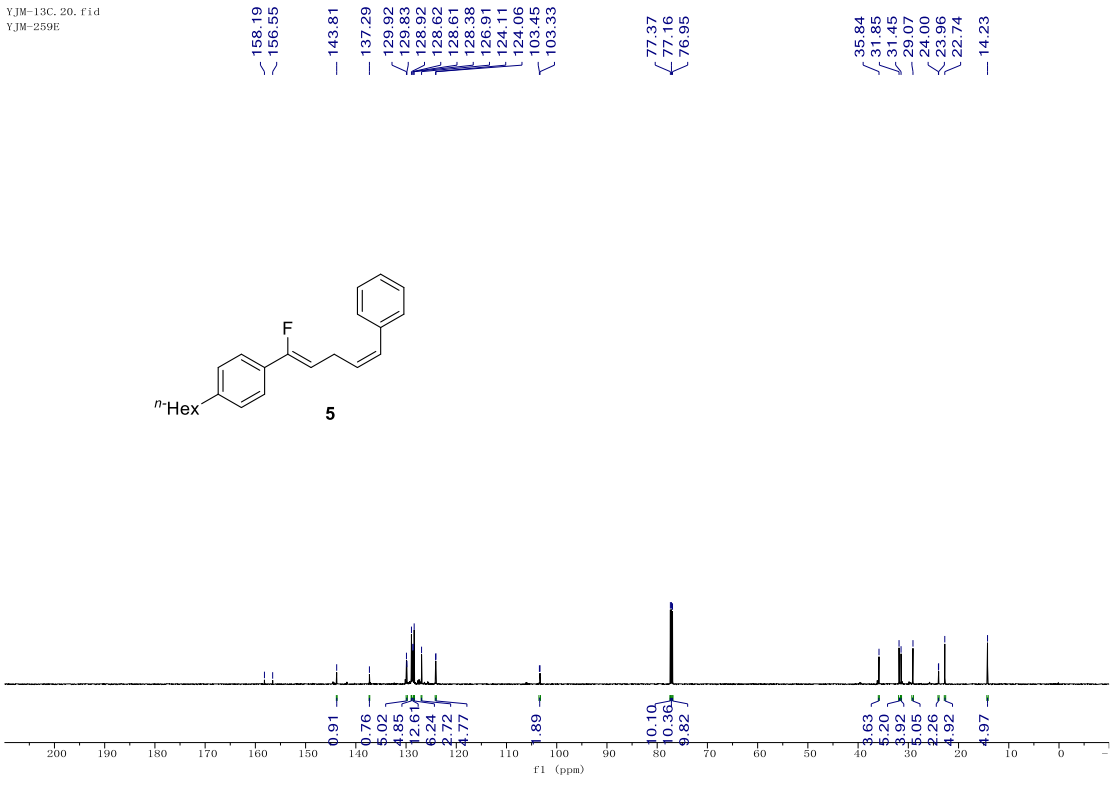

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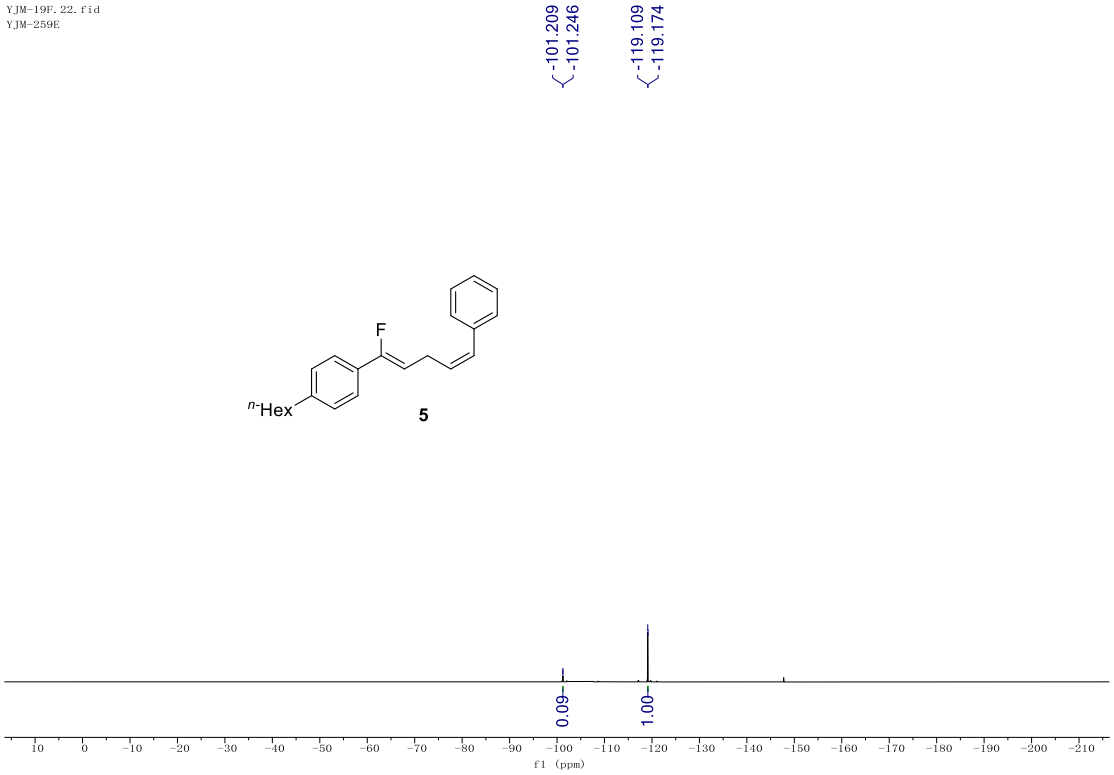

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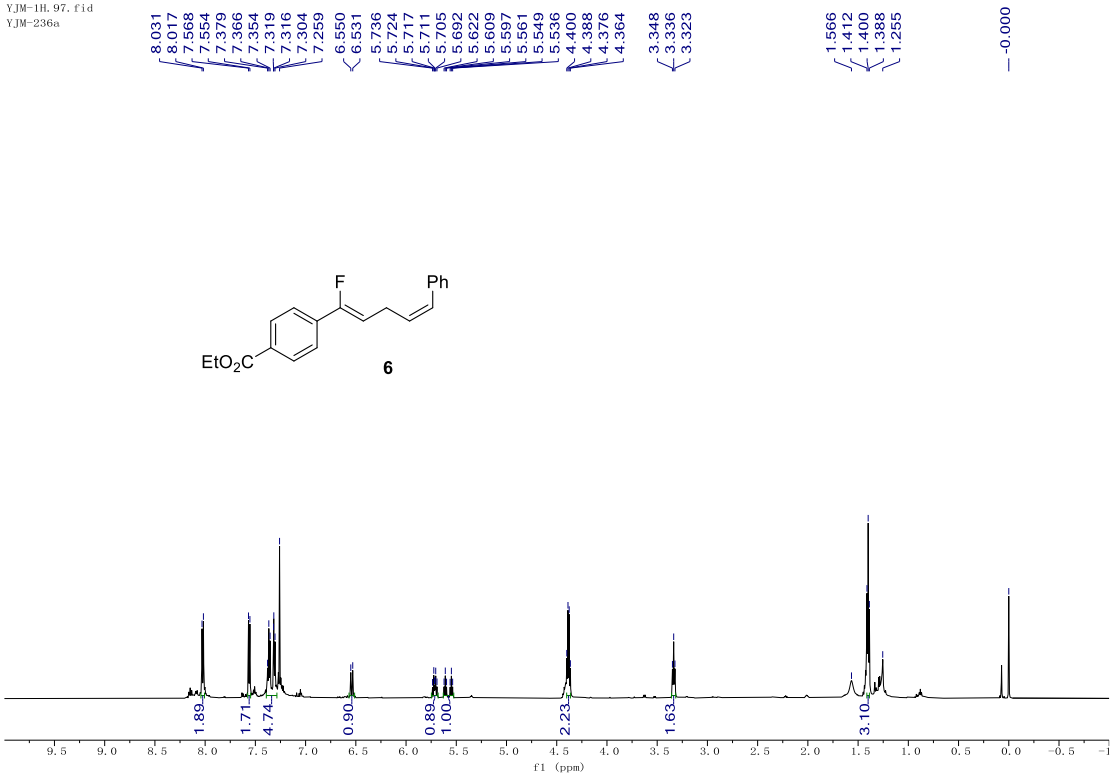

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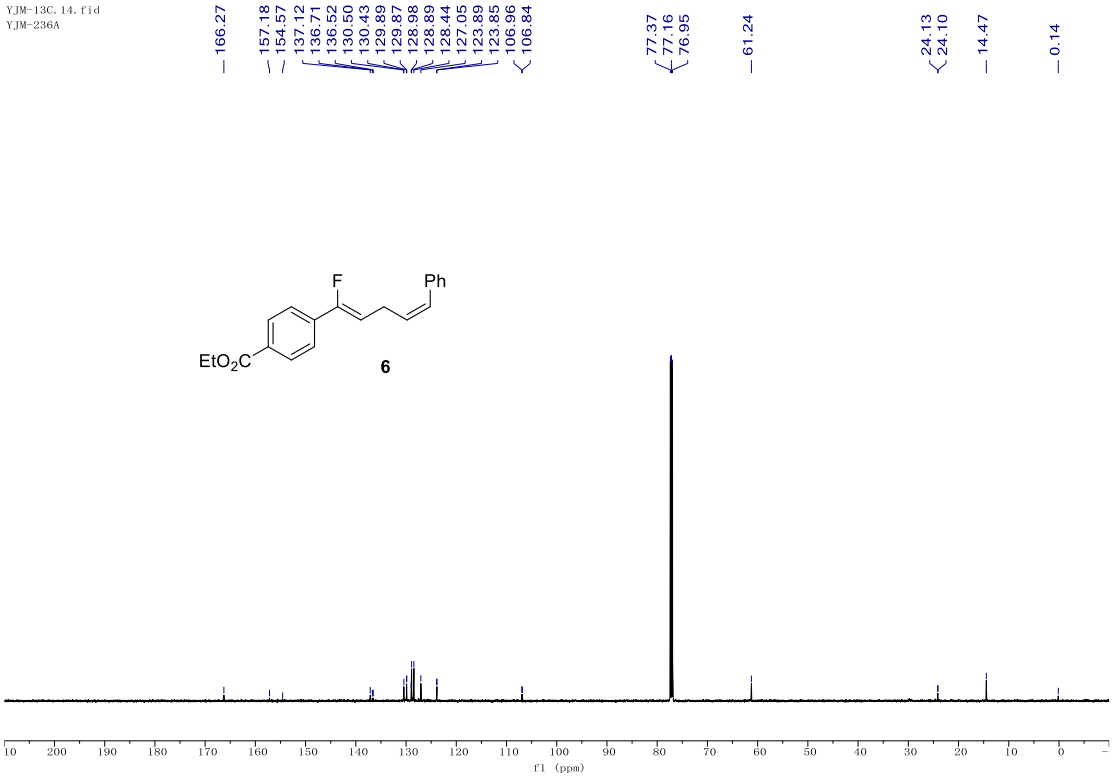

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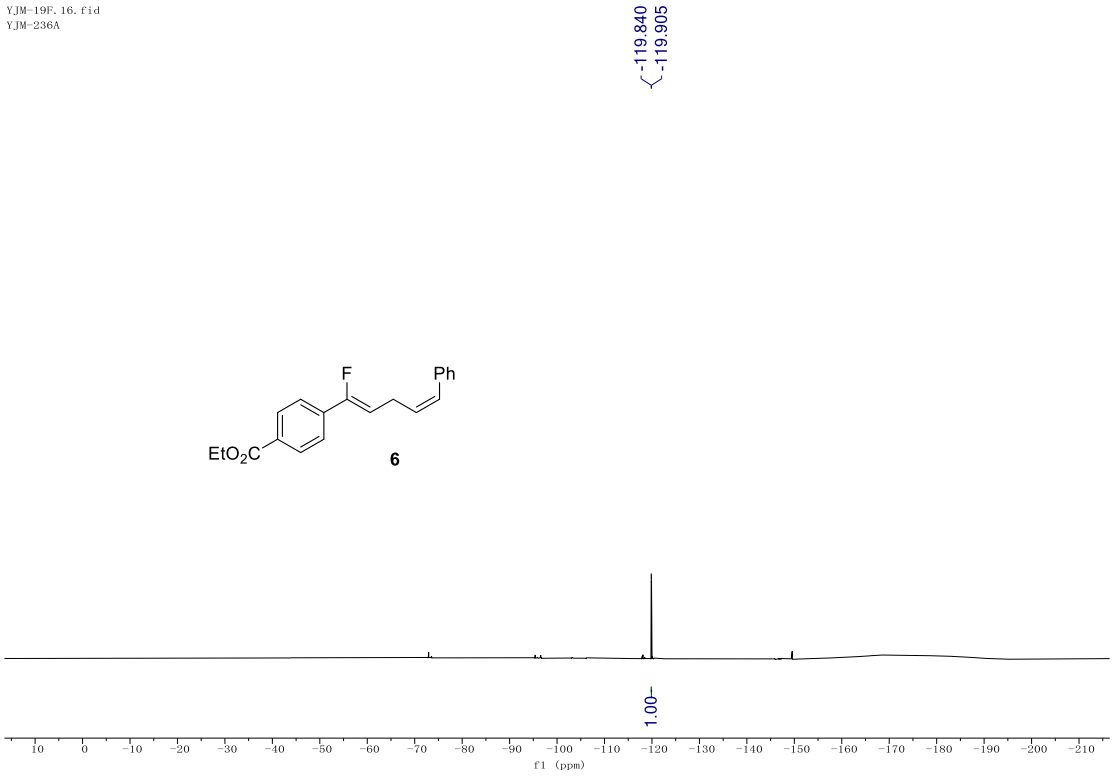

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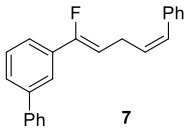

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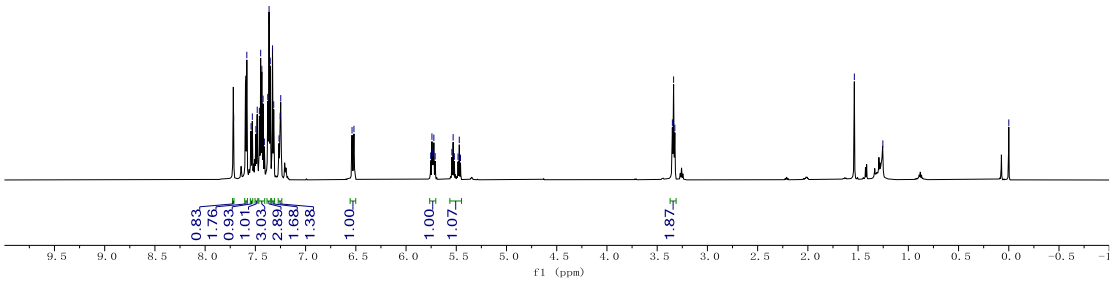

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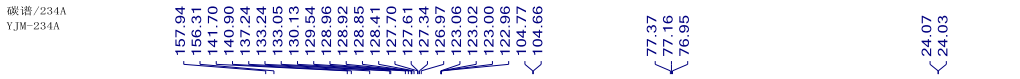

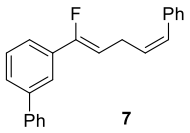

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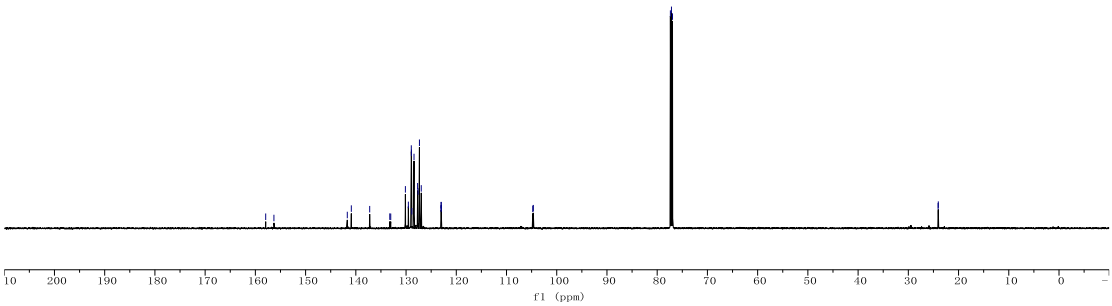

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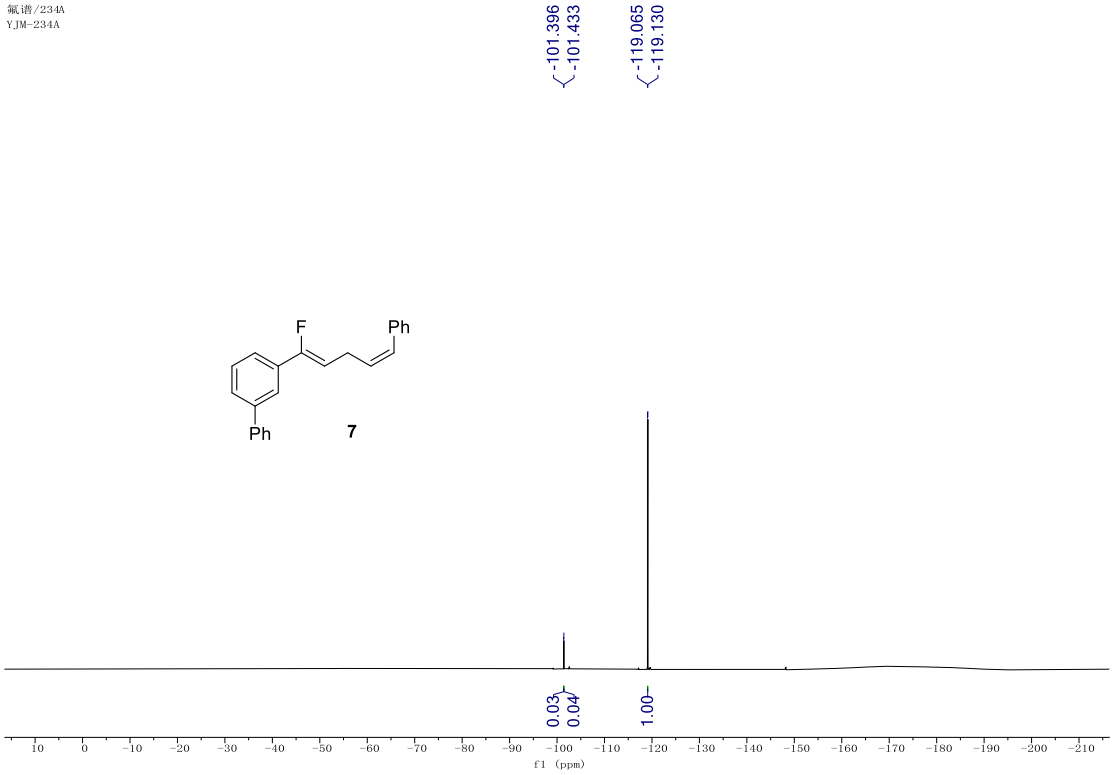

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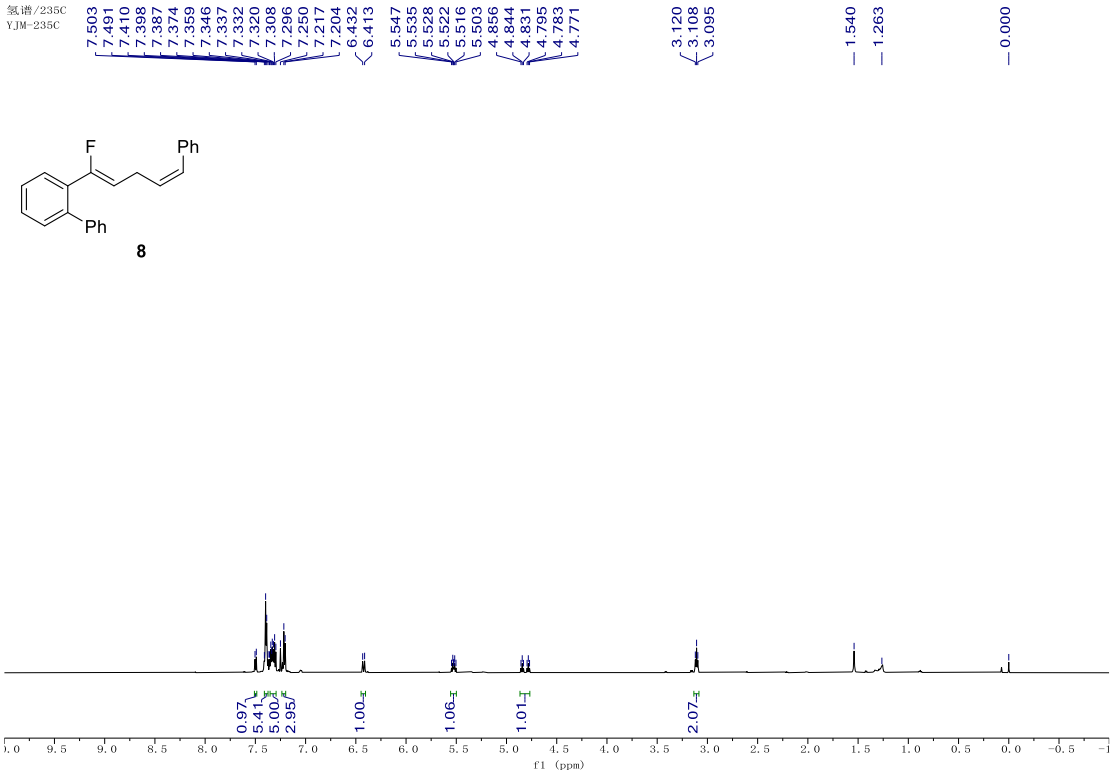

^{13}C NMR (151 MHz, $CDCl_3$)

碳谱/235C
YJM-235C

158.13
156.47
141.58
140.78
137.23
132.00
131.82
130.72
129.81
129.47
129.22
129.08
129.05
128.86
128.77
128.36
128.33
127.31
127.27
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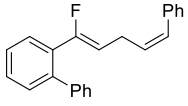
109.07

77.37
77.16
76.95

24.16
24.13



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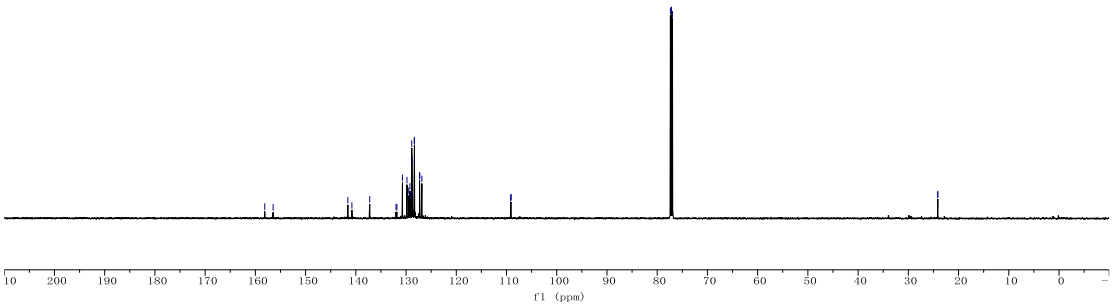
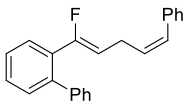


^{19}F NMR (565 MHz, $CDCl_3$)

氟谱/235C
YJM-235C

-90.595
-90.628

-103.366
-103.430



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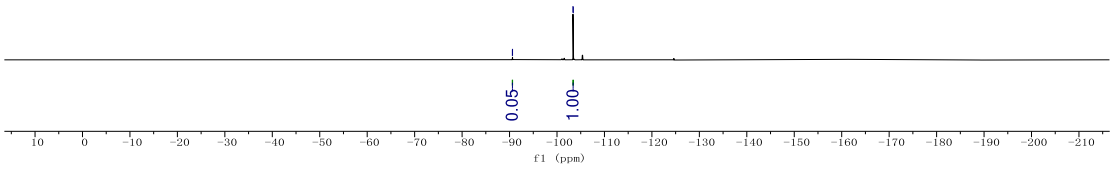

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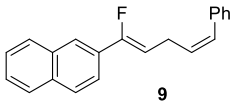

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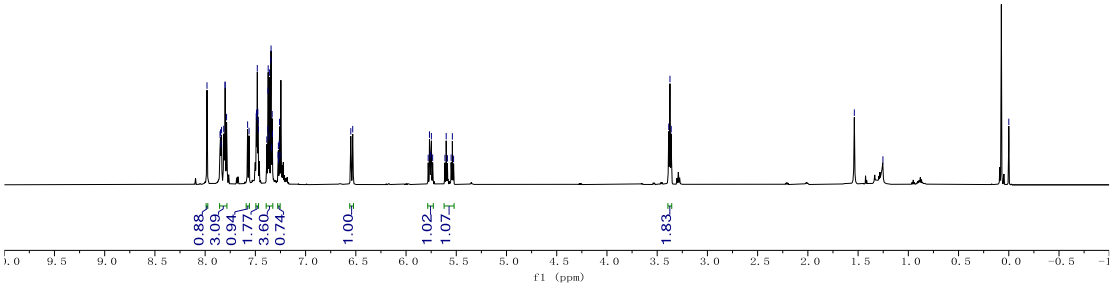
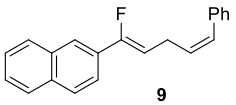


^{13}C NMR (151 MHz, $CDCl_3$)



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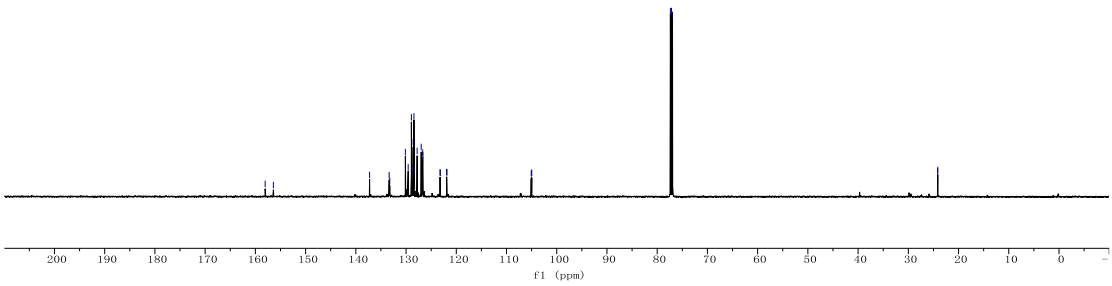

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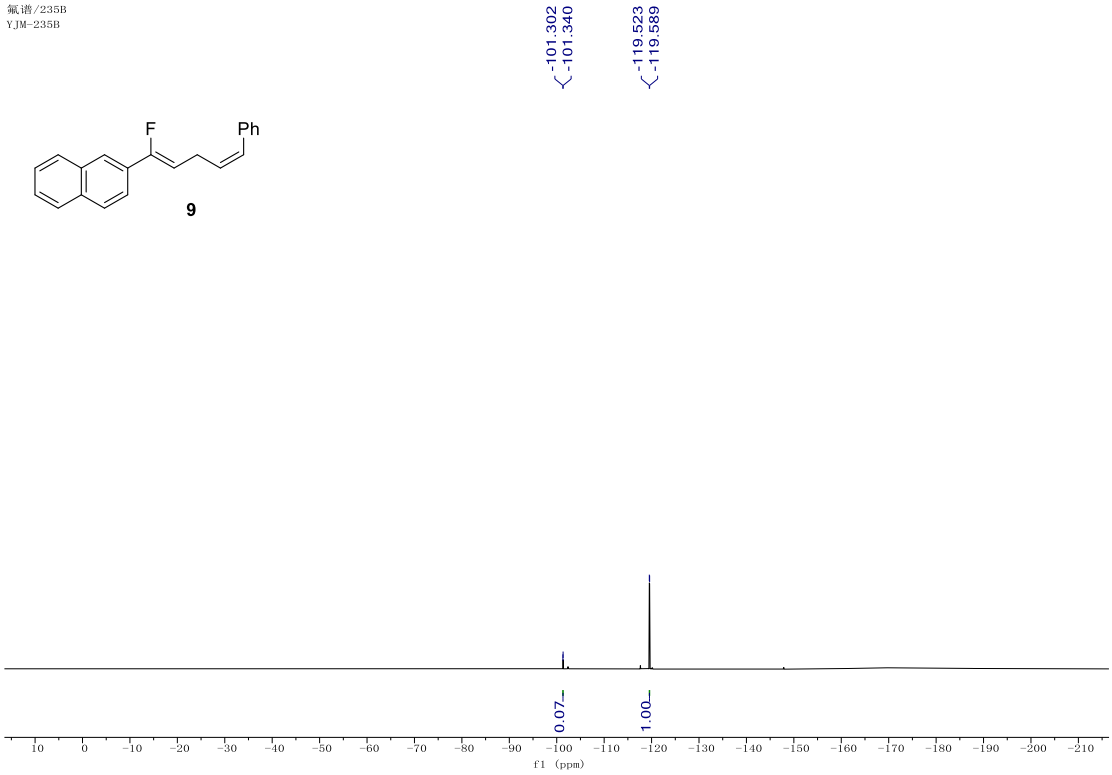

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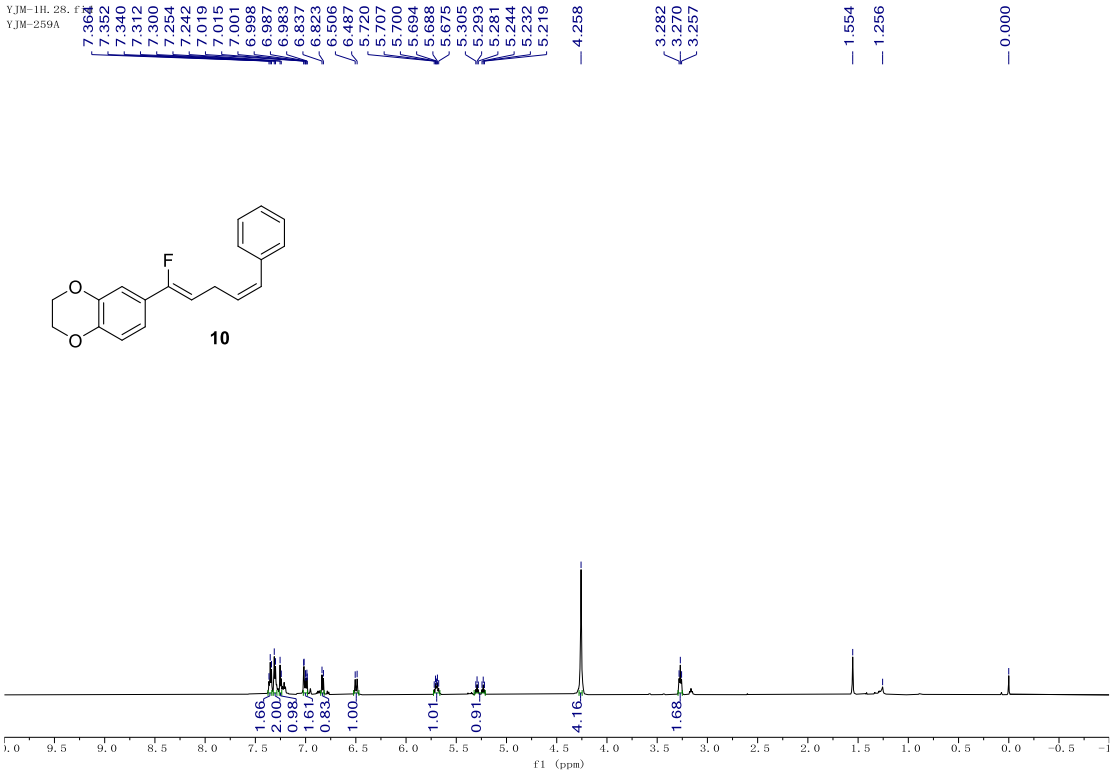

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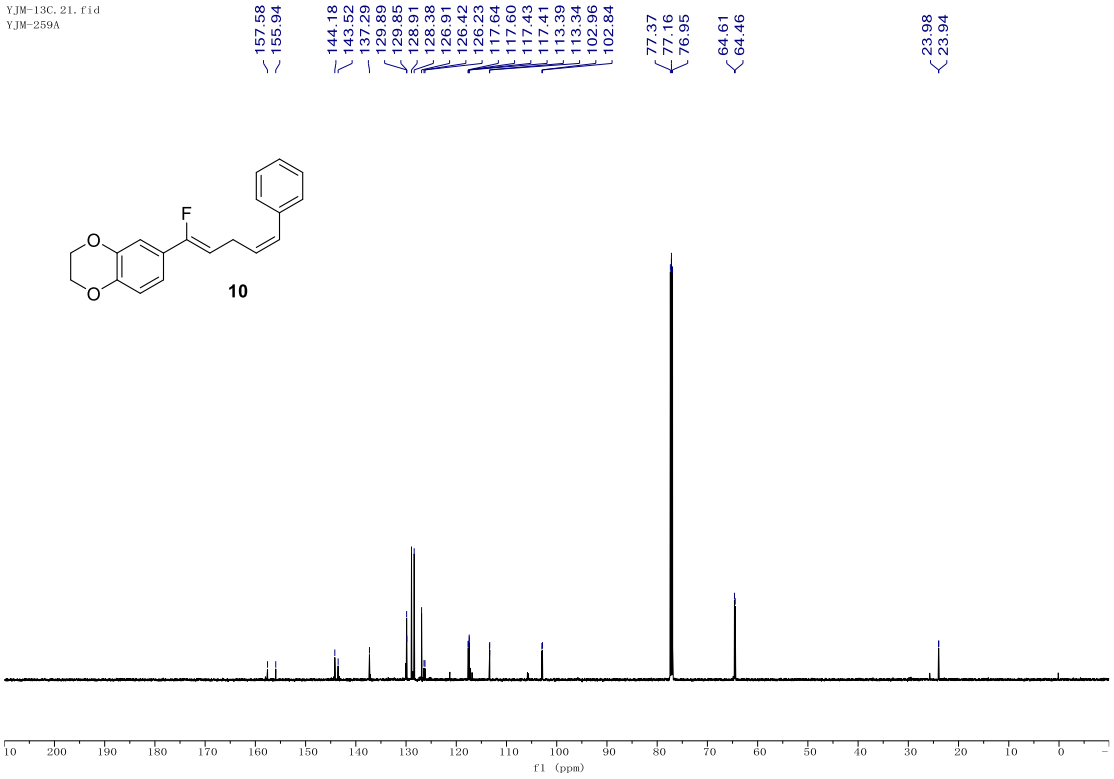

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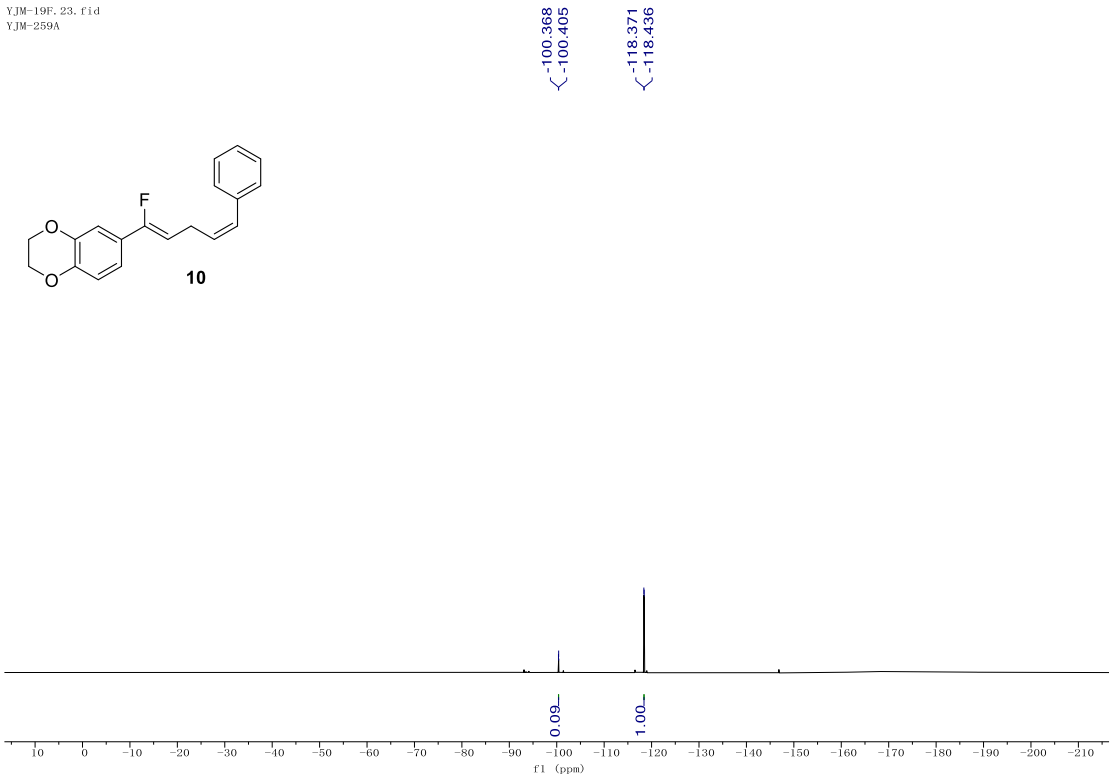

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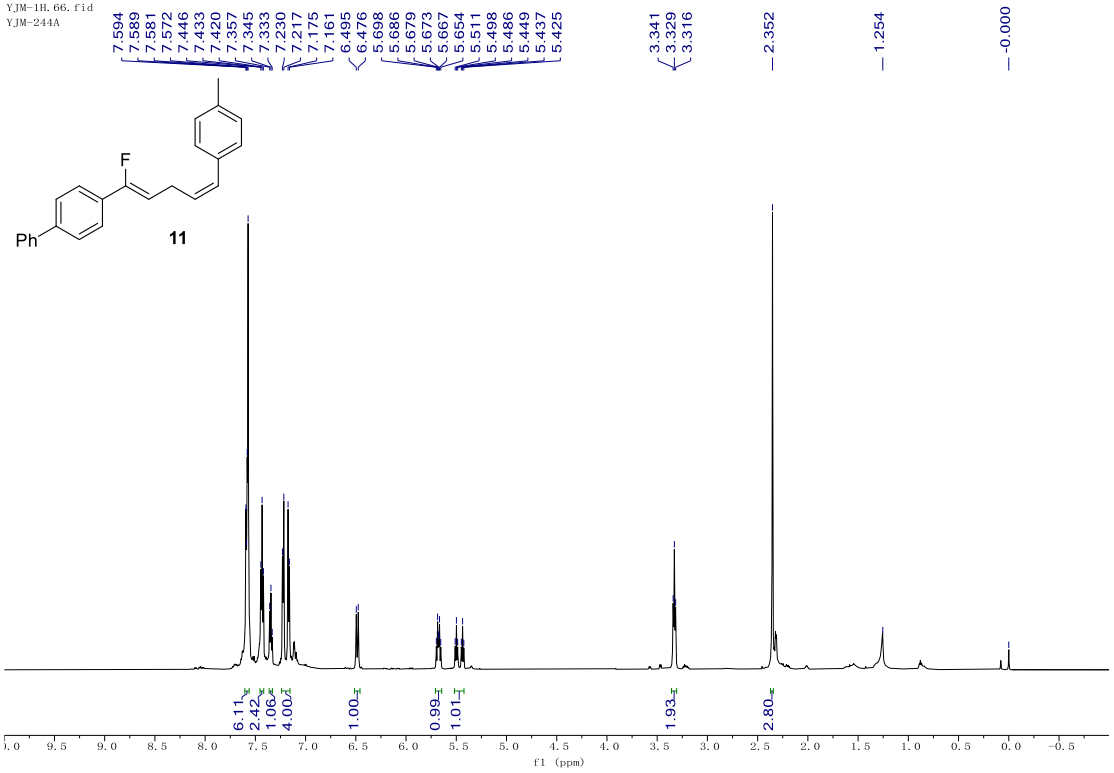

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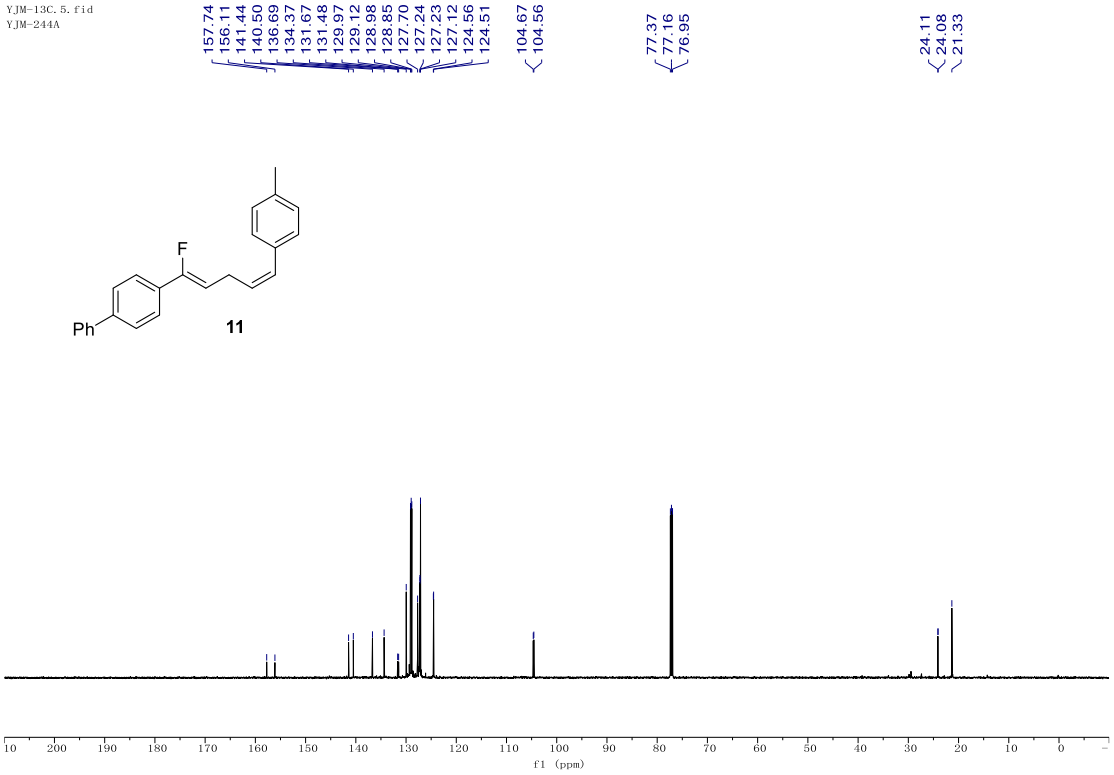

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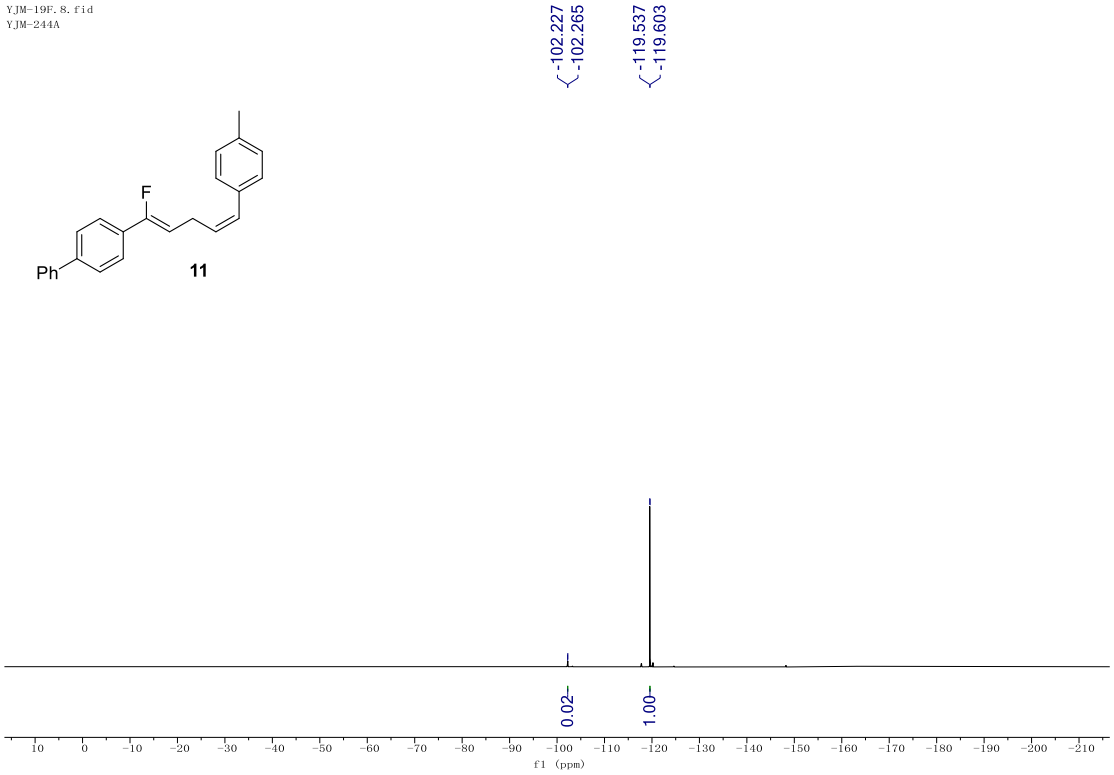

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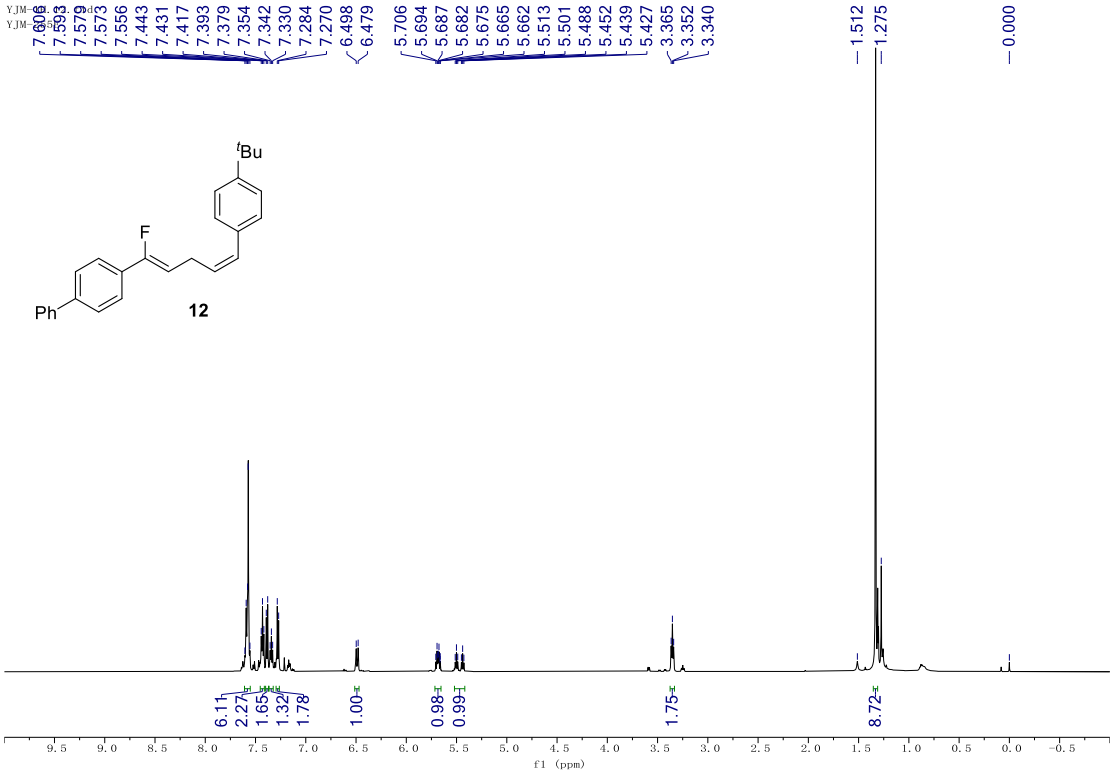

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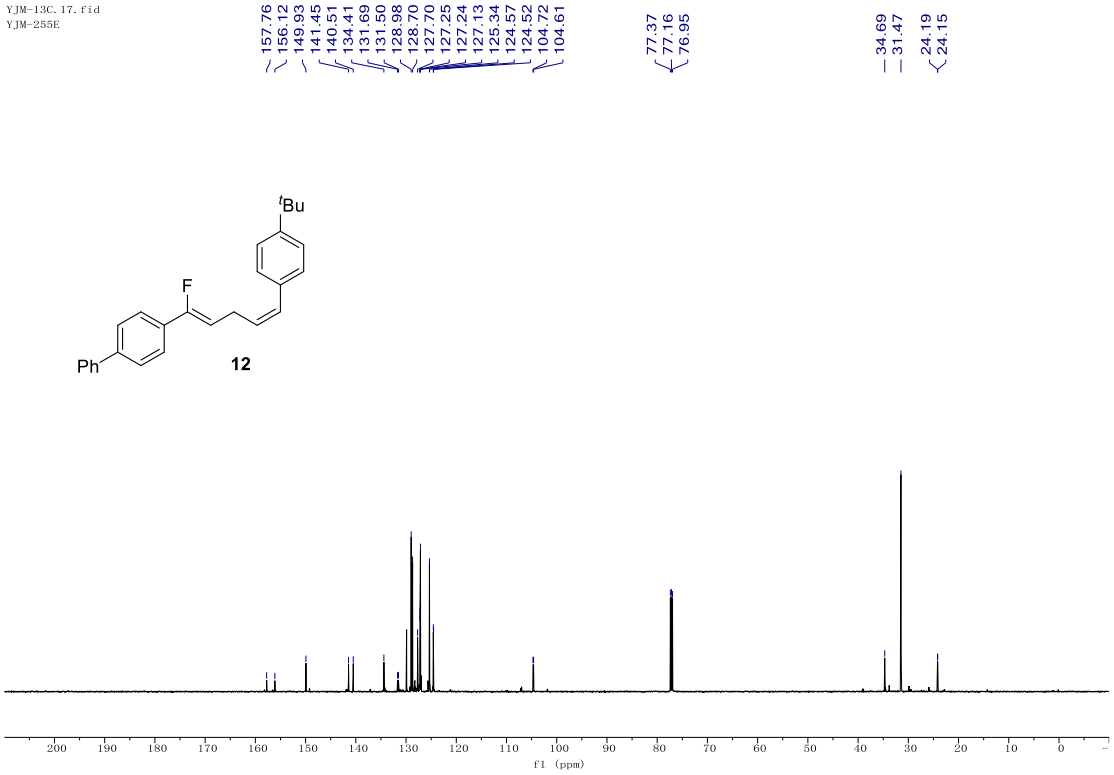

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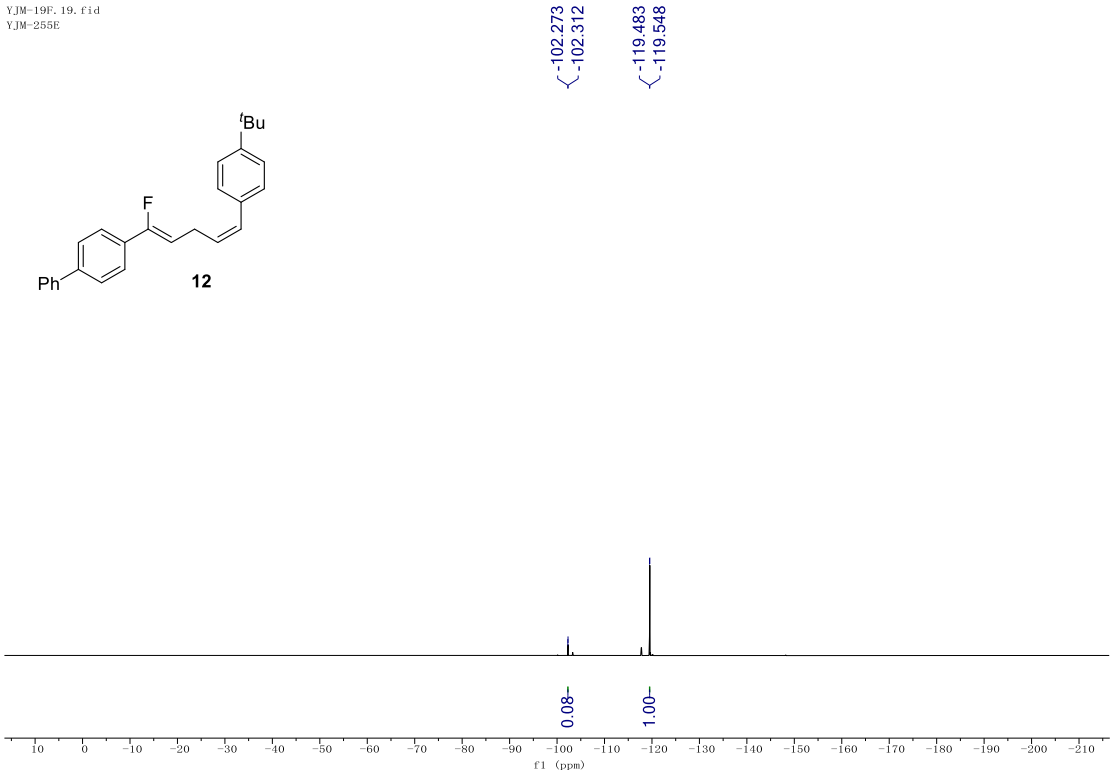

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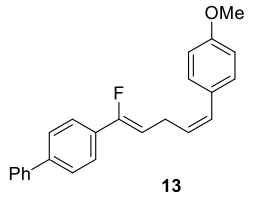

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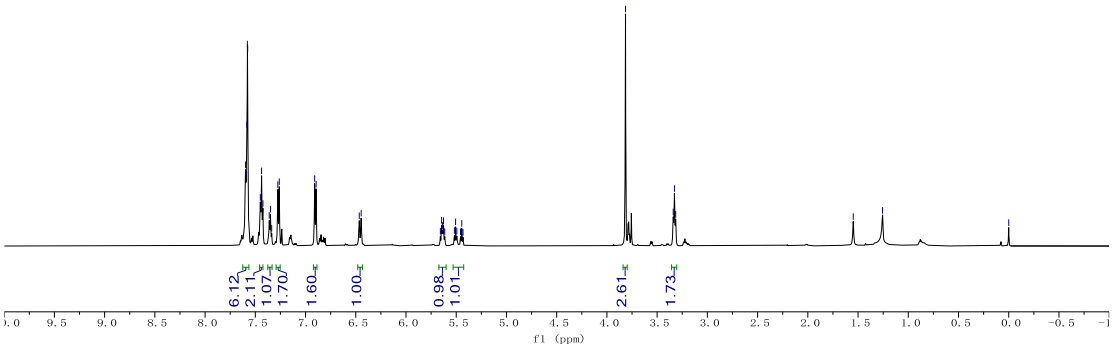

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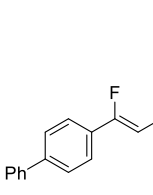

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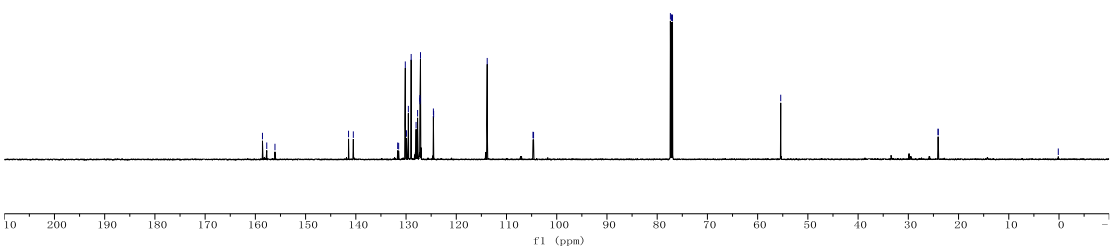

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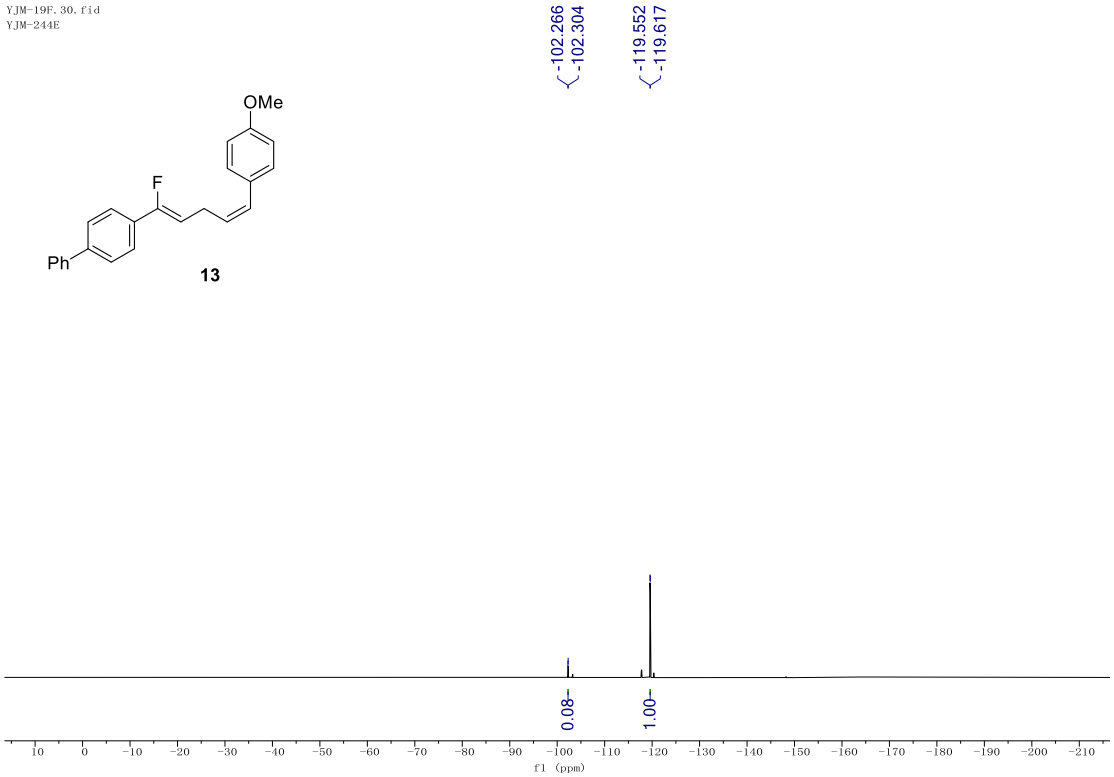

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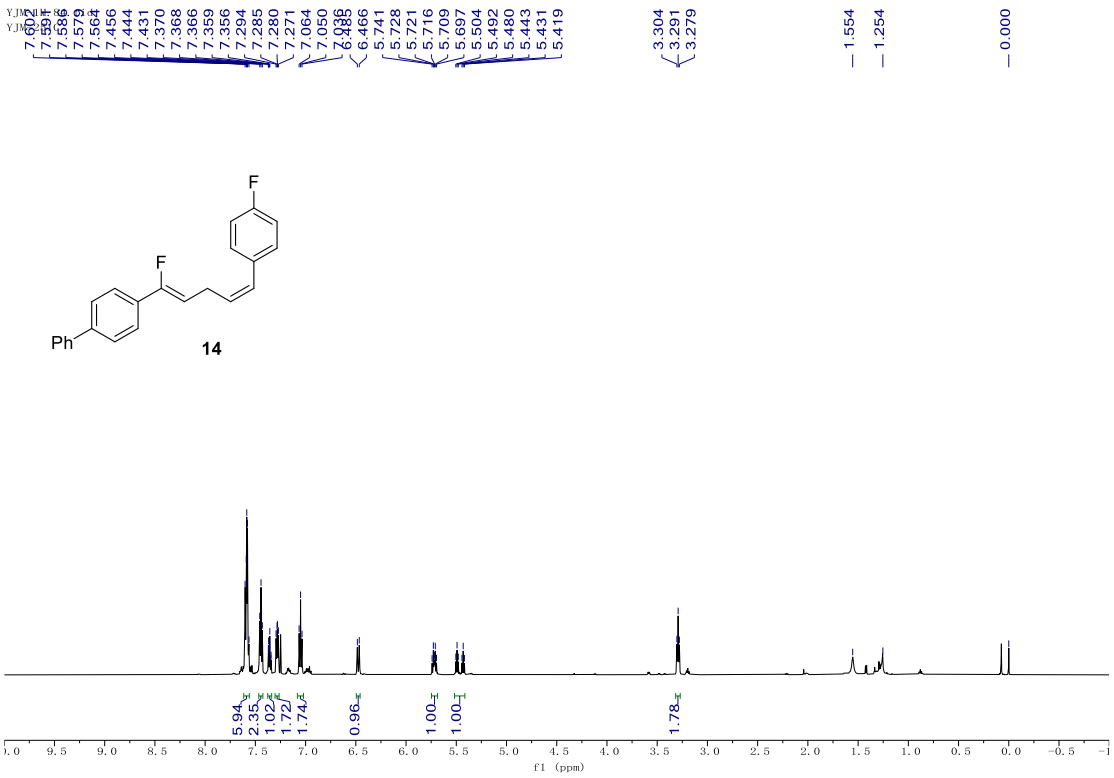

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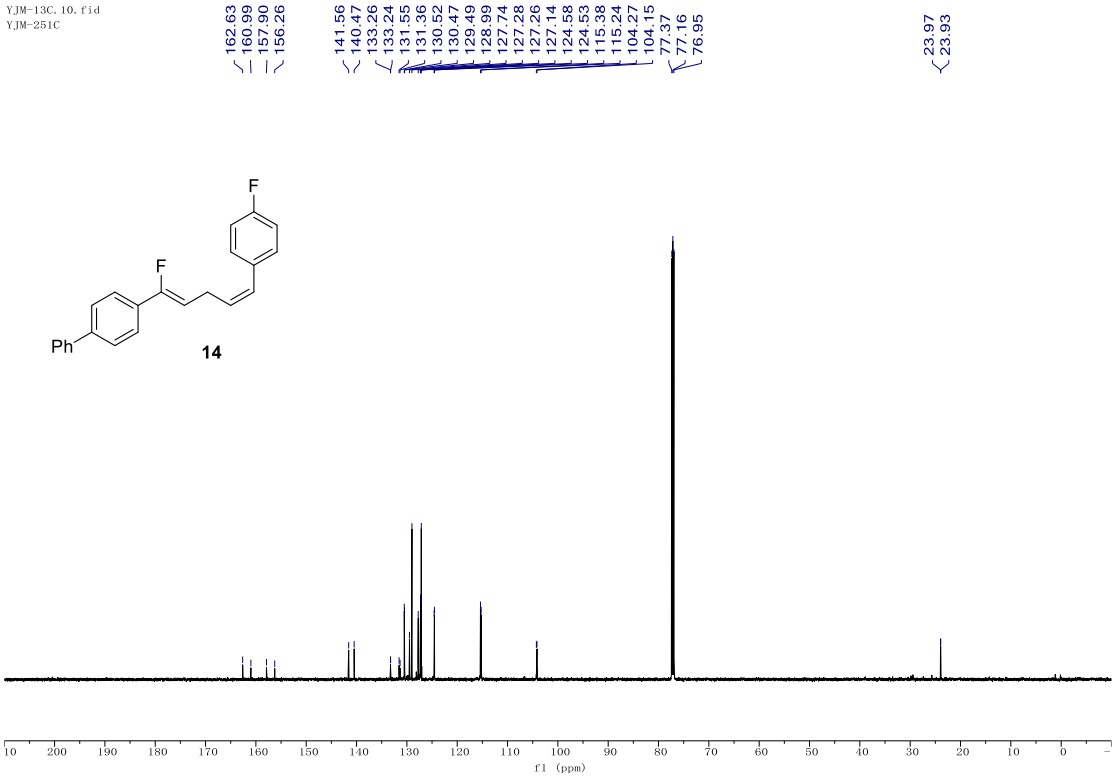

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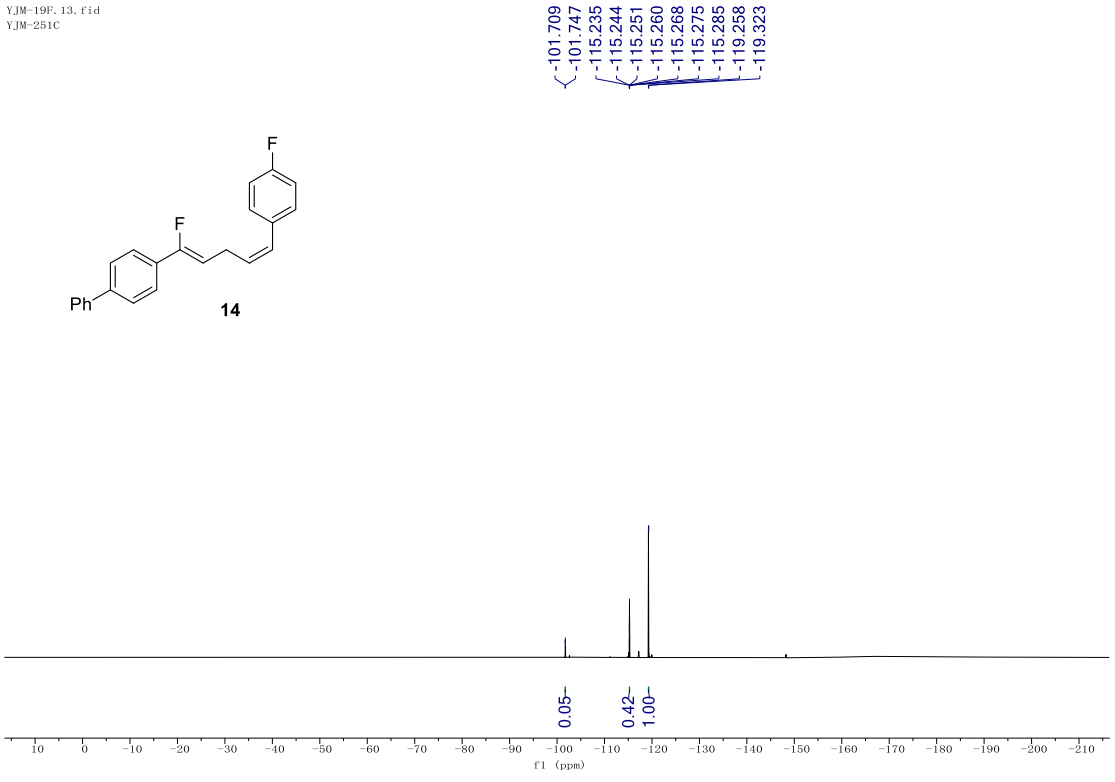

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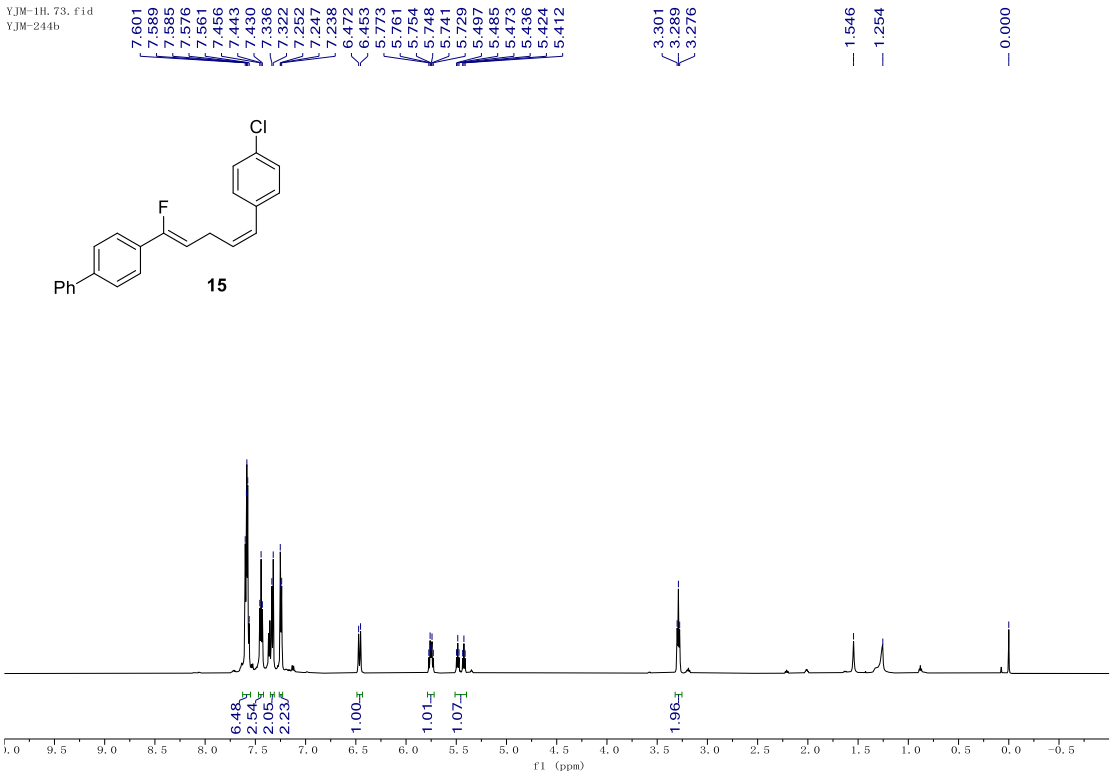

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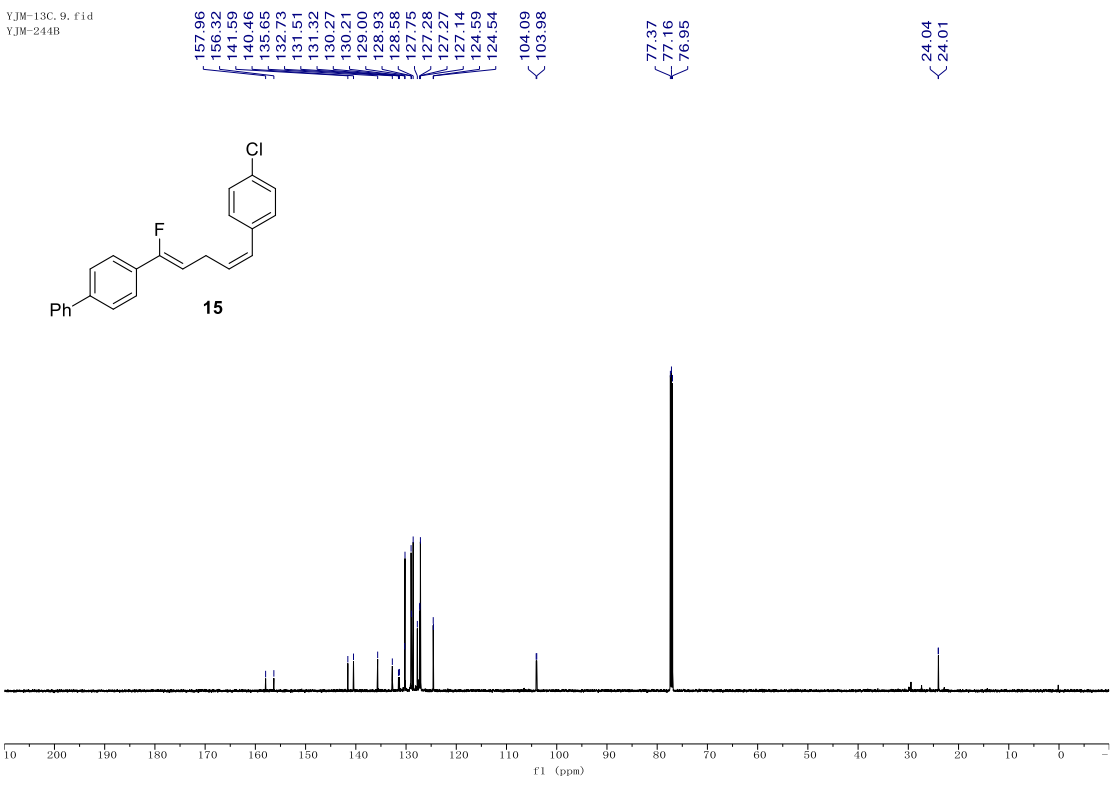

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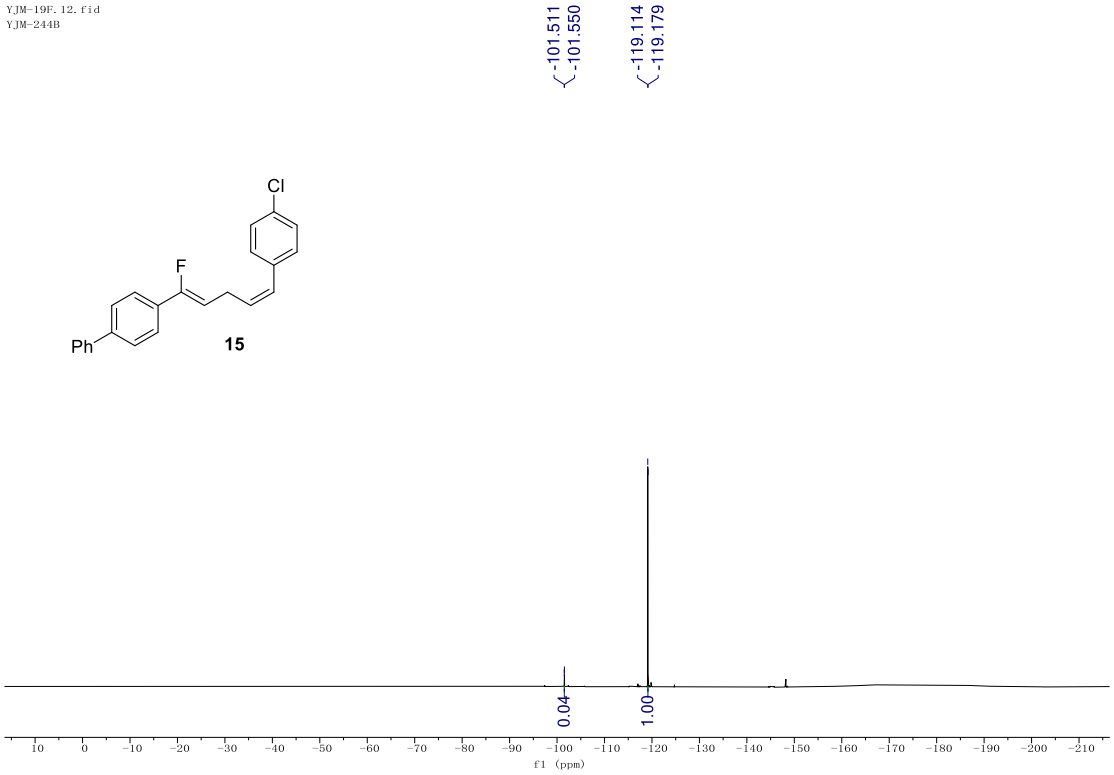

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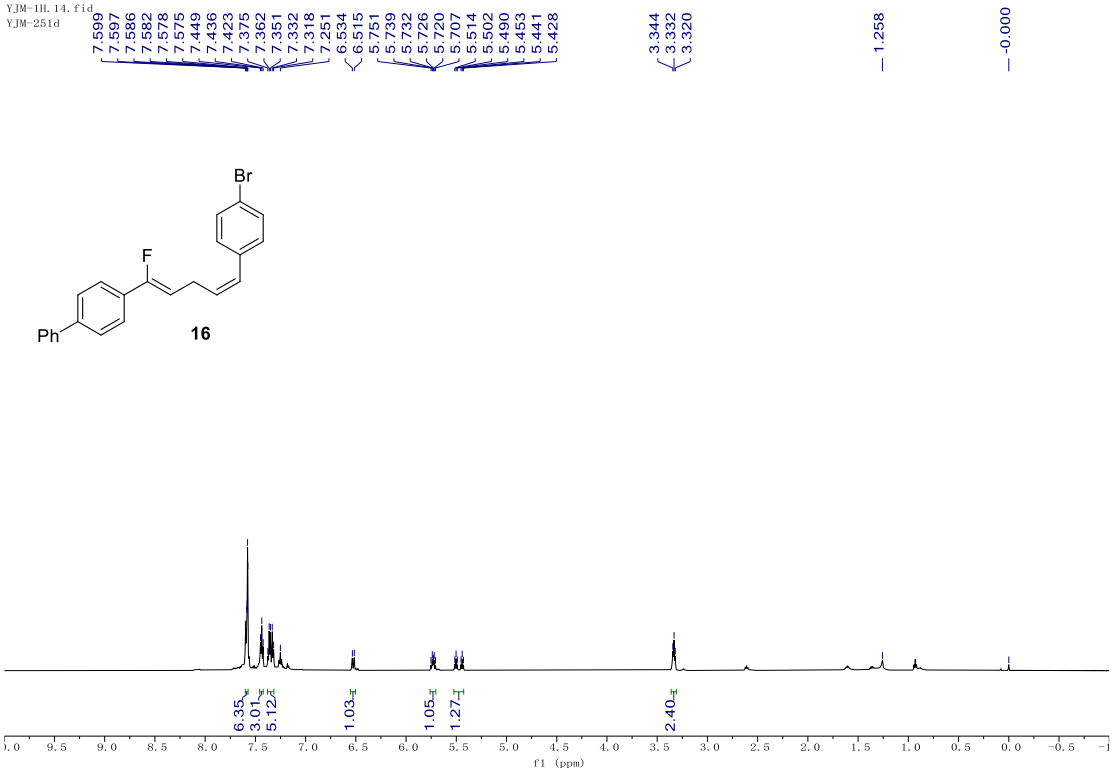

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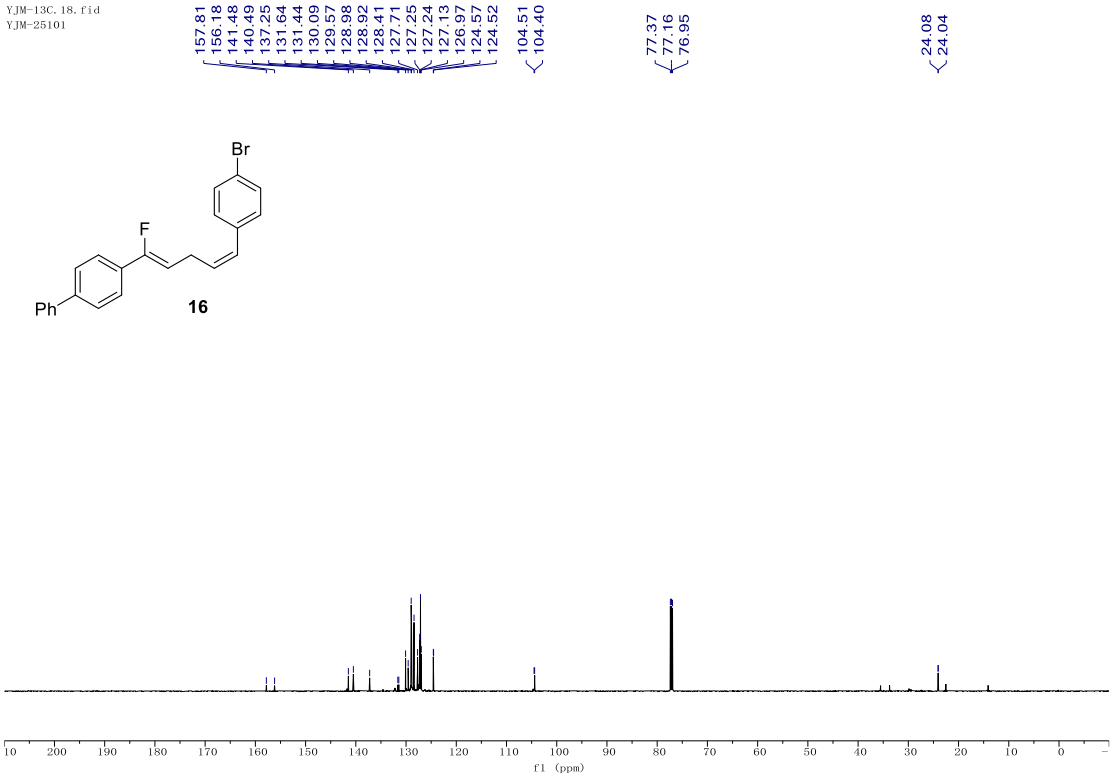

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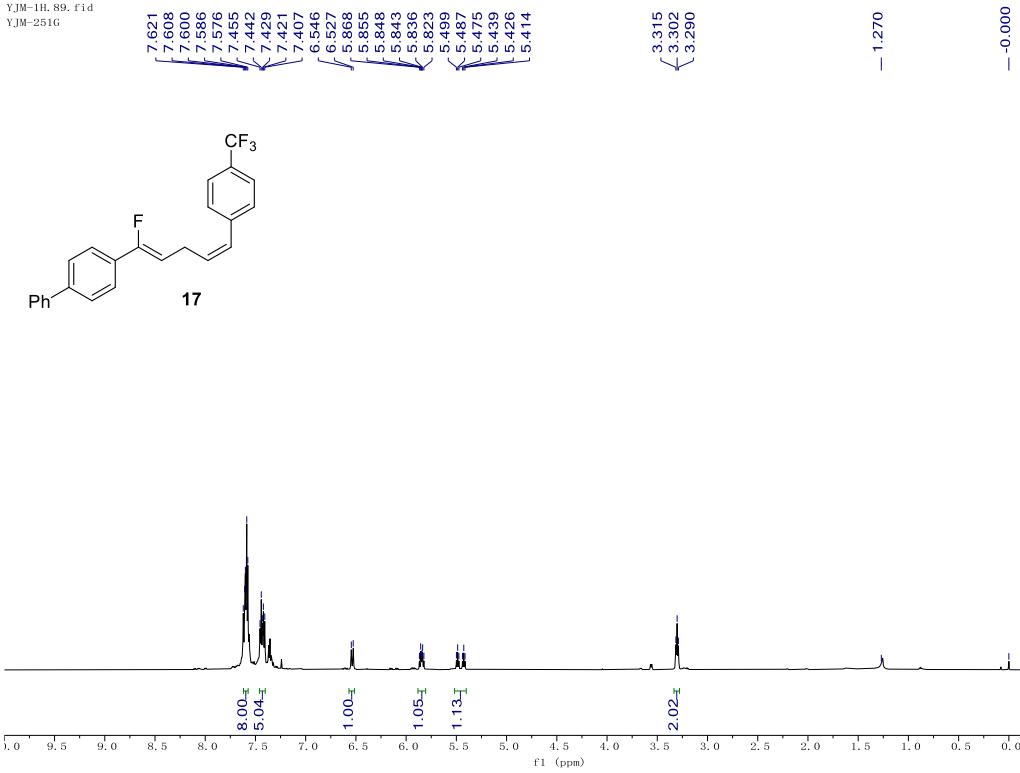
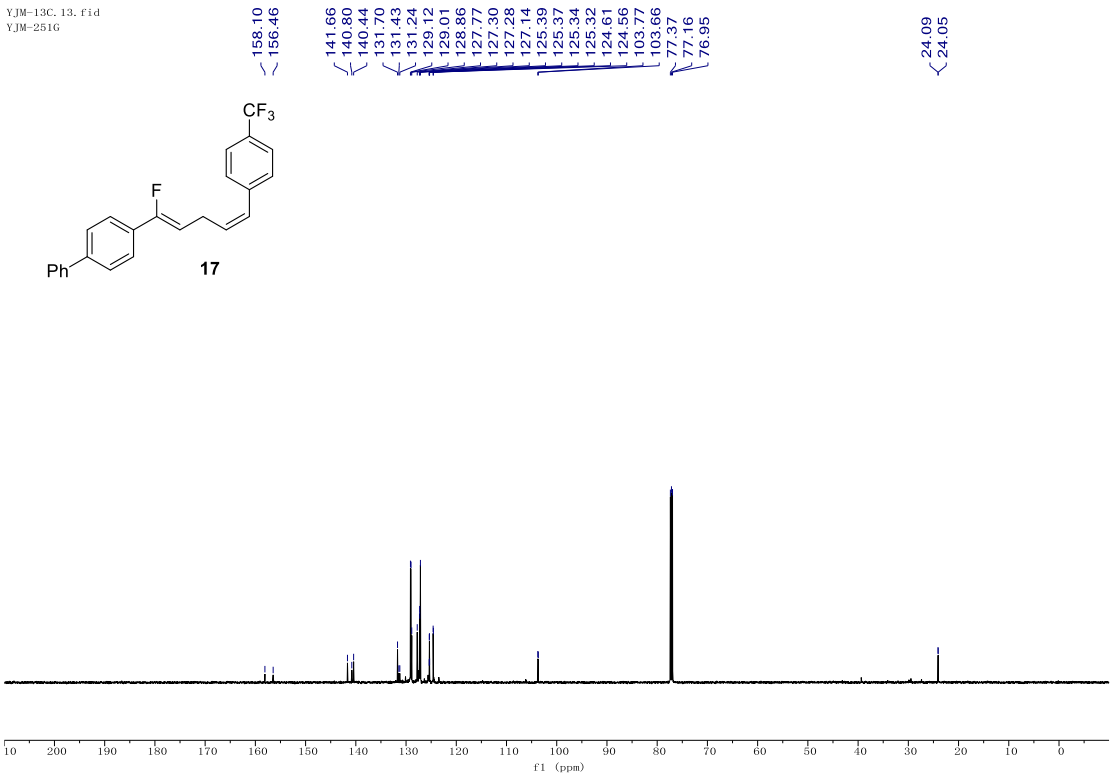
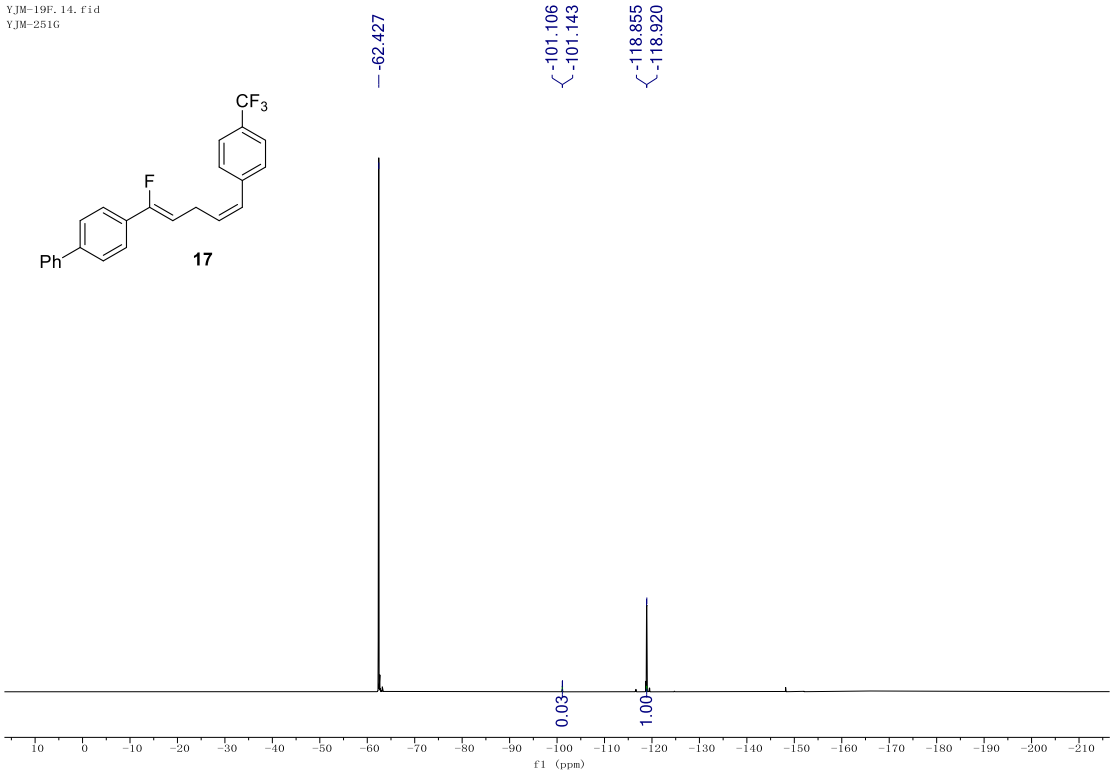
^{1}H NMR (600 MHz, $CDCl_3$)



^{13}C NMR (151 MHz, $CDCl_3$)



^{19}F NMR (565 MHz, $CDCl_3$)



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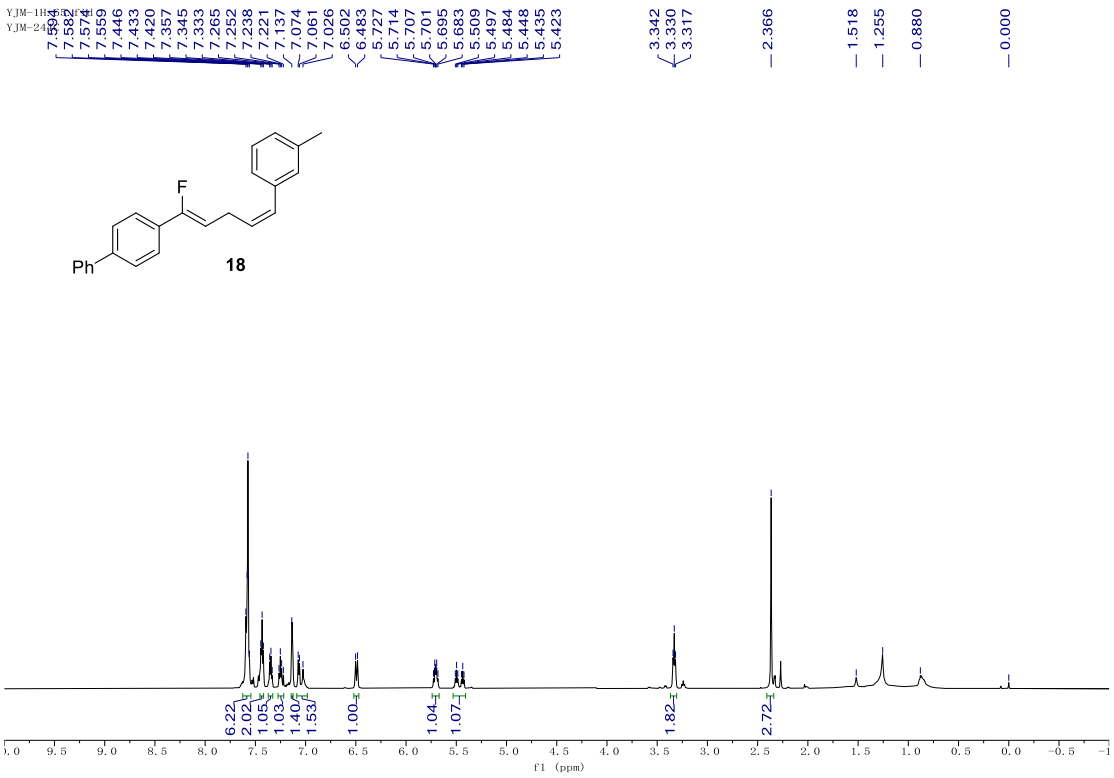
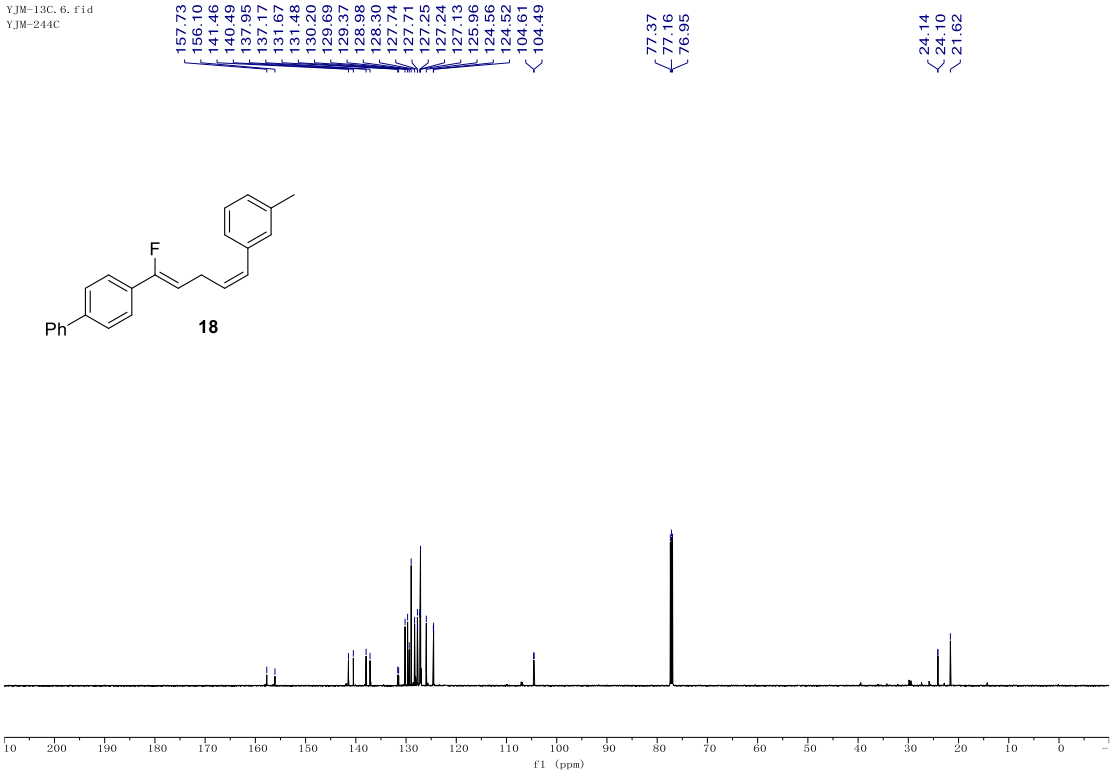
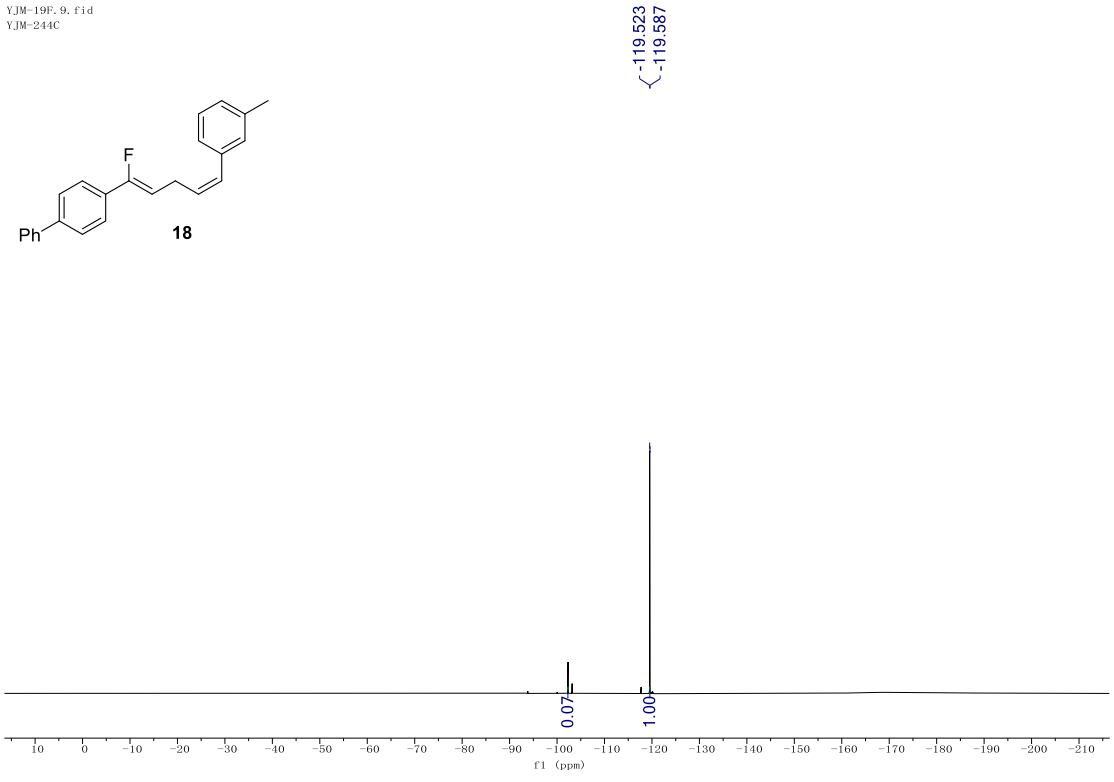


^{13}C NMR (151 MHz, $CDCl_3$)



^{19}F NMR (565 MHz, $CDCl_3$)



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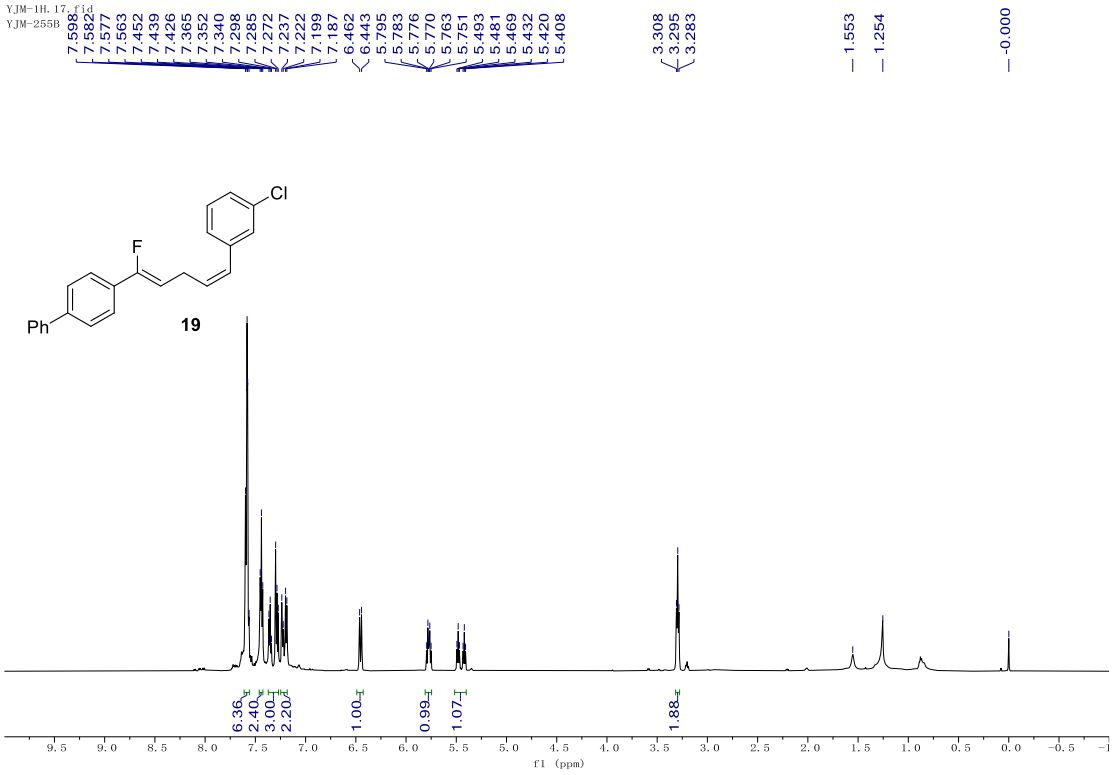

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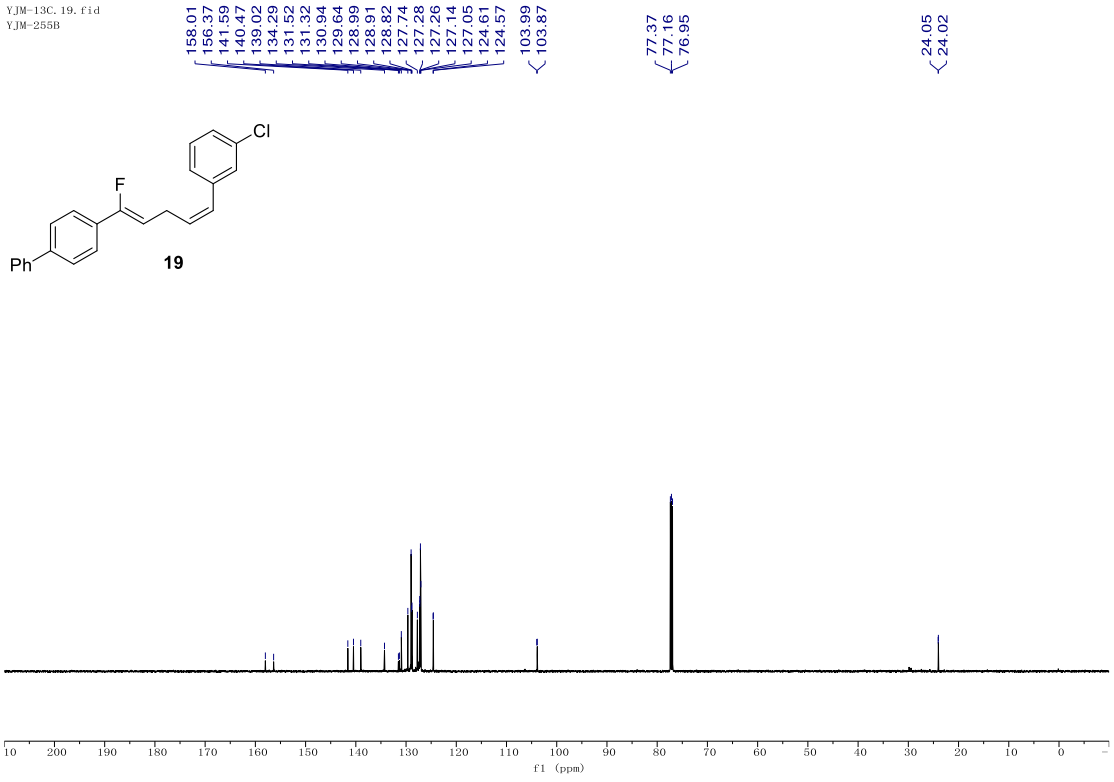

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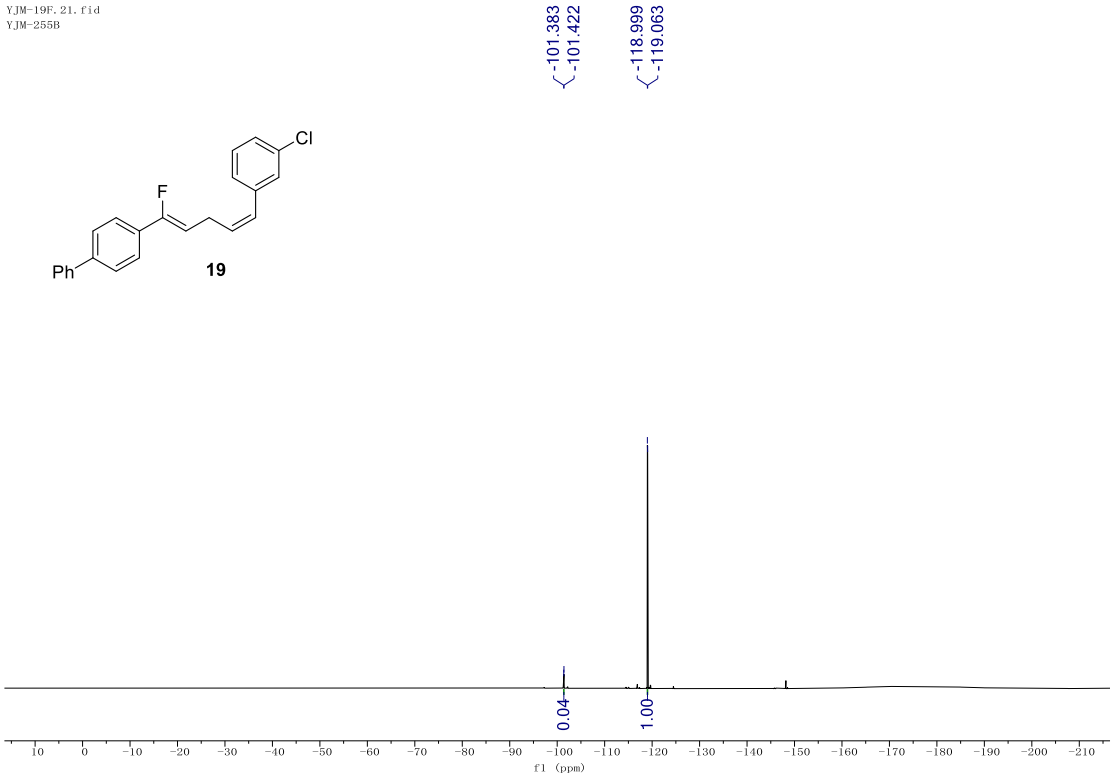

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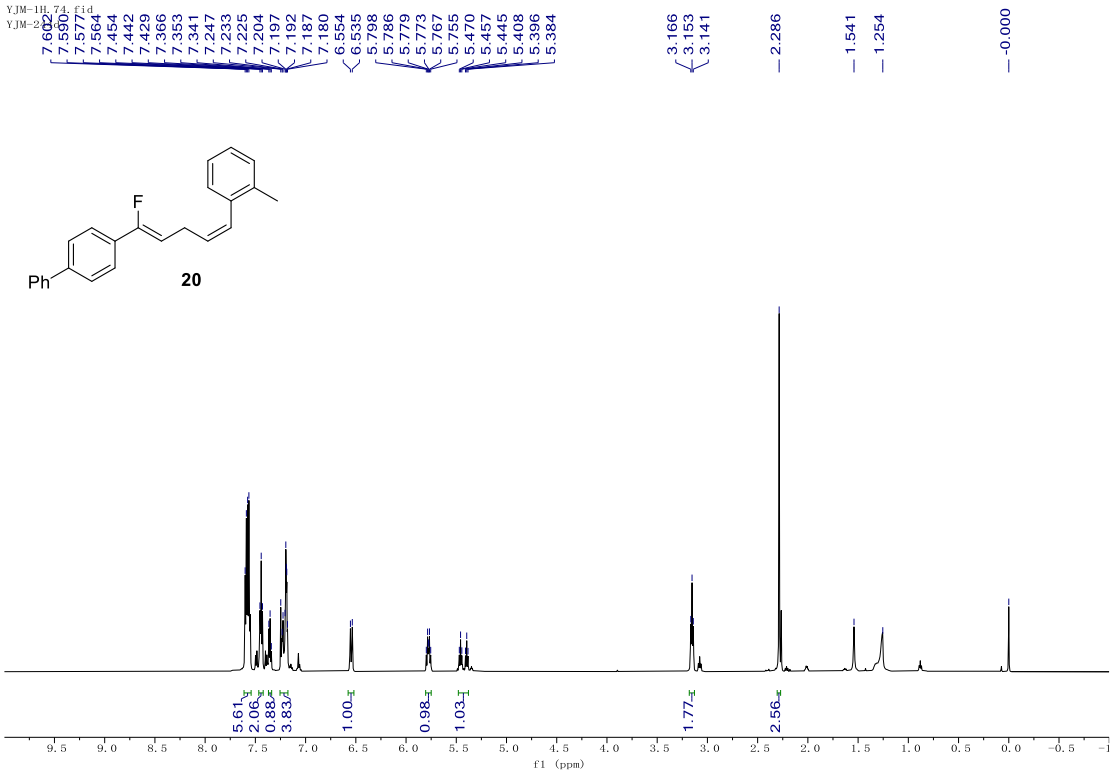

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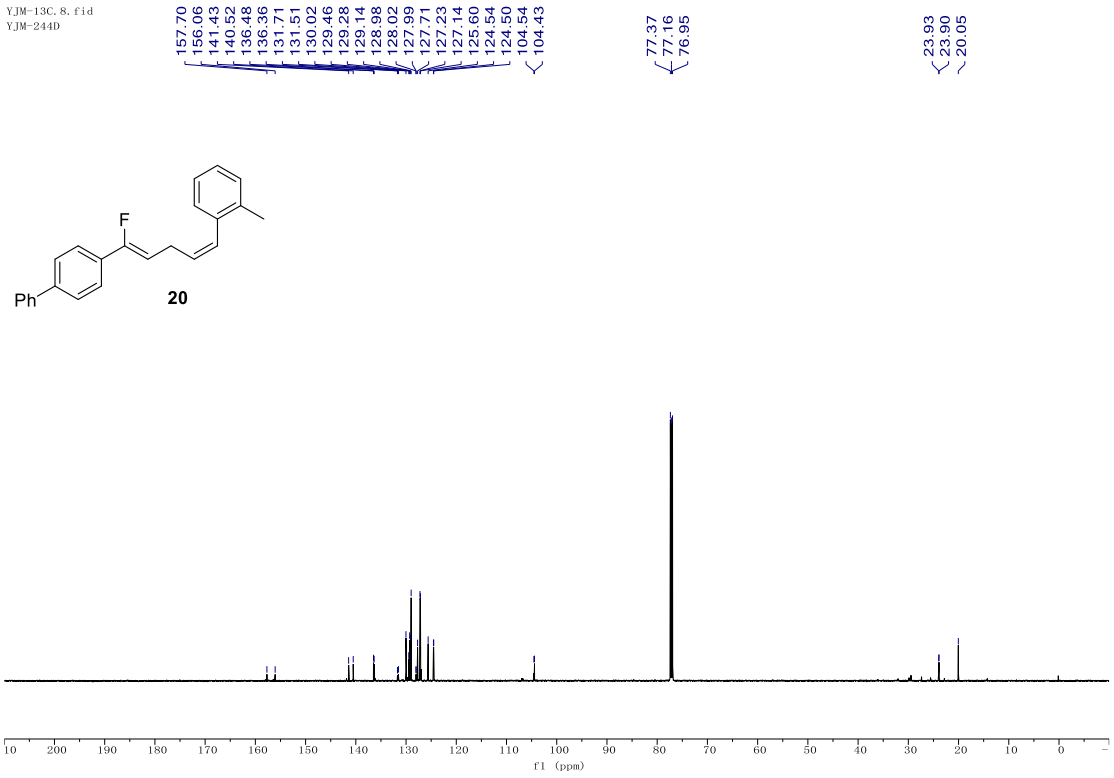

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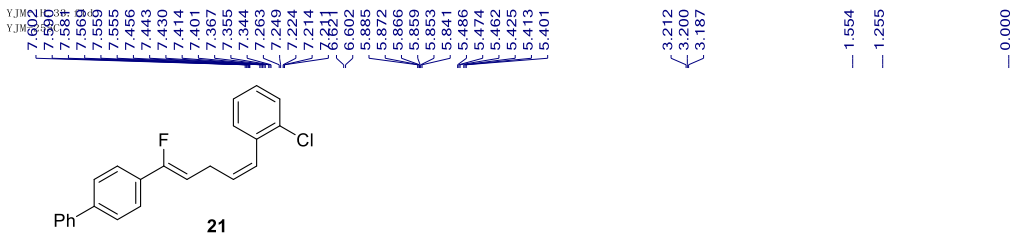

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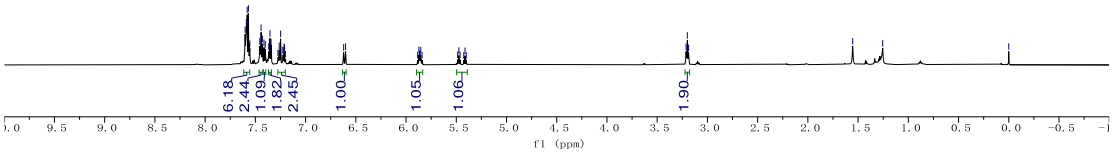

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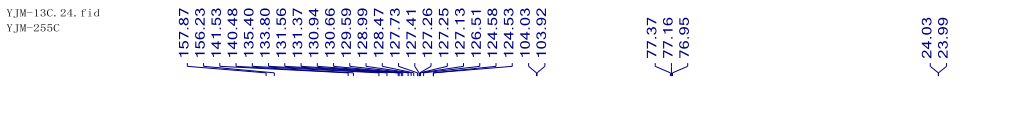

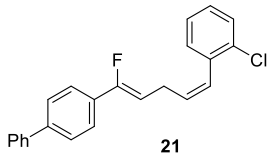

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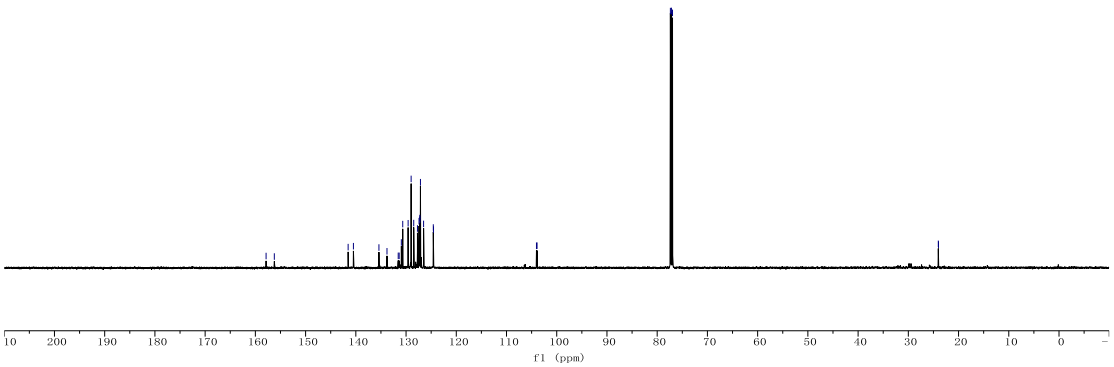

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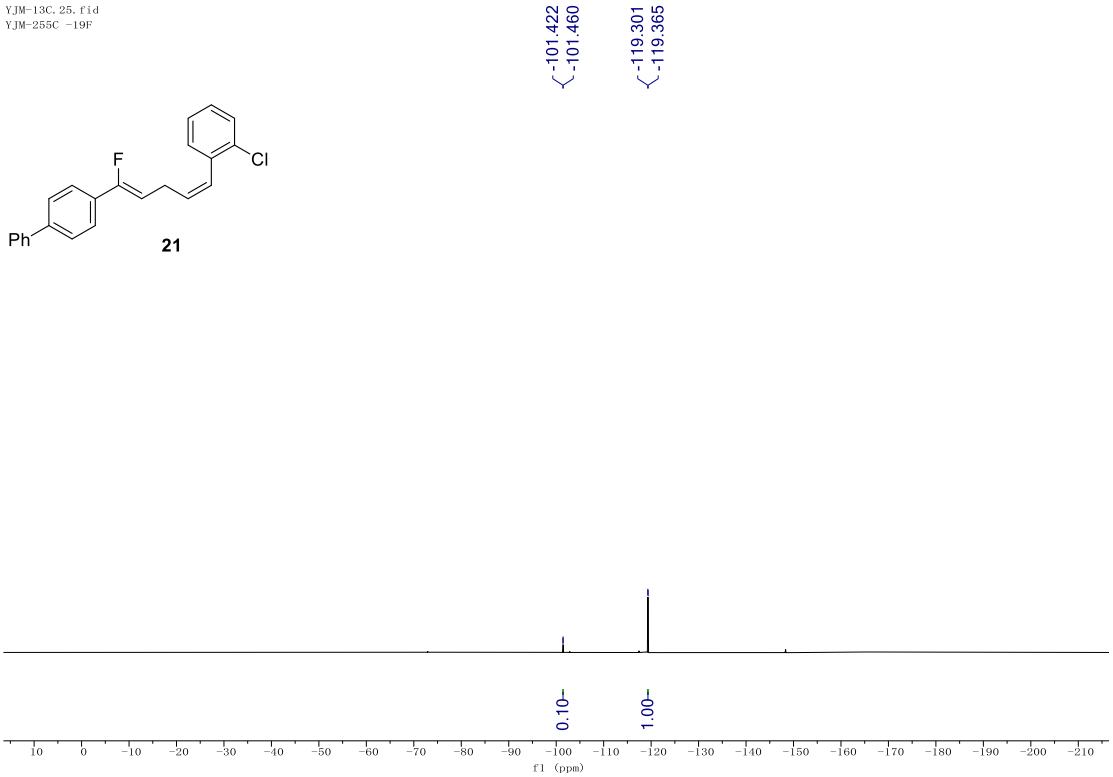

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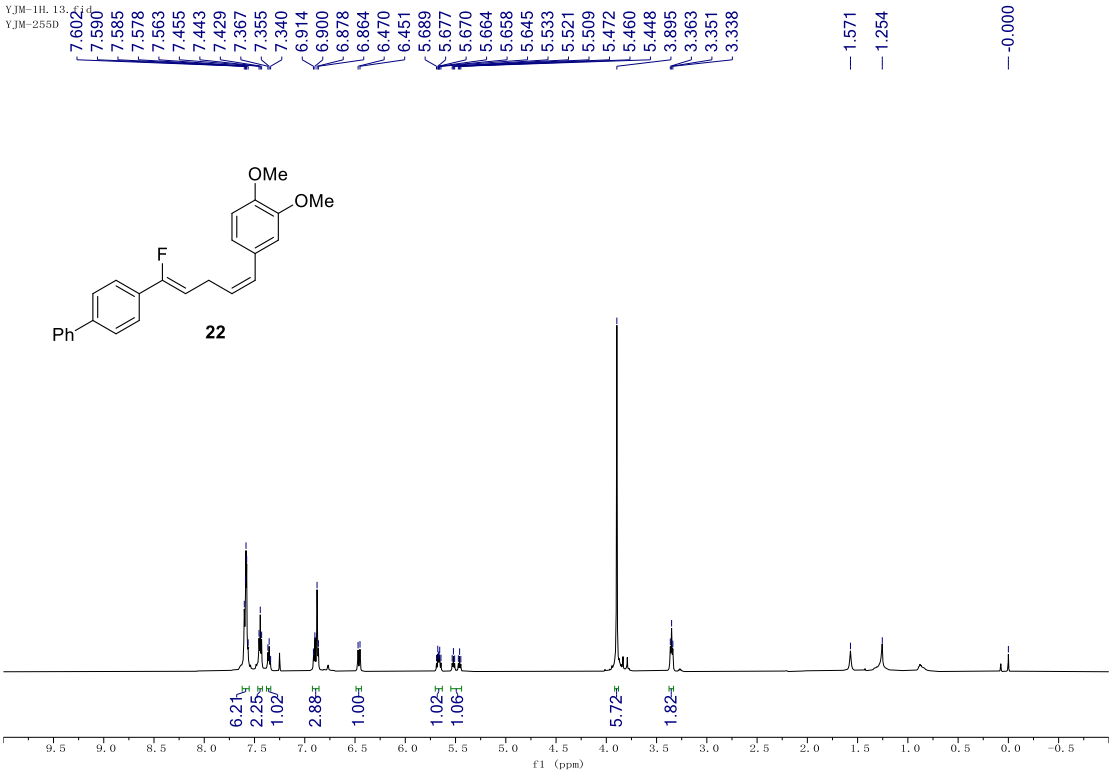

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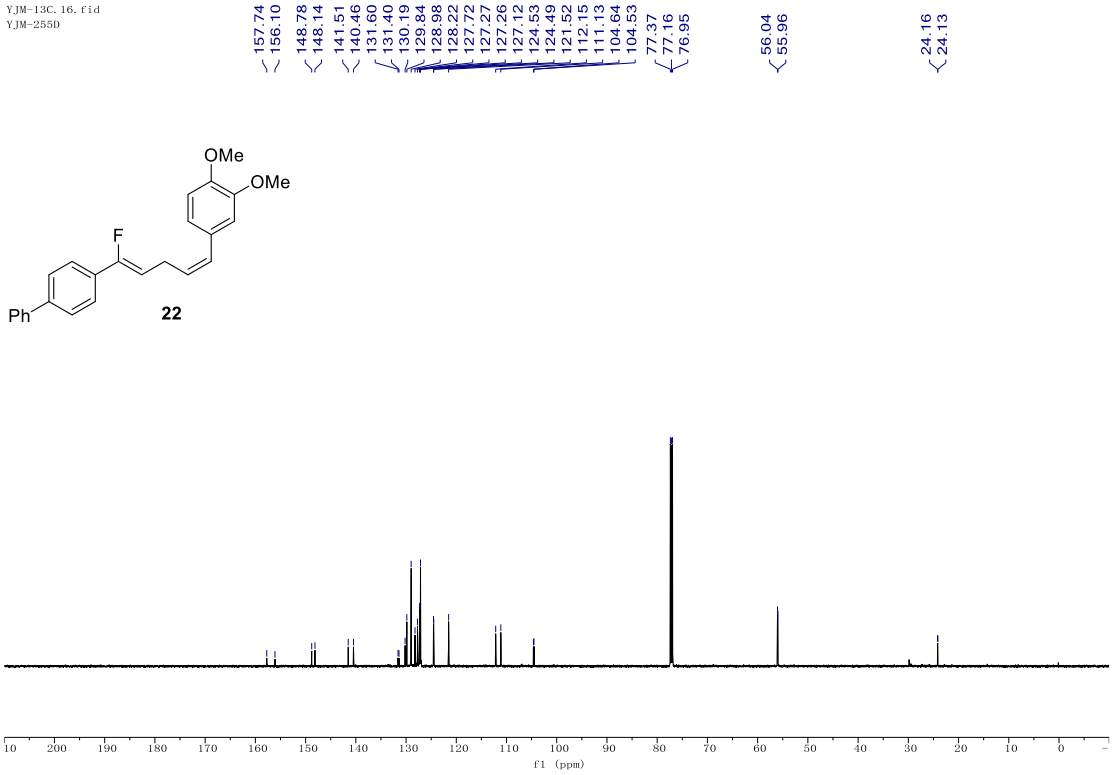
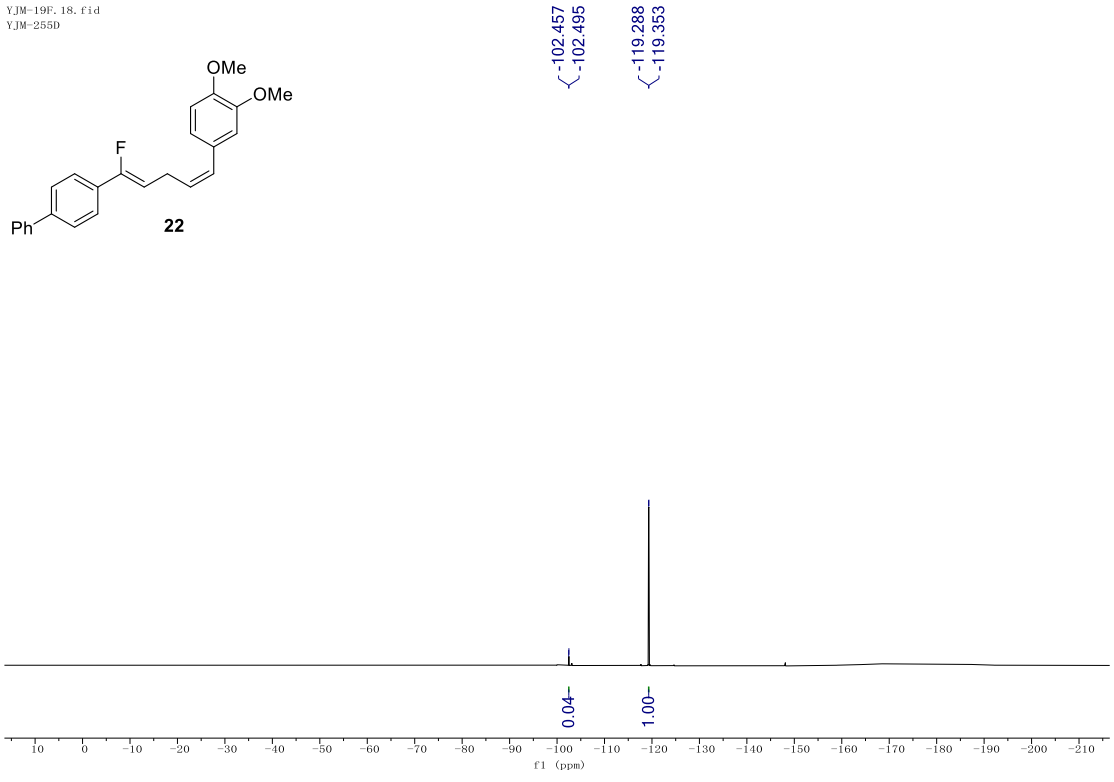


^{19}F NMR (565 MHz, $CDCl_3$)



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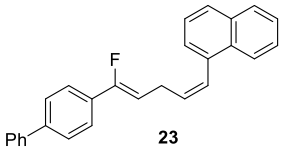

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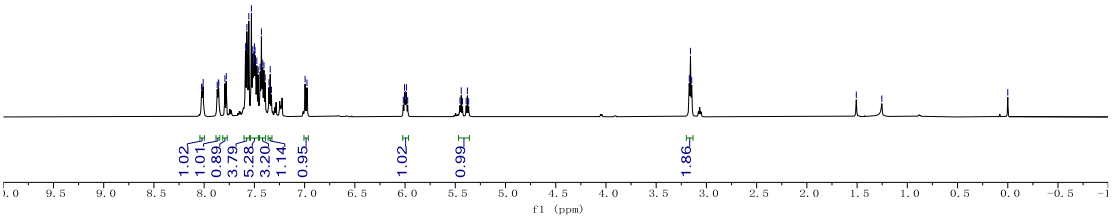
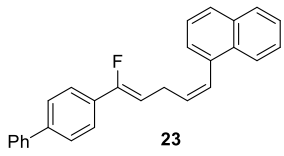


^{13}C NMR (151 MHz, $CDCl_3$)



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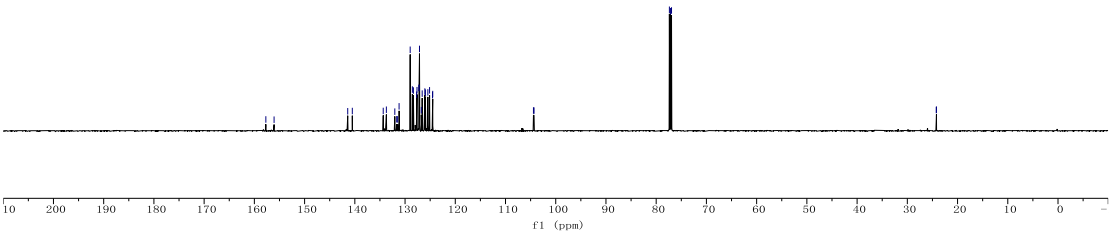

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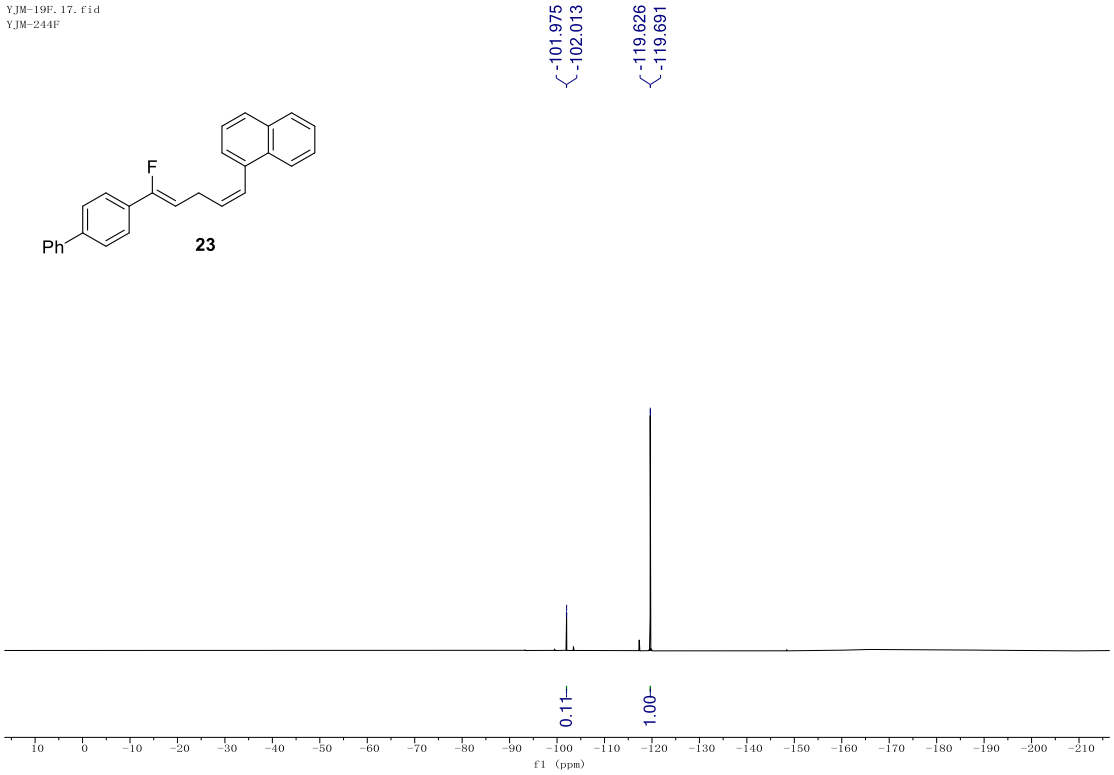

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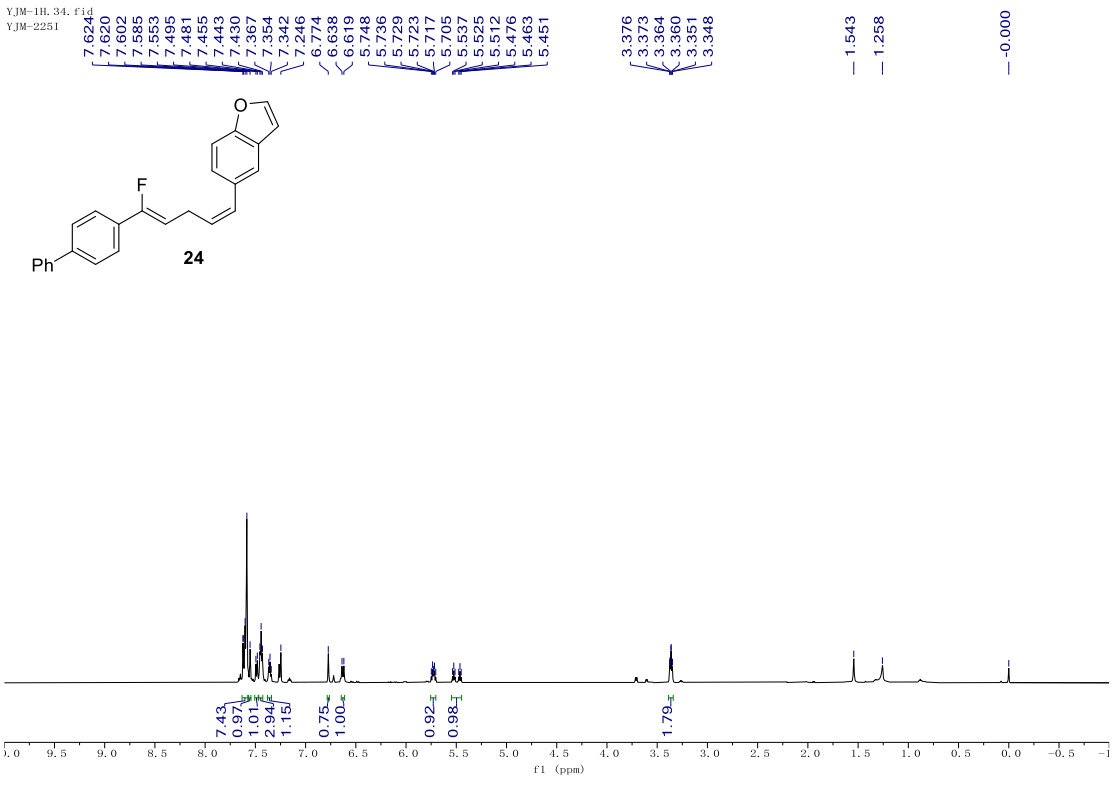

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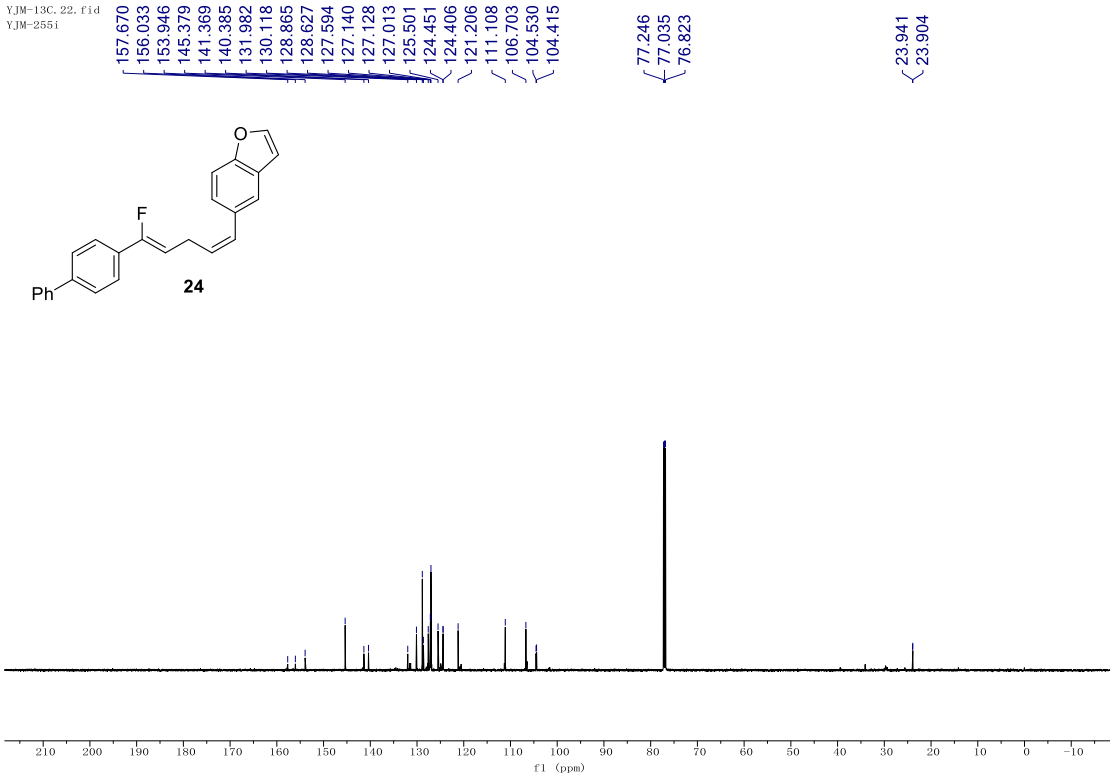

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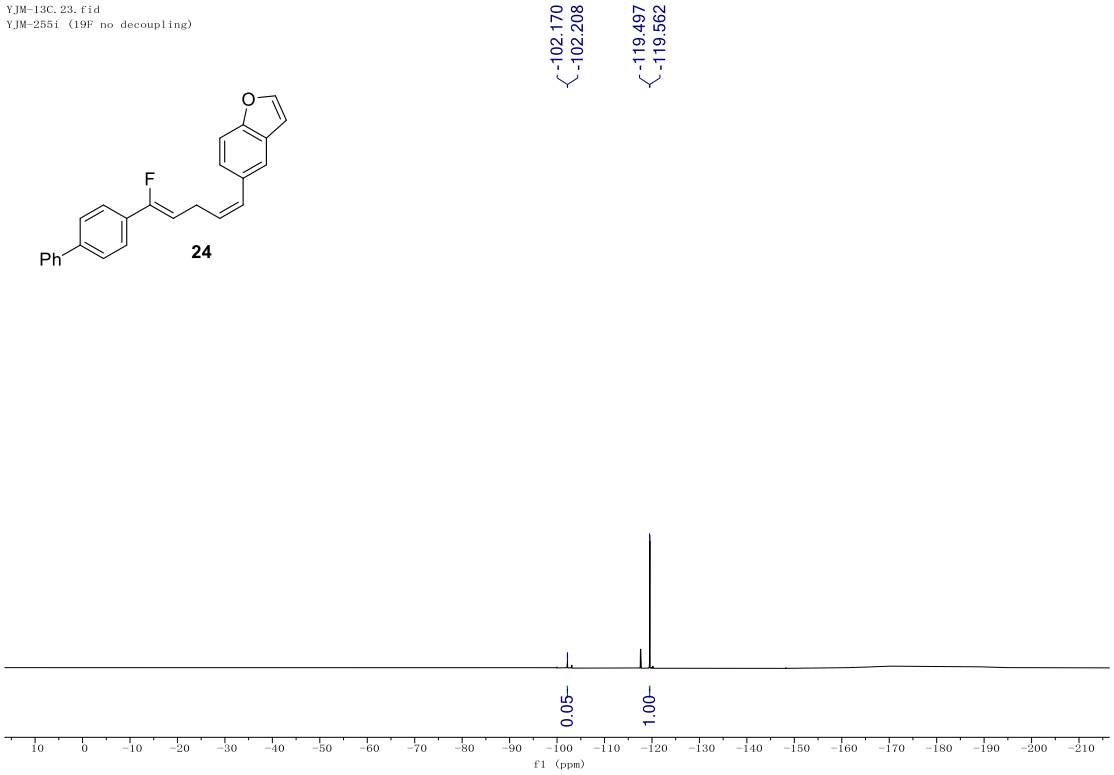

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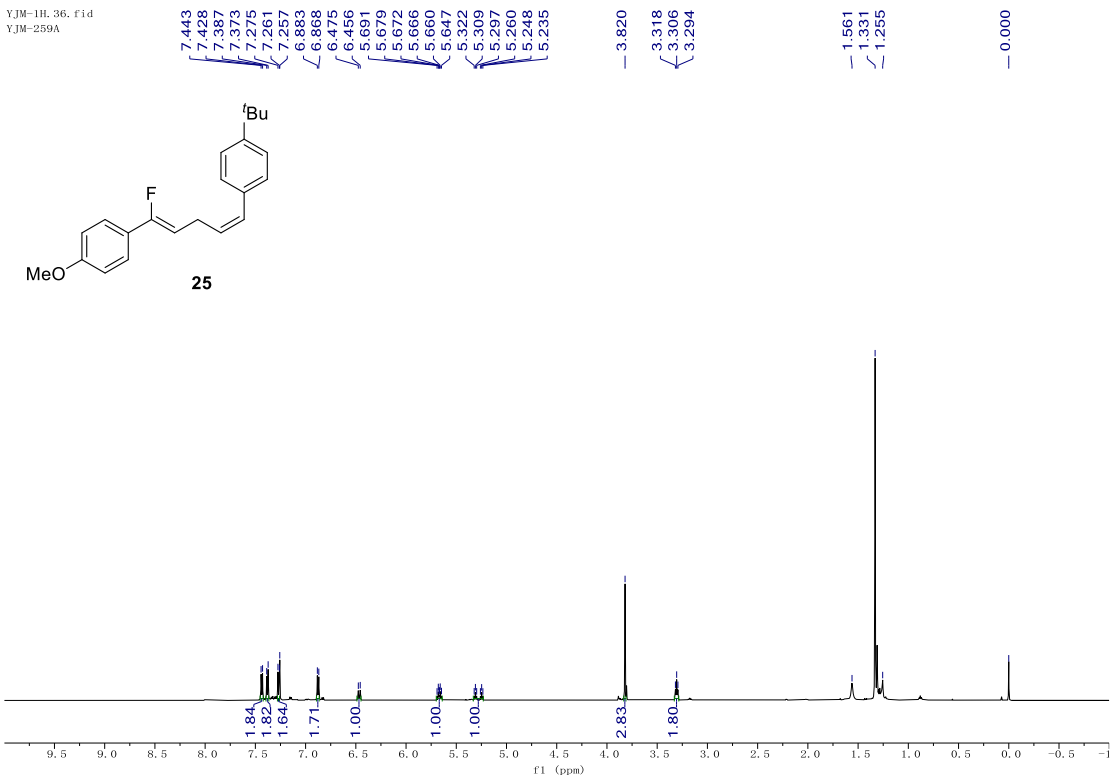

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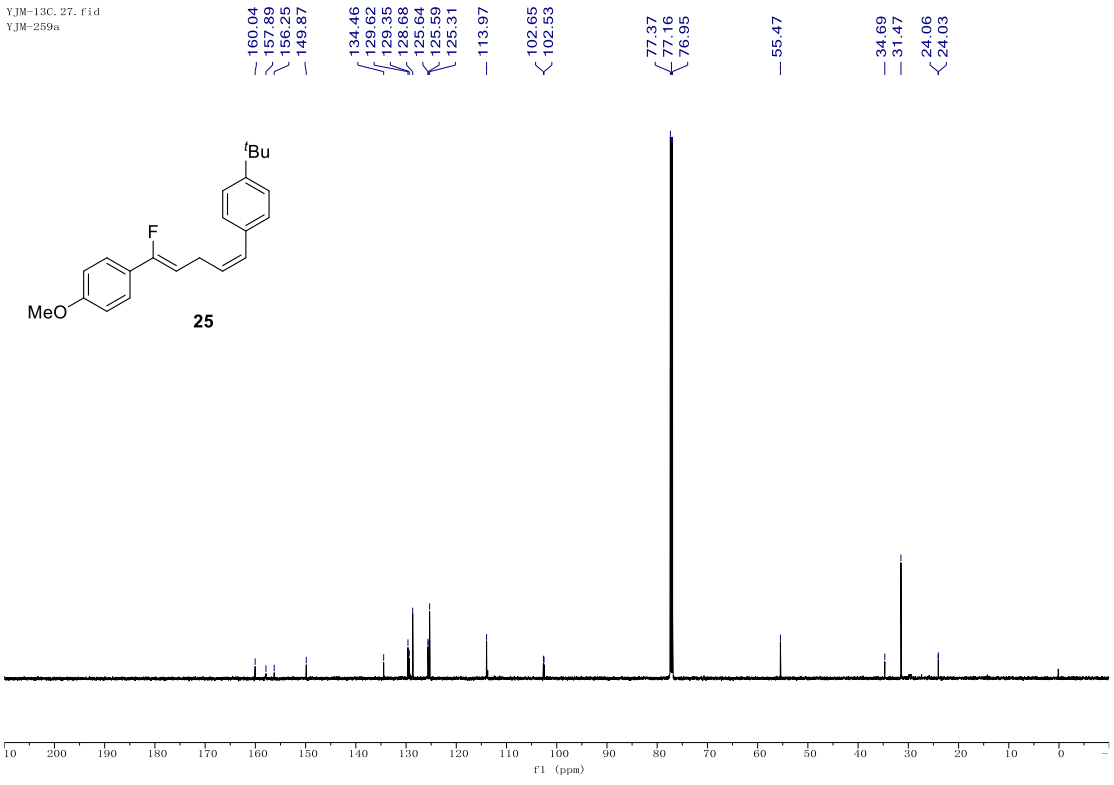

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