Supporting Information

Electrochemically mediated synthesis of trifluoromethylallenes

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Table of Contents

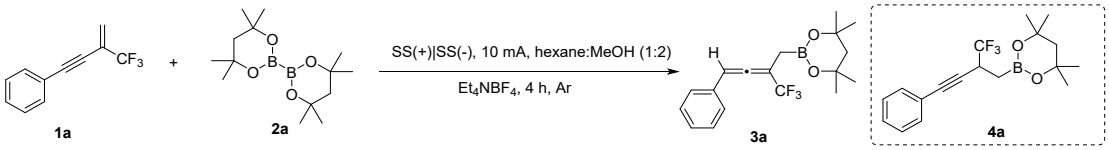
1 General Methods

Unless otherwise noted, all reagents and solvents were obtained commercially and used without further purification. Column chromatography on silica gel (300-400 mesh) was carried out using technical grade 60 - 90 ^{o}C petroleum ether and analytical grade EtOAc (without further purification). ^{1}H and ^{13}C and ^{19}F spectra were recorded on a 400 MHz or 500 MHz spectrometer. Chemical shifts were reported in ppm. ^{1}H and ^{19}F NMR spectra were referenced to $CDCl_3$ (7.26 ppm) or DMSO (2.5 ppm) or MeOD (4.87 ppm), and ^{13}C-NMR spectra were referenced to $CDCl_3$ (77.0 ppm) or DMSO (39.5 ppm) or MeOD (49.0 ppm). Peak multiplicities were designated by the following abbreviations: s, singlet; d, doublet; t, triplet; m, multiplet; brs, broad singlet and J, coupling constant in Hz. The HRMS spectrum was measured by micromass QTOF2 Quadrupole/Time of Flight Tandem mass spectrometer with electron spray ionization. Potentiostat was purchased from Shanghai Xinrui Companyand the model is DJS-292B. Cyclic voltammograms were recorded on a CHI 660E potentiostat.

2. Chemical Experiment procedure

2.1 Supplementary experiments

Table S1 Screening of Reaction Conditions

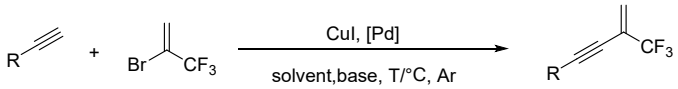


Entry	Variation from standard conditions	Yield/%[b]
1	**none**	81
2	CH_3CN instead of hexane:MeOH(1:2)	0
3	CH_3OH instead of hexane:MeOH(1:2)	66
4	THF/CH_3OH(1: 1) instead of hexane:MeOH(1:2)	0
5	THF instead of hexane:MeOH(1:2)	0
6	1,4-dioxane/CH_3OH(1:2) instead of hexane:MeOH(1:2)	50
7	CH_3CN/CH_3OH (9:1) instead of hexane:MeOH(1:2)	30
8	THF/CH_3OH(1:5) instead of hexane:MeOH(1:2)	47
9	HFIP instead of hexane:MeOH(1:2)	20
10	C (+) | SS (-) instead of SS (+) | SS (-)	0
11	SS (+) | Pt (-) instead of SS (+) | SS (-)	40
12	SS (+) | C (-) instead of SS (+) | SS (-)	0
13	Fe (+) | SS (-) instead of SS (+) | SS (-)	0
14	2.5 eq B_2oct_2	79
15	1.5 eq B_2oct_2	77
16	1 eq K_2CO_3 as the base	54
17	1 eq CsF as the base	0
18	1 eq CH_3ONa as the base	20
19	1 eq ^{t}BuOK as the base	5
20	$LiClO_4$ instead of Et_4NBF_4	0
21	^{n}Bu_4NBr instead of Et_4NBF_4	20
22	^{n}Bu_4NCl instead of Et_4NBF_4	20
23	^{n}Bu_4NI instead of Et_4NBF_4	30
24	^{n}Bu_4NPF_6 instead of Et_4NBF_4	54
25	5 mA instead of 10 mA	50
26	15 mA instead of 10 mA	56
27	6 h instead of 4 h	60
28	8 h instead of 4 h	50
29	no current	0

Standard conditions: **1a** (0.2 mmol), **2a** (0.4 mmol), Et_4NBF_4 [0.05 M] in hexane:CH_3OH (1:2, 6 mL), rt, stainless steel electrodes (cathode and anode), 10 mA, 3 $F \cdot mol^{-1}$, undivided cell, under Ar. **1a** (0.1 mmol), **2a** (0.15 mmol), Et_4NBF_4 [0.05 M] in hexane:CH_3OH (1:2, 6 mL), rt, stainless steel

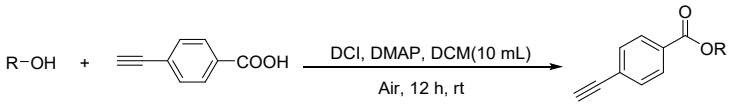
electrodes (cathode and anode), 10 mA, 3 $F \cdot mol^{-1}$, undivided cell, under Ar. [a] Yield of isolated product .

2.2 Synthesis of Substrates



Method A: [1]Under argon atmosphere, $PdCl_2(PPh_3)_2$ (0.14 g, 2 mol %) and CuI (0.10 g, 5 mol %) were added into an oven dried Schlenk flask, followed by dry degassed triethylamine (30 mL) and 2-bromo-3,3,3-trifluoroprop-1-ene (1.75 g, 10 mmol, 1.0 equiv.). The corresponding 1-alkyne (11 mmol, 1.1 equiv.) was added dropwise via a syringe. The slurry was stirred at 50 °C (oil bath) overnight, and quenched with saturated NH_4Cl solution, extracted with hexane, dried over anhydrous Na_2SO_4. After concentration under vacuum, the residue was purified by distillation or column chromatography over silica gel (200-300 mesh) using ethyl acetate/petroleum ether as eluent.

Method B: [2]Under argon atmosphere, $Pd(PPh_3)_4$ (0.0520 g, 0.3 mol %) and CuI (0.0571 g, 2 mol %) were added into an oven dried round bottom flask, followed by dry degassed diethylamine (7.5 mL) and THF (20 mL), sequentially. The corresponding 1-alkyne (15 mmol, 1.0 equiv.) and 2-bromo-3,3,3- trifluoroprop-1-ene (3.499 g, 1.3 equiv.) was added dropwise. The slurry was stirred at room temperature overnight, and quenched with saturated NH_4Cl solution at 0 °C, extracted with hexane/Et_2O (1:1), washed by 1 mol/L HCl, dried over anhydrous Na_2SO_4. After concentration under vacuum, the residue was purified by distillation.



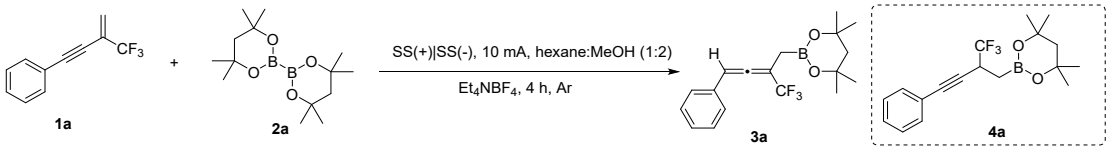
To a mixture of the 4-vinylbenzoic acid (1.0 equiv.), the corresponding alcohol or amine (1.5equiv.) and DMAP (0.2 equiv.) in CH_2Cl_2 (0.2 M) was added N, N'- Diisopropylcarbodiimide (1.2 equiv.) dropwise. The reaction was stirred at room temperature until its completion, which was monitored by TLC. The reaction was quenched with H_2O and extracted with CH_2Cl_2. The organic layers were washed with brine, dried over anhydrous Na_2SO_4, filtered, concentrated in vacuo. Flash chromatography (EtOAc/Hexane 6 = 1:5) afforded the product. The analytical data of the alkenes are in accordance with the reported data[2].

References:

1. C. Yang, Z.-L. Liu, D.-T. Dai, Q. Li, W.-W. Ma, M. Zhao and Y.-H. Xu, Catalytic Asymmetric Conjugate Protosilylation and Protoborylation of 2-Trifluoromethyl Enynes for Synthesis of Functionalized Allenes, *Org. Lett.*, 2020, **22**, 1360–1367;
2. S. Chen, J. Wang, L.-G. Xie, Transition Metal-Free Formal Hydro/Deuteromethylthiolation of Unactivated Alkenes, *Org. Biomol. Chem.* 2021, **19** ,4037–4042.

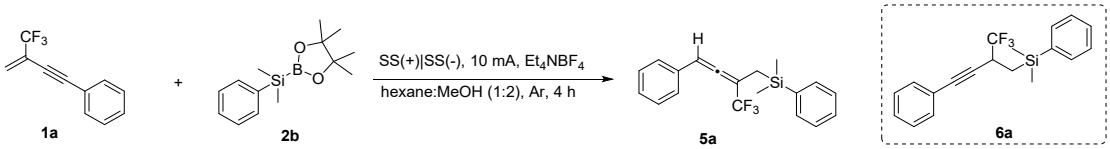
2.3 General procedure for the preparation of products

General procedure for synthesis of 4,4,6,6-tetramethyl-2-(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)-1,3,2-dioxaborinane

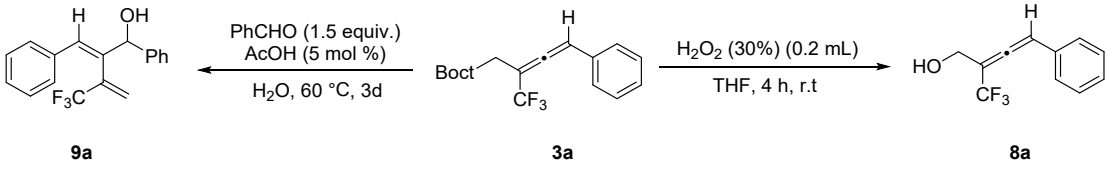


B_2pin_2(112.7 mg, 0.2 mmol, 2 equiv) and Et_4NBF_4 (65.1 mg, 0.3 mmol, 0.05 M) were weighted under Argon in a gloveboxe and added in a 10 mL IKA© vial equipped with a magnetic stirrer. The 2-trifluoromethyl-1,3-enyne (0.2 mmol, 1 equiv) was added and all compounds were solubilized in 2 mL of hexane and 4 mL of methanol. Two stainless steel electrodes (SST) were immersed in the solution and the vial was set on the IKA ElectraSyn© device at 10 mA. The reaction is monitored by TLC and stopped when total conversion of the alkene substrate is observed. The crude mixture is filtered through a pad of silica and concentrated under reduced pressure. The residue was purified by flash chromatography, preparative thin layer chromatography (PTLC) or reversed-phase chromatography.

General procedure for synthesis of dimethyl(phenyl)(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)silane



$PhMe_2Si$-Bpin (39.4 mg, 0.15 mmol, 1.5 equiv) and Et_4NBF_4 (65.1 mg, 0.3 mmol, 0.05 M) were weighted under Argon in a gloveboxe and added in a 10 mL IKA© vial equipped with a magnetic stirrer. The 2-trifluoromethyl-1,3-enyne (0.1 mmol, 1 equiv) was added and all compounds were solubilized in 2 mL of hexane and 4 mL of methanol. Two stainless steel electrodes (SST) were immersed in the solution and the vial was set on the IKA ElectraSyn© device at 10 mA. The reaction is monitored by TLC and stopped when total conversion of the alkene substrate is observed. The crude mixture is filtered through a pad of silica and concentrated under reduced pressure. The residue was purified by flash chromatography, preparative thin layer chromatography (PTLC) or reversed-phase chromatography.



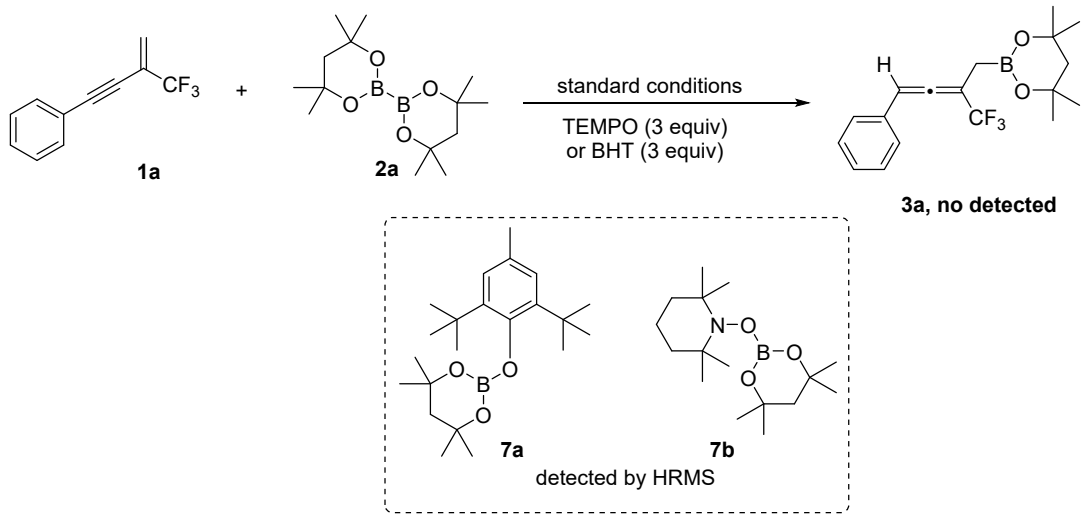
Under argon atmosphere, the starting material **3** (0.0338 g,0.1 mmol), benzaldehyde (0.15 mmol, 1.5 equiv.) and H_2O (0.9 mL) were added sequentially into a Schlenk tube. Then AcOH (0.0003 g, 5 mol %) in H_2O (0.1 mL) was added into the mixture and stirred at 60 °C (oil bath) for 3 d. The mixture was cooled to room temperature, extracted with DCM (15 mL × 3). The combined organic layers dried over anhydrous Na_2SO_4. After concentration under vacuum, the residue was purified by column chromatography over silica gel (200-300 mesh) using ethyl acetate/petroleum ether (1:5) as eluent to afford the product 8a as pale yellow oil (0.0234 g, 77% yield).

The starting material **3** (0.0338 g,0.1 mmol) was dissolved in THF (2 mL) and cooled to 0 °C. Then, 30% H_2O_2 (0.2 mL) was added dropwise. The mixture was warmed to room temperature, diluted with 1 mL THF and stirred for 4 h in the air. When the reaction was over, the resulting solution was cooled to 0 °C again, saturated aqueous $Na_2S_2O_3$ (0.5 mL) was added slowly, stirred for a further 5 min. Warmed to room temperature and extracted with ethyl acetate (15 mL × 3), combined the organic layers and dried over anhydrous Na_2SO_4. After concentration under vacuum, the residue was purified by column chromatography over silica gel (200-300 mesh) using ethyl

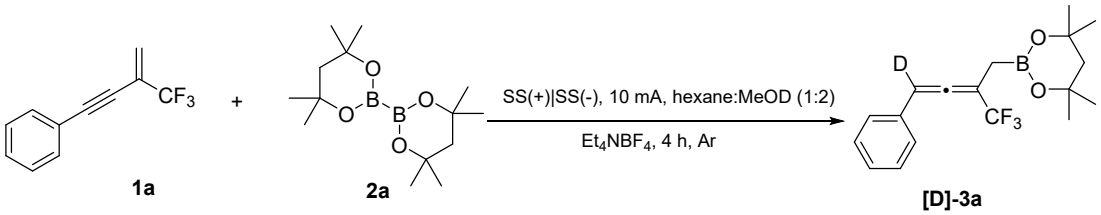
acetate/petroleum ether (1: 5) as eluent to afford the product as pale yellow oil (0.0214 g, 88% yield)

2.4 Control Experiments

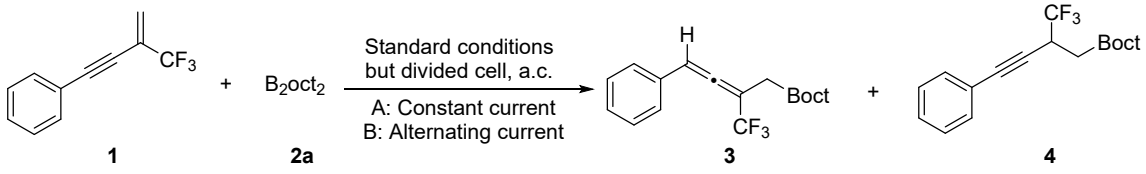
a) Radical inhibition expeirments



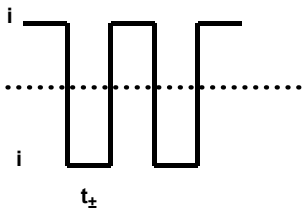
b) Labeling expeirment



c)Divided electrolysis expeirments



AC: i = ±10 mA, $t_{\pm}$ = 1s



Conditions	Yield of (3/4 ratio)
Method A	N.R
Method B	13%

Procedures for reaction b: A reaction was set-up according to the general procedure using a mixture of CH_3OD: hexane (2:1) as the solvent. The ratio of H- and D- products were determined by ^1H NMR.

2.5 BHT or TEMPO trapped experiment

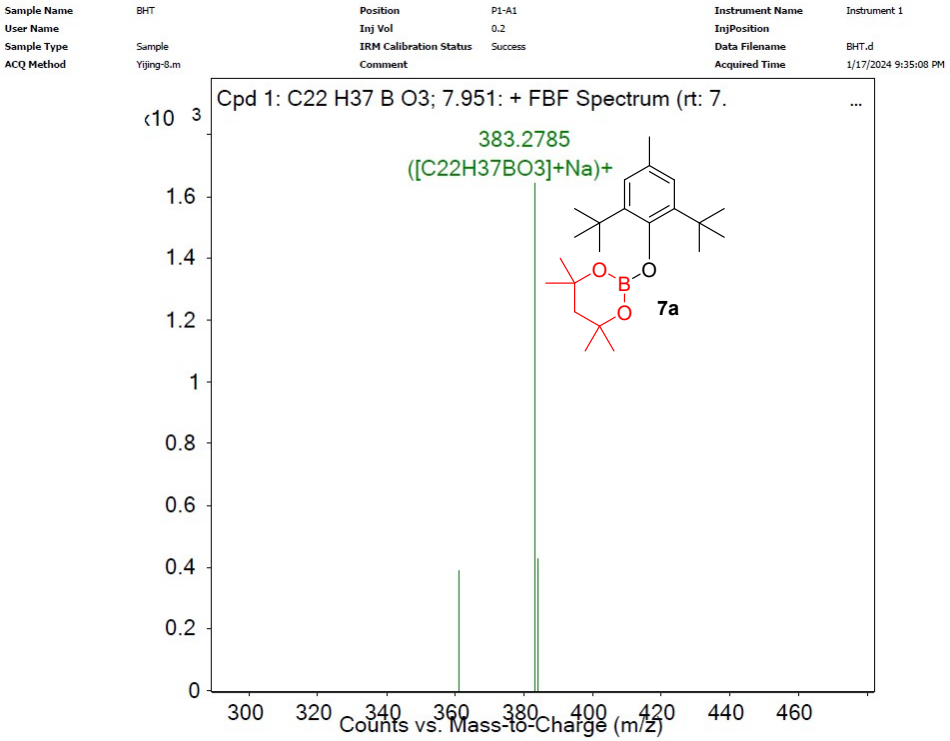


Figure S2 HRMS analysis compound **7a**. HRMS (m/z) [ESI]: calculated for $C_{22}H_{37}BO_3$ $[M+Na]^+$: 383.2728, found 383.2785.

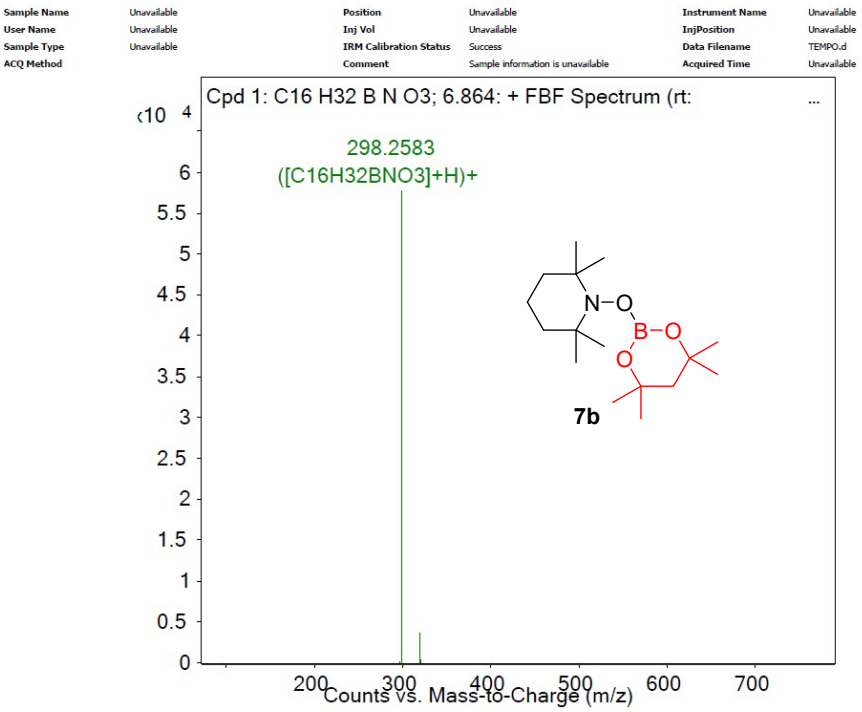
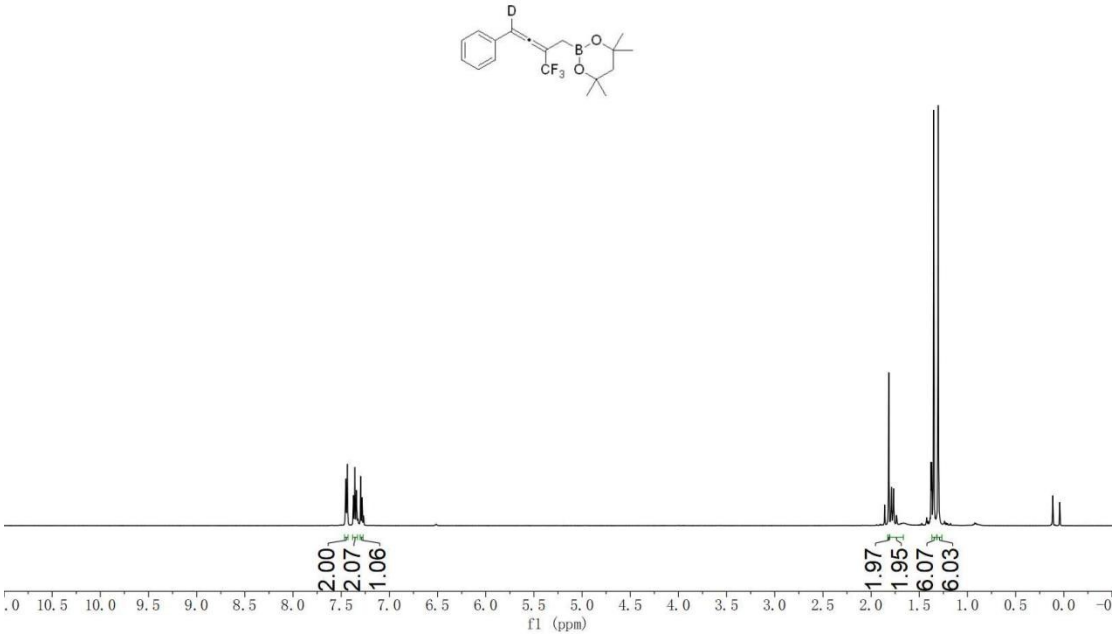


Figure S3 HRMS analysis compound **7b**. HRMS (m/z) [ESI]: calculated for $C_{16}H_{32}BNO_3$ $[M+Na]^+$: 298.2548, found 298.2583.

2.6 Copies of ^{1}H NMR for the Product



2.7 Cyclic Voltammetry Studies

The cyclic voltammograms were recorded in an electrolyte solution of Et_4NBF_4 (0.05 M) in various solvents using a glassy carbon disk working electrode (diameter, 3 mm), a Pt wire auxiliary electrode and a Ag/AgCl reference electrode. The scan rate was 100 mV/s.

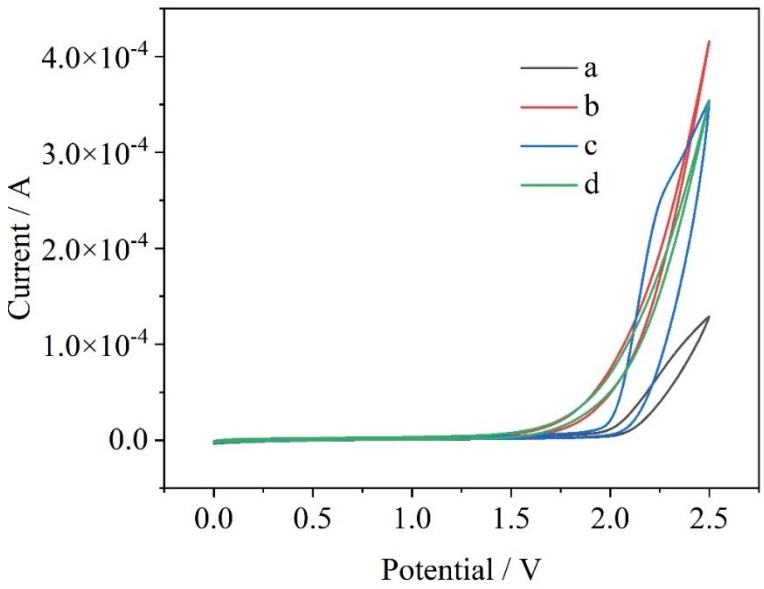


Figure S4-1 Cyclic voltammograms in 0.3 mmol B_2oct_2 + 0.05 M Et_4NBF_4. a) CH_3CN, 6 mL. b) CH_3OH, 6 mL. c) CH_3ONa + CH_3CN, 6 mL. d) CH_3OH+Hexane, 6 mL.

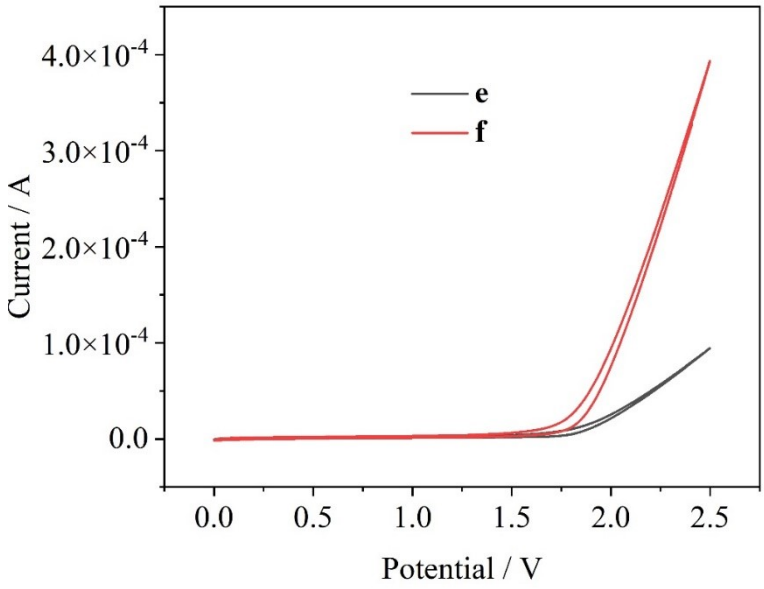


Figure S4-2 Cyclic voltammograms in 0.3 mmol enyne + 0.05 M Et_4NBF_4 + CH_3OH/hexane (1:2, 6 mL). e) no B_2oct_2. f) with B_2oct_2

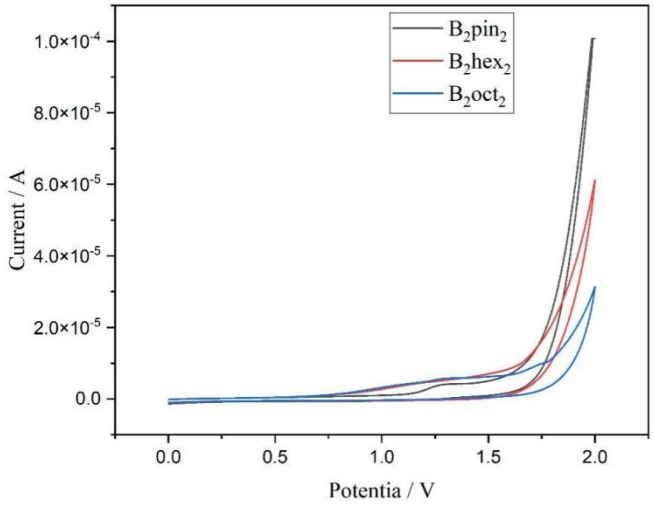
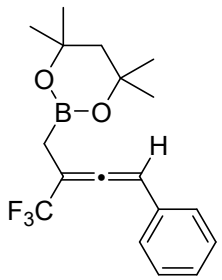


Figure S4-3 Cyclic voltammograms in 0.3 mmol Borane + 0.05 M Et_4NBF_4 + CH_3OH/hexane (1:2, 6 mL).

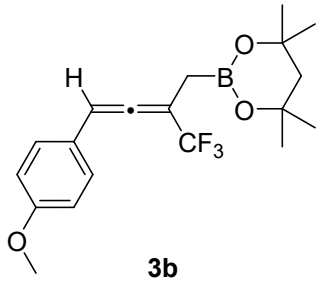
3.Characterization Data and Spectrum of Compounds



3a

4,4,6,6-tetramethyl-2-(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)-1,3,2-dioxaborinane**(3a)**: Pale yellow oil, yield = 81%, 0.0548 g

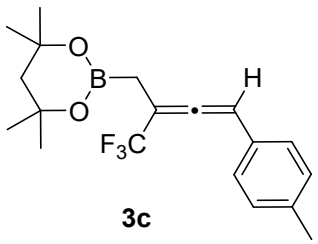
^{1}H NMR (400 MHz, Chloroform-d) δ 7.33-7.31 (m, 2H), 7.21-7.25 (m, 2H),7.17-7.14 (m, 1H), 6.40-6.38(m, 1H), 1.69 (s, 2H), 1.67-1.59 (m, 2H), 1.23 (s, 6H), 1.18 (s, 6H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.4 (q, *J* = 4.1 Hz), 132.8, 131.7, 128.6, 127.6, 123.9（q, *J* = 274.7 Hz）, 100.2(q, *J* = 30.3 Hz), 99.8, 71.1, 48.7, 31.6, 31.5; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.85, -72.60; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.66; **HRMS** (ESI) m/z calcd for $C_{18}H_{22}BF_3O_2Na$ $[M+Na]^+$: 361.1557, found: 361.1563



3b

2-(4-(4-methoxyphenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane**(3b)**: Pale yellow oil, yield = 75%, 0.0552 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.35-7.30 (m, 2H), 6.88-6.84 (m, 2H), 6.45-6.43 (m, 1H), 3.81 (s, 3H), 1.78 (s, 2H), 1.74-1.68 (m, 2H), 1.31 (s, 7H), 1.27 (s, 8H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 203.9 (q, *J* = 3.8 Hz), 159.4, 133.2, 128.8, 125.1,123.9(q, *J* = 274.7 Hz), 114.1, 100.0(q, *J* = 35.3 Hz), 99.3, 71.1, 69.5, 55.4, 48.7, 31.7, 31.6; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.93, -72.68; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.60; **HRMS** (ESI) m/z calcd for $C_{19}H_{24}BF_3O_3Na$ $[M+Na]^+$: 391.1663, found: 391.1674

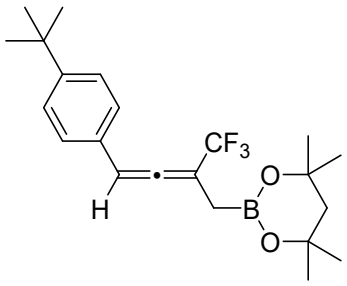


3c

4,4,6,6-tetramethyl-2-(4-(p-tolyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-1,3,2-dioxaborinane**(3c)**: Pale yellow oil, yield = 78%, 0.0549 g

^{1}H NMR (500 MHz, Chloroform-d) δ 7.31-7.30 (m, 2H), 7.15-7.12 (m, 2H), 6.47-6.45 (m, 1H), 2.35 (s, 3H), 1.79 (s, 2H), 1.75-1.71 (m, 2H), 1.33 (s, 6H), 1.29 (s, 7H); **^{13}C NMR** (126 MHz,

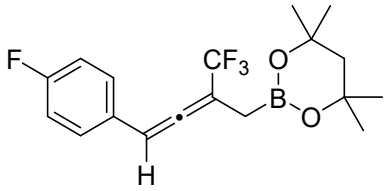
Chloroform-d) δ 204.2 (q, *J* = 3.8 Hz), 137.7, 131.7, 129.8, 129.4, 129.0, 127.5, 124.0 (q, *J* = 274.7 Hz), 119.9, 100.0(q, *J* = 35.3 Hz), 99.6, 71.1, 48.8, 31.7, 31.6, 21.3; **^{19}F NMR** (471 MHz, Chloroform-d) δ -64.83, -72.61 ; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.69; **HRMS** (ESI) m/z calcd for $C_{19}H_{24}BF_3O_2Na$ $[M+Na]^+$: 375.1714, found: 375.1721



3d

2-(4-(4-(tert-butyl)phenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane**(3d)**: Pale yellow oil, yield = 69%, 0.0544 g

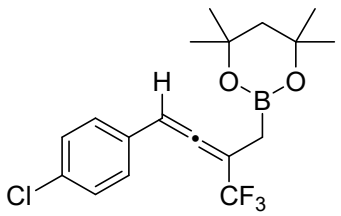
^{1}H NMR (400 MHz, Chloroform-d) δ 7.33 (s, 4H), 6.47-6.44 (m, 1H), 1.77 (s, 2H), 1.73-1.68 (m, 2H), 1.31 (s, 12H), 1.26 (s, 9H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.4 (q, *J* = 4.1 Hz), 150.1, 131.5, 129.8, 127.3, 125.5, 125.2,123.9 (q, *J* = 275.7 Hz), 99.9(q, *J* = 34.3 Hz), 99.4, 71.1, 48.7, 34.6, 31.7, 31.5, 31.3; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.78, -72.65; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.48; **HRMS** (ESI) m/z calcd for $C_{22}H_{30}BF_3O_2Na$ $[M+Na]^+$: 417.2183, found: 417.2195



3e

2-(4-(4-fluorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane**(3e)**: Yellow oil, yield = 71%, 0.0518 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.39-7.35 (m, 2H), 7.03-6.99 (m, 2H), 6.46-6.43(m, 1H), 1.78 (s, 2H), 1.75-1.69 (m, 2H), 1.31 (s, 6H), 1.26 (s, 6H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 204.26 -204.16 (m), 162.5(d, *J* = 247.0 Hz), 129.2(d, *J* = 8.8 Hz), 123.8 (q, *J* = 274.7 Hz), 115.6 (d, *J* = 21.4 Hz), 100.4 (q, *J* = 34.0 Hz), 98.8, 71.2, 48.7, 31.7, 31.6; **^{19}F NMR** (471 MHz, Chloroform-d) δ -64.95, -72.60, -111.09, -114.03; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.63; **HRMS** (ESI) m/z calcd for $C_{18}H_{21}BF_4O_2Na$ $[M+Na]^+$: 379.1463, found: 379.1477

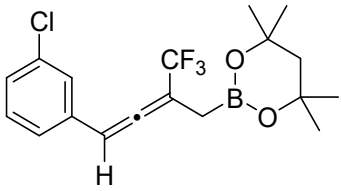


3f

2-(4-(4-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-

dioxaborinane**(3f)**: Brownish-yellow oil, yield = 78%, 0.0580 g

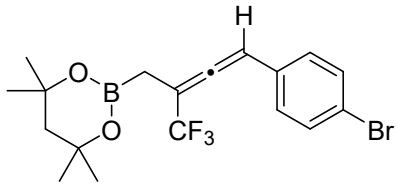
^{1}H NMR (500 MHz, Chloroform-d) δ 7.39-7.36 (m, 2H), 7.34-7.30 (m, 2H), 6.49-6.45 (m, 1H), 1.83 (s, 2H), 1.79-1.73 (m, 2H), 1.35 (s, 6H), 1.31 (s, 6H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 204.5 (q, *J* = 3.8 Hz), 133.5, 131.4, 128.8 (d, *J* = 3.8 Hz), 123.8 (q, *J* = 274.5 Hz), 100.7 (q, *J* = 35.3 Hz), 98.9, 71.2, 48.7, 31.7, 31.6; **^{19}F NMR** (471 MHz, Chloroform-d) δ -64.90, -72.54 ; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.47; **HRMS** (ESI) m/z calcd for $C_{18}H_{21}BClF_3O_2Na$ $[M+Na]^+$: 395.1167, found: 395.1173



3g

2-(4-(3-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane**(3g)**: Brownish-yellow oi, yield = 74%, 0.0551 g

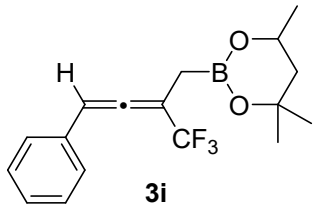
^{1}H NMR (400 MHz, Chloroform-d) δ 7.37 (s, 1H), 7.27-7.22 (m, 3H), 6.42 (m, 1H), 1.79(s, 2H), 1.76-1.69 (m, 2H), 1.32 (s, 6H), 1.27 (s, 6H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 204.63 (q, *J* = 3.8 Hz), 134.9, 134.7, 129.8, 127.9, 127.3, 125.8, 123.8 (q, *J* = 275.9 Hz),100.8 (q, *J* = 34.0 Hz), 98.8, 71.2, 48.8, 31.7, 31.6; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.86, -72.51; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.36; **HRMS** (ESI) m/z calcd for $C_{18}H_{21}BClF_3O_2Na$ $[M+Na]^+$: 395.1167, found: 395.1170



3h

2-(4-(4-bromophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane**(3h)**: Yellow oil, yield = 63%, 0.0524 g

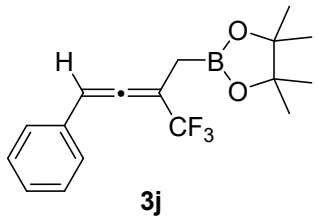
^{1}H NMR (400 MHz, Chloroform-d) δ 7.45-7.43 (m, 2H), 7.29-7.26 (m, 2H), 6.43-6.41(m, 1H), 1.79 (s, 2H), 1.75-1.68 (m, 2H), 1.31 (s, 6H), 1.27 (s, 6H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.5 (q, *J* = 4.2 Hz), 131.7, 129.1, 123.7 (q, *J* = 275.7 Hz), 121.6, 100.7 (q, *J* = 34.3 Hz), 98.9, 71.2, 48.7, 31.7, 31.6; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.90, -72.53; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.66; **HRMS** (ESI) m/z calcd for $C_{18}H_{21}BBrF_3O_2Na$ $[M+Na]^+$:439.0662, found: 439.0668



3i

4,4,6-trimethyl-2-(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)-1,3,2-dioxaborinane**(3i)**: Yellow oil, yield = 50%, 0.0324 g

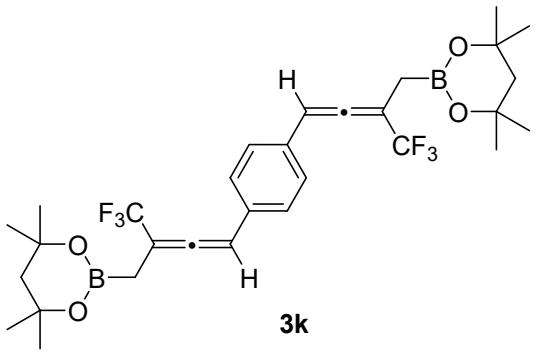
^{1}H NMR (400 MHz, Chloroform-d) δ 7.40-7.37 (m, 2H), 7.33-7.30 (m, 2H), 7.26-7.22 (m, 1H), 6.48-6.46 (m, 1H), 4.21-4.09 (m, 1H), 1.75-1.71 (m, 3H), 1.45-1.38 (m, 1H), 1.24 (d, *J* = 3.1 Hz, 3H), 1.22 (s, 1H), 1.11-1.16 (m, 5H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.5-204. (m), 132.7, 128.6, 128.6, 127.8, 127.6, 127.5, 123.9 (q, *J* = 275.7 Hz), 99.8, 99.0 (q, *J* = 35.1 Hz), 71.3, 65.1, 65.1, 45.8, 45.7, 31.1, 31.0, 28.0, 27.9, 23.0, 22.9; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.94, -72.64; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.82; **HRMS** (ESI) m/z calcd for $C_{17}H_{20}BF_3O_2Na$ $[M+Na]^+$:347.1401, found: 347.1411



3j

4,4,5,5-tetramethyl-2-(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)-1,3,2-dioxaborolane**(3j)**: Yellow oil, yield = 57%, 0.0369 g

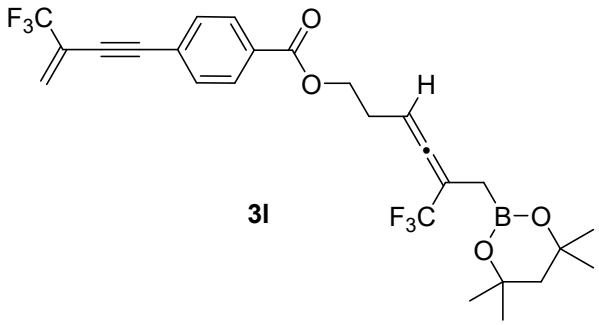
^{1}H NMR (400 MHz, Chloroform-d) δ 7.31-7.29 (m, 2H), 7.27-7.22 (m, 2H), 7.20-7.17 (m, 1H), 6.47-6.44 (m, 1H), 1.83-1.73 (m, 2H), 1.14 (s, 6H), 1.11 (s, 6H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.4 (q, *J* = 4.0 Hz), 131.8, 128.7, 128.2, 128.0, 127.7 , 123.6 (q, *J* = 274.0 Hz), 100.5, 99.0 (q, *J* = 35.1 Hz), 83.9, 24.8, 24.7; **^{19}F NMR** (376 MHz, Chloroform-d) δ -65.19, -72.95; **^{11}B NMR** (128 MHz, Chloroform-d) δ 32.07; **HRMS** (ESI) m/z calcd for $C_{17}H_{20}BF_3O_2Na$ $[M+Na]^+$:347.1401, found: 347.1413



3k

1,4-bis(4,4,4-trifluoro-3-((4,4,6,6-tetramethyl-1,3,2-dioxaborinan-2-yl)methyl)buta-1,2-dien-1-yl)benzene**(3k)**: Pale yellow oil, yield = 55%, 0.0658 g

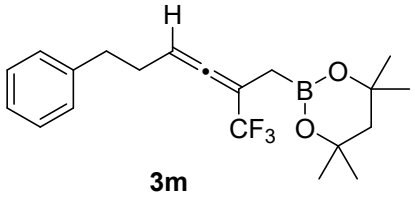
^{1}H NMR (400 MHz, Chloroform-d) δ 7.34-7.33 (m, 4H), 6.47-6.45 (m, 2H), 1.77 (d, *J* = 2.7 Hz, 4H), 1.74-1.68 (m, 4H), 1.30 (d, *J* = 2.2 Hz, 12H), 1.26 (d, *J* = 3.3 Hz, 12H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 204.7 (q, *J* = 5.0 Hz), 132.3, 127.8, 123.9 (q, *J* = 274.7 Hz), 100.3(q, *J* = 35.3 Hz), 99.6, 71.1, 48.7, 31.7, 31.7; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.89, -72.56; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.30; **HRMS** (ESI) m/z calcd for $C_{30}H_{38}B2F_6O_4Na$ $[M+Na]^+$:621.2753, found: 621.2766



3l

6,6,6-trifluoro-5-((4,4,6,6-tetramethyl-1,3,2-dioxaborinan-2-yl)methyl)hexa-3,4-dien-1-yl 4-(3-(trifluoromethyl)but-3-en-1-yn-1-yl)benzoate**(3l)**: Pale yellow oil, yield = 50%, 0.0528 g

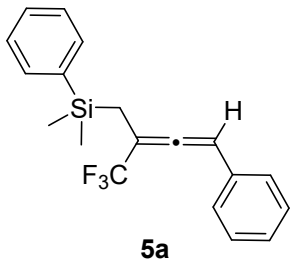
^{1}H NMR (500 MHz, Chloroform-d) δ 8.01-7.98 (m, 2H), 7.49-7.46 (m, 2H), 6.52-6.50 (m, 1H), 6.01 (d, *J* = 1.3 Hz, 1H), 5.81 (s, 1H), 4.46 (t, *J* = 6.7 Hz, 2H), 2.84 (t, *J* = 6.7 Hz, 2H), 1.79 (s, 2H), 1.77-1.70 (m, 2H), 1.31 (s, 6H), 1.27 (s, 6H); **^{13}C NMR** (101 MHz, Chloroform-*d*) δ 205.4 (q, *J* = 4.0 Hz), 166.0, 138.1, 130.0, 128.9, 127.5, 126.7 (q, *J* = 4.5 Hz), 125.1, 123.8 (q, *J* = 275.7 Hz), 122.7(q, *J* = 35.4 Hz), 121.3 (q, *J* = 274.7 Hz), 101.0, 99.2, 97.9 (q, *J* = 35.0 Hz), 90.3, 74.8 (q, *J* = 2.2 Hz), 71.2, 62.1, 48.7, 31.6, 31.6, 20.0; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.83, -68.30, -72.45, -72.56; **^{11}B NMR** (128 MHz, Chloroform-d) δ 28.18; **HRMS** (ESI) m/z calcd for $C_{26}H_{27}B2F_6O_4Na$ $[M+Na]^+$:551.1799, found: 551.1821



3m

4,4,6,6-tetramethyl-2-(6-phenyl-2-(trifluoromethyl)hexa-2,3-dien-1-yl)-1,3,2-dioxaborinane**(3m):** Pale yellow oil, yield = 66%, 0.0480 g

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.30 – 7.26 (m, 2H), 7.22 – 7.18 (m, 3H), 5.58 – 5.55 (m, 0.4H), 2.82 – 2.69 (m, 2H), 2.46 – 2.35 (m, 2H), 1.80 (s, 2H), 1.62 – 1.52 (m, 1H), 1.3 (s, 12H); **^{13}C NMR** (101 MHz, Chloroform-*d*) δ 202.7 (q, *J* = 4.0 Hz), 141.5, 140.7, 128.5, 128.5, 128.4, 128.4 , 126.3, 126.0, 124.3(q, *J* = 275.7 Hz), 96.7(q, *J* = 35.4 Hz), 96.3, 82.6, 70.9, 70.9, 48.8, 48.8, 35.2, 34.7, 31.7, 31.7, 31.7, 20.9; **^{19}F NMR** (376 MHz, Chloroform-*d*) δ -65.05, -72.95； **^{11}B NMR** (128 MHz, Chloroform-*d*) δ 28.72; **HRMS** (ESI) m/z calcd for $C_{20}H_{26}BF_3O_2Na$ $[M+Na]^+$:389.1870, found: 389.1883

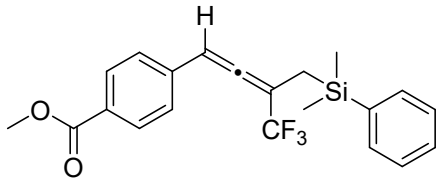


5a

Dimethyl(phenyl)(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)silane**(5a)**: Pale yellow oil, 64%, 0.0193 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.47-7.45 (m, 2H), 7.33 – 7.23 (m, 6H), 7.15 – 7.12 (m, 2H), 6.37-6.34 (m, 1H), 1.87 – 1.79 (m, 2H), 0.34 (s, 3H), 0.33 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.6 (q, *J* = 4.0 Hz), 137.6, 133.6, 132.1, 129.3, 128.8, 128.0, 127.8, 127.4, 123.7

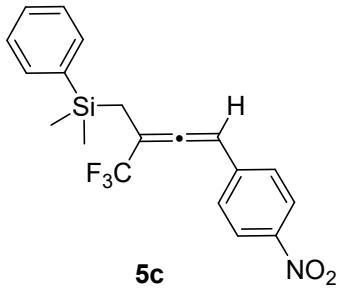
(q, *J* = 274.7 Hz), 101.0, 99.7 (q, *J* = 34.3 Hz), 14.5, -2.9; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.73, -73.30; **HRMS** (ESI) m/z calcd for $C_{19}H_{19}F_3Si$ $[M+H]^+$:332.1203, found: 332.1210



5b

Methyl 4-(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-y l)benzoate**(5b)**: Pale yellow oil, 68%, 0.0193 g

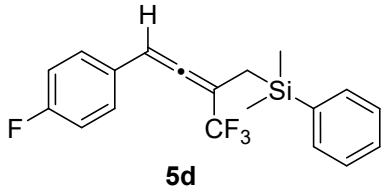
^{1}H NMR (400 MHz, Chloroform-d) δ 7.96 – 7.93 (m, 2H), 7.47 - 7.45 (m, 2H), 7.34 – 7.27 (m, 3H), 7.17 – 7.15 (m, 2H), 6.39-6.37 (m, 1H), 3.92 (s, 3H), 1.90 - 1.81 (m, 2H), 0.36 (s, 3H), 0.34 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 205.4 (q, *J* = 4.1 Hz), 166.7, 137.3, 137.0, 133.6, 130.0, 129.5, 129.4, 127.9, 127.2, 123.5 (q, *J* = 275.7 Hz), 100.4, 100.3 (q, *J* = 35.4 Hz), 52.2, 14.4, -2.9, -2.9; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.66, -73.15; **HRMS** (ESI) m/z calcd for $C_{21}H_{22}F_3O_2Si$ $[M+H]^+$: 391.1336, found: 391.1341



5c

Dimethyl(4-(4-nitrophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)(phenyl)silane **(5c)**: Pale yellow oil, 64%, 0.0193 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.54 – 7.50 (m, 2H), 7.45-7.43 (m, 2H), 7.33 – 7.24 (m, 3H), 7.13 – 7.10 (m, 2H), 6.35-6.33 (m, 1H), 1.90-1.82 (m, 2H), 0.36 (s, 3H), 0.34 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 205.63 (q, *J* = 4.0 Hz), 137.2, 137.0, 133.6, 132.5, 129.4, 127.9, 127.8, 123.4 (q, *J* = 275.7 Hz), 118.8, 111.2, 100.6 (q, *J* = 35.4 Hz), 99.9, 14.4, -2.8, -2.9; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.61, -72.62; **HRMS** (ESI) m/z calcd for $C_{19}H_{19}F_3NO_2Si$ $[M+H]^+$: 378.1132, found: 378.1151

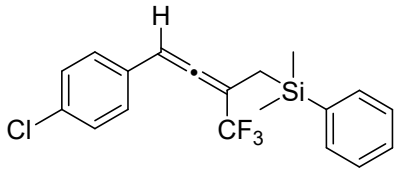


5d

(4-(4-fluorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane**(5d)**: Yellow oil, yield = 80%, 0.0280 g

^{1}H NMR (500 MHz, Chloroform-d) δ 7.49-7.45 (m, 2H), 7.35-7.29 (m, 3H), 7.09 -7.06 (m, 2H), 7.00-6.95 (m, 2H), 6.35-6.33 (m, 1H), 1.88-1.82 (m, 2H), 0.36 (s, 3H), 0.34 (s, 3H); **^{13}C NMR** (101

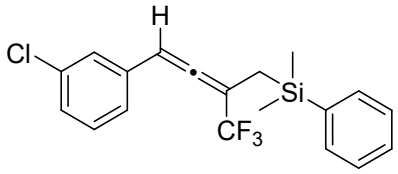
MHz, Chloroform-d) δ 206.6 (q, *J* = 2.0 Hz), 164.8 (d, *J* = 248.5 Hz), 139.8, 135.9, 131.6, 131.3 (d, *J* = 8.1 Hz), 130.2, 125.9 (q, *J* = 274.7 Hz), 118.1 (d, *J* = 22.2 Hz), 102.3, 102.3 (q, *J* = 34.8 Hz), 16.8, -0.52, -0.60; **^{19}F NMR** (471 MHz, Chloroform-d) δ -64.79, -73.29, -110.47, -113.46; **HRMS** (ESI) m/z calcd for $C_{19}H_{19}F_4Si$ $[M+H]^+$: 351.1187, found: 351.1194



5e

(4-(4-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane**(5e)**：Yellow oil, yield = 77%, 0.0281 g

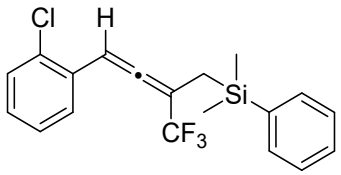
^{1}H NMR (400 MHz, Chloroform-d) δ 7.48-7.44 (m, 2H), 7.35-7.27 (m, 3H), 7.26-7.22 (m, 2H), 7.04-7.00 (m, 2H), 6.32-6.30 (m, 1H), 1.88-1.80 (m, 2H), 0.35 (s, 3H), 0.33 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.6 (q, *J* = 4.0 Hz), 137.4, 133.7, 133.6, 130.6, 129.3, 128.9, 128.5, 127.9, 123.5 (q, *J* = 275.7 Hz), 100.2 (q, *J* = 35.4 Hz), 100.0, 14.5, -2.8, -2.9; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.77; **HRMS** (ESI) m/z calcd for $C_{19}H_{19}ClF_3Si$ $[M+H]^+$: 367.0891, found: 367.0923



5f

(4-(3-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane**(5f)**: Pale yellow oil, yield = 99%, 0.0362 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.48-7.45 (m, 2H), 7.33-7.27 (m, 3H), 7.23-7.20 (m, 2H), 7.10-7.09 (m, 1H), 7.01 - 6.96 (m, 1H), 6.30-6.28 (m, 1H), 1.89-1.81 (m, 2H), 0.36 (s, 3H), 0.34 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.7 (q, *J* = 3.0 Hz), 137.3, 134.7, 133.6, 129.9, 129.3, 128.1, 127.8, 127.2, 125.5,123.5 (q, *J* = 275.7 Hz),100.4(q, *J* = 34.3 Hz), 100.0, 14.4, -2.9, -3.0; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.76, -73.22; **HRMS** (ESI) m/z calcd for $C_{19}H_{19}ClF_3Si$ $[M+H]^+$: 367.0891, found: 367.0915



5g

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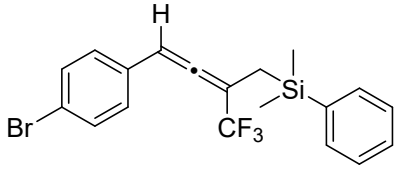
(4-(2-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane**(5g)**: Amber oil, yield = 96%, 0.0351 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.48-7.45 (m, 2H), 7.35 – 7.27 (m, 4H), 7.20 – 7.13 (m, 3H), 6.823-6.80 (m, 1H), 1.88-1.81 (m, 2H), 0.36 (s, 3H), 0.34 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-

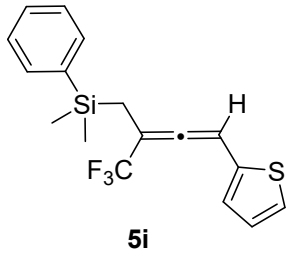
d) δ 205.4 (q, *J* = 4 Hz), 137.3, 133.6, 132.6, 129.8, 129.3, 129.1, 128.9, 127.8, 127.0,123.6 (q, *J* = 275.7 Hz), 100.4 (q, *J* = 35.4 Hz) , 97.4, 14.5, -2.9, -3.0; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.69; **HRMS** (ESI) m/z calcd for $C_{19}H_{19}ClF_3Si$ $[M+H]^+$: 367.0891, found: 367.0911



5h

(4-(4-bromophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane**(5h)**: Pale yellow oil, yield = 77%, 0.0316 g

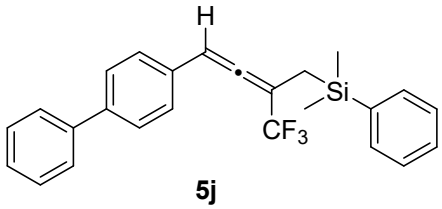
^{1}H NMR (400 MHz, Chloroform-d) δ 7.48-7.45 (m, 2H), 7.41 – 7.38 (m, 2H), 7.35-7.28 (m 3H), 6.98 – 6.95(m, 2H), 6.31-6.29 (m, 1H), 1.88-1.81 (m, 2H), 0.35 (s, 3H), 0.34 (s, 3H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 204.6 (q, *J* = 3.0 Hz), 137.4, 133.6, 131.9, 129.4, 128.9, 127.9, 123.5 (q, *J* = 274.7 Hz), 121.9, 100.3 (q, *J* = 35.3 Hz), 100.1, 14.5, -2.8, -2.9; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.74 – -64.76 (m), -73.22; **HRMS** (ESI) m/z calcd for $C_{19}H_{19}BrF_3Si$ $[M+H]^+$: 411.0386, found: 411.0397



5i

Dimethyl(phenyl)(4-(thiophen-2-yl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)silane**(5i)**: Pale yellow oil, yield = 77%, 0.0260 g

^{1}H NMR (500 MHz, Chloroform-d) δ 7.55 – 7.53 (m, 2H), 7.40 – 7.36 (m, 3H), 7.30 – 7.27 (m, 1H), 7.02-7.00 (m, 1H), 6.95-6.94 (m, 1H), 6.65-6.63 (m, 1H), 1.89-1.88 (m, 2H), 0.43 (s, 3H), 0.42 (s, 3H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 204.1 (q, *J* = 3.8 Hz), 137.7, 135.8, 133.6, 129.3, 127.9, 127.6, 126.7, 126.2, 123.4 (q, *J* = 275.9 Hz), 99.9 (q, *J* = 35.3 Hz), 95.10, 14.76, -2.92; **^{19}F NMR** (471 MHz, Chloroform-d) δ -64.99, -73.09; **HRMS** (ESI) m/z calcd for $C_{17}H_{18}F_3SSi$ $[M+H]^+$: 339.0845, found: 339. 0886.

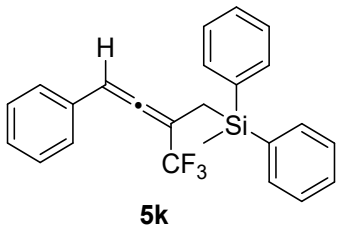


5j

(4-([1,1'-biphenyl]-4-yl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane**(5i)**: Pale yellow oil, yield = 66%, 0.0269 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.52 – 7.50 (m, 2H), 7.45 – 7.35 (m, 6H), 7.29 – 7.21 (m, 4H), 7.13 – 7.11 (m, 2H), 6.34 - 6.32 (m, 1H), 1.82 – 1.74 (m, 2H), 0.29 (s, 3H), 0.27 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.8 (q, *J* = 4.0 Hz), 140.9, 140.6, 137.6, 133.6, 131.1, 129.3, 127.9, 127.8, 127.5, 127.0, 123.7 (q, *J* = 275.7 Hz), 100.6, 99.8 (q, *J* = 35.4 Hz), 14.5, -2.8, -2.9;

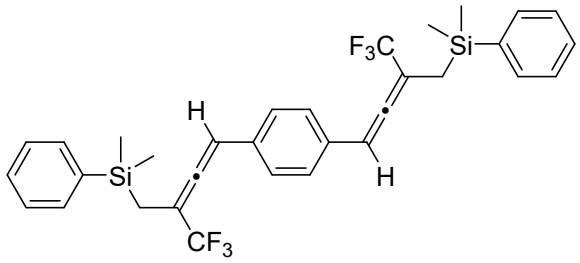
^{19}F NMR (376 MHz, Chloroform-d) δ -64.69; **HRMS** (ESI) m/z calcd for $C_{25}H_{23}F_3Si$ $[M+H]^+$: 408.1521, found: 408.1537



5k

Methyldiphenyl(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)silane**(5k)**: Pale yellow oil, yield = 50%, 0.0197 g

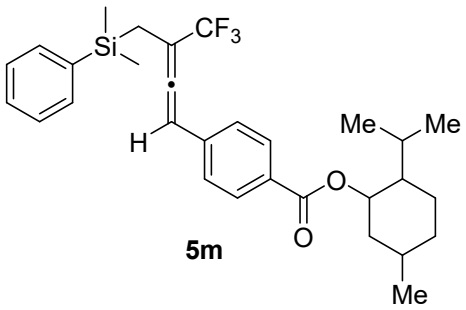
^{1}H NMR (400 MHz, Chloroform-d) δ 7.50 – 7.7 (m, 4H), 7.35 – 7.28 (m, 6H), 7.23 – 7.21 (m, 3H), 7.00 - 6.98 (m, 2H), 6.20 - 6.1 7 (m, 1H), 2.21 – 2.12 (m, 2H), 0.63 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.9 (q, *J* = 4.0 Hz), 135.7, 134.5, 134.4, 131.9, 131.7, 129.5 (d, *J* = 2.0 Hz), 128.6, 127.9, 127.4, 123.7 (q, *J* = 275.7 Hz), 99.1 (q, *J* = 35.4 Hz), 12.80, -4.35; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.94, -73.24; **HRMS** (ESI) m/z calcd for $C_{24}H_{22}F_3Si$ $[M+H]^+$: 395.1437, found: 395.1459



5l

1,4-bis(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-yl)benzene**(5l):** Pale yellow oil, yield = 73%, 0.0428 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.49-7.45 (m, 4H), 7.3 – 7.28 (m, 6H), 7.06 - 7.01 (m, 4H), 6.35-6.33(m, H) ,1.88 – 1.81 (m, 4H), 0.36 (s, 6H), 0.34 (s, 3H), 0.34 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 204.93 – 204.76 (m), 137.5, 137.5, 133.6, 132.1, 129.3, 127.9, 127.8, 127.7, 123.8(q, *J* = 274.7 Hz), 100.6, 99.9 (q, *J* = 34.4 Hz), 14.5, -2.9; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.74, -73.25; **HRMS** (ESI) m/z calcd for $C_{32}H_{33}F_6Si_2$ $[M+H]^+$: 587.2019, found: 587.2033

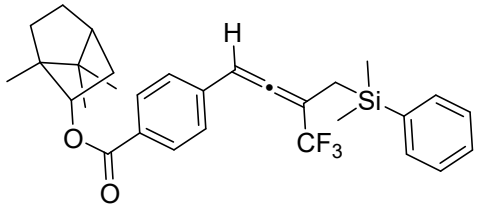


5m

2-isopropyl-5-methylcyclohexyl 4-(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-yl)benzoate**(5m)**: Pale yellow oil, yield = 60%, 0.0308 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.97 – 7.93 (m, 2H), 7.47 – 7.45 (m, 2H), 7.33 – 7.27 (m, 2H), 7.19-7.14 (m, 2H), 6.40 - 6.37 (m, 1H), 4.96 - 4.90 (m, 1H), 2.16 – 2.12 (m, 1H), 1.98 – 1.85

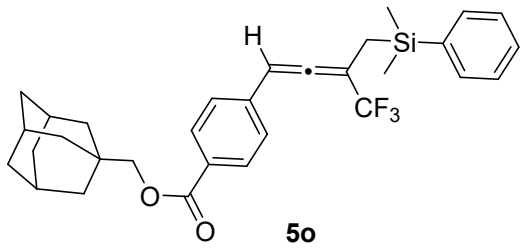
(m, 3H), 1.76-1.72 (m, 2H), 1.60 – 1.53 (m, 2H), 1.17 – 1.08 (m, 2H), 0.95 – 0.92 (m, 9H), 0.82-0.79 (m, 4H), 0.36 (s, 3H), 0.34 (s, 2H), 0.34 (s, 1H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 205.5 (d, *J* = 3.7 Hz), 165.8, 137.3, 136.8, 133.6, 130.0, 129.4, 127.9, 127.2, 126.4, 123.6 (q, *J* = 272.5 Hz), 100.4, 100.3 (q, *J* = 35.3 Hz), 75.0, 47.3, 41.0, 34.4, 31.5, 26.6, 23.7, 22.1, 20.8, 16.7, 14.5, -2.8, -2.9; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.68, -72.38; **HRMS** (ESI) m/z calcd for $C_{30}H_{38}F_3O_2Si$ $[M+H]^+$:515.2588, found: 515.2594



5n

1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl 4-(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-yl)benzoate**(5n)**: Pale yellow oil, yield = 55%, 0.0282 g

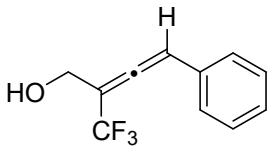
^{1}H NMR (500 MHz, Chloroform-d) δ 7.98-7.95 (m, 2H), 7.47 – 7.46 (m, 2H), 7.35 – 7.28 (m, 3H), 7.19-7.16 (m, 2H), 6.40-6.38 (m, 1H), 5.13-5.10 (m, 1H), 2.51-2.46 (m, 1H), 2.15 – 2.10 (m, 1H), 1.85 (t, *J* = 2.9 Hz, 2H), 1.80-1.74 (m, 2H), 1.36 – 1.28 (m, 2H), 1.14-1.10 (m, 1H), 0.97 (s, 3H), 0.94 – 0.92 (s, 6H), 0.36 (s, 3H), 0.34 (s, 3H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 205.5 (q, *J* = 3.8 Hz), 166.5, 137.3, 136.8, 133.6, 131.7, 130.0, 129.4, 127.9, 127.3, 126.4, 123.6 (q, *J* = 274.7 Hz), 100.5 (q, *J* = 35.3 Hz), 100.4, 80.7, 49.2, 48.0, 45.0, 37.0, 28.2, 27.5, 19.8, 19.0, 14.4, 13.7, -2.8, -2.9; **^{19}F NMR** (471 MHz, Chloroform-d) δ -64.66, -72.35; **HRMS** (ESI) m/z calcd for $C_{30}H_{36}F_3O_2Si$ $[M+H]^+$:513.2431, found: 513.2437



5o

((1s,3s)-adamantan-1-yl)methyl 4-(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-yl)benzoate**(5o)**: Pale yellow oil, yield = 77%, 0.0299 g

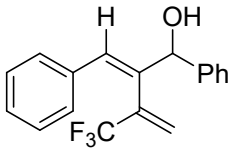
^{1}H NMR (400 MHz, Chloroform-d) δ 7.90 – 7.88 (m, 2H), 7.47-7.45 (m, 2H), 7.35 – 7.30 (m, 3H), 7.16 – 7.14 (m, 2H), 6.39-6.36 (m, 1H), 2.26 (s, 7H), 1.85-1.84 (m, 2H), 1.76 – 1.68 (m, 8H), 1.38 – 1.24 (m,2H), 0.35 (s, 3H), 0.33 (s, 3H); **^{13}C NMR** (101 MHz, Chloroform-d) δ 205.3 (q, *J* = 3.9 Hz), 165.1, 137.4, 136.3, 133.6, 131.5, 129.9, 129.3, 127.9, 127.1, 123.5 (q, *J* = 123.5 Hz), 100.5,100.2(q, *J* = 35.4 Hz), 81.2, 41.4, 36.3, 30.9, 14.4, -2.9; **^{19}F NMR** (376 MHz, Chloroform-d) δ -64.70, -72.39; **HRMS** (ESI) m/z calcd for $C_{31}H_{36}F_3O_2Si$ $[M+H]^+$:525.2431, found: 525.2449



8a

4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-ol**(8a)**: pale yellow oil , yield = 88%, 0.0214 g

^{1}H NMR (400 MHz, Chloroform-d) δ 7.39 – 7.29 (m,5H), 6.76-6.74 (m, 1H), 4.45-4.38 (m, 2H), 1.85 (s, 1H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 204.32 – 204.09 (m), 130.99, 129.06, 128.78, 127.62,123.0 (q, *J* = 276.0 Hz), 103.3 (q, *J* = 33.1 Hz), 102.75, 58.97; **^{19}F NMR** (471 MHz, Chloroform-d) δ -62.16; **HRMS** (ESI) m/z calcd for $C_{11}H_{10}F_3O$ $[M+H]^+$:215.0678, found: 215.0684



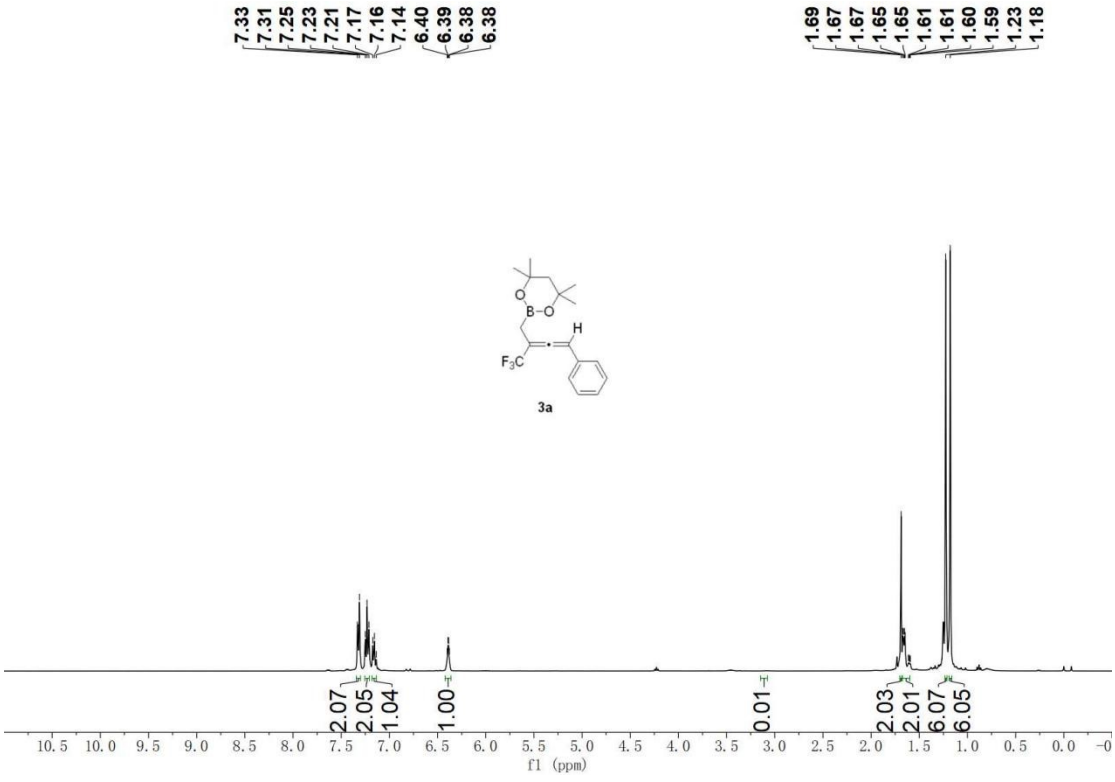
9a

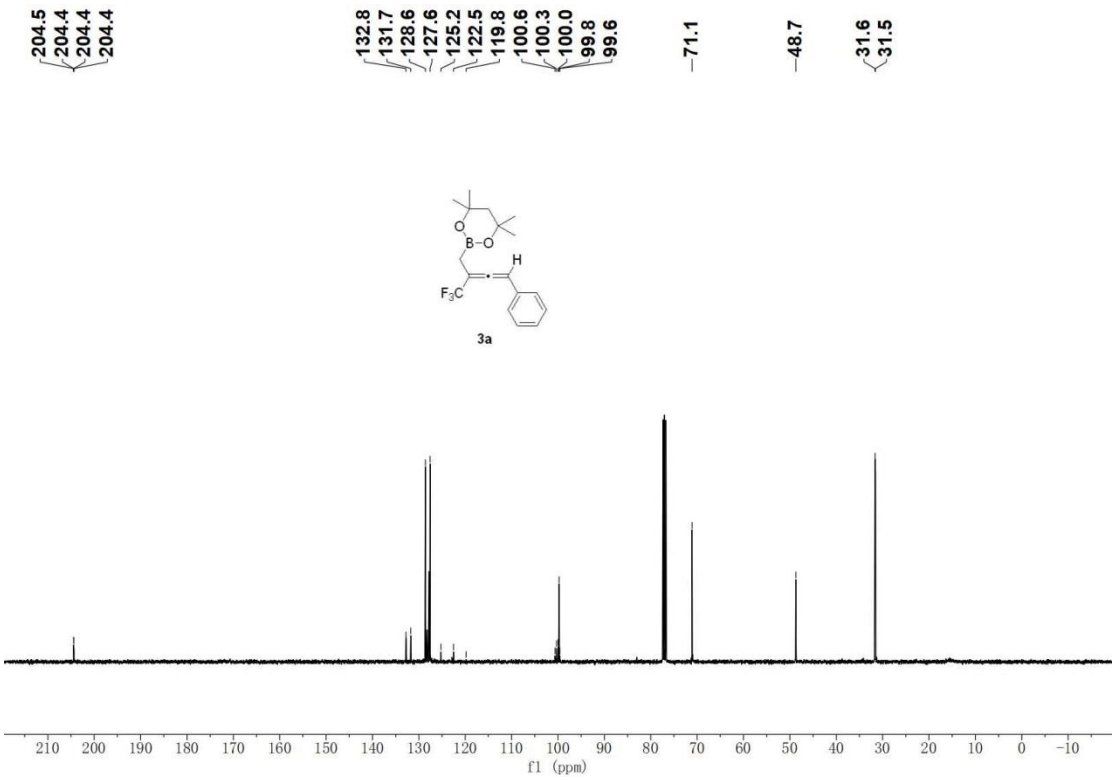
(E)-2-benzylidene-1-phenyl-3-(trifluoromethyl)but-3-en-1-ol **(9a)**: Pale yellow oil, yield = 77%, 0.0234 g

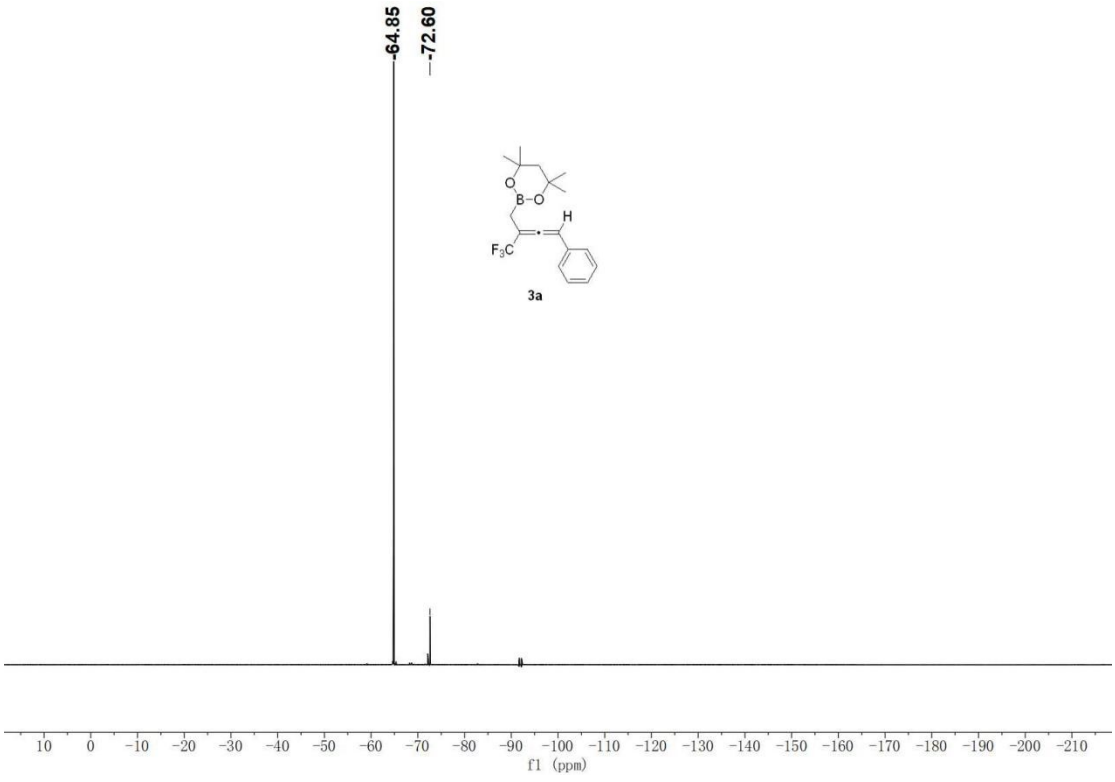
^{1}H NMR (500 MHz, Chloroform-d) δ 7.42 – 7.33 (m, 6H), 7.32 – 7.27 (m, 3H), 7.25 – 7.21 (m, 1H), 7.06 (s, 1H), 5.78 – 5.77 (d, *J* = 5 Hz, 1H), 5.44 (s, 1H), 4.99 (s, 1H); **^{13}C NMR** (126 MHz, Chloroform-d) δ 140.8, 136.8, 135.7, 135.3(q, *J* = 31.5 Hz), 131.0, 129.0, 128.6, 128.2, 128.2, 127.7, 127.3, 126.0 (q, *J* = 5.0 Hz), 123.0 (q, *J* = 274.7 Hz), 76.5; **^{19}F NMR** (471 MHz, Chloroform-d) δ -64.35; **HRMS** (ESI) m/z calcd for $C_{18}H_{15}F_3ONa$ $[M+Na]^+$: 327.0667, found: 327.0688

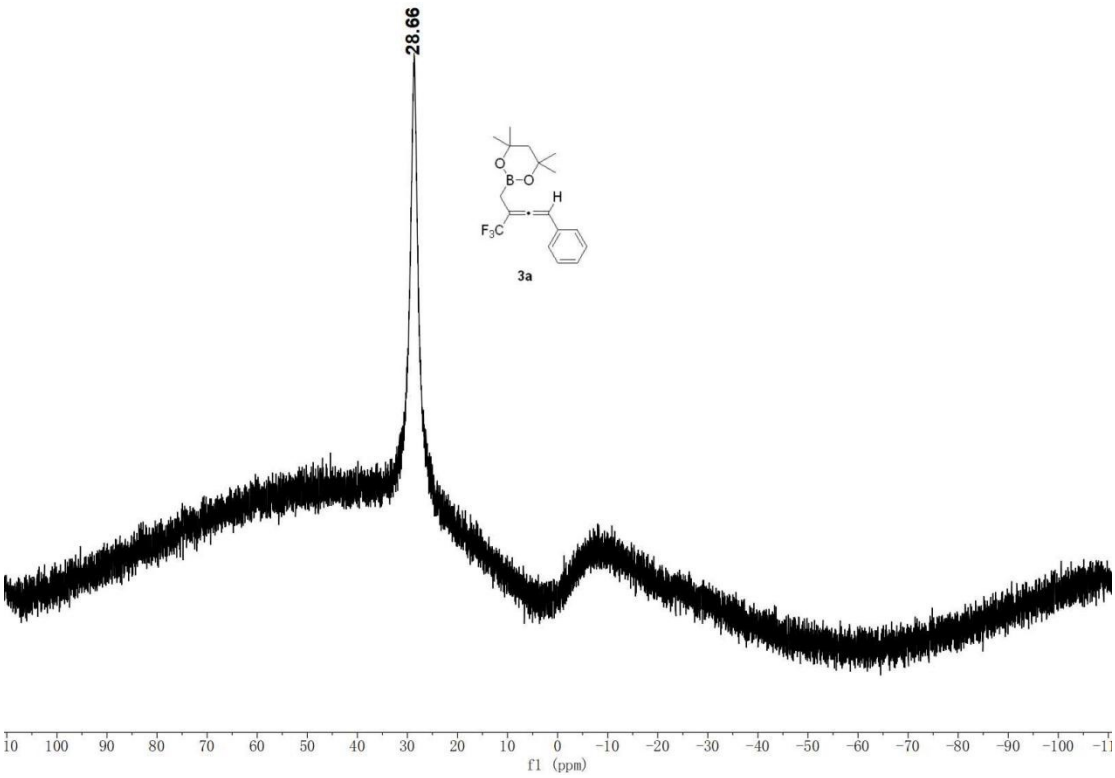
4.Copies of the NMR spectra

4,4,6,6-tetramethyl-2-(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)-1,3,2-dioxaborinane(3a)

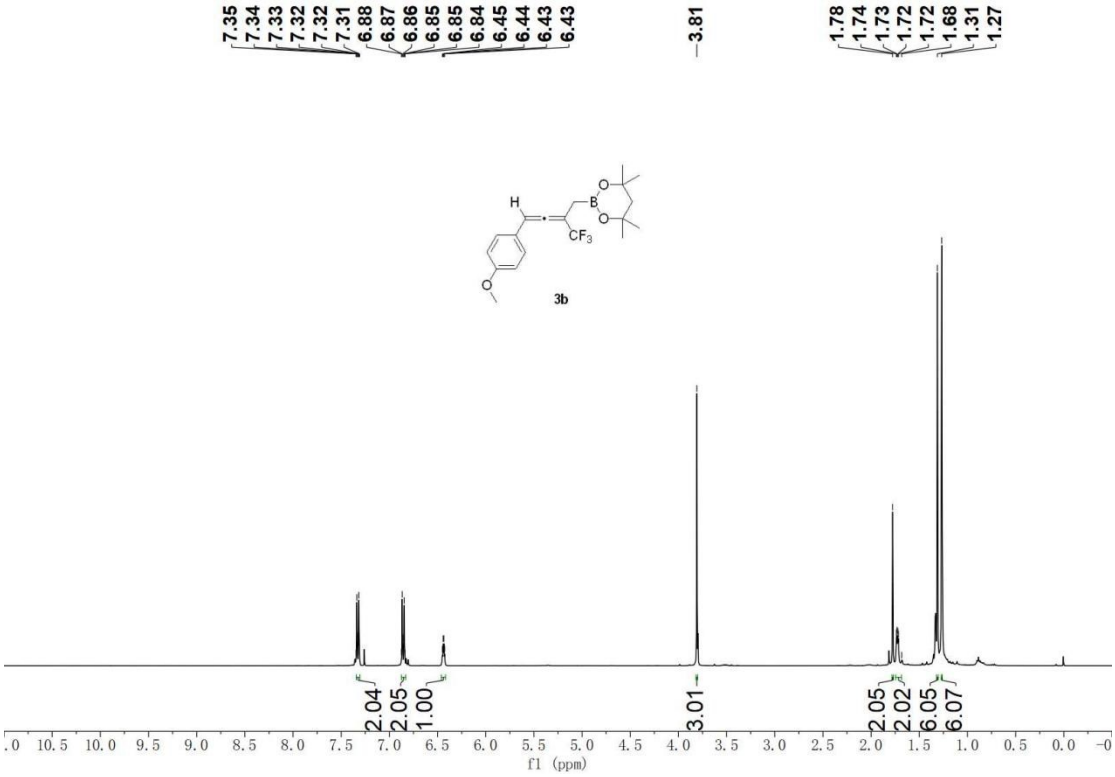


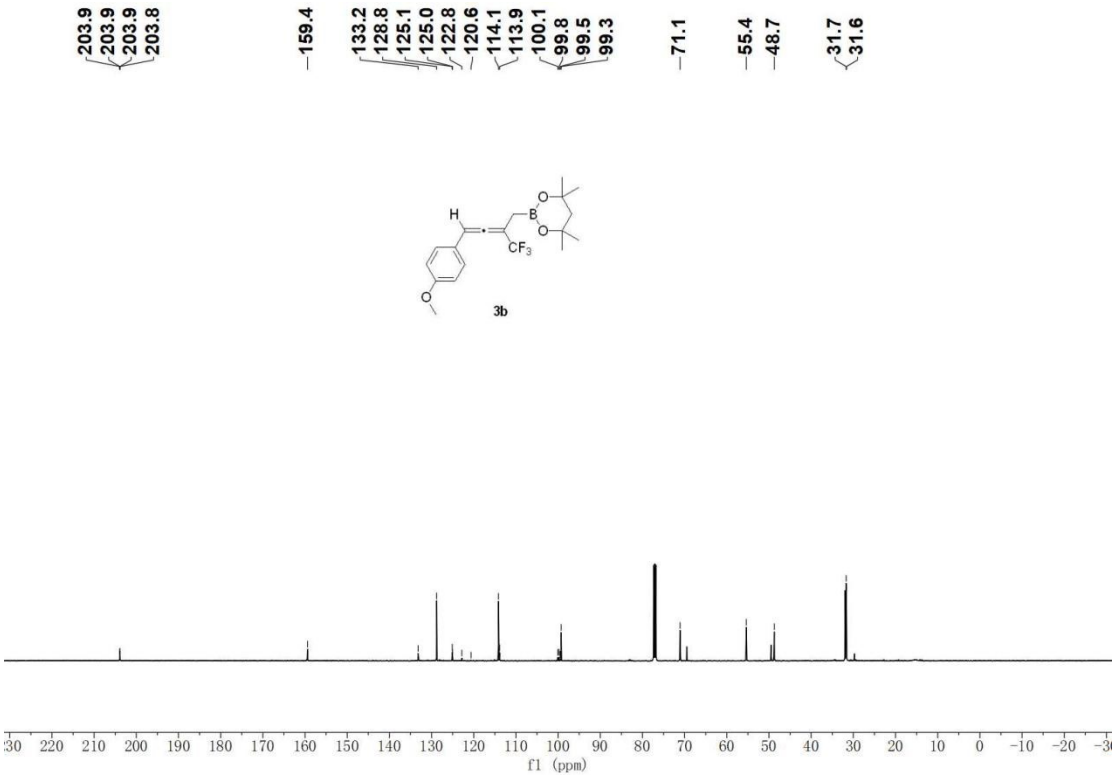

204.5
204.4
204.4
204.4
132.8
131.7
128.6
127.6
125.2
122.5
119.8
100.6
100.3
100.0
99.8
99.6
71.1
48.7
31.6
31.5
O
B–O
H
F3C
3a
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10
f1 (ppm)


-64.85
-72.60
O
B–O
H
F3C
3a
10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210
f1 (ppm)



2-(4-(4-methoxyphenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane(3b)




203.9
203.9
203.9
203.8
159.4
133.2
128.8
125.1
125.0
122.8
120.6
114.1
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100.1
99.8
99.5
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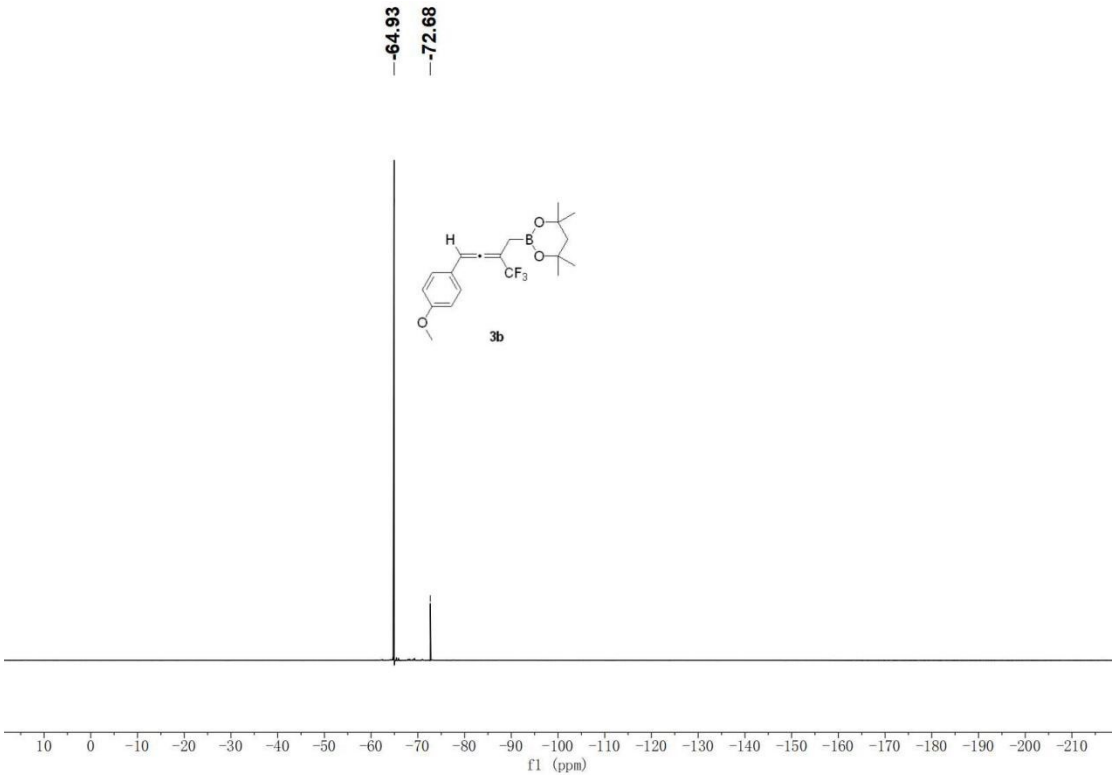
H
B
O
O
CF3
O
3b
f1 (ppm)


-64.93
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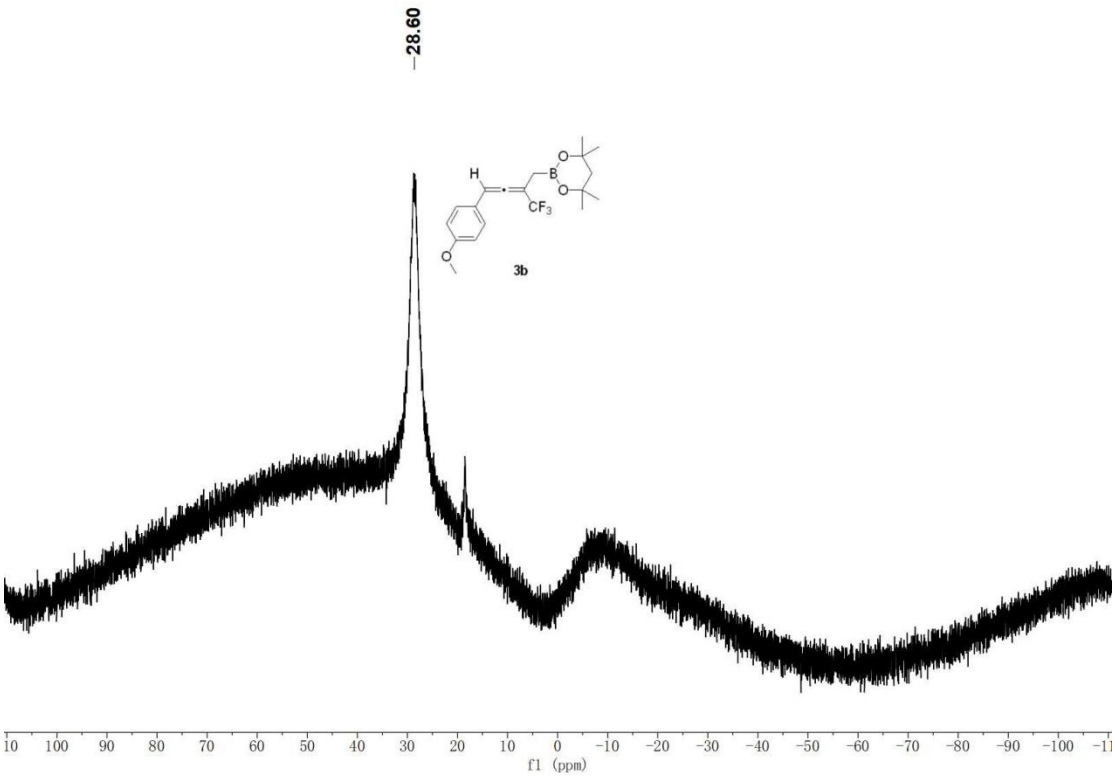
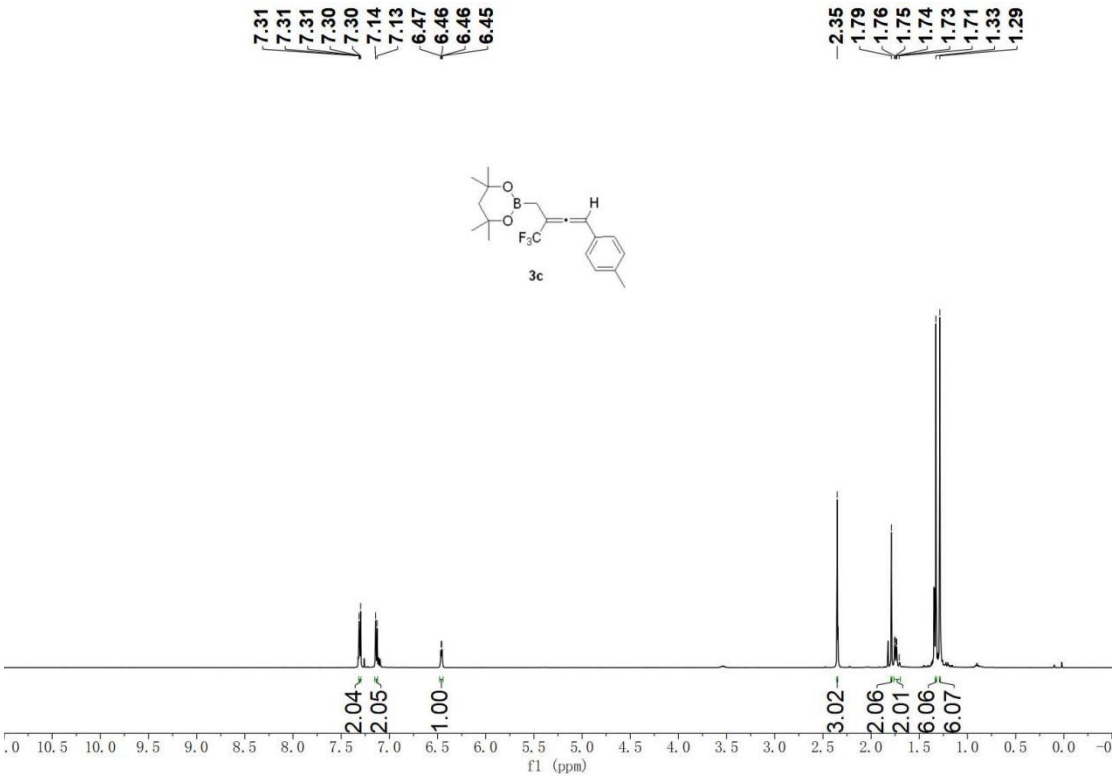
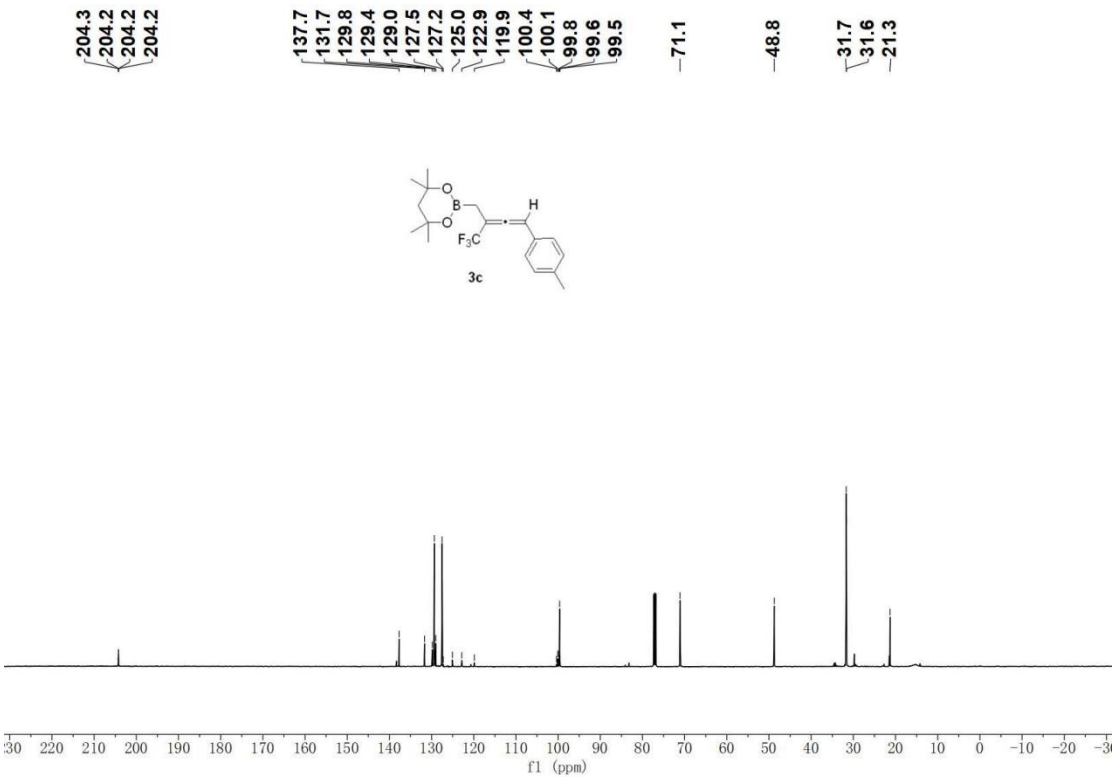
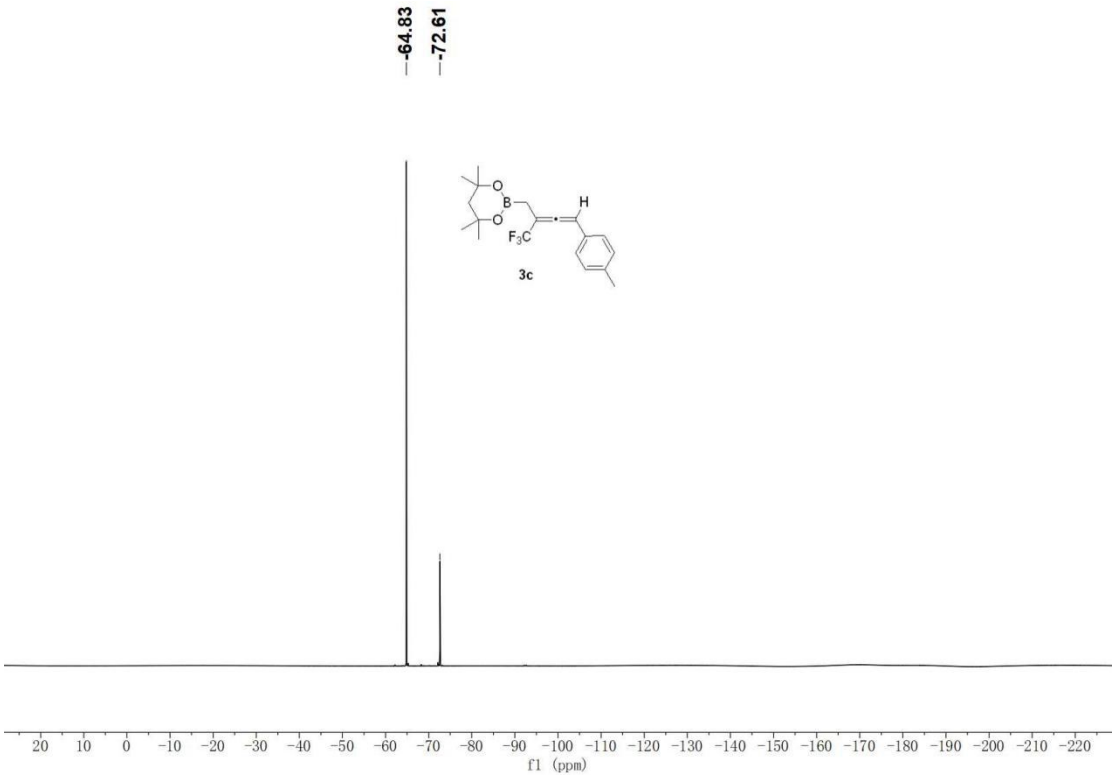
H
B
O
O
CF3
O
3b
f1 (ppm)

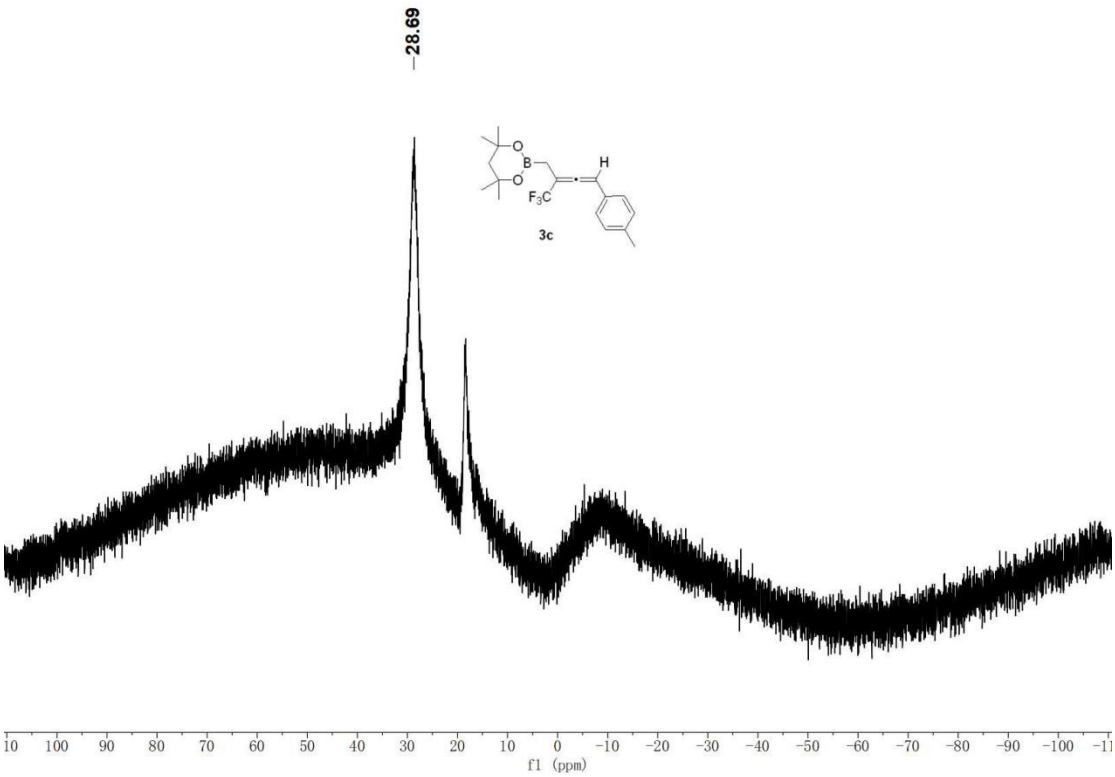


4,4,6,6-tetramethyl-2-(4-(p-tolyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-1,3,2-dioxaborinane (3c)

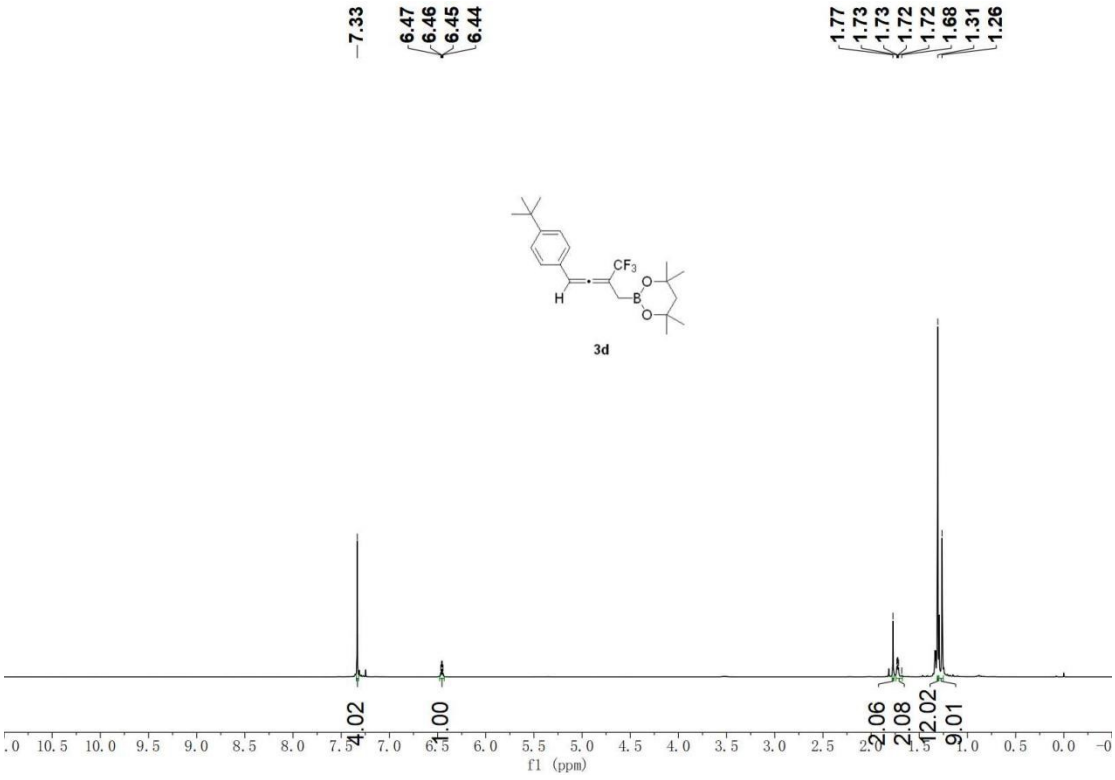


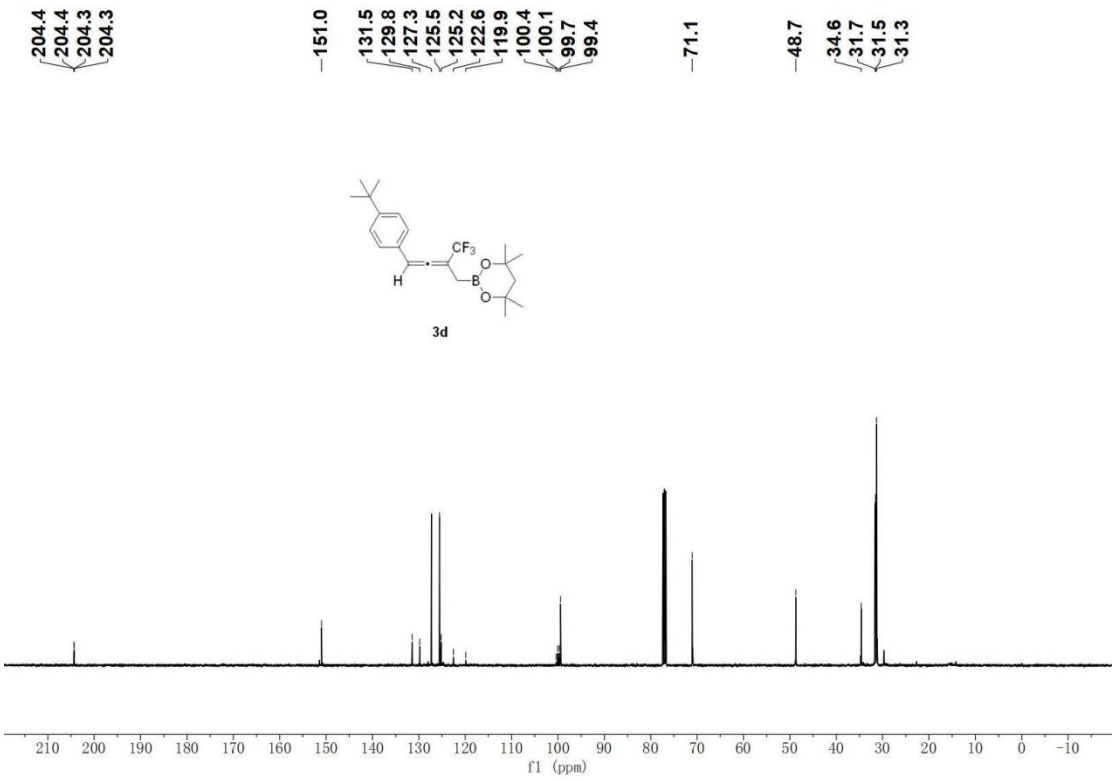

204.3
204.2
204.2
204.2
137.7
131.7
129.8
129.4
129.0
127.5
127.2
125.0
122.9
119.9
100.4
100.1
99.8
99.6
99.5
71.1
48.8
31.7
31.6
21.3
3c
f1 (ppm)

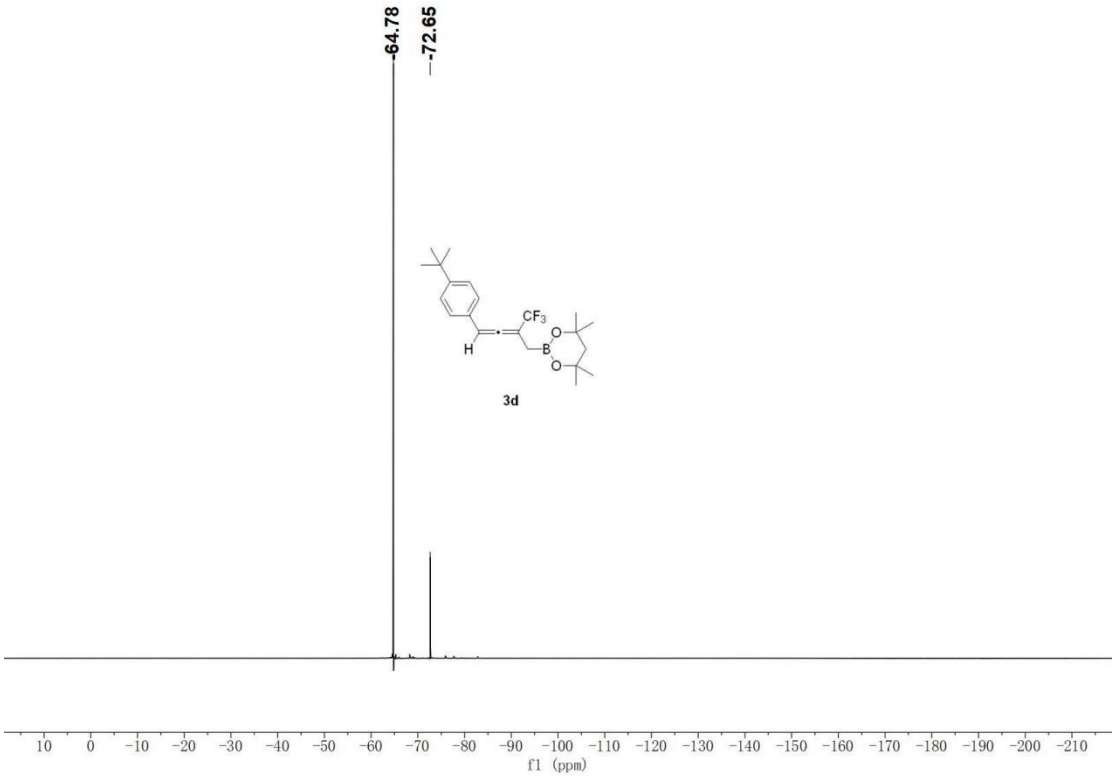

-64.83
-72.61
3c
f1 (ppm)

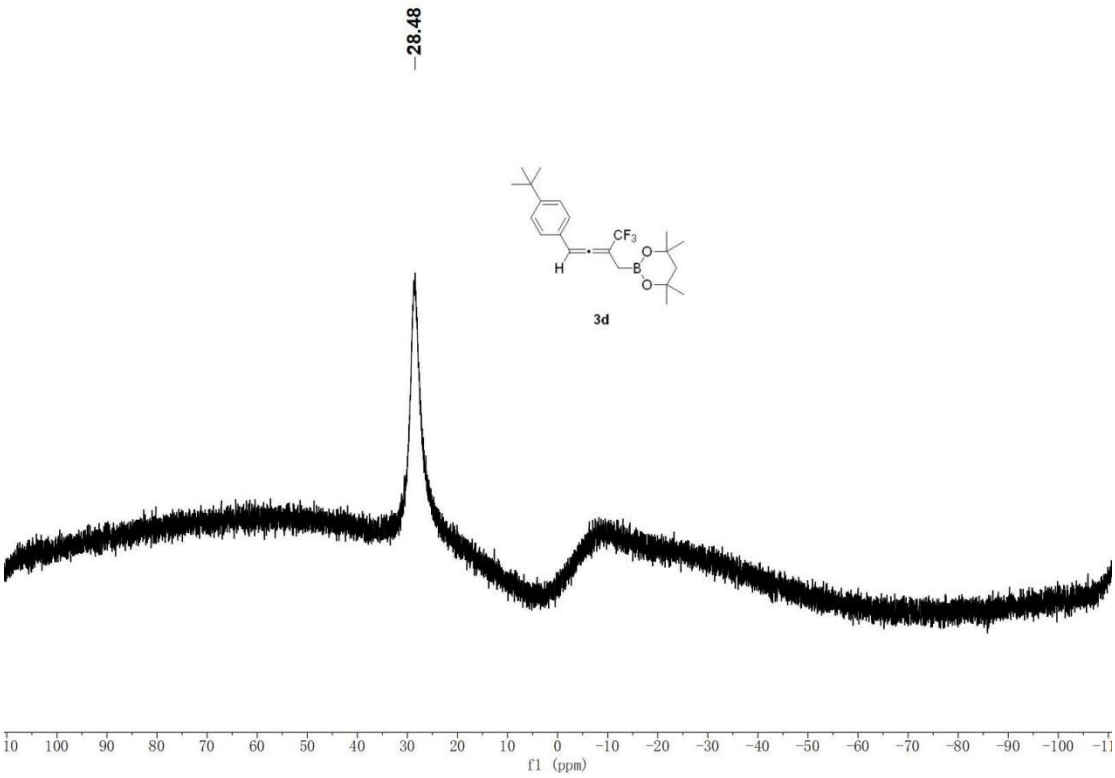


2-(4-(4-(*tert*-butyl)phenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane **(3d)**

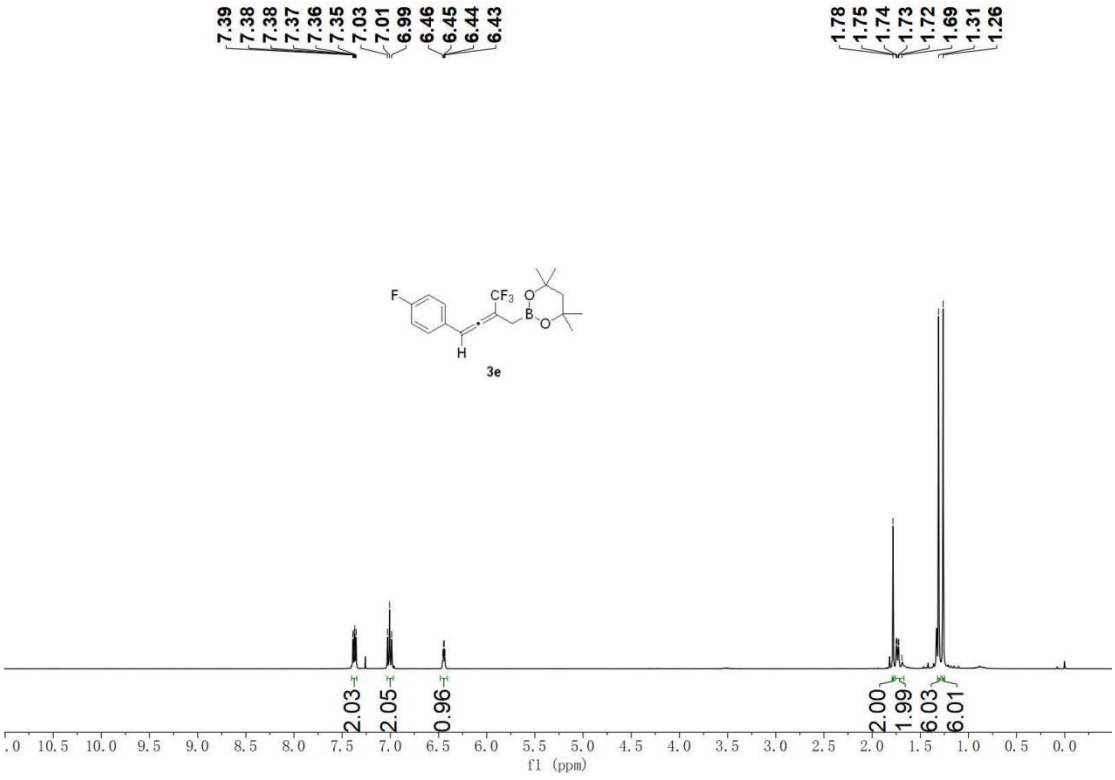


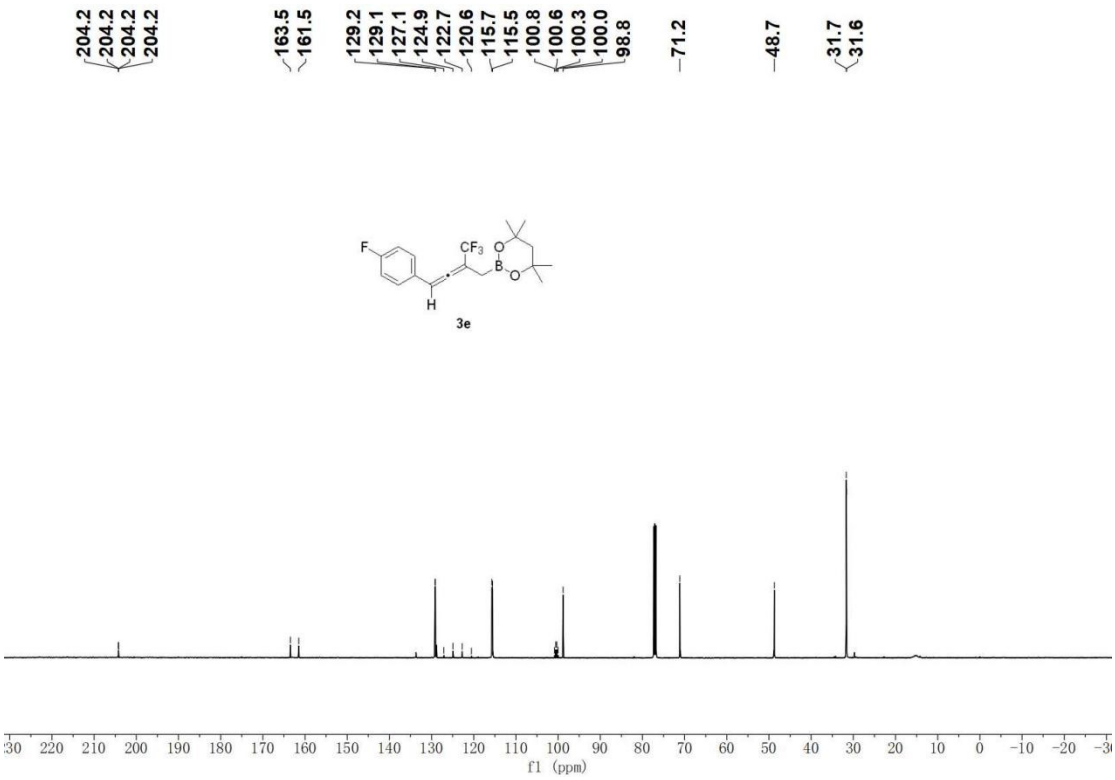

204.4
204.4
204.3
204.3
151.0
131.5
129.8
127.3
125.5
125.2
122.6
119.9
100.4
100.1
99.7
99.4
71.1
48.7
34.6
31.7
31.5
31.3
CF3
H
B
O
O
3d
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10
f1 (ppm)

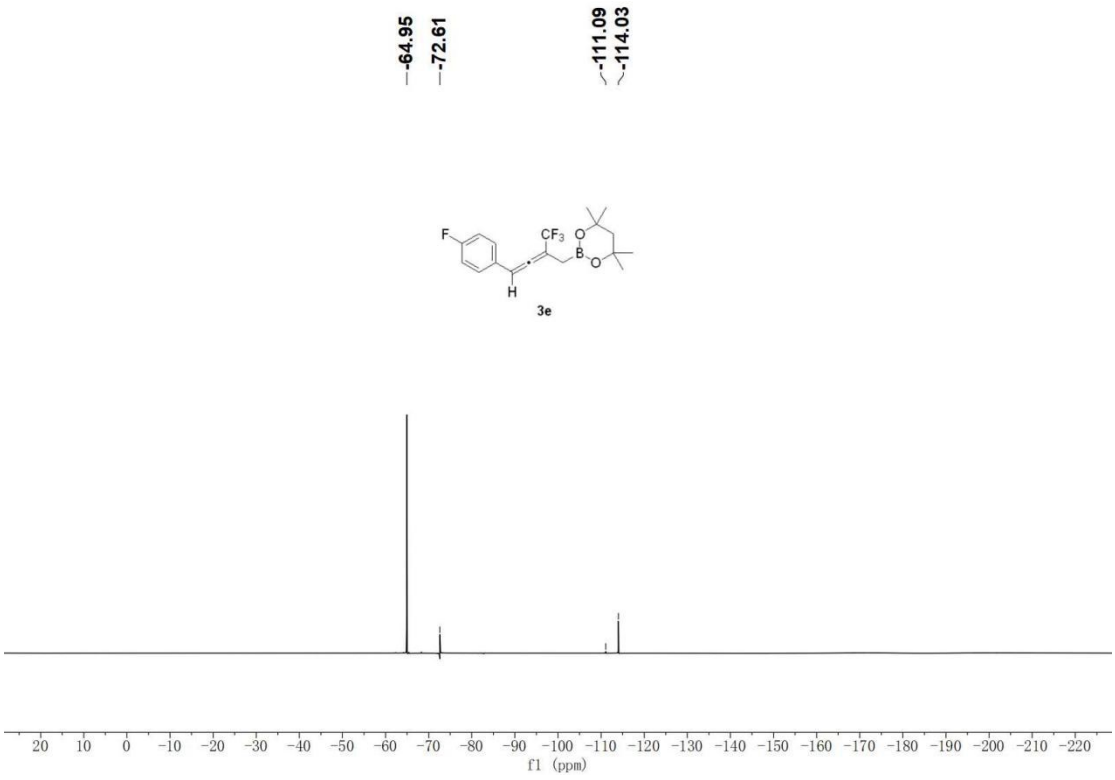

-64.78
-72.65
CF3
H
B
O
O
3d
10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210
f1 (ppm)

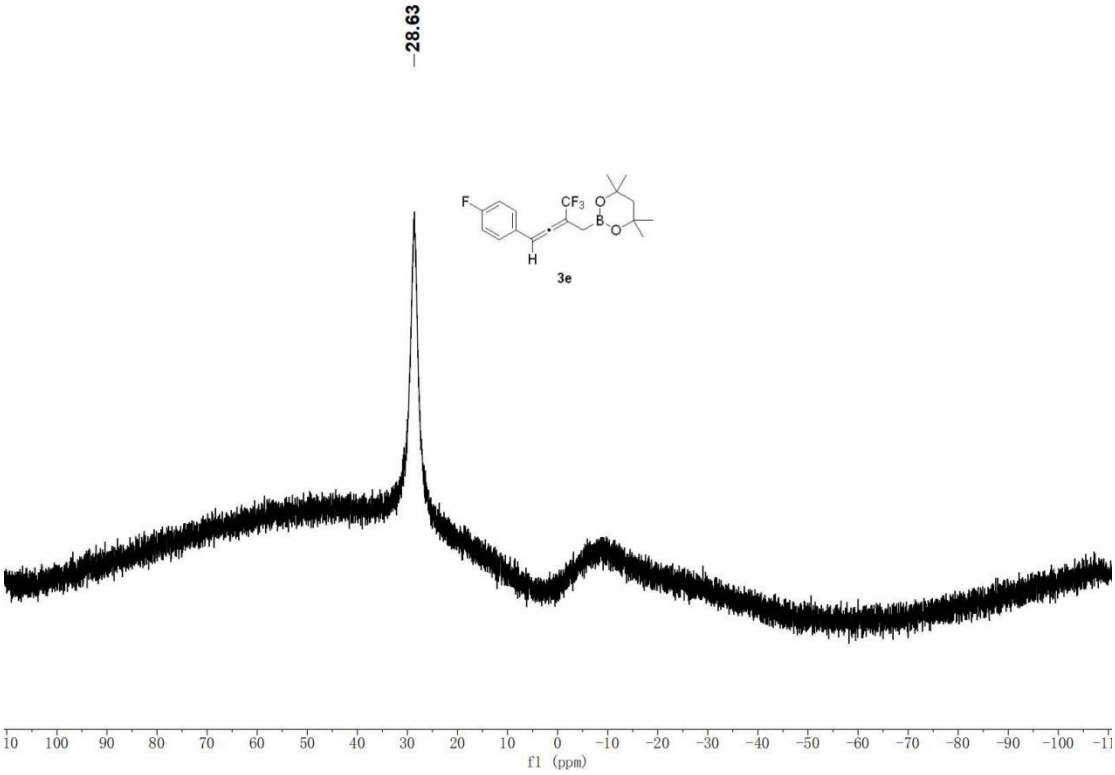


2-(4-(4-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane (3e)

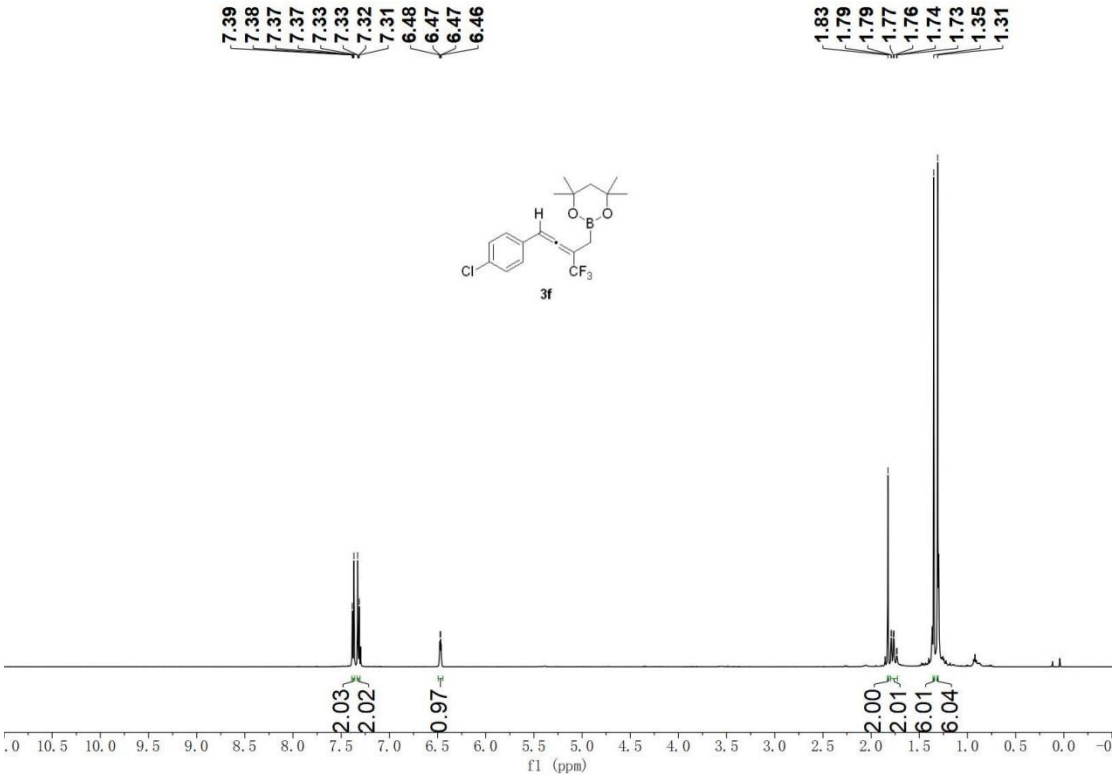


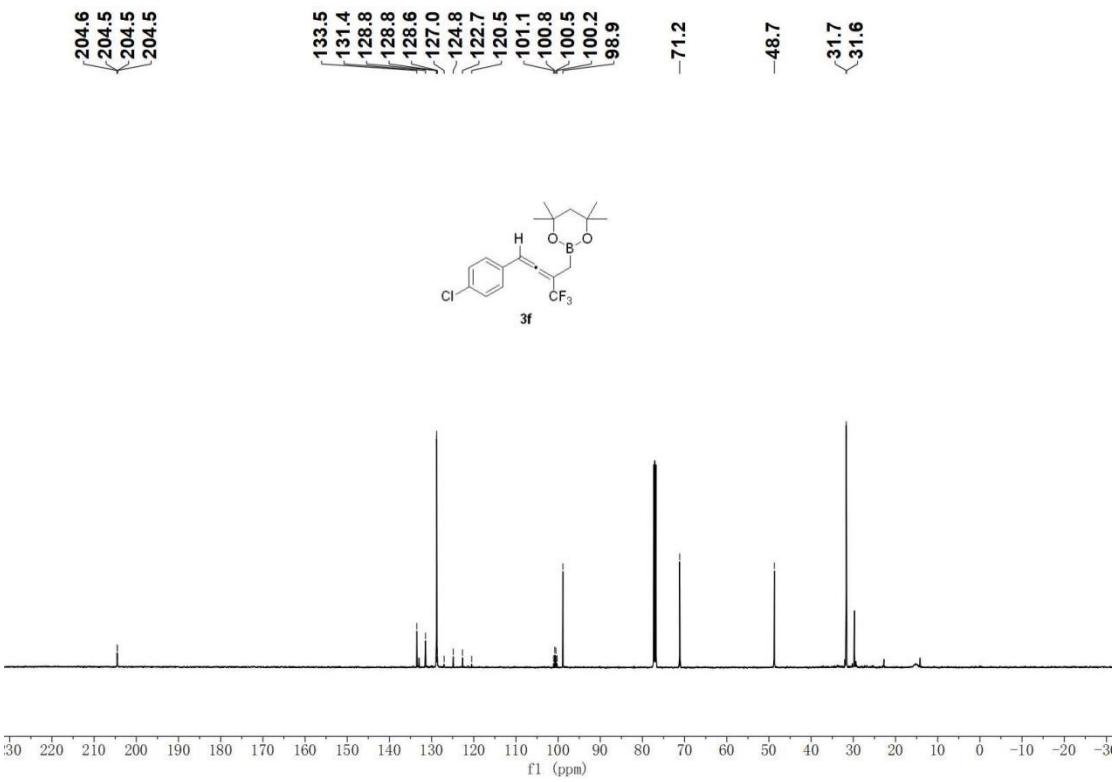

204.2
204.2
204.2
204.2
163.5
161.5
129.2
129.1
127.1
124.9
122.7
120.6
115.7
115.5
100.8
100.6
100.3
100.0
98.8
71.2
48.7
31.7
31.6
F
CF3
O
B
O
H
3e
f1 (ppm)

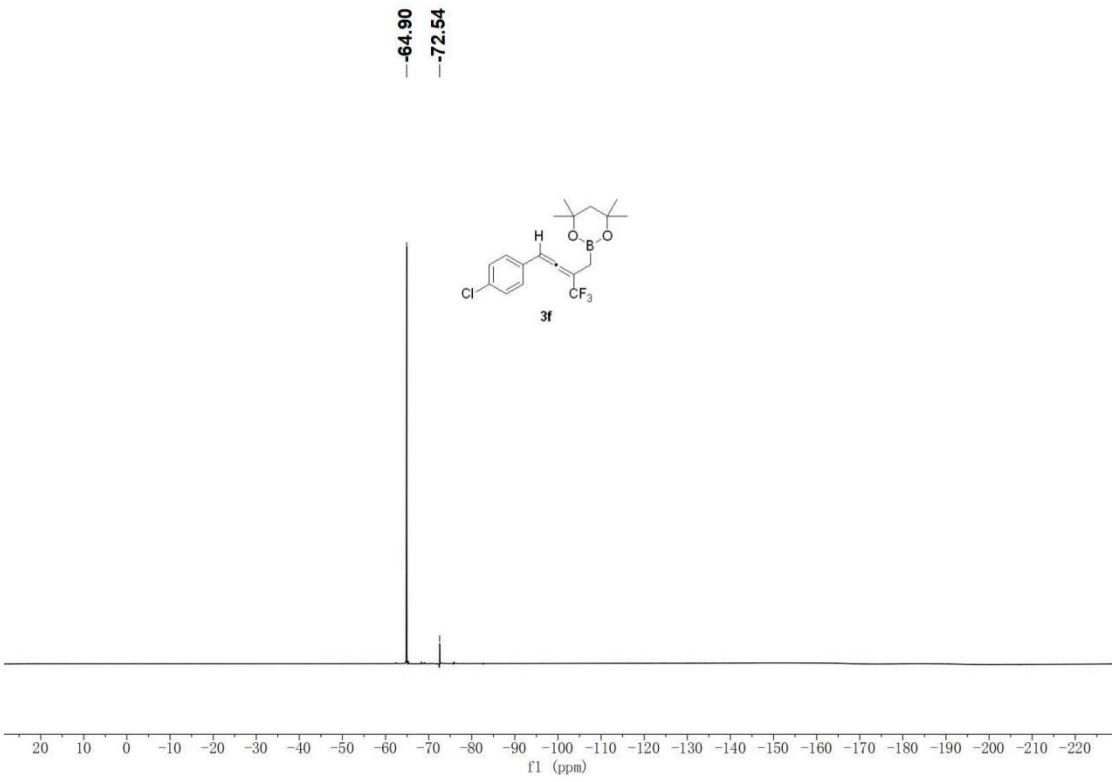

-64.95
-72.61
-111.09
-114.03
F
CF3
O
B
O
H
3e
f1 (ppm)

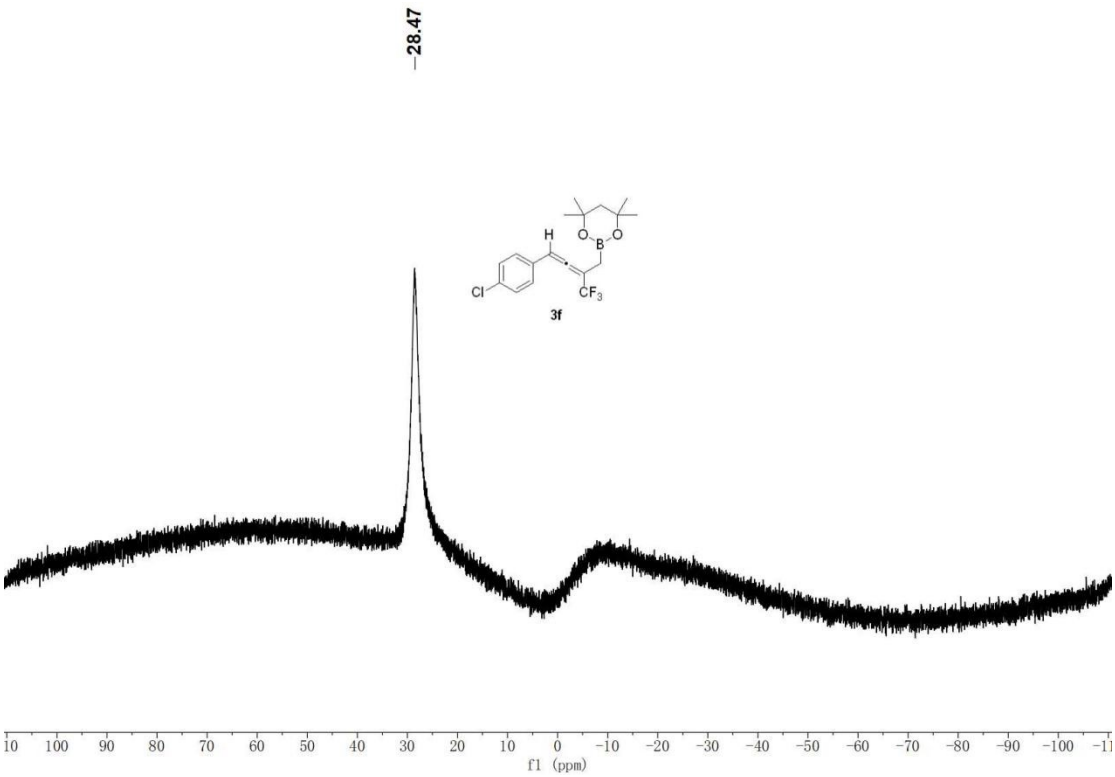


2-(4-(4-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane(3f)

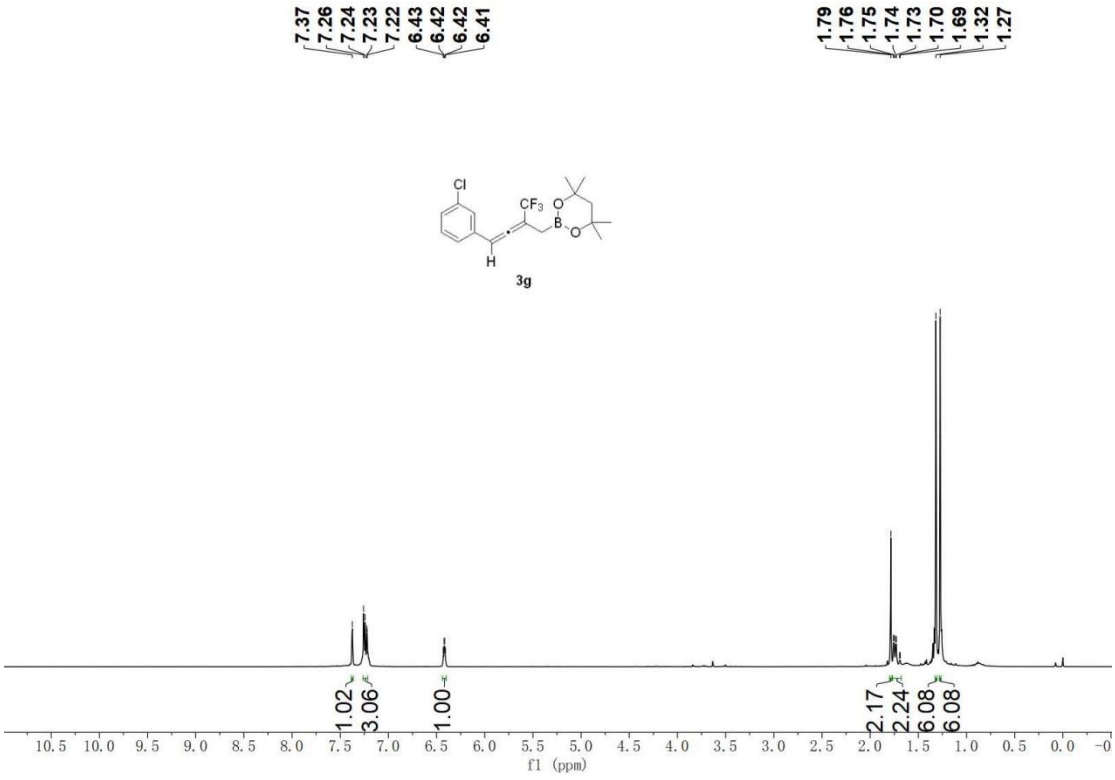


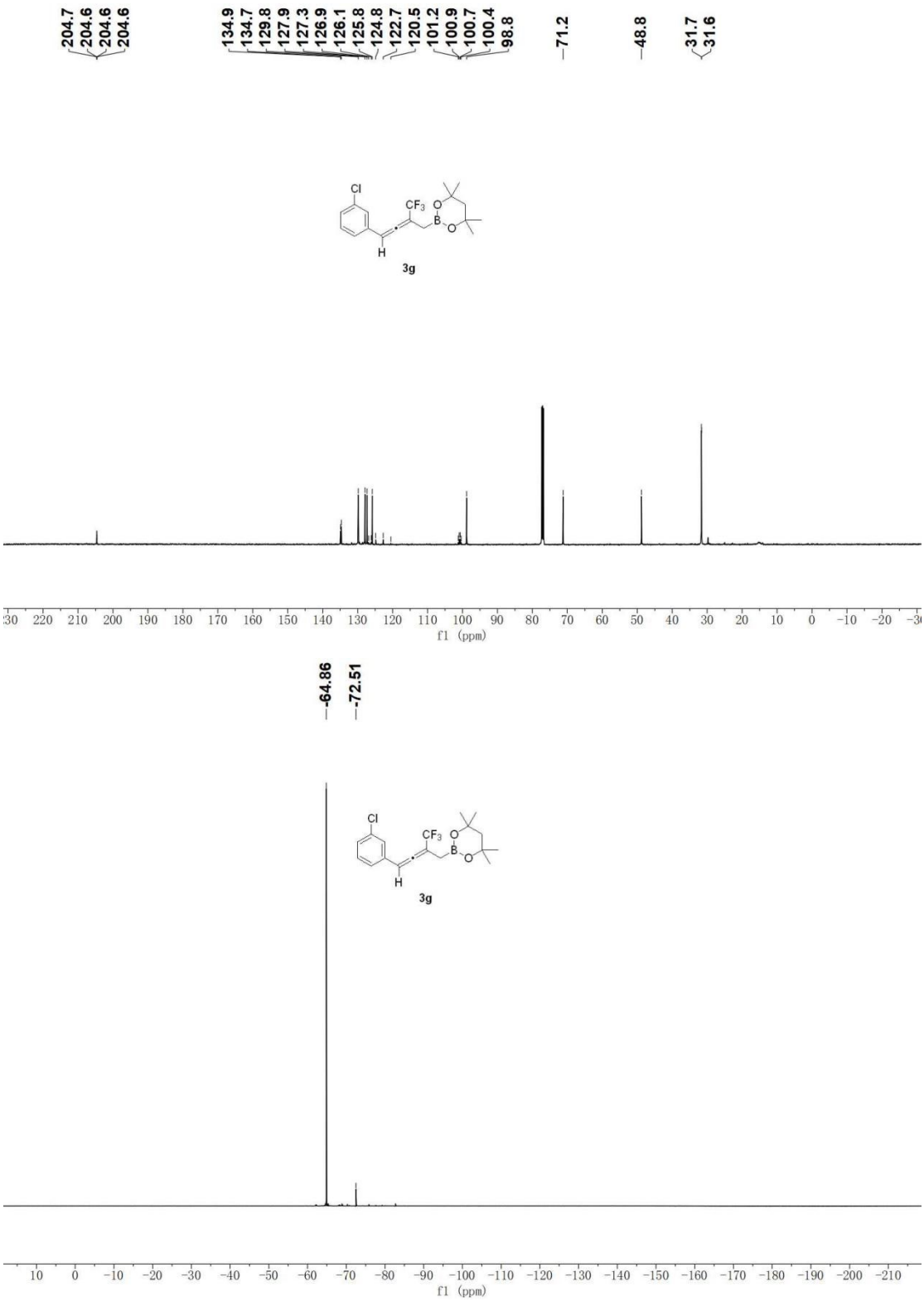

204.6
204.5
204.5
204.5
133.5
131.4
128.8
128.8
128.6
127.0
124.8
122.7
120.5
101.1
100.8
100.5
100.2
98.9
71.2
48.7
31.7
31.6
H
O
B
O
Cl
CF3
3f
f1 (ppm)

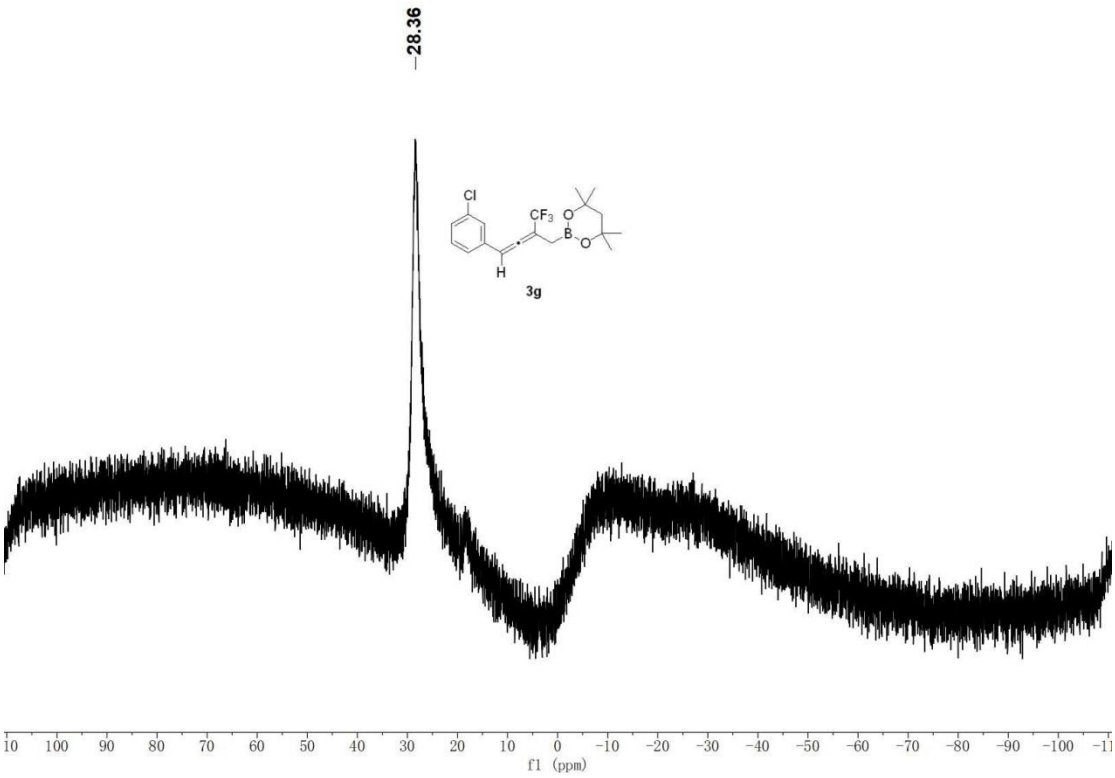

-64.90
-72.54
H
O
B
O
Cl
CF3
3f
f1 (ppm)



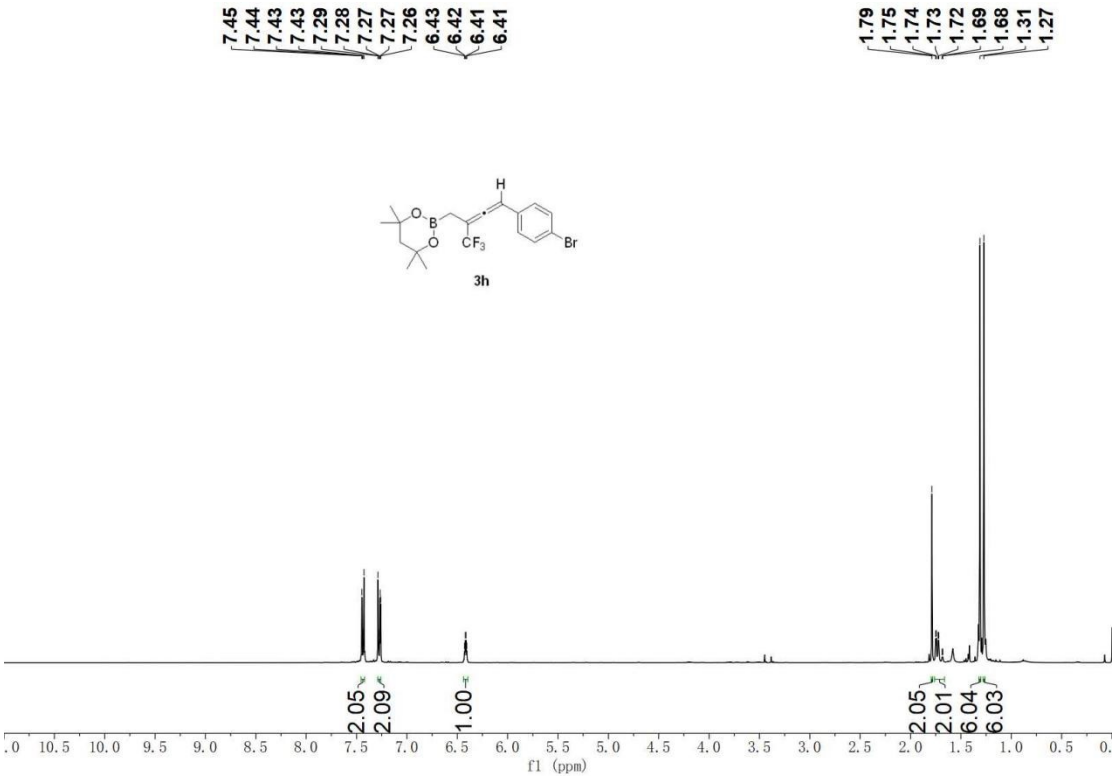
2-(4-(3-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane(3g)

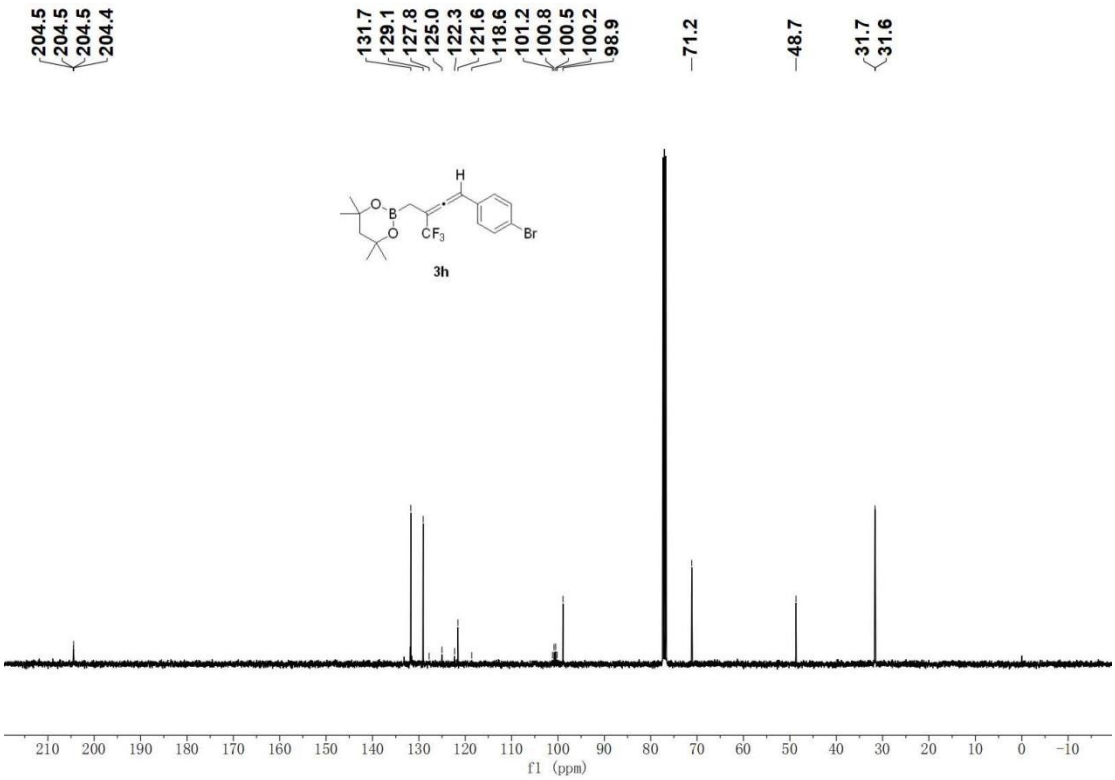



204.7
204.6
204.6
204.6
134.9
134.7
129.8
127.9
127.3
126.9
126.1
125.8
124.8
122.7
120.5
101.2
100.9
100.7
100.4
98.8
71.2
48.8
31.7
31.6
Cl
CF3
O
B
O
H
3g
f1 (ppm)
-64.86
-72.51
Cl
CF3
O
B
O
H
3g
f1 (ppm)



2-(4-(4-bromophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)-4,4,6,6-tetramethyl-1,3,2-dioxaborinane(3h)




204.5
204.5
204.5
204.4
131.7
129.1
127.8
125.0
122.3
121.6
118.6
101.2
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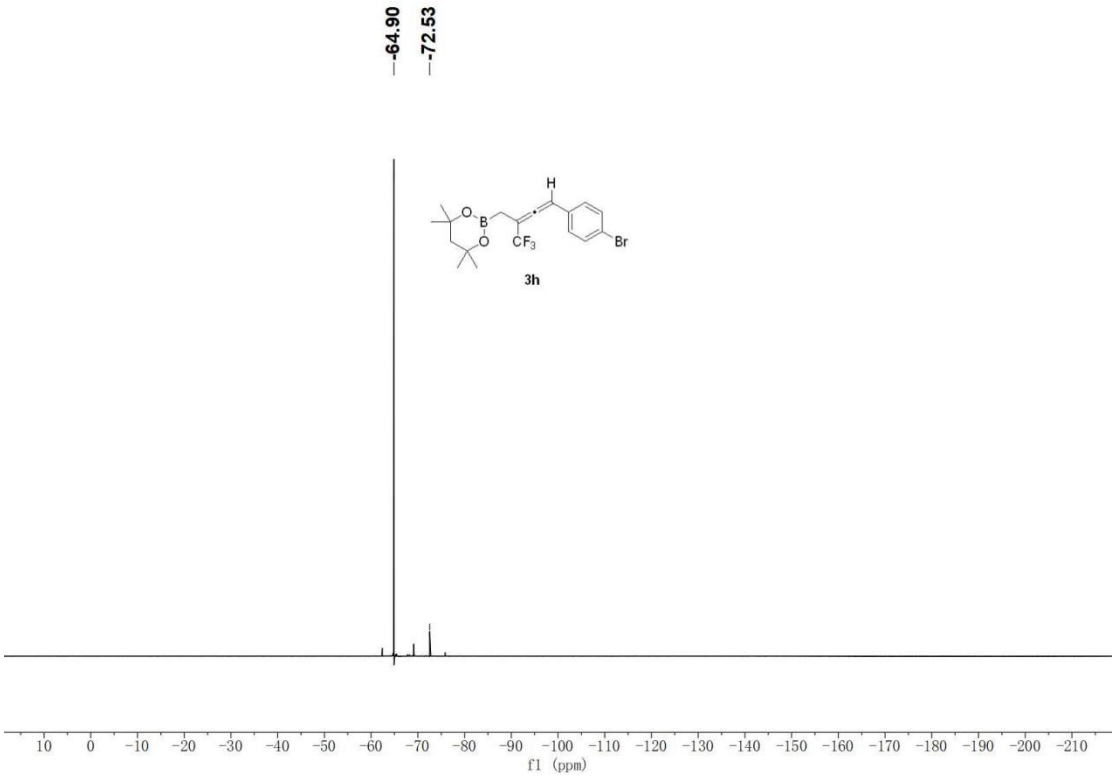
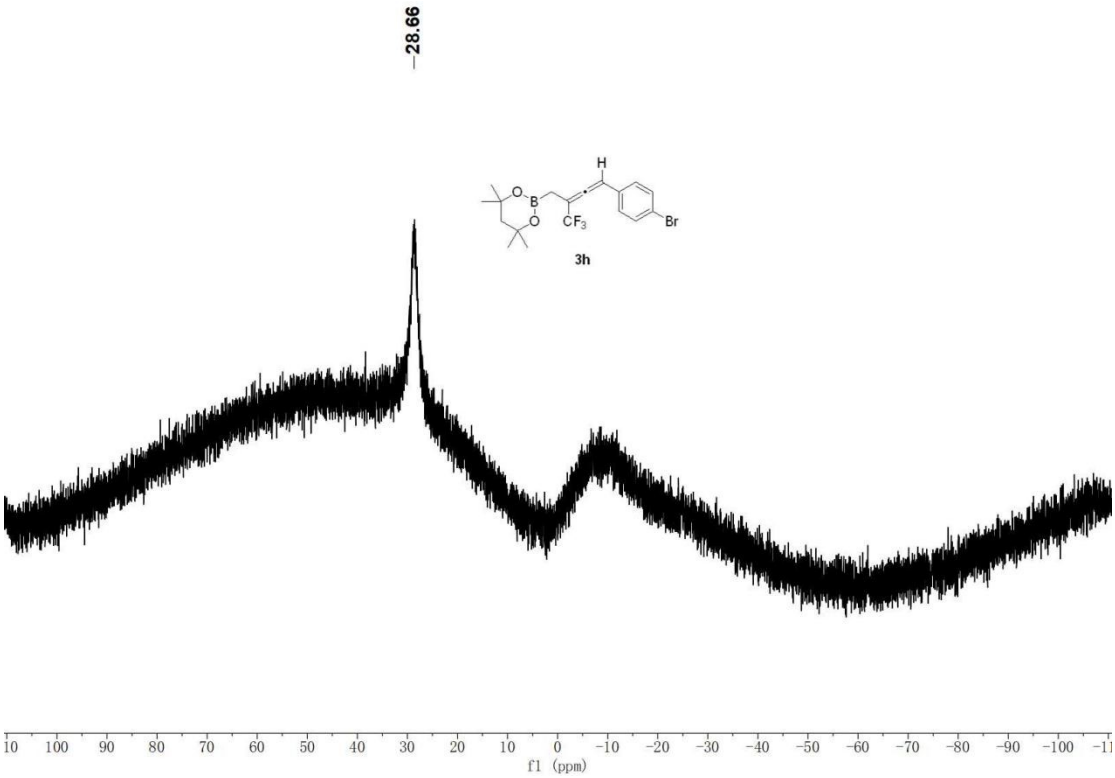
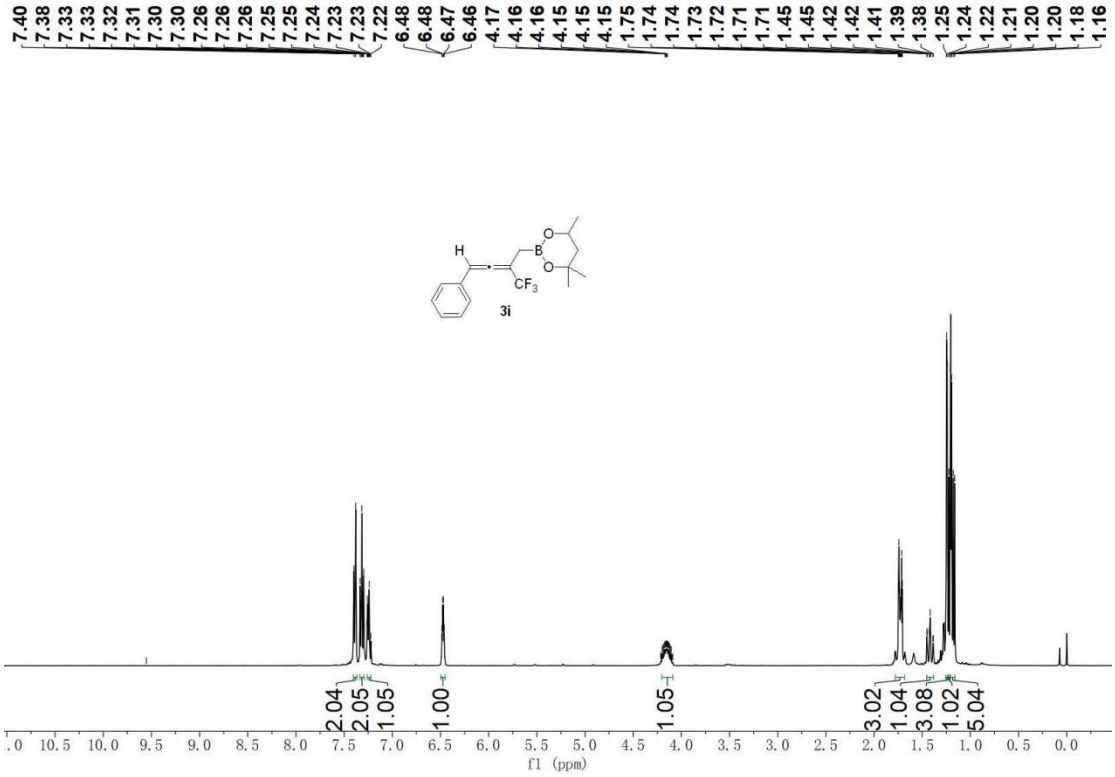
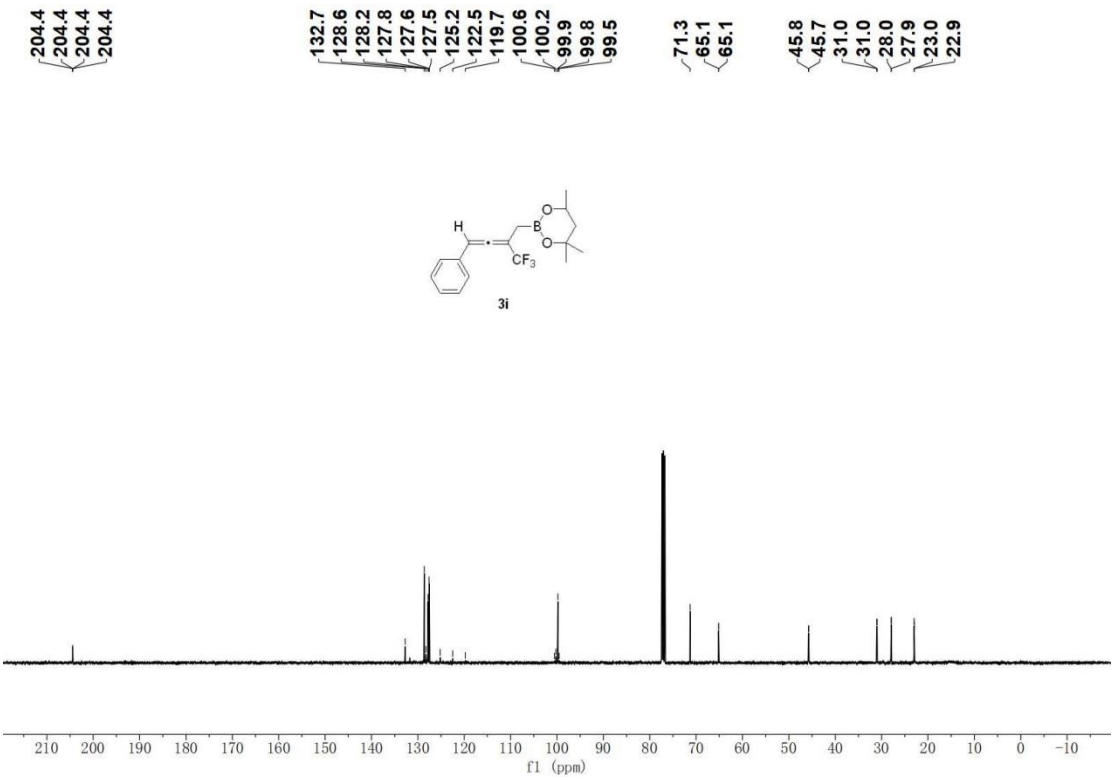
100.5
100.2
98.9
71.2
48.7
31.7
31.6
3h
f1 (ppm)

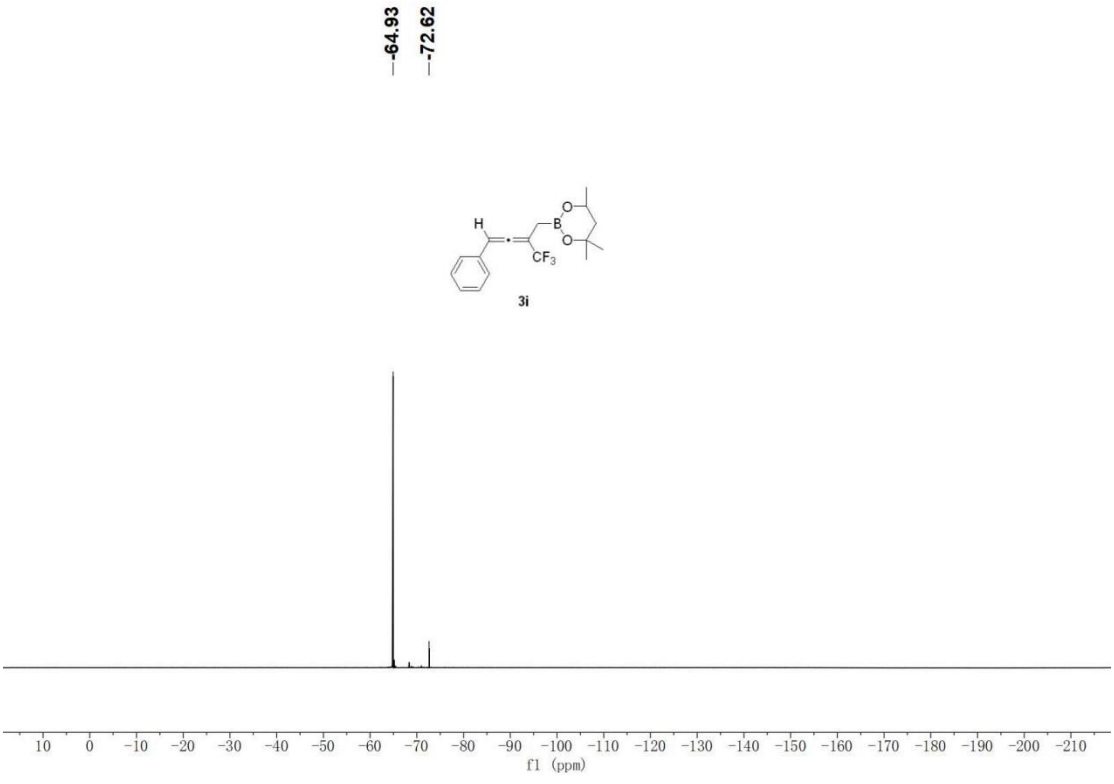

-64.90
-72.53
3h
f1 (ppm)

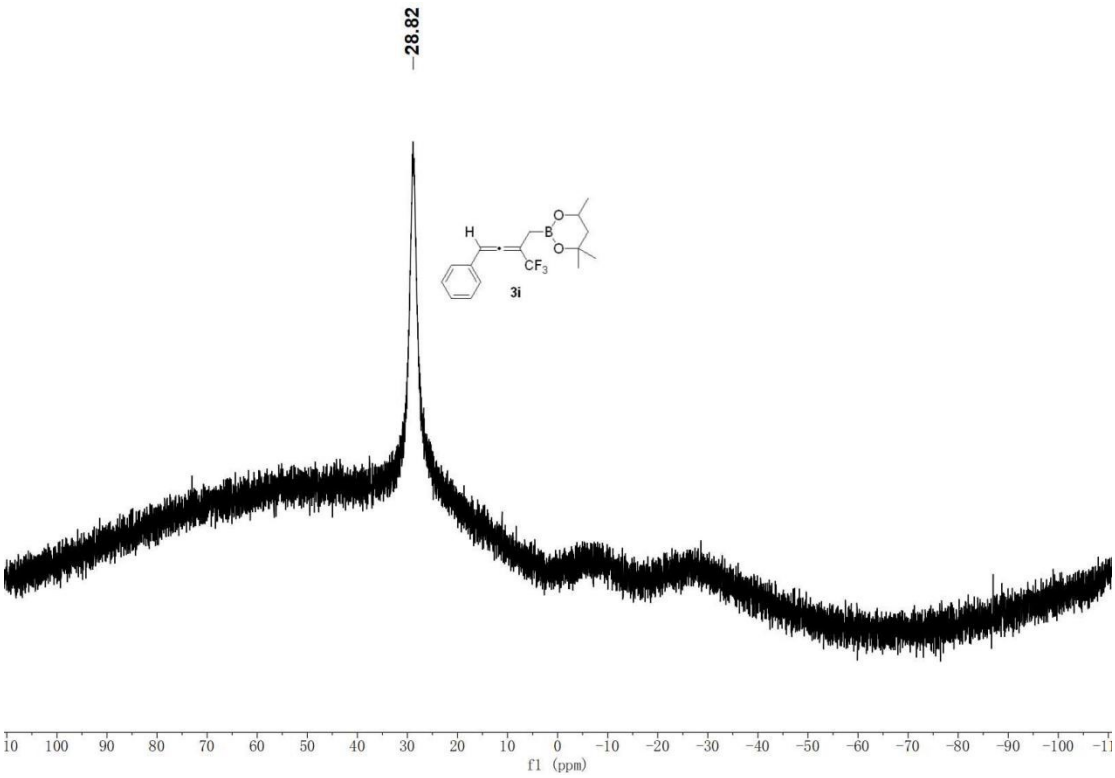


4,4,6-trimethyl-2-(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)-1,3,2-dioxaborinane (3i)

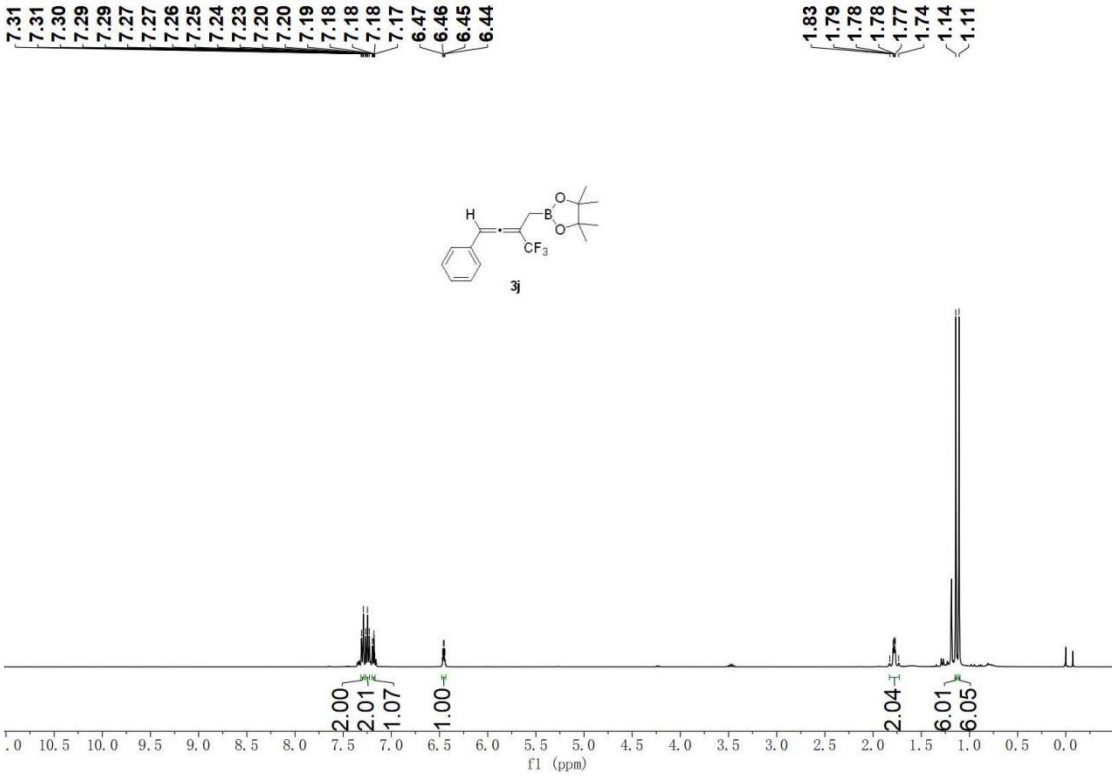


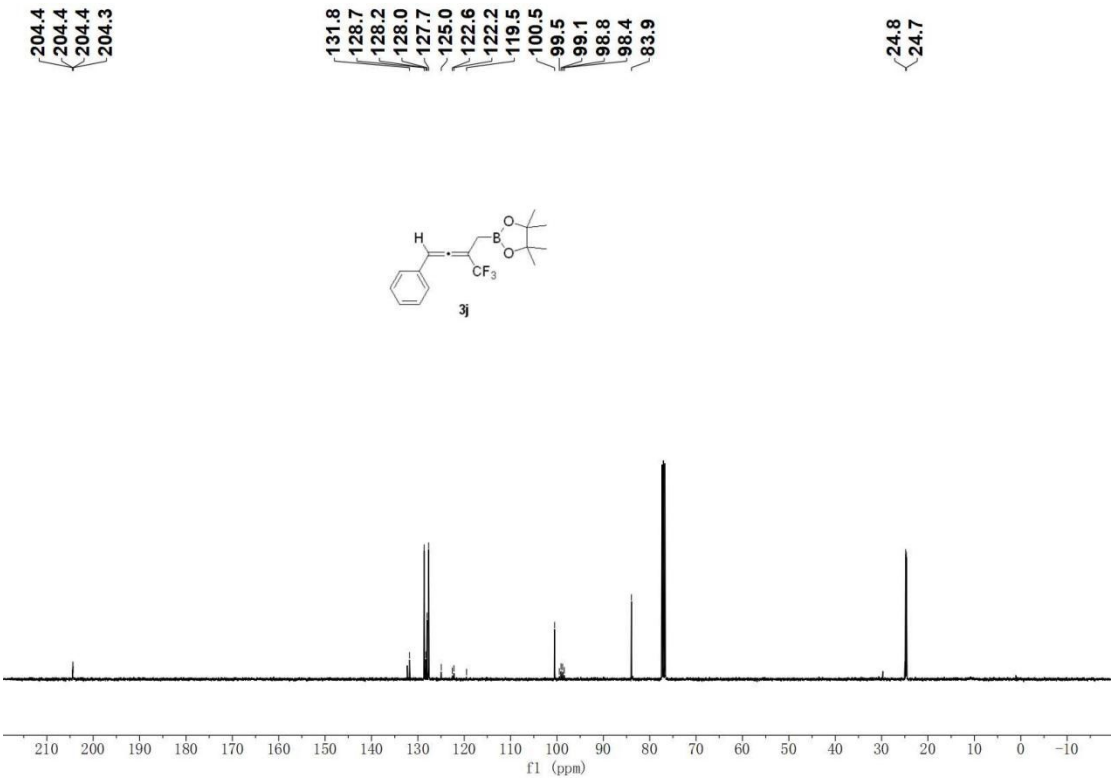

204.4
204.4
204.4
204.4
132.7
128.6
128.2
127.8
127.6
127.5
125.2
122.5
119.7
100.6
100.2
99.9
99.8
99.5
71.3
65.1
65.1
45.8
45.7
31.0
31.0
28.0
27.9
23.0
22.9
H
B
O
O
CF3
3i
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10
f1 (ppm)


-64.93
-72.62
H
B
O
O
CF3
3i
10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210
f1 (ppm)



4,4,5,5-tetramethyl-2-(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)-1,3,2-dioxaborolane (3j)

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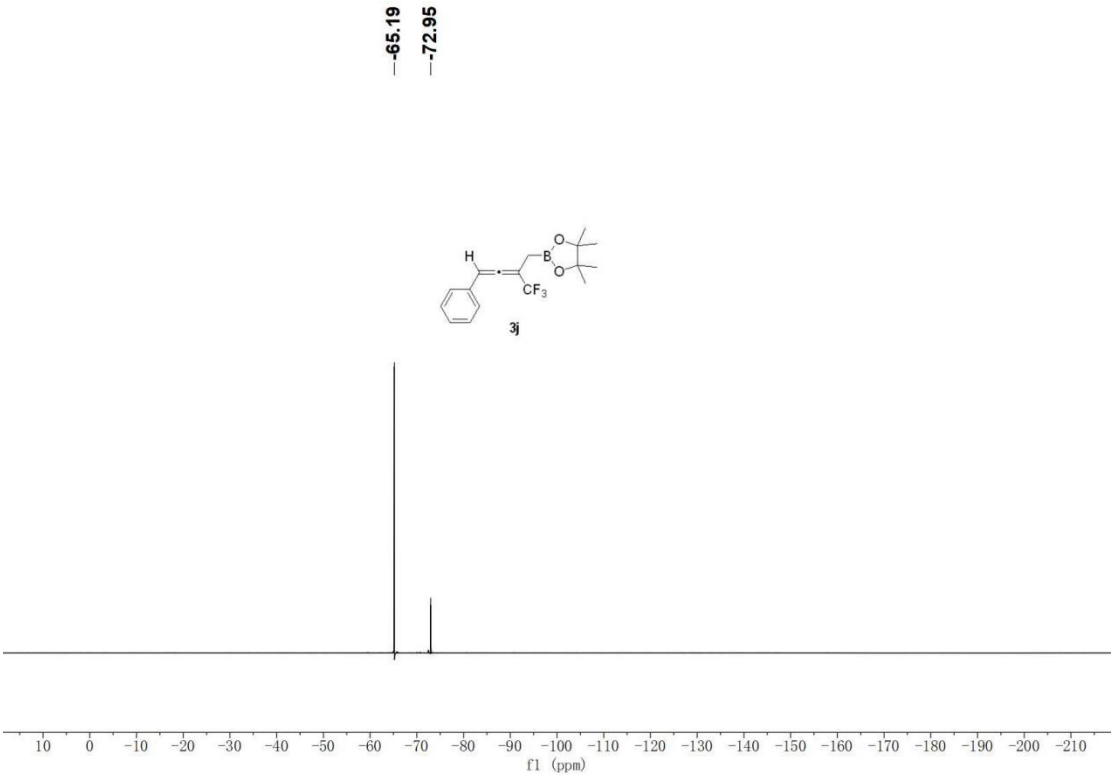
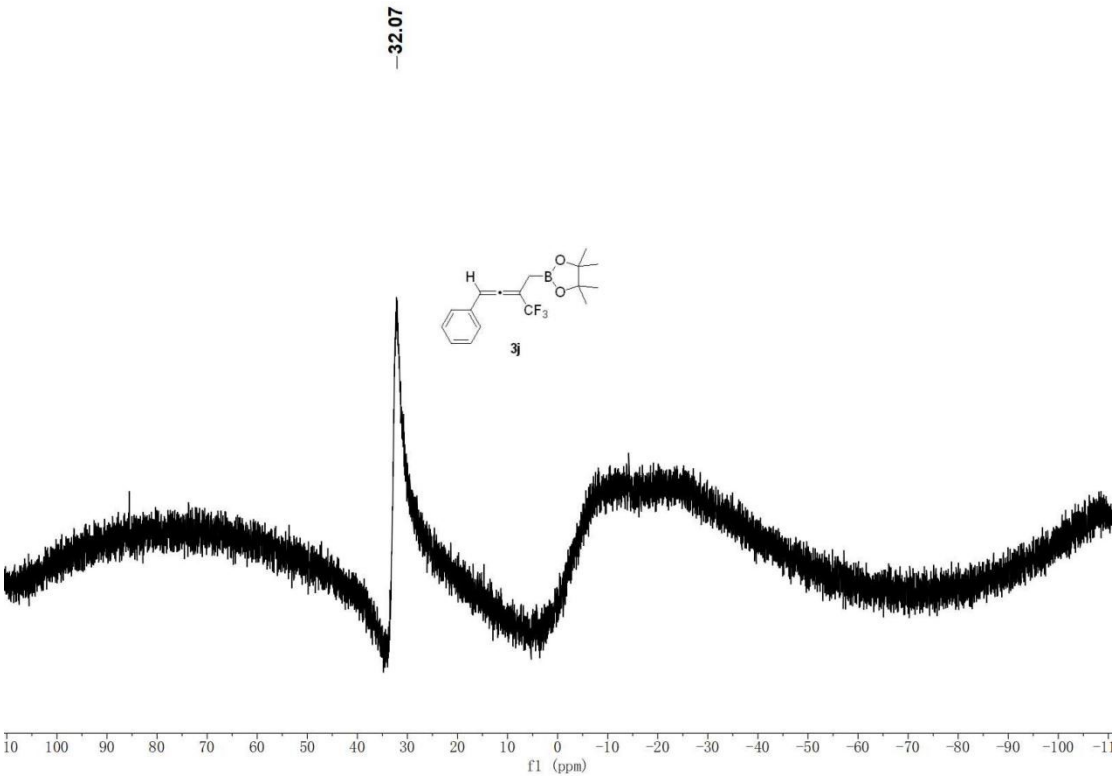
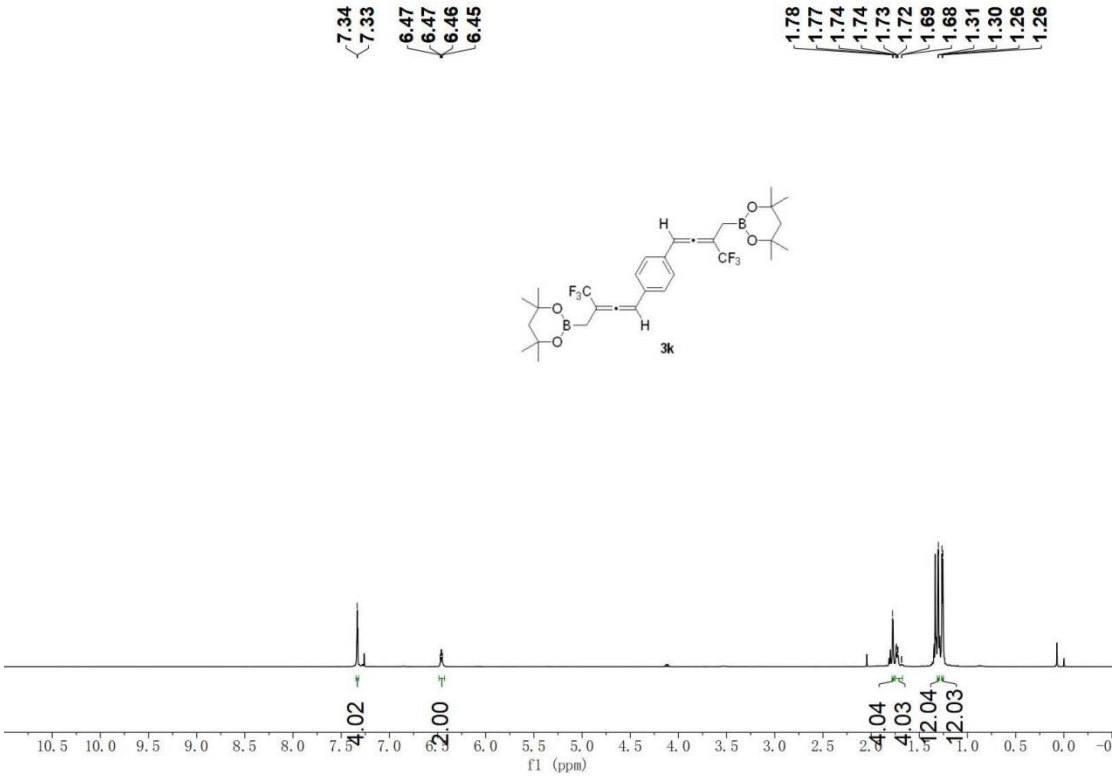
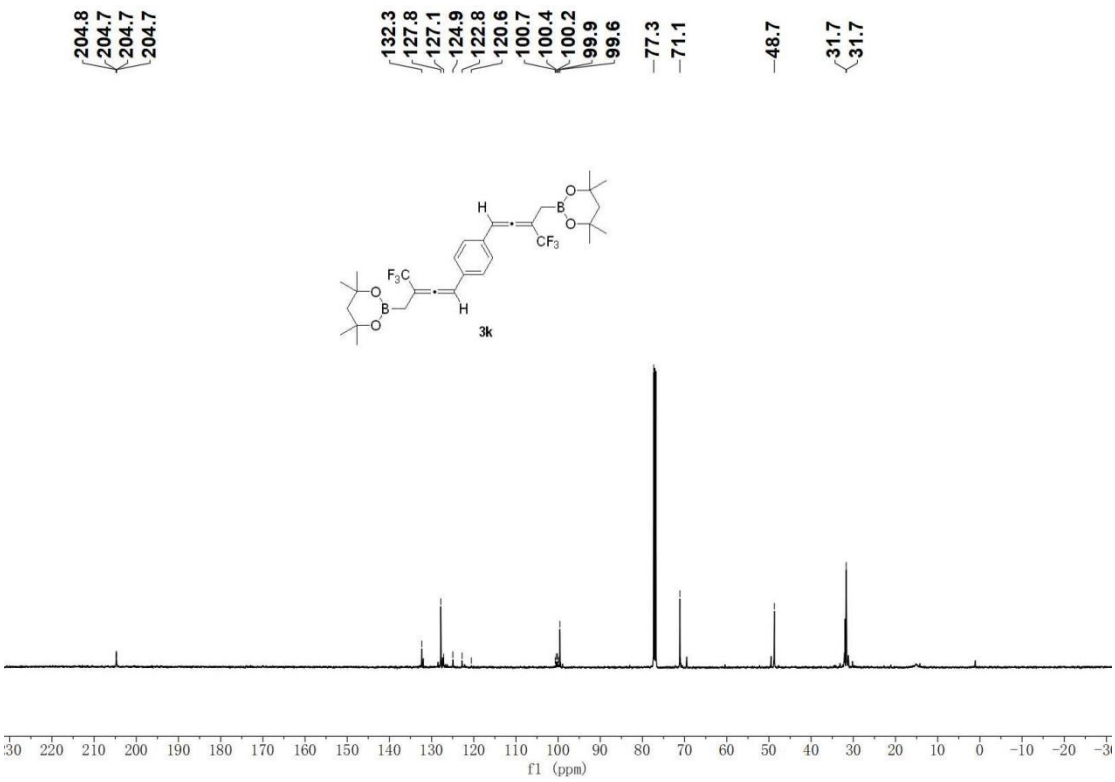
204.4
204.4
204.3
131.8
128.7
128.2
128.0
127.7
125.0
122.6
122.2
119.5
100.5
99.5
99.1
98.8
98.4
83.9
24.8
24.7
H
B
O
O
CF3
3j
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10
f1 (ppm)


-65.19
-72.95
H
B
O
O
CF3
3j
10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210
f1 (ppm)



1,4-bis(4,4,4-trifluoro-3-((4,4,6,6-tetramethyl-1,3,2-dioxaborinan-2-yl)methyl)buta-1,2-dien-1-yl)benzene(3k)




204.8
204.7
204.7
204.7
132.3
127.8
127.1
124.9
122.8
120.6
100.7
100.4
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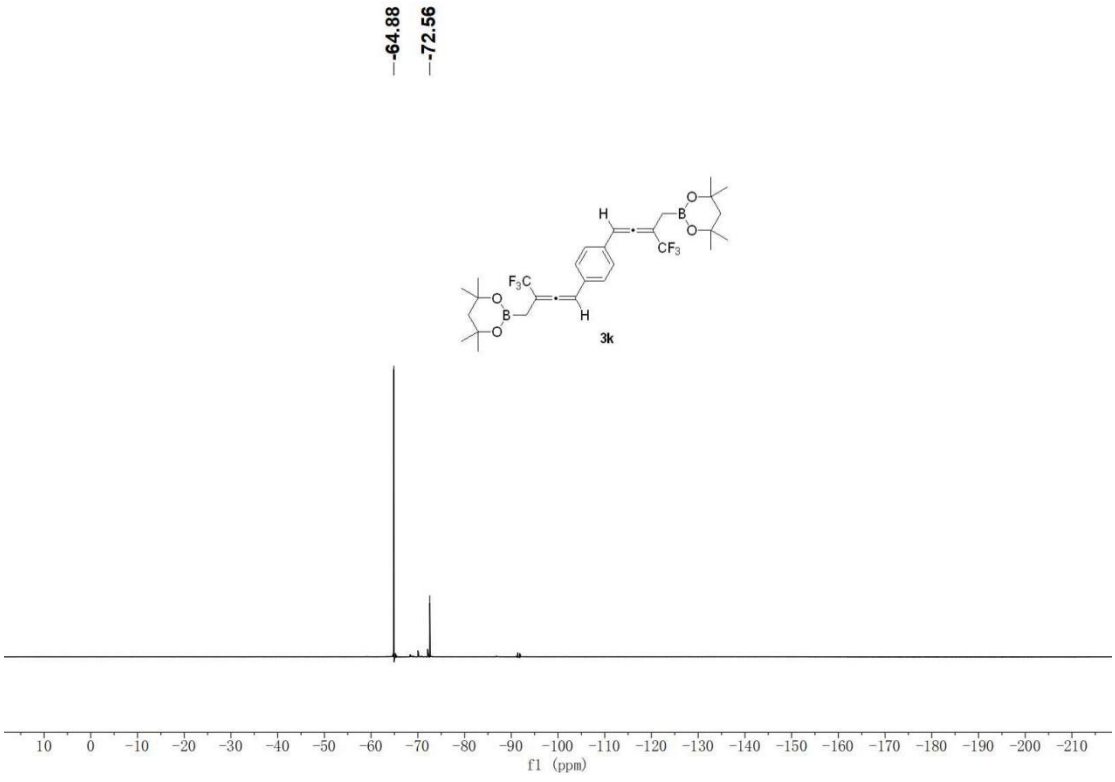
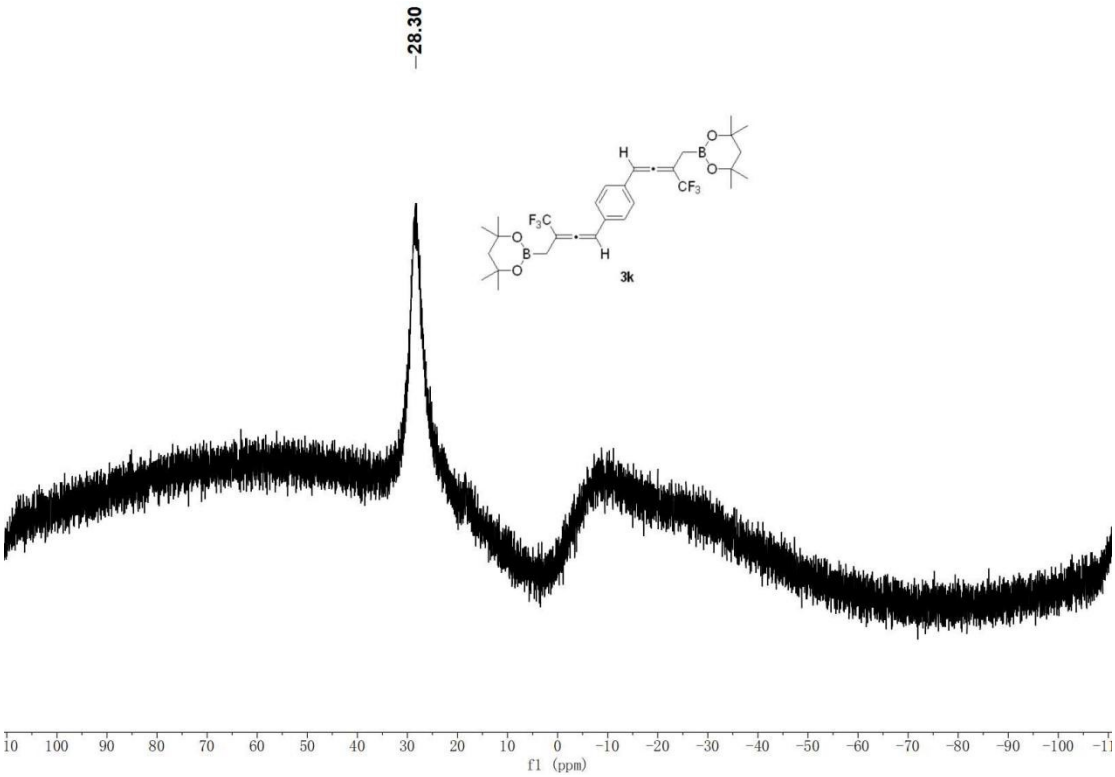
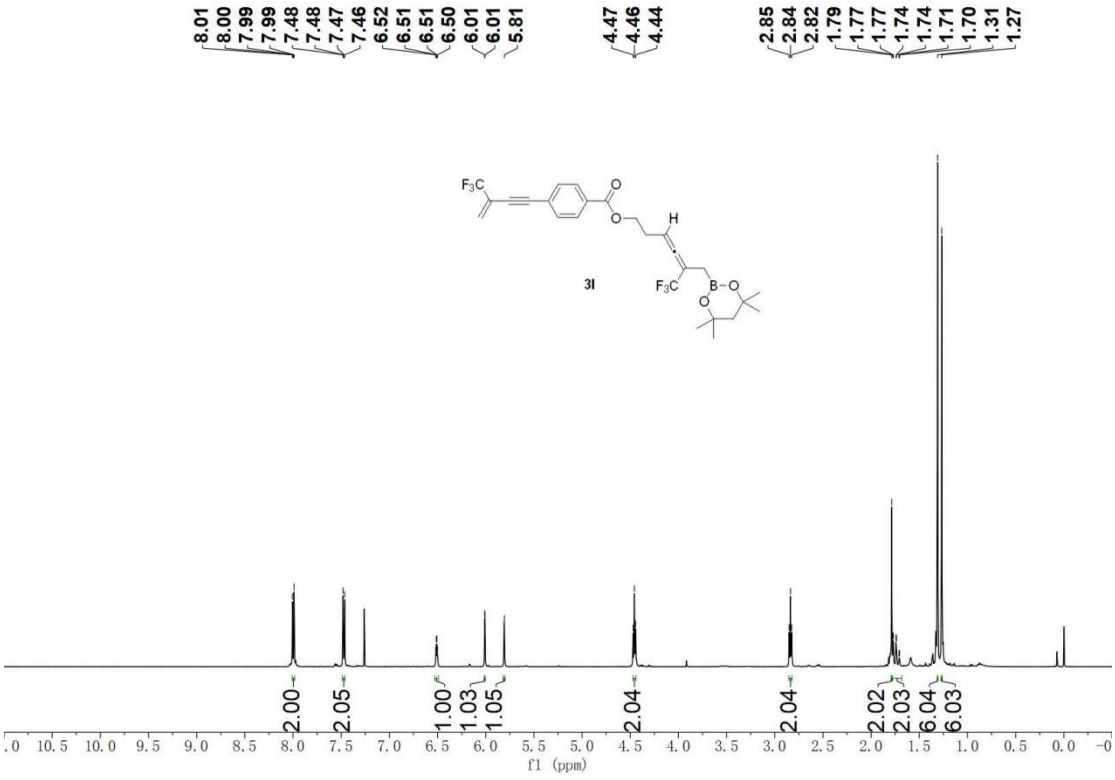
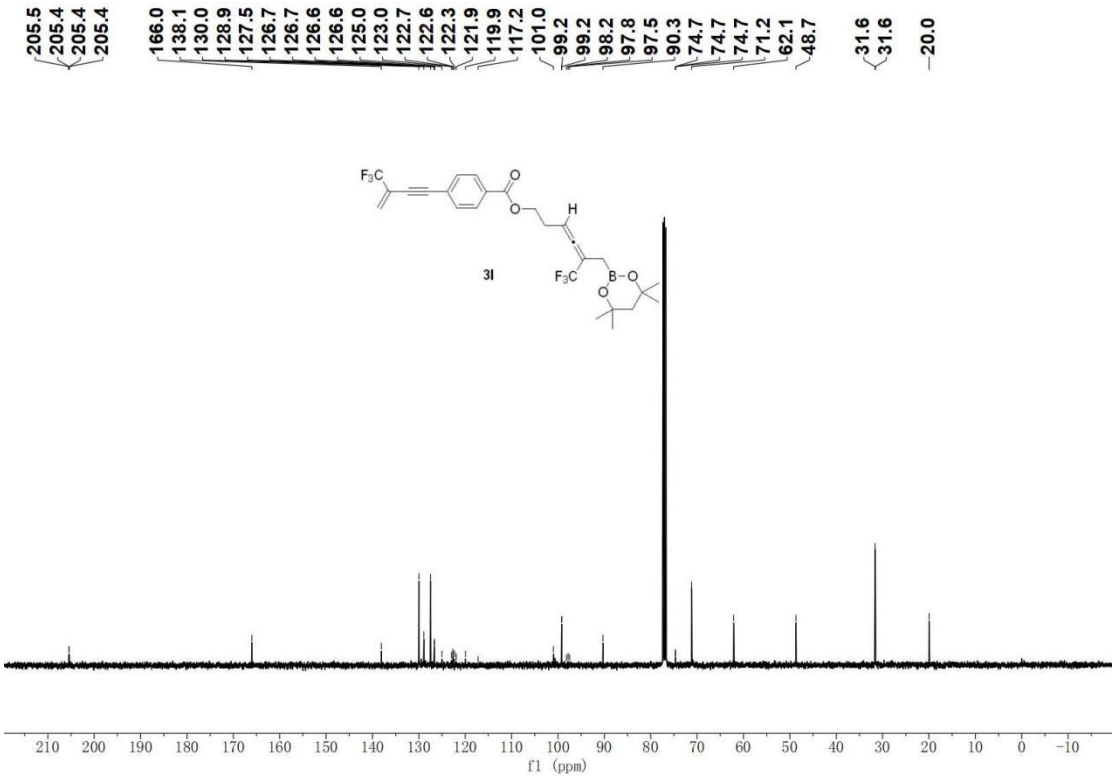
99.9
99.6
77.3
71.1
48.7
31.7
31.7
3k
f1 (ppm)


-64.88
-72.56
3k
f1 (ppm)



6,6,6-trifluoro-5-((4,4,6,6-tetramethyl-1,3,2-dioxaborinan-2-yl)methyl)hexa-3,4-dien-1-yl 4-(3-(trifluoromethyl)but-3-en-1-yn-1-yl)benzoate(3l)

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205.4
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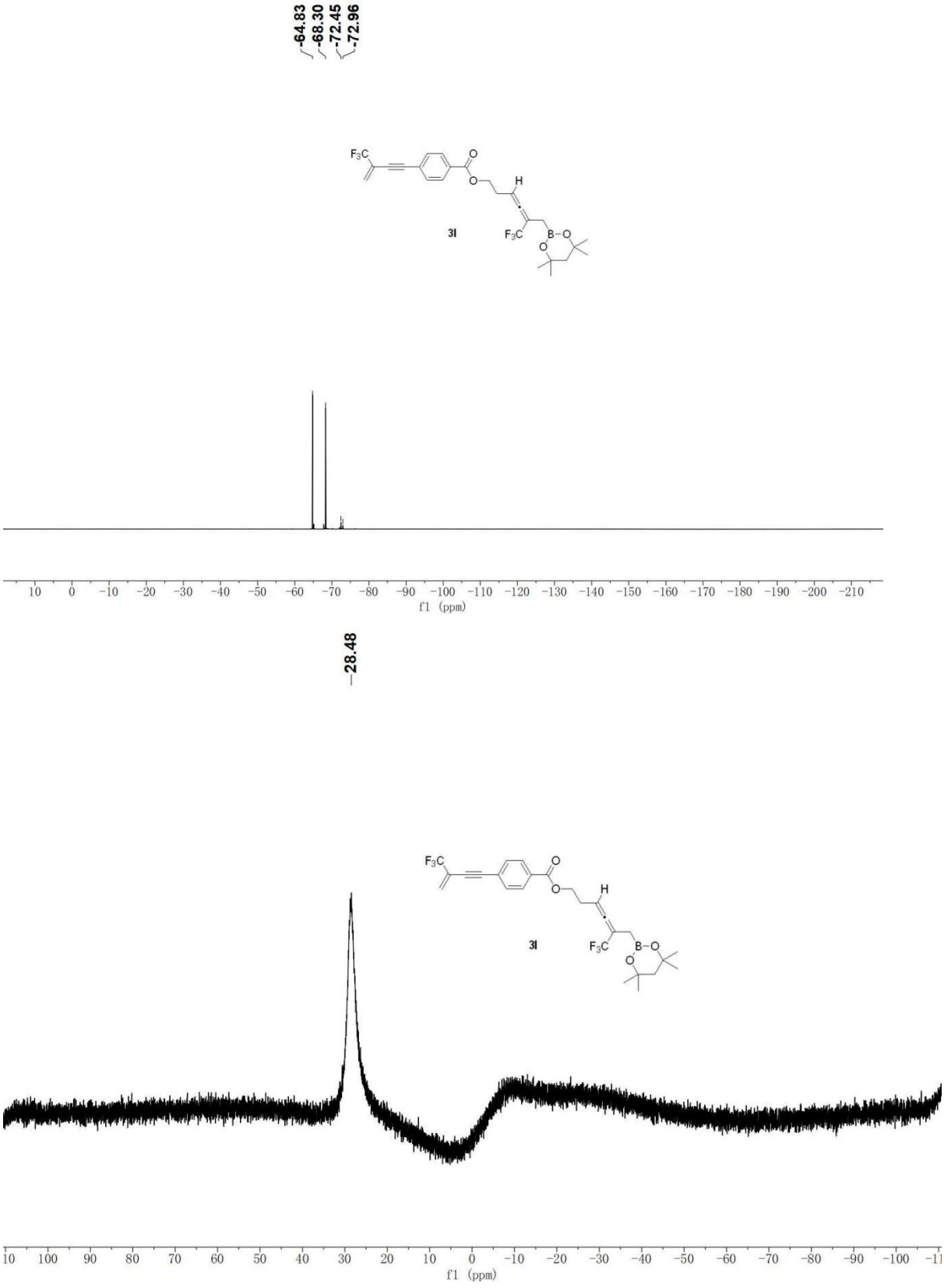
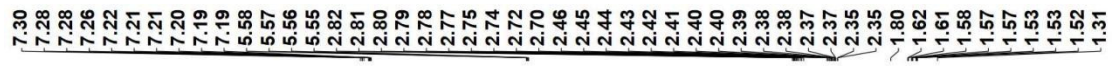
130.0
128.9
127.5
126.7
126.7
126.6
126.6
125.0
123.0
122.7
122.6
122.3
121.9
119.9
117.2
101.0
99.2
99.2
98.2
97.8
97.5
90.3
74.7
74.7
74.7
71.2
62.1
48.7
31.6
31.6
20.0
F3C
O
O
H
3l
F3C
B-O
O
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



4,4,6,6-tetramethyl-2-(6-phenyl-2-(trifluoromethyl)hexa-2,3-dien-1-yl)-1,3,2-dioxaborinane(3m)


7.30
7.28
7.28
7.26
7.22
7.21
7.21
7.20
7.19
7.19
5.58
5.57
5.56
5.55
2.82
2.81
2.80
2.79
2.78
2.77
2.75
2.74
2.72
2.70
2.46
2.45
2.44
2.43
2.42
2.41
2.40
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2.39
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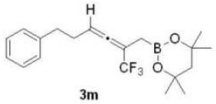
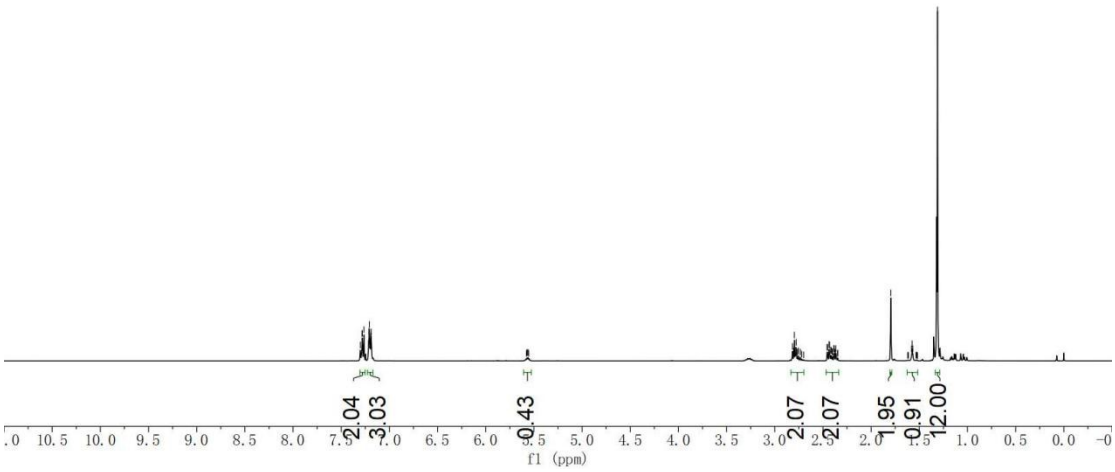
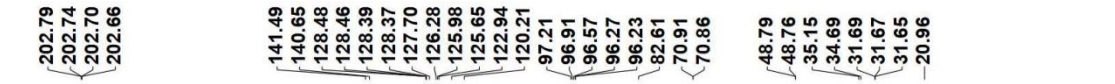
1.57
1.57
1.53
1.53
1.52
1.31


H
B
O
O
CF3

3m


2.04
3.03
0.43
2.07
2.07
1.95
0.91
12.00
f1 (ppm)


202.79
202.74
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202.66
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128.46
128.39
128.37
127.70
126.28
125.98
125.65
122.94
120.21
97.21
96.91
96.57
96.27
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34.69
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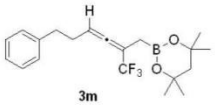
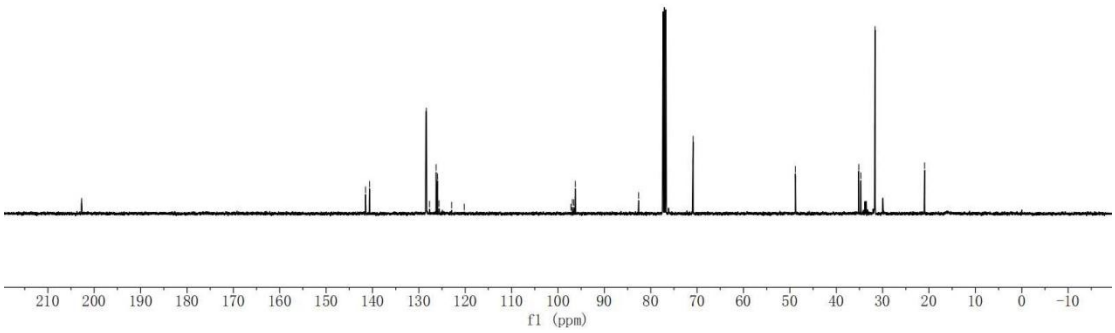
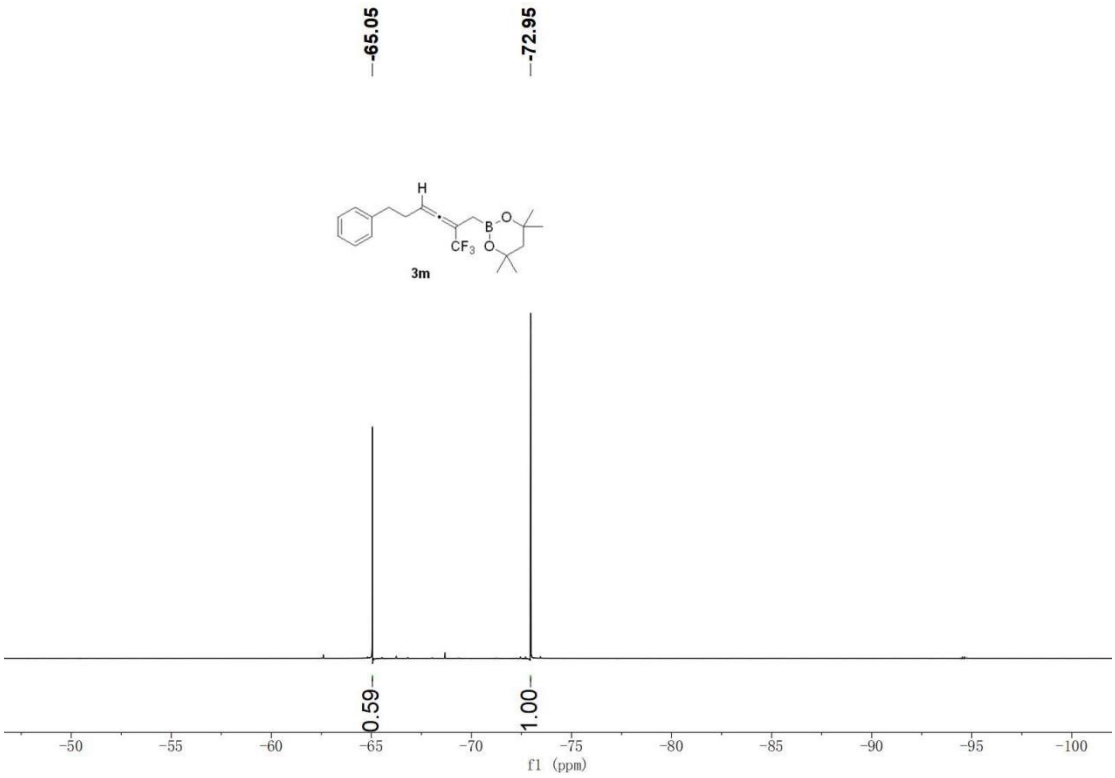
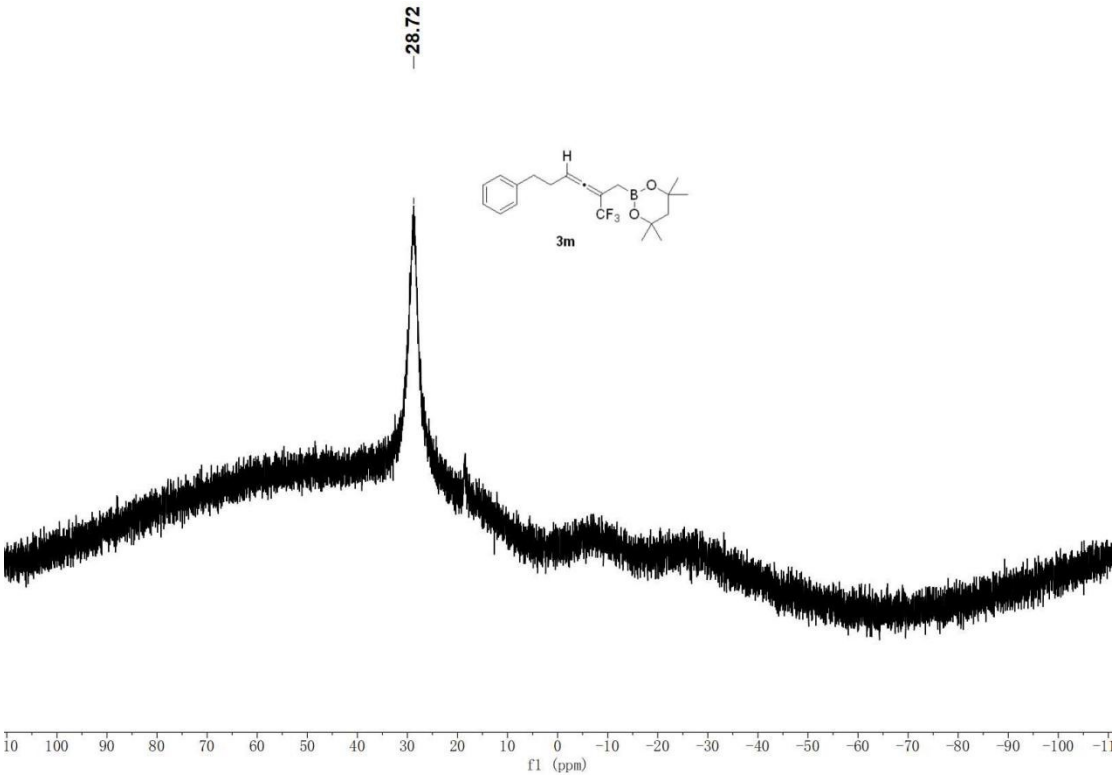
31.67
31.65
20.96


H
B
O
O
CF3

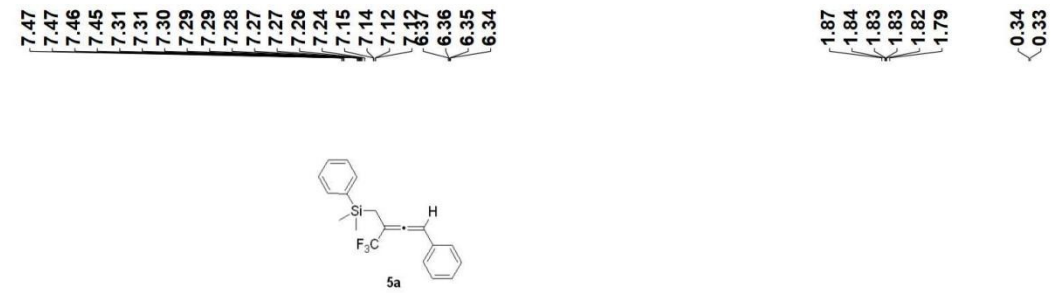
3m


f1 (ppm)



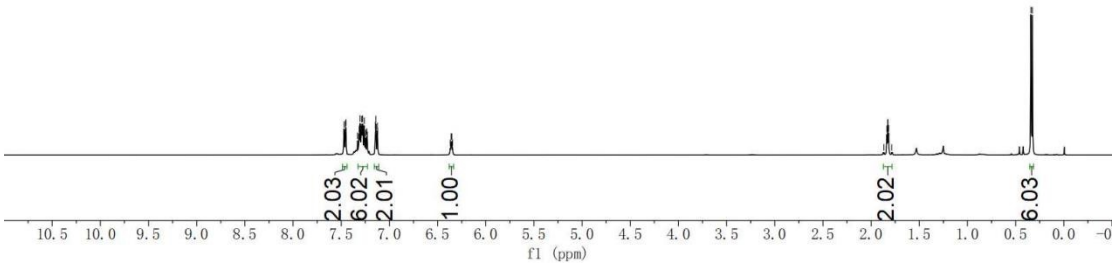


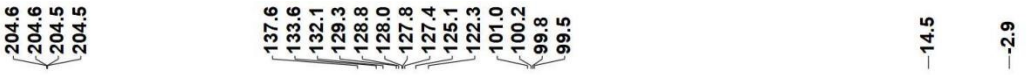
Dimethyl(phenyl)(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)silane(5a)

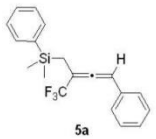

7.47
7.47
7.46
7.45
7.31
7.31
7.30
7.29
7.29
7.28
7.27
7.27
7.26
7.24
7.15
7.14
7.12
6.37
6.36
6.35
6.34
1.87
1.84
1.83
1.83
1.82
1.79
0.34
0.33

Si
H
F3C

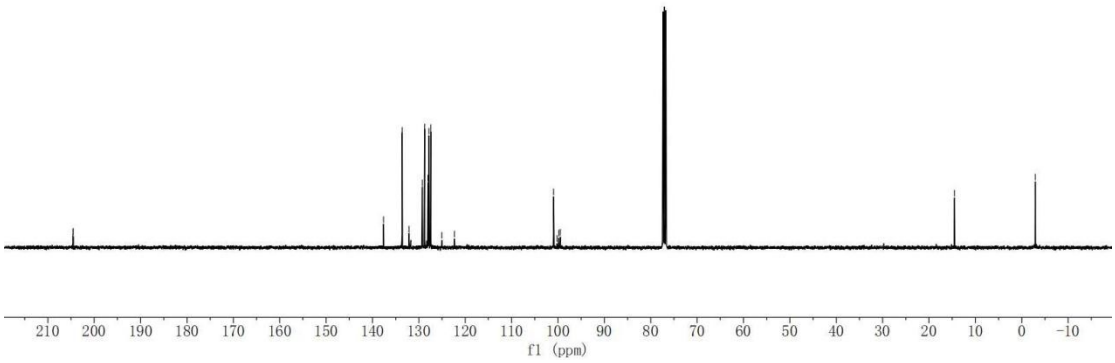
5a

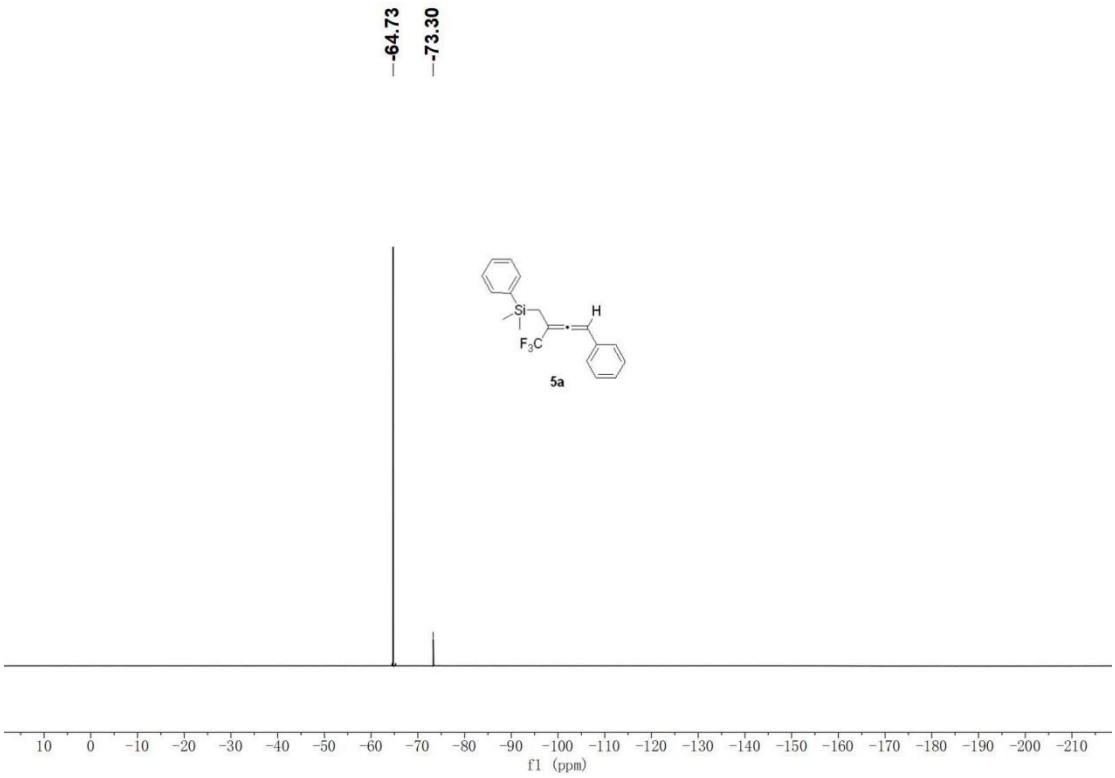

2.03
6.02
2.01
1.00
2.02
6.03
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 −0
f1 (ppm)


204.6
204.6
204.5
204.5
137.6
133.6
132.1
129.3
128.8
128.0
127.8
127.4
125.1
122.3
101.0
100.2
99.8
99.5
14.5
-2.9

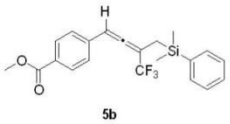

Si
H
F3C

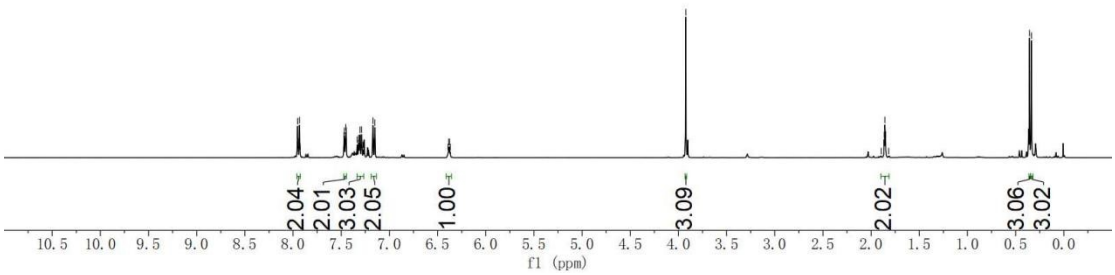
5a

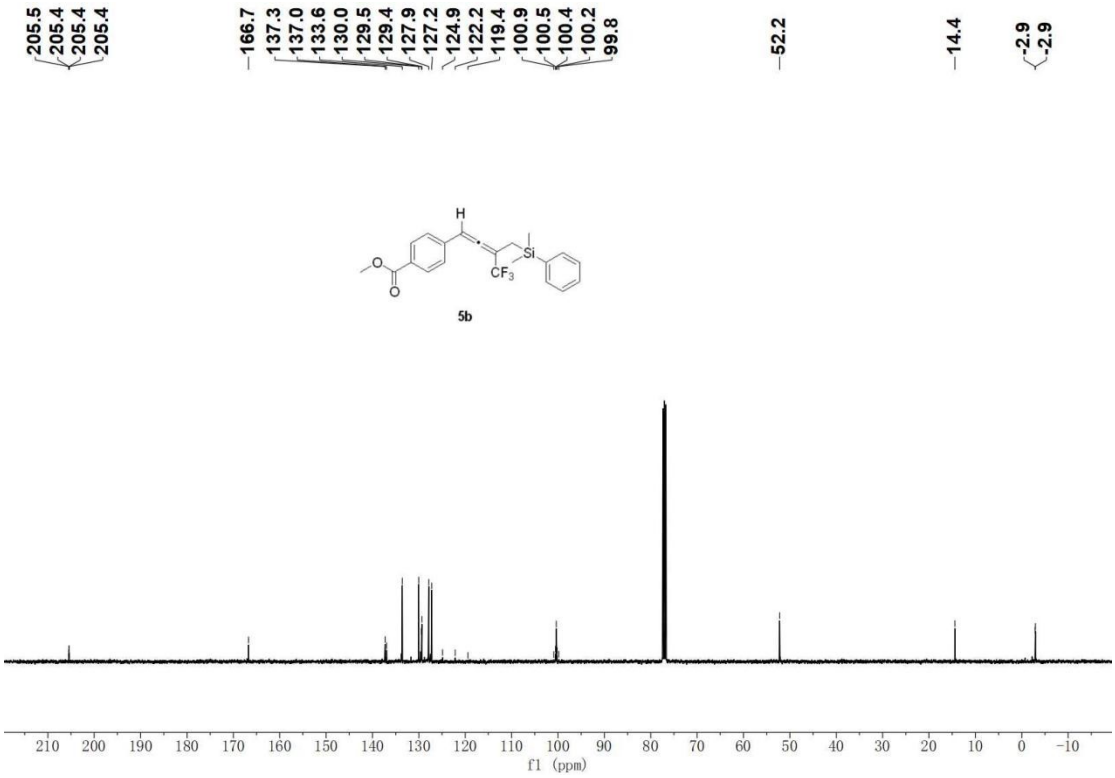

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10
f1 (ppm)

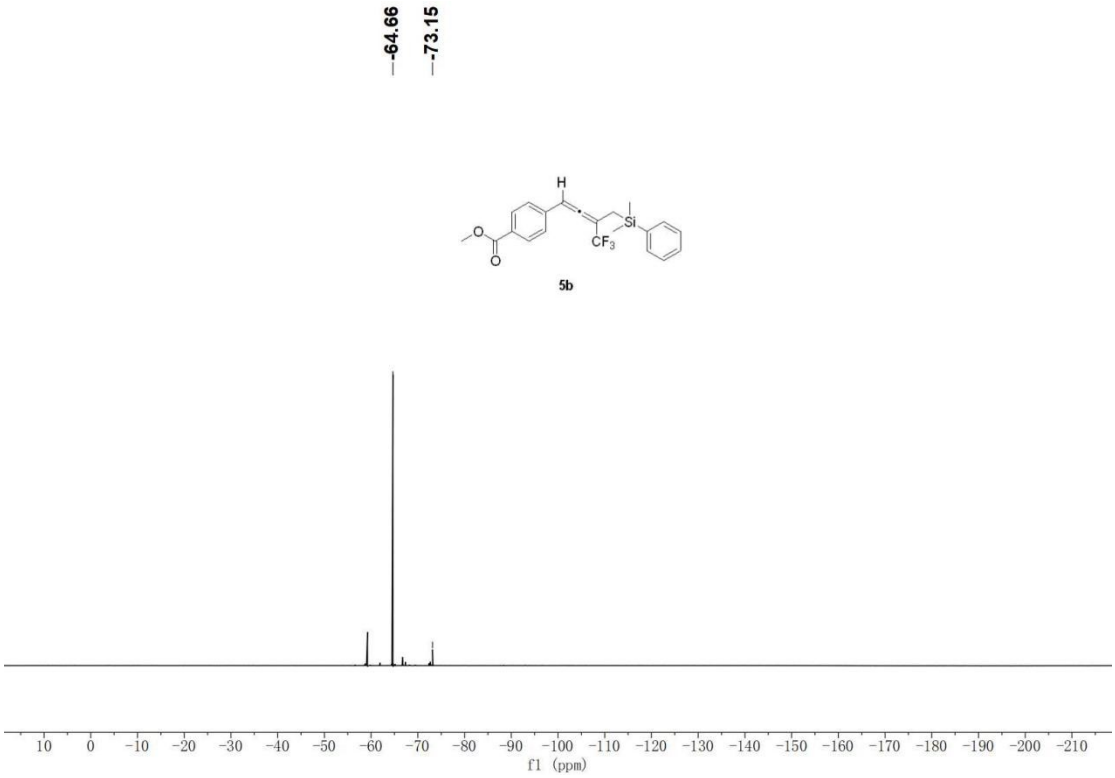


Methyl 4-(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-yl)benzoate(5b)

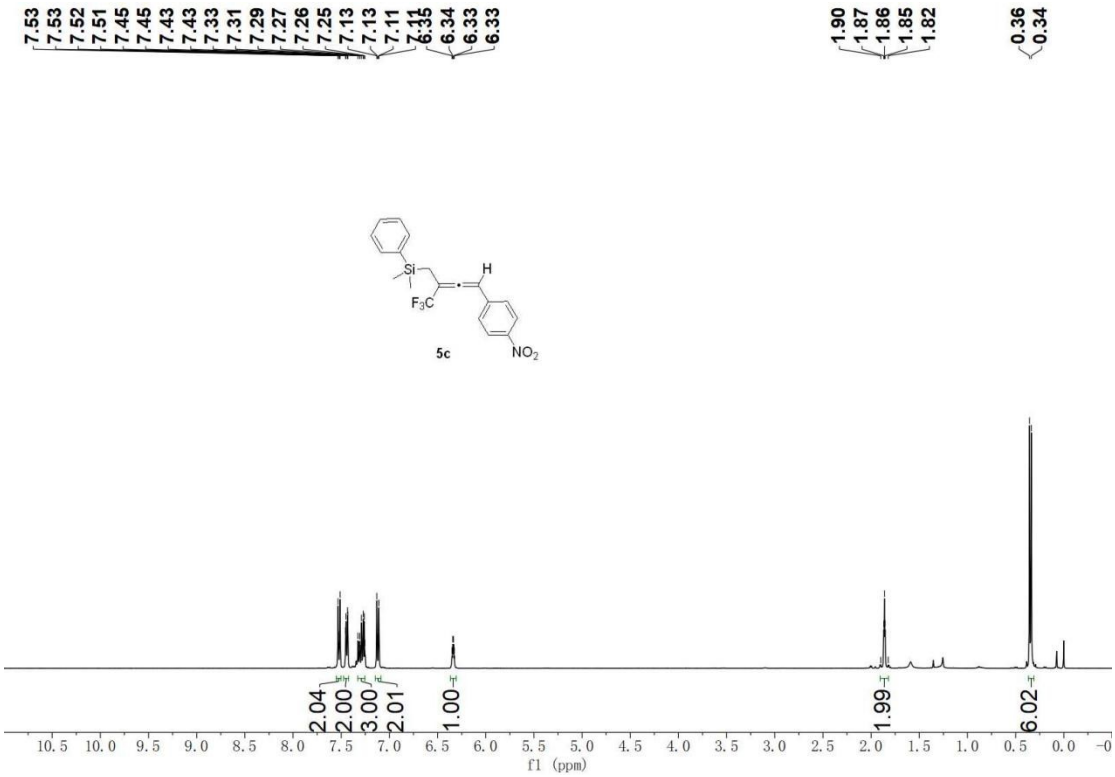


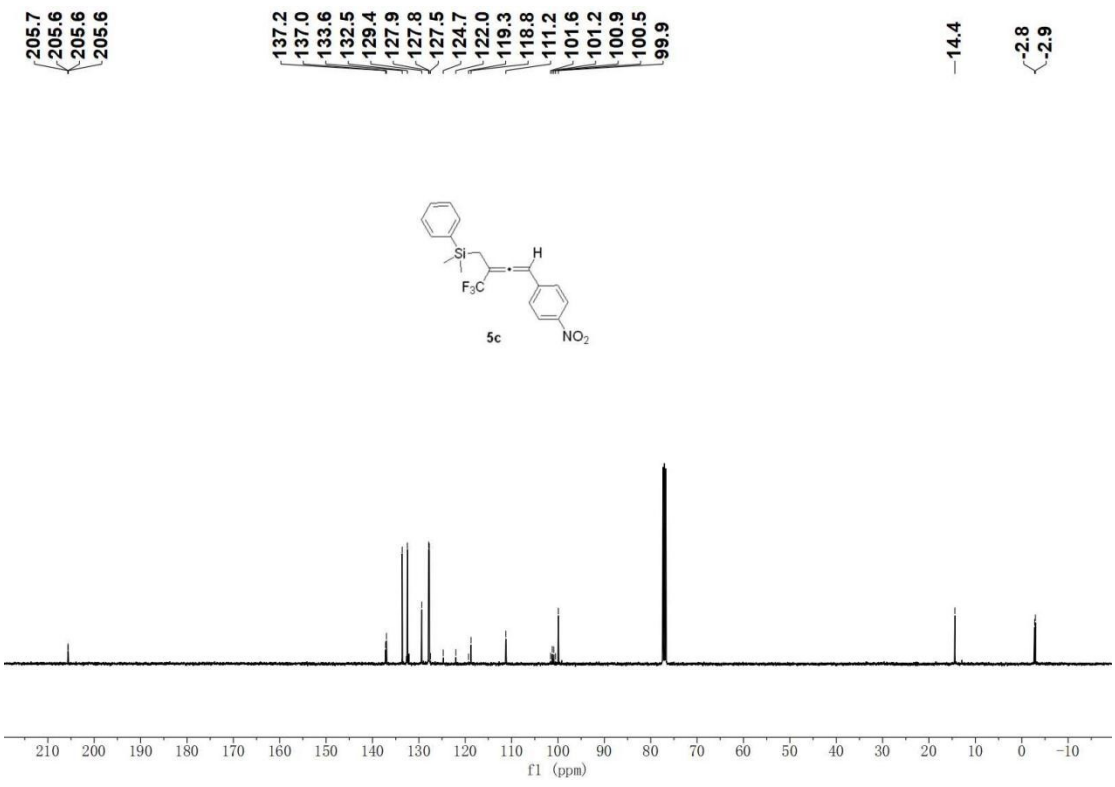


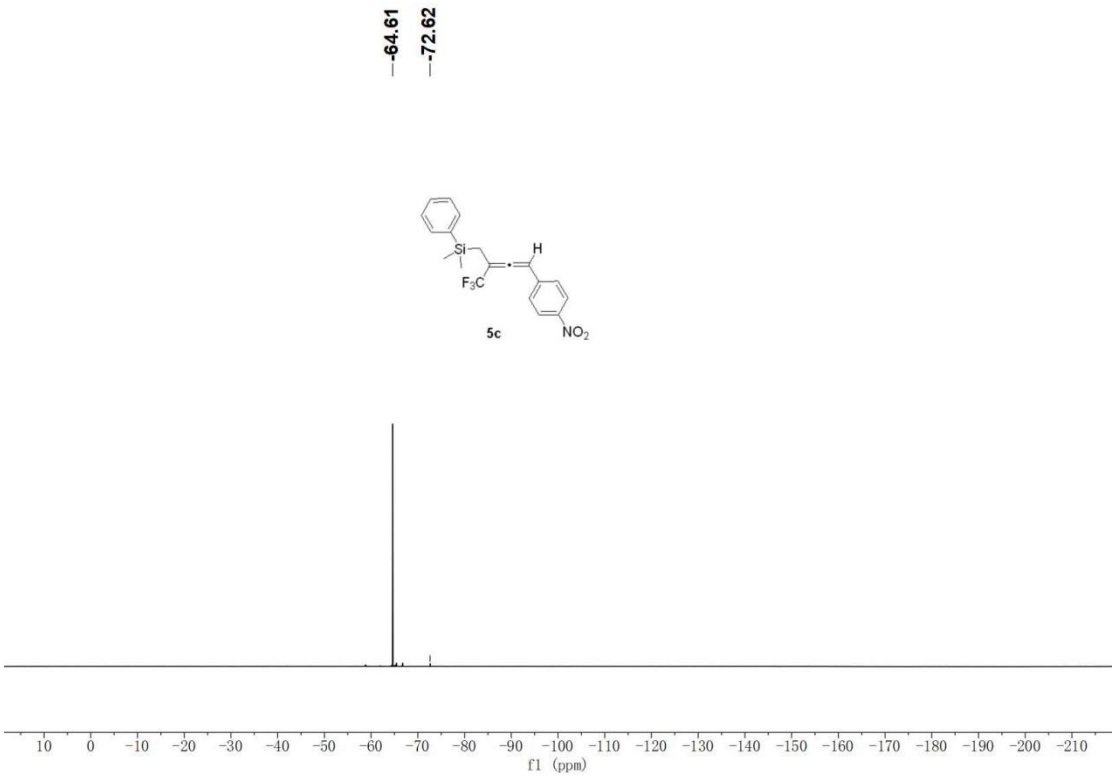




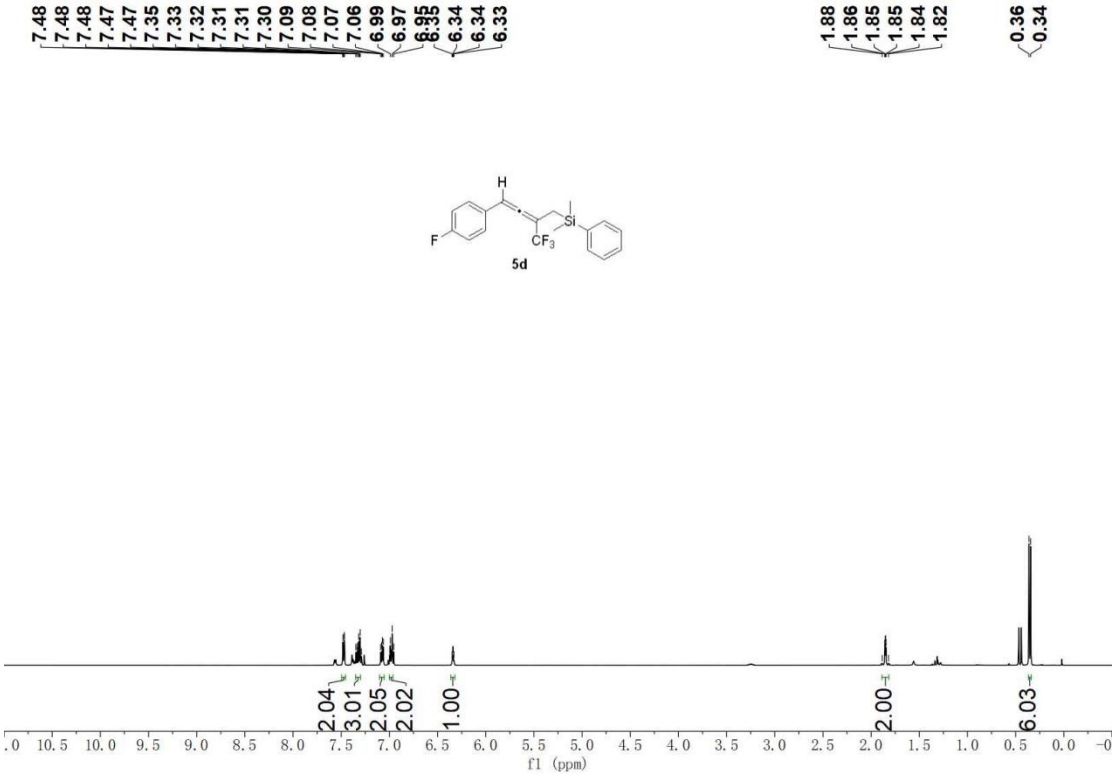
Dimethyl(4-(4-nitrophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)(phenyl)silane (5c)

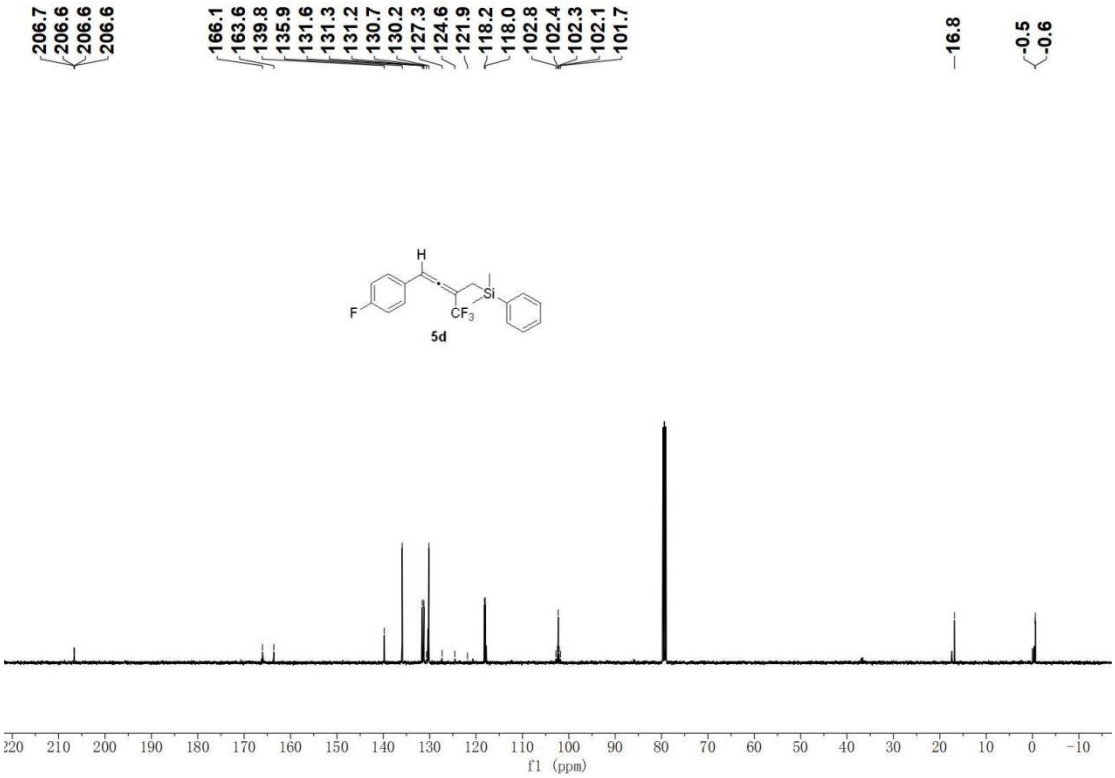

7.53
7.53
7.52
7.51
7.45
7.45
7.43
7.43
7.33
7.31
7.29
7.27
7.26
7.25
7.13
7.13
7.11
6.35
6.34
6.33
6.33
1.90
1.87
1.86
1.85
1.82
0.36
0.34
Si
H
F3C
NO2
5c
2.04
2.00
3.00
2.01
1.00
1.99
6.02
f1 (ppm)

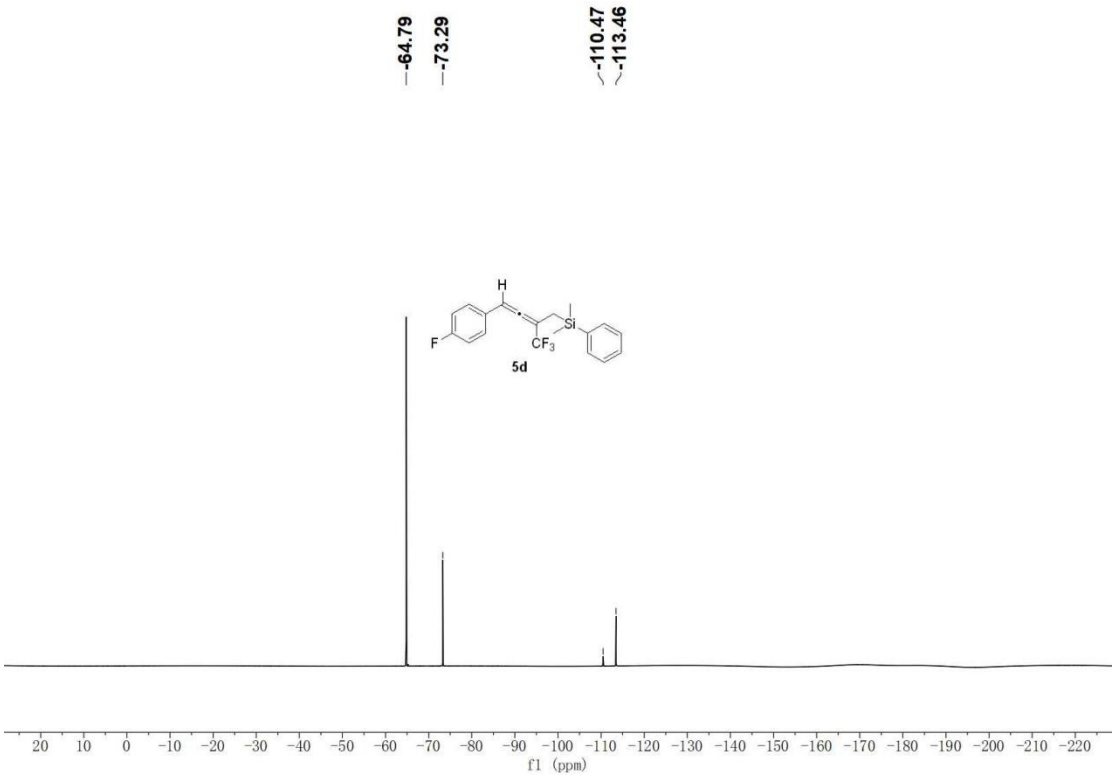

205.7
205.6
205.6
205.6
137.2
137.0
133.6
132.5
129.4
127.9
127.8
127.5
124.7
122.0
119.3
118.8
111.2
101.6
101.2
100.9
100.5
99.9
14.4
2.8
2.9
Si
H
F3C
NO2
5c
f1 (ppm)



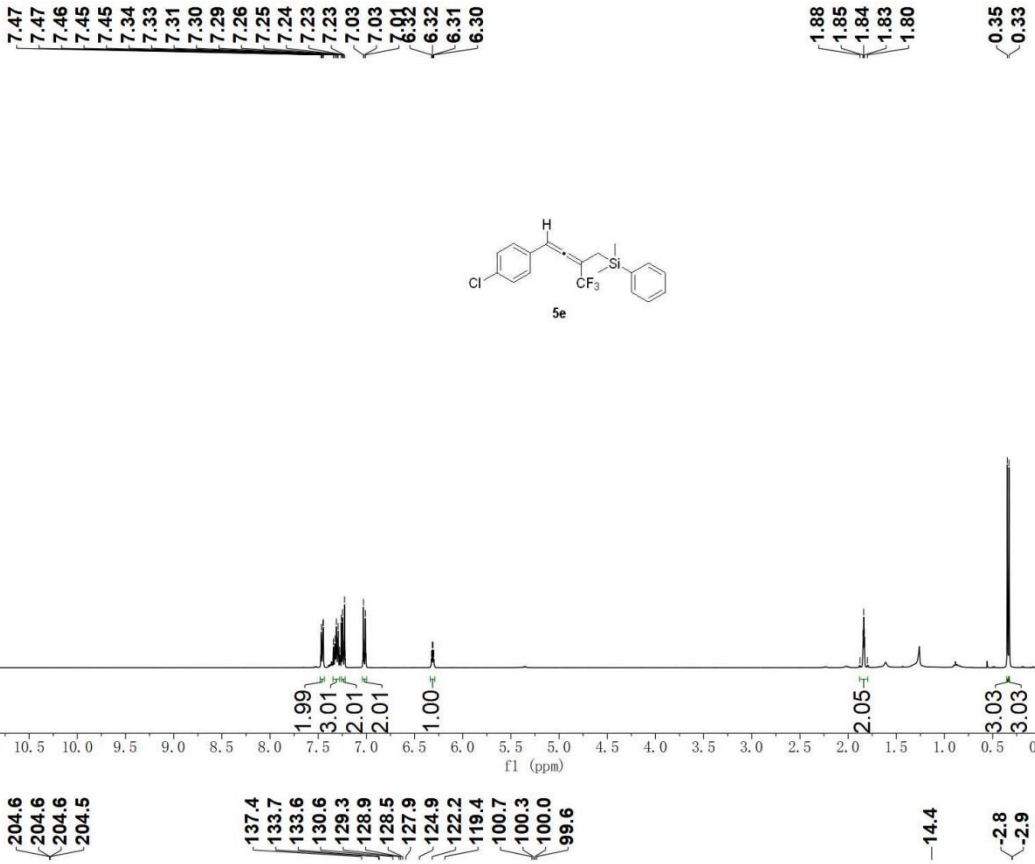
(4-(4-fluorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane(5d)







(4-(4-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane(5e)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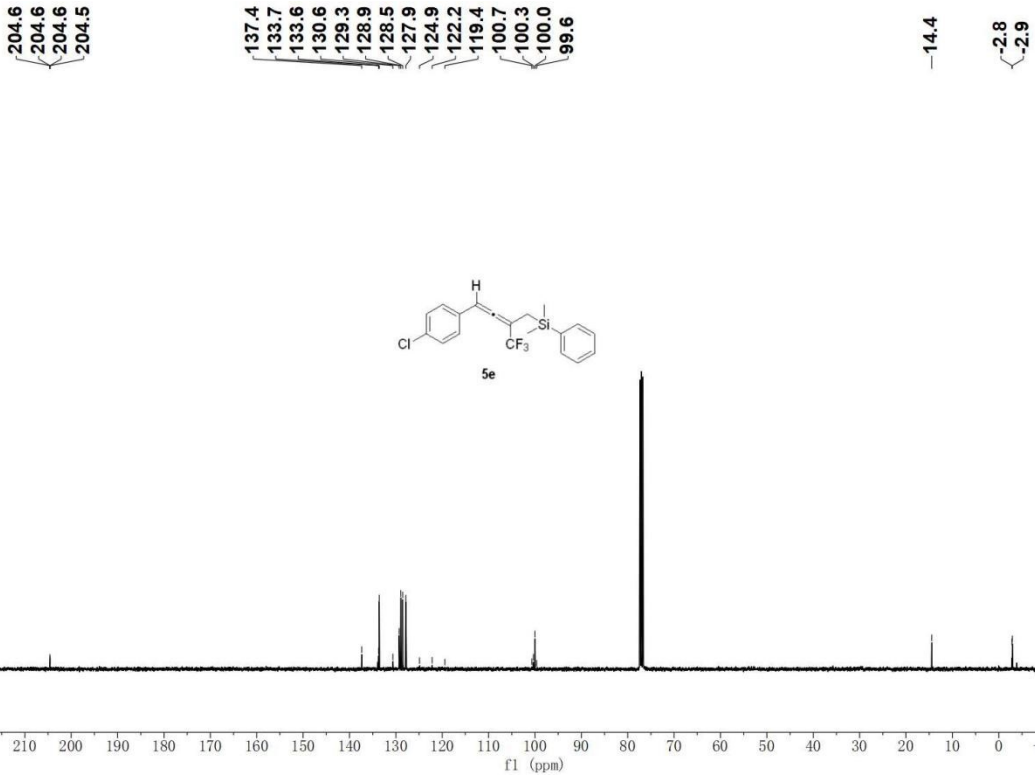
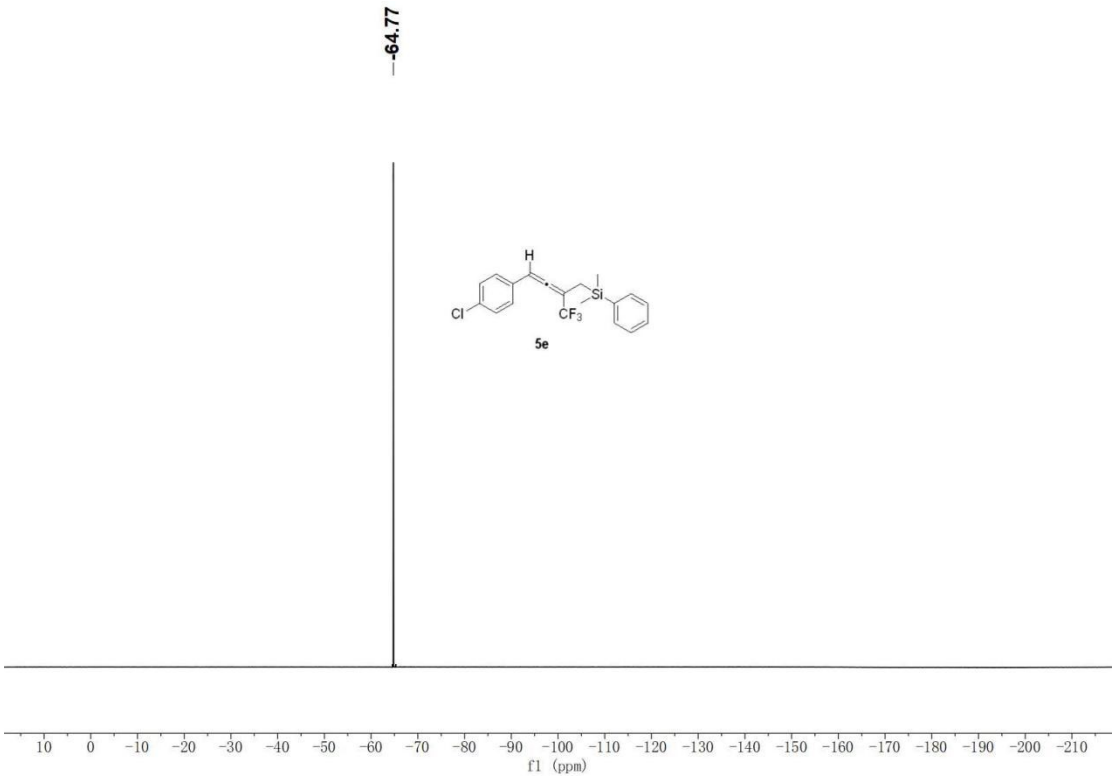
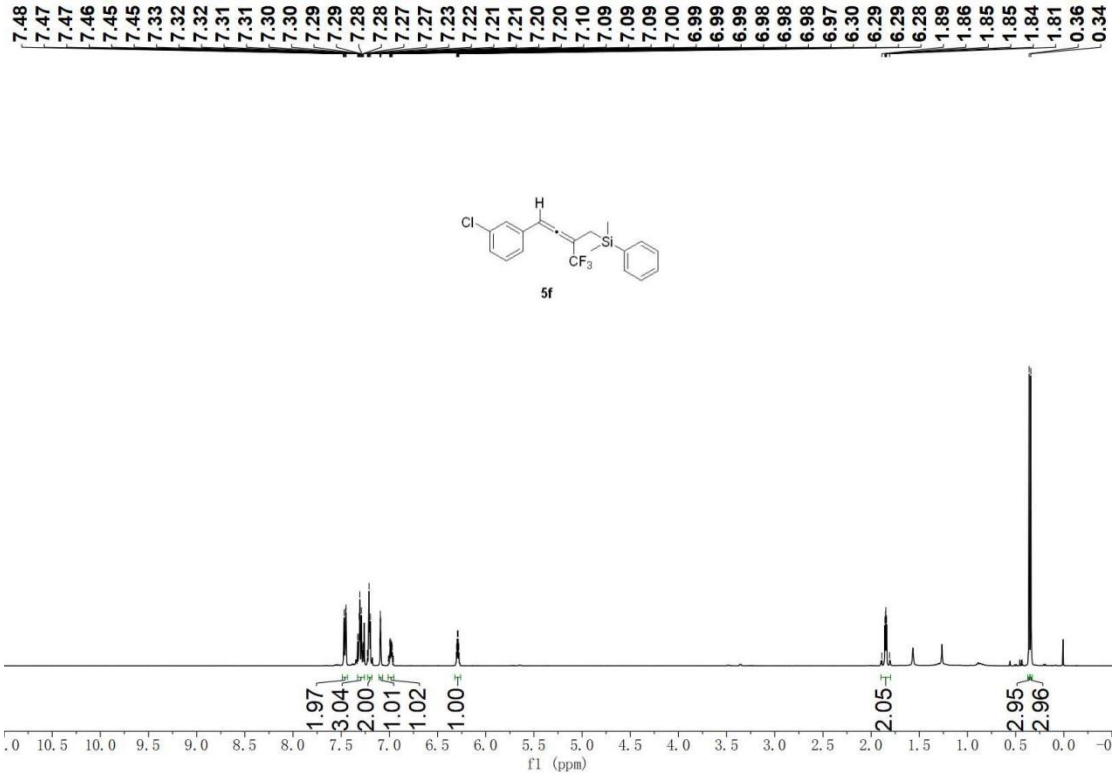
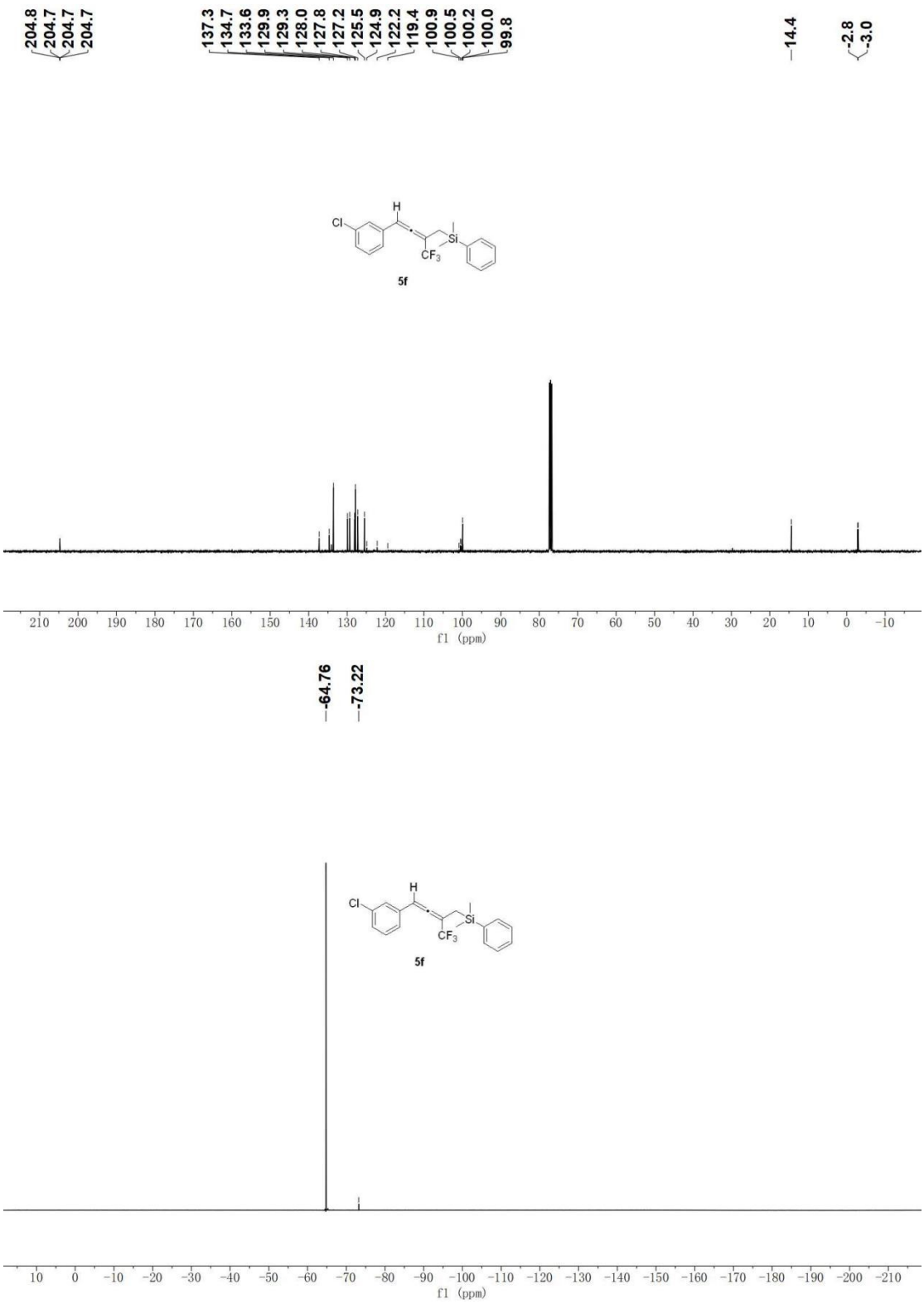
7.47
7.46
7.45
7.45
7.34
7.33
7.31
7.30
7.29
7.26
7.25
7.24
7.23
7.23
7.03
7.03
7.01
6.32
6.31
6.30
1.88
1.85
1.84
1.83
1.80
0.35
0.33
H
Cl
CF3
Si
5e
1.99
3.01
2.01
2.01
1.00
2.05
3.03
3.03
f1 (ppm)


204.6
204.6
204.6
204.5
137.4
133.7
133.6
130.6
129.3
128.9
128.5
127.9
124.9
122.2
119.4
100.7
100.3
100.0
99.6
-14.4
-2.8
-2.9
H
Cl
CF3
Si
5e
f1 (ppm)

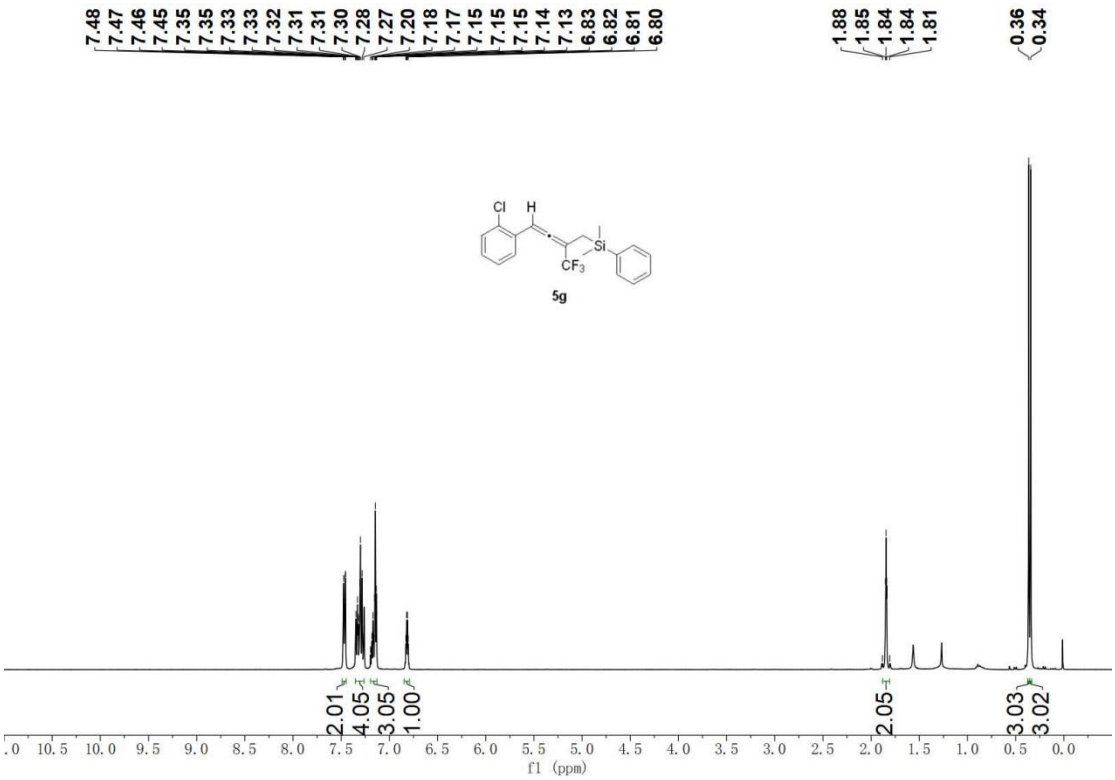


(4-(3-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane(5f)





(4-(2-chlorophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane(5g)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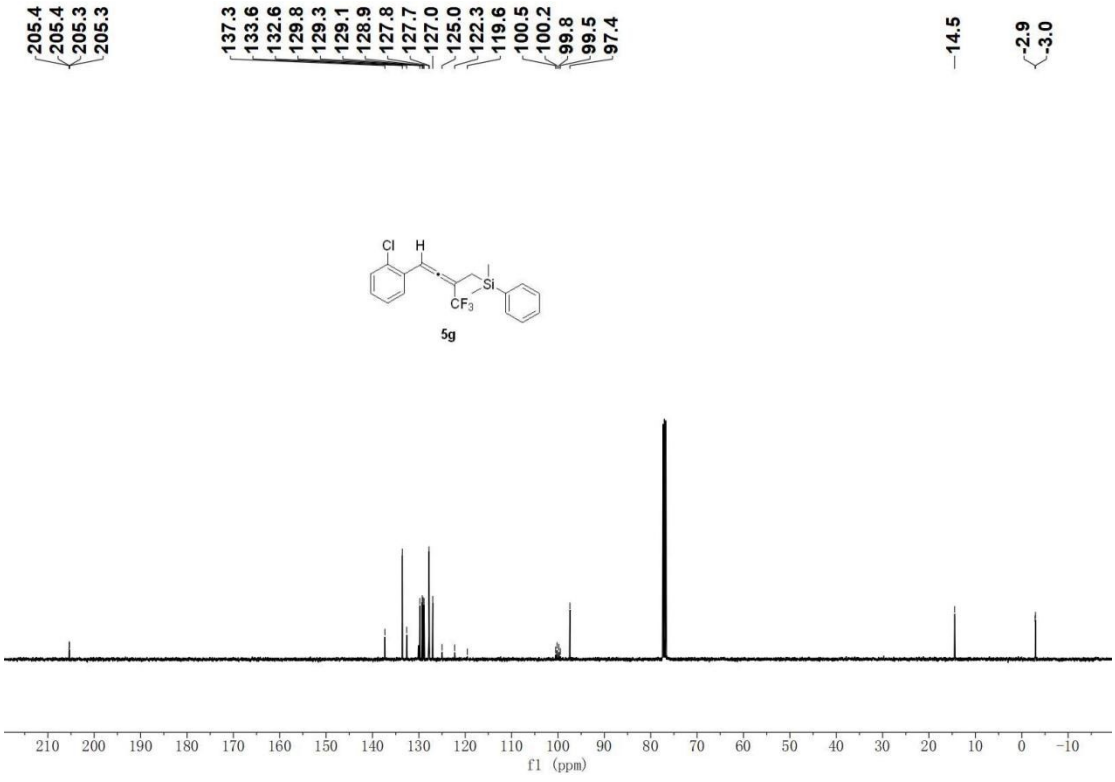
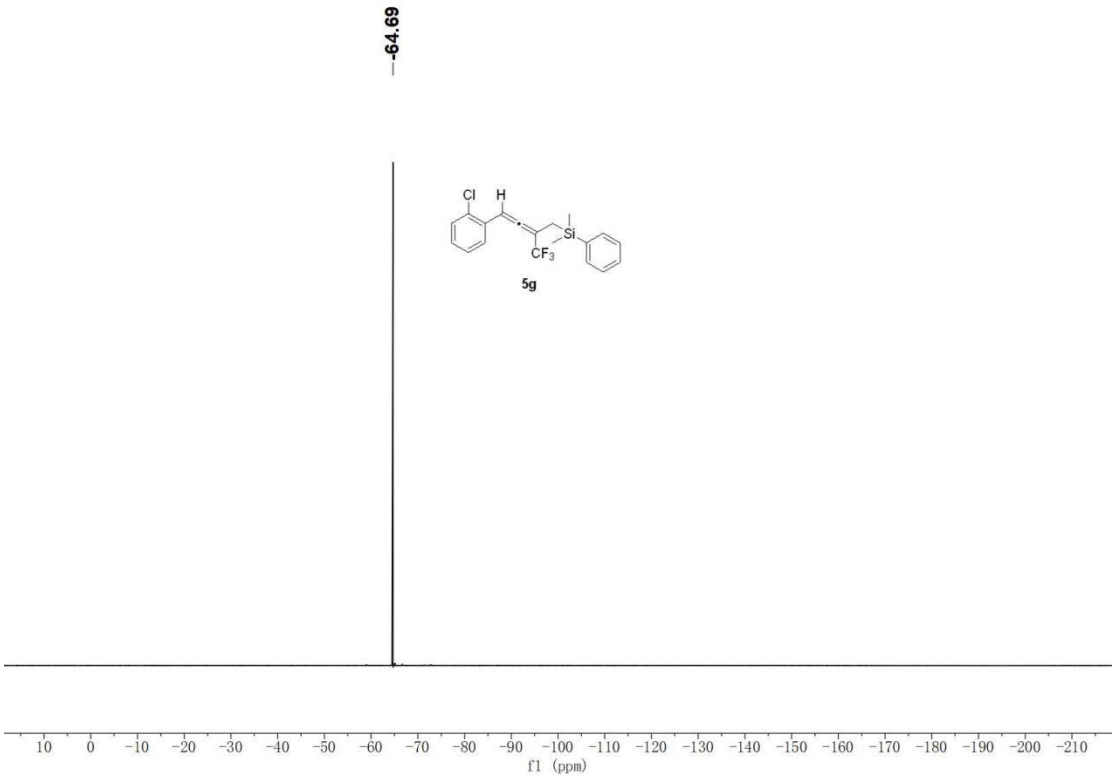
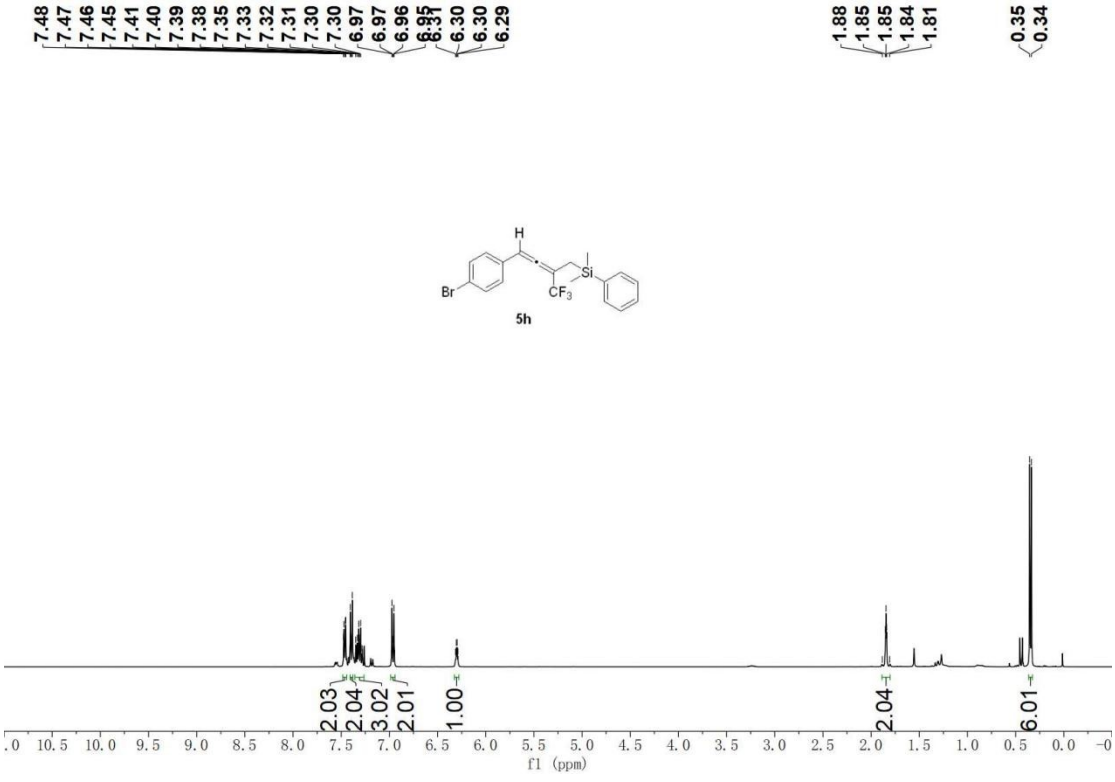
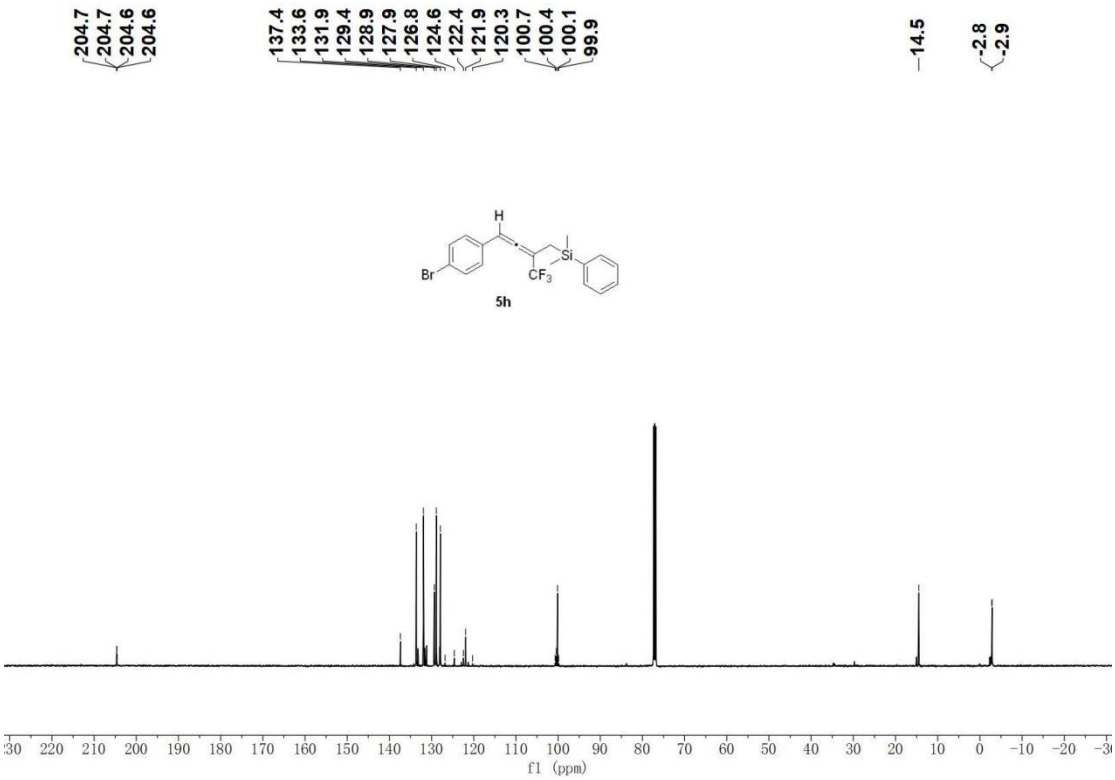
7.35
7.33
7.33
7.32
7.31
7.31
7.30
7.28
7.27
7.20
7.18
7.17
7.15
7.15
7.14
7.13
6.83
6.82
6.81
6.80
1.88
1.85
1.84
1.84
1.81
0.36
0.34
Cl
H
Si
CF3
5g
2.01
4.05
3.05
1.00
2.05
3.03
3.02
f1 (ppm)

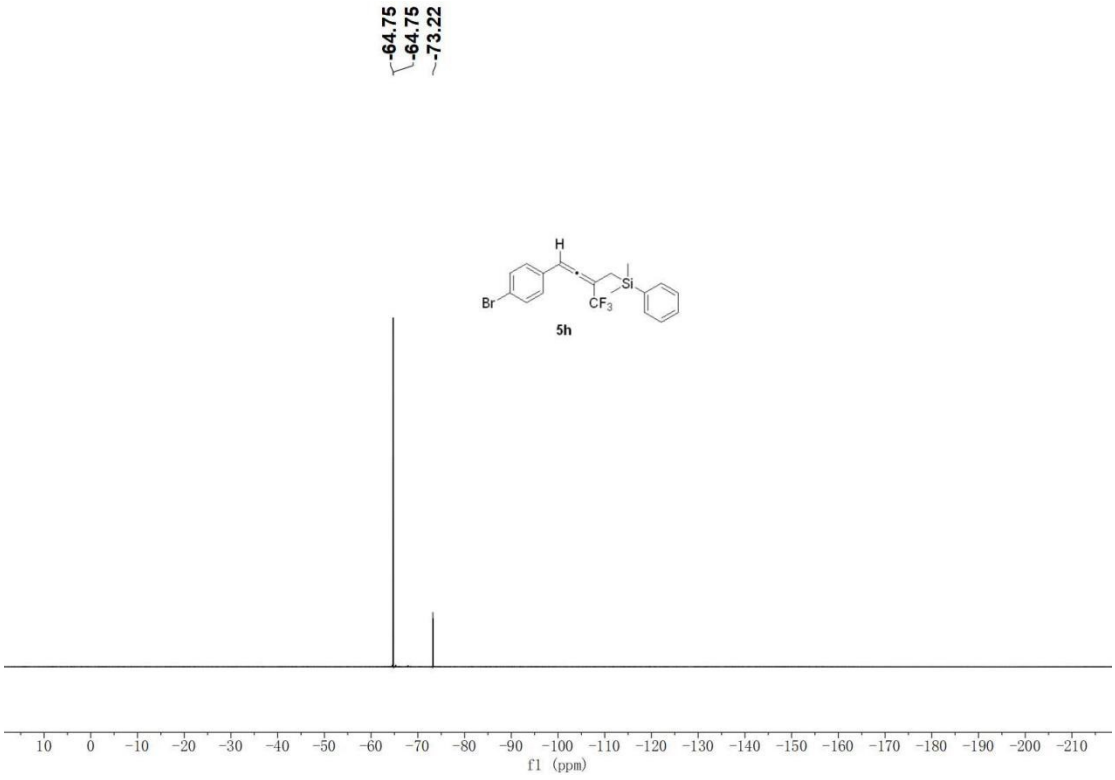

205.4
205.4
205.3
205.3
137.3
133.6
132.6
129.8
129.3
129.1
128.9
127.8
127.7
127.0
125.0
122.3
119.6
100.5
100.2
99.8
99.5
97.4
14.5
2.9
-3.0
Cl
H
Si
CF3
5g
f1 (ppm)



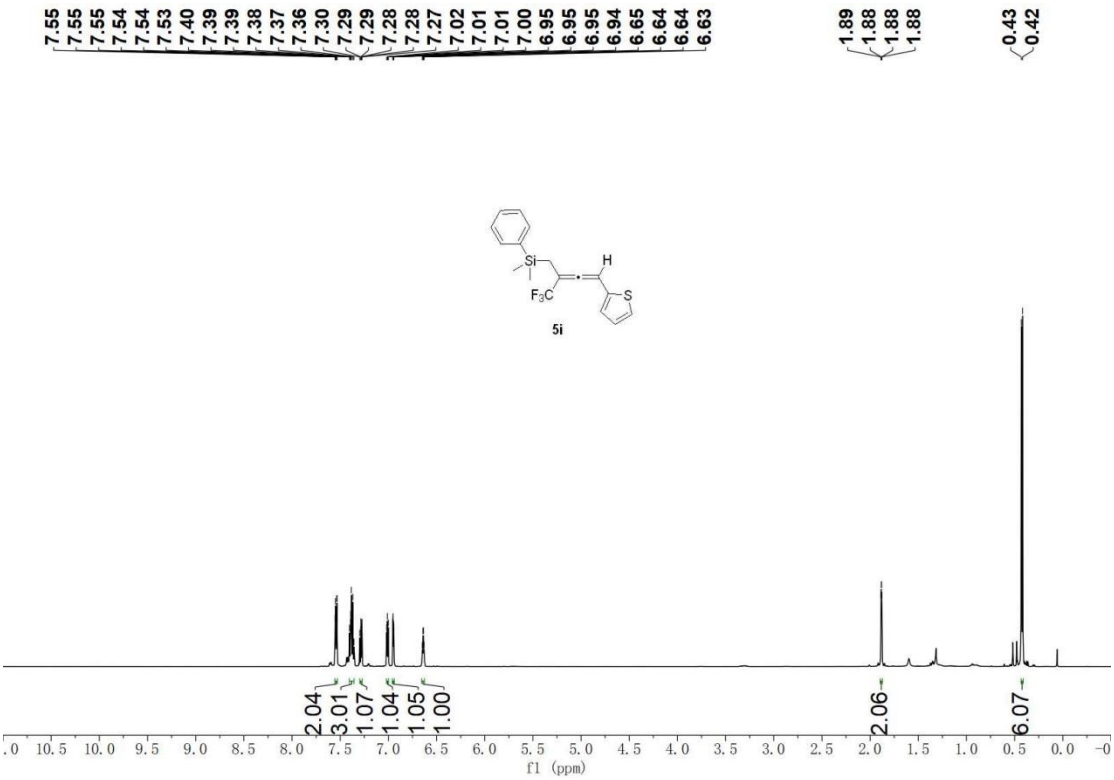
(4-(4-bromophenyl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane(5h)

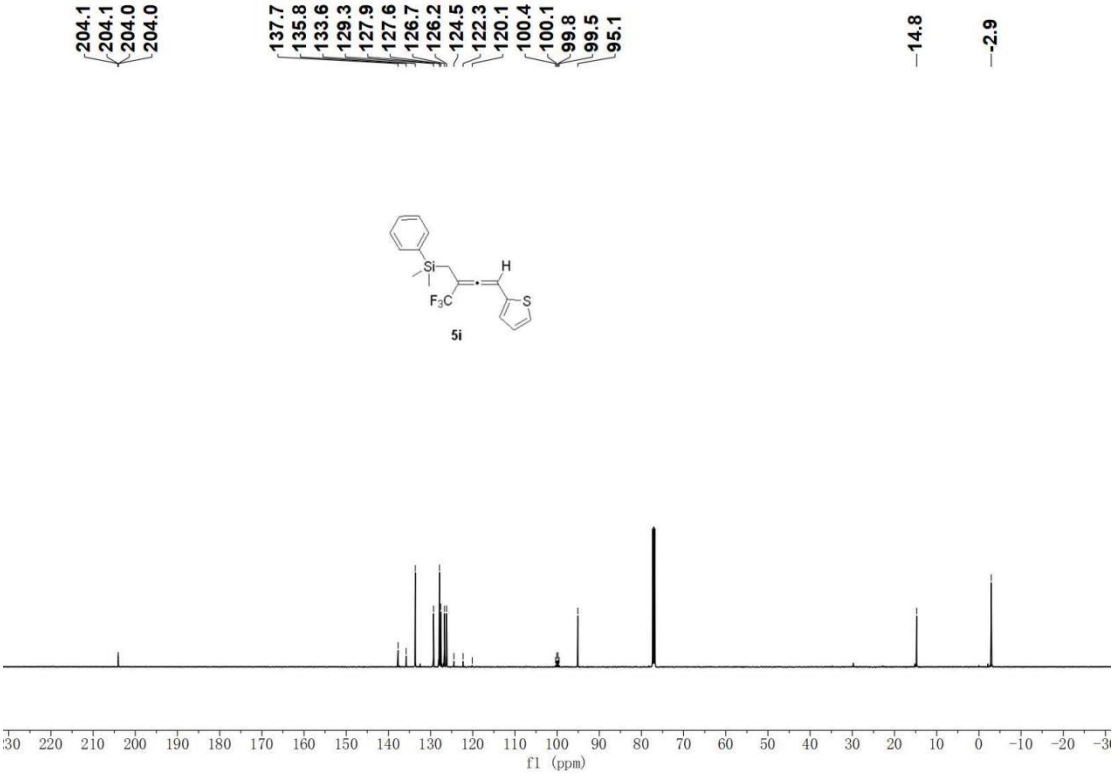


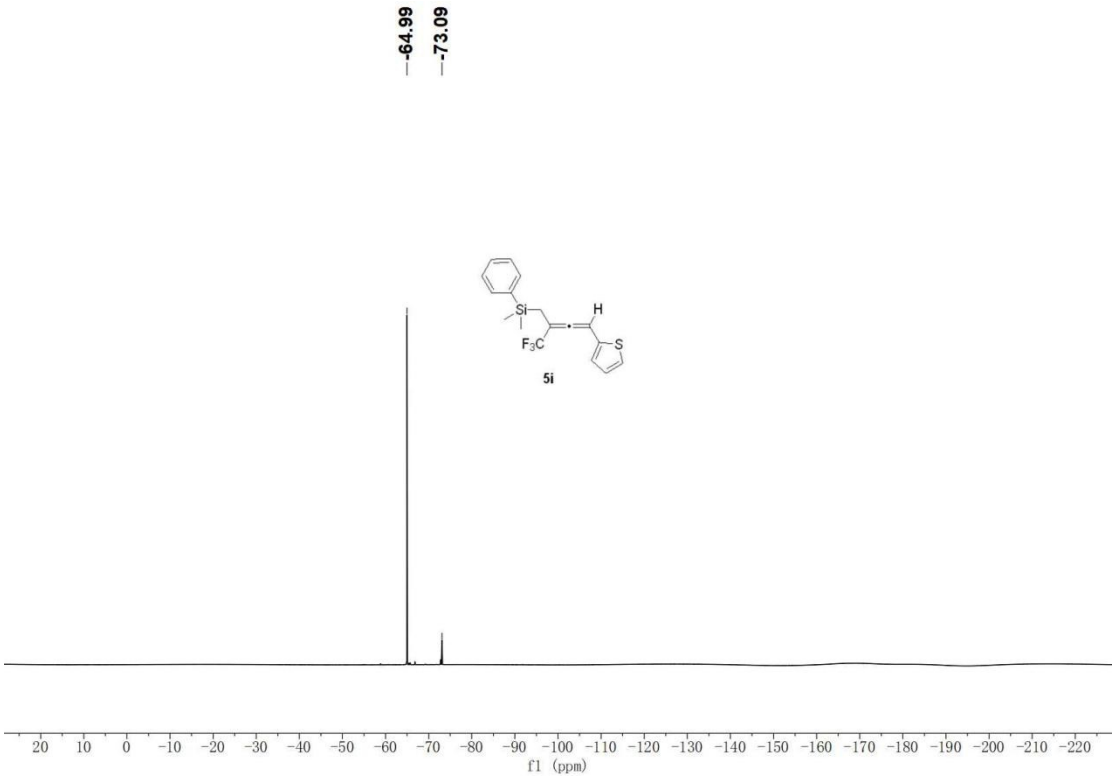




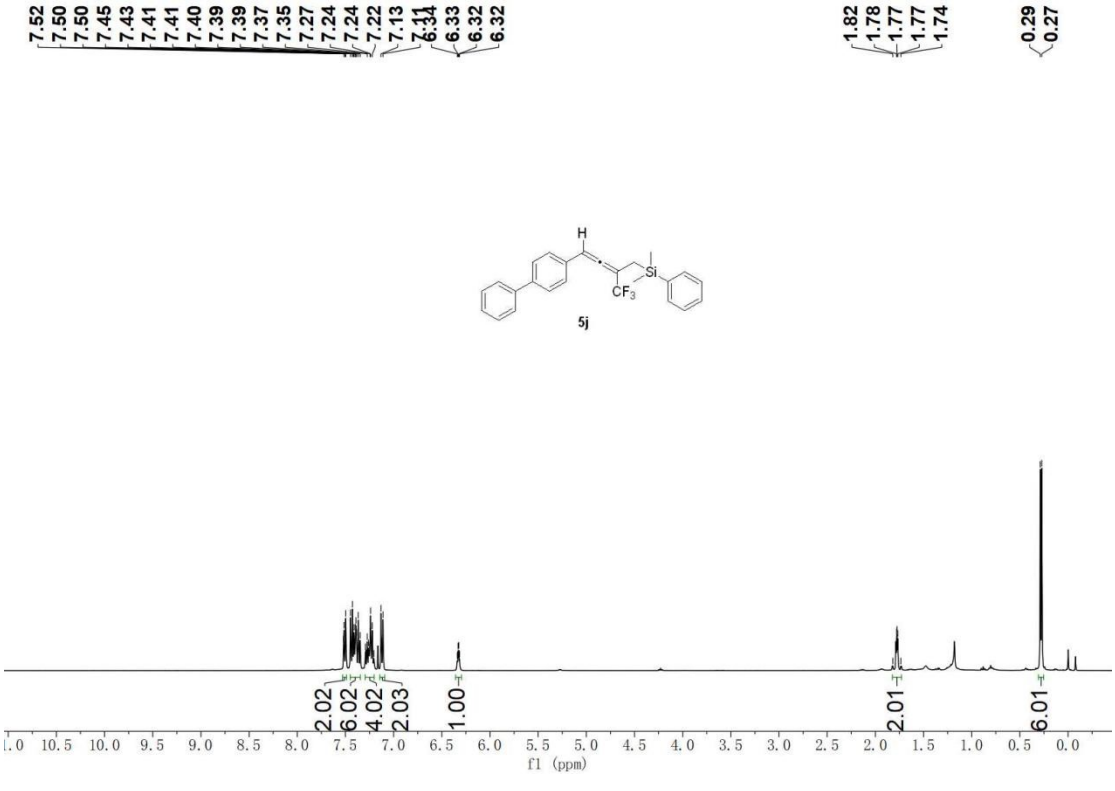
dimethyl(phenyl)(4-(thiophen-2-yl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)silane(5i)

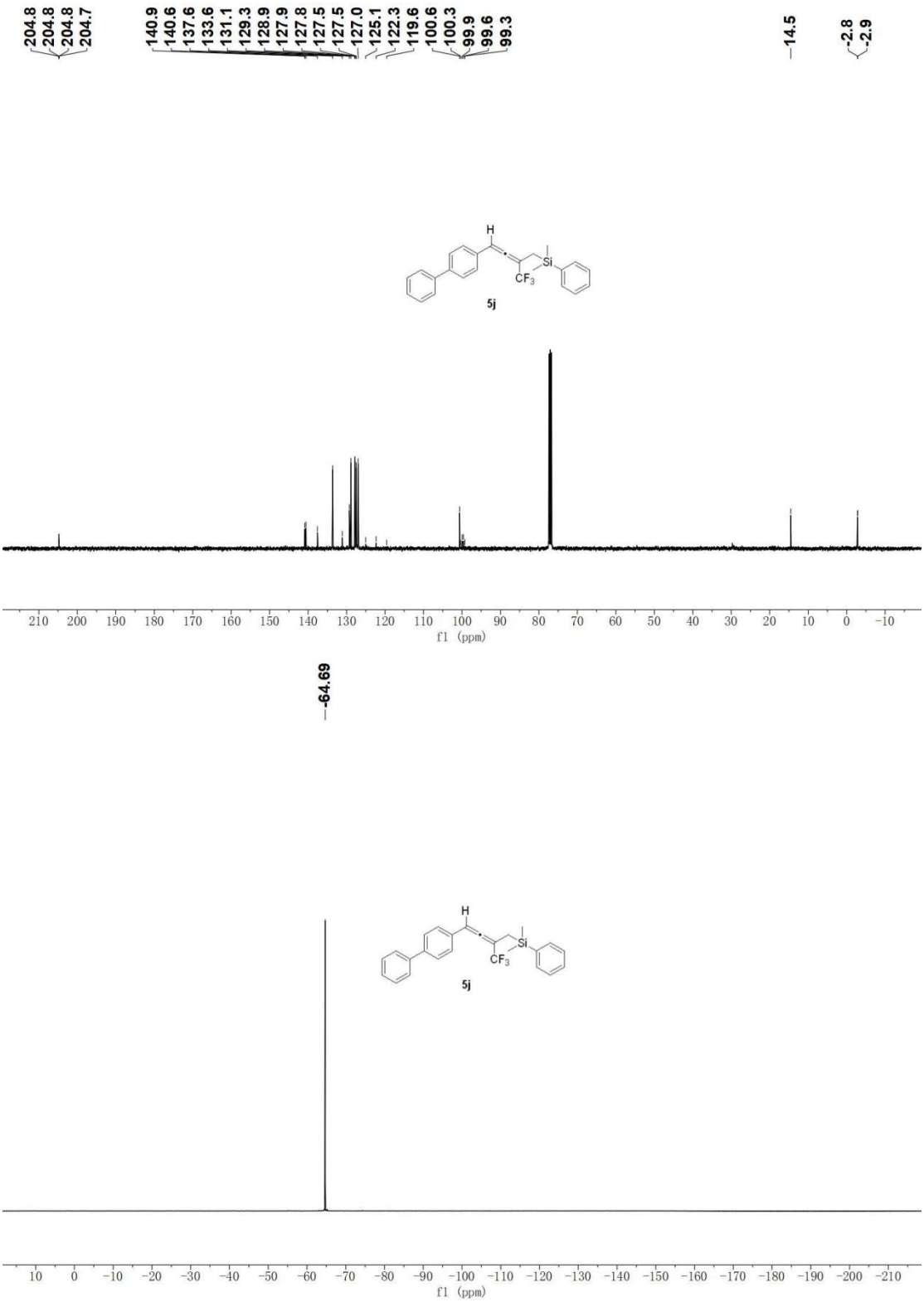

7.55 7.55 7.55 7.54 7.54 7.53 7.40 7.39 7.39 7.38 7.37 7.36 7.30 7.29 7.29 7.28 7.28 7.27 7.02 7.01 7.01 7.00 6.95 6.95 6.95 6.94 6.65 6.64 6.64 6.63
1.89 1.88 1.88 1.88
0.43 0.42
Si
H
F3C
S
5i
2.04 3.01 1.07 1.04 1.05 1.00
2.06
6.07
f1 (ppm)


204.1 204.1 204.0 204.0
137.7 135.8 133.6 129.3 127.9 127.6 126.7 126.2 124.5 122.3 120.1 100.4 100.1 99.8 99.5 95.1
14.8
2.9
Si
H
F3C
S
5i
f1 (ppm)

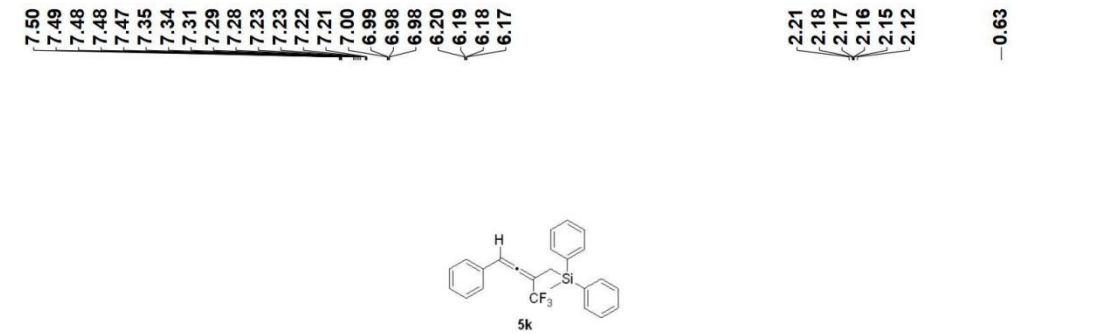


(4-([1,1'-biphenyl]-4-yl)-2-(trifluoromethyl)buta-2,3-dien-1-yl)dimethyl(phenyl)silane(5j)



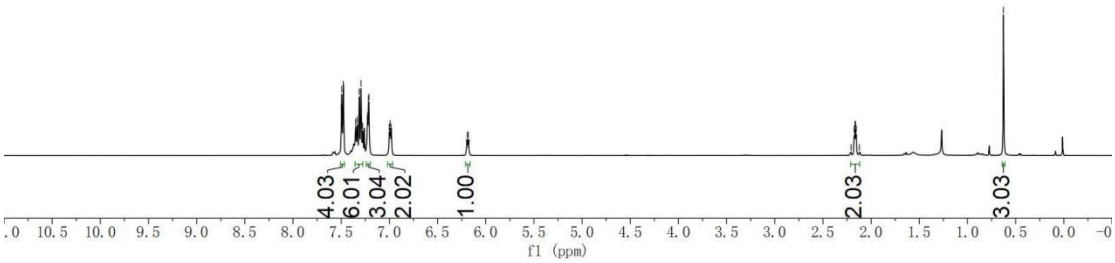


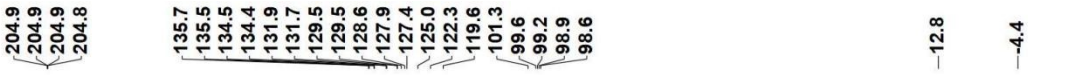
Methyldiphenyl(4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-yl)silane(5k)

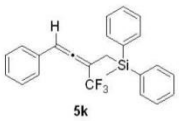

7.50
7.49
7.48
7.48
7.47
7.35
7.34
7.31
7.29
7.28
7.23
7.23
7.22
7.21
7.00
6.99
6.98
6.98
6.20
6.19
6.18
6.17
2.21
2.18
2.17
2.16
2.15
2.12
0.63

H
Si
CF3

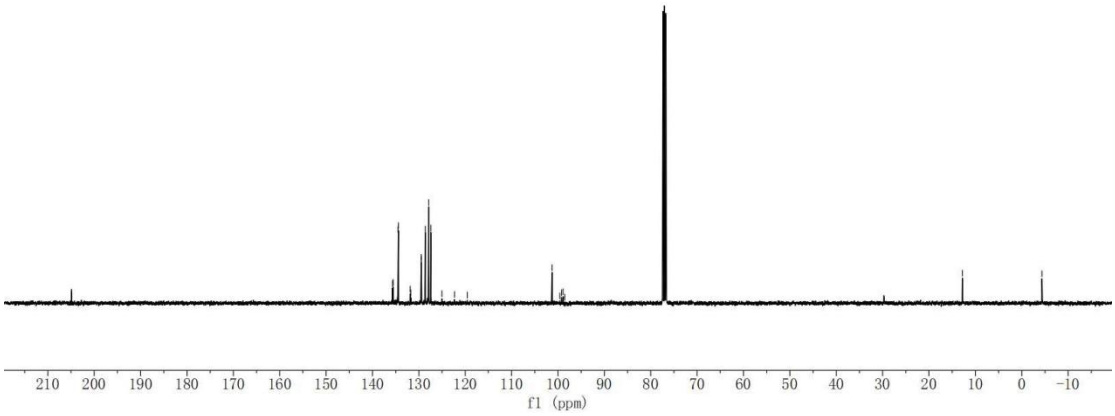
5k

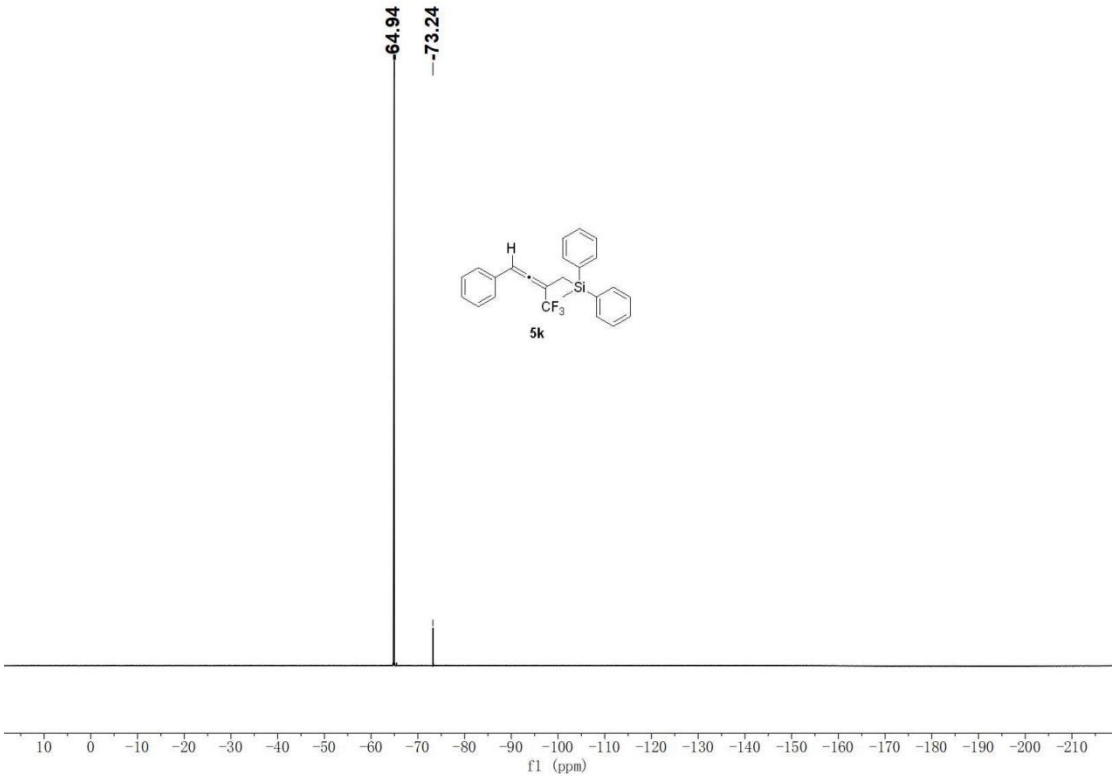

4.03
6.01
3.04
2.02
1.00
2.03
3.03
f1 (ppm)


204.9
204.9
204.9
204.8
135.7
135.5
134.5
134.4
131.9
131.7
129.5
129.5
128.6
127.9
127.4
125.0
122.3
119.6
101.3
99.6
99.2
98.9
98.6
12.8
4.4

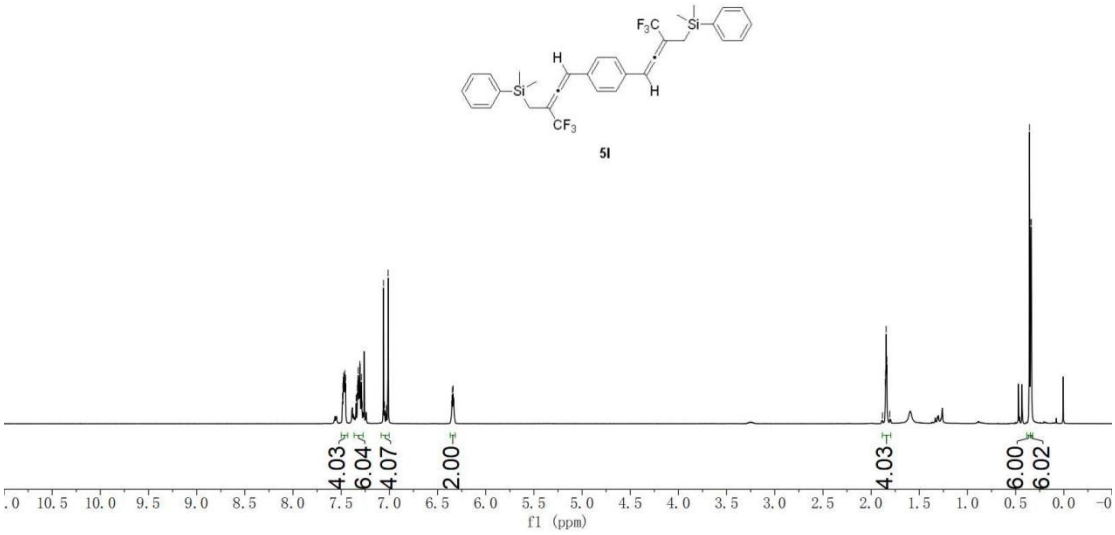

H
Si
CF3

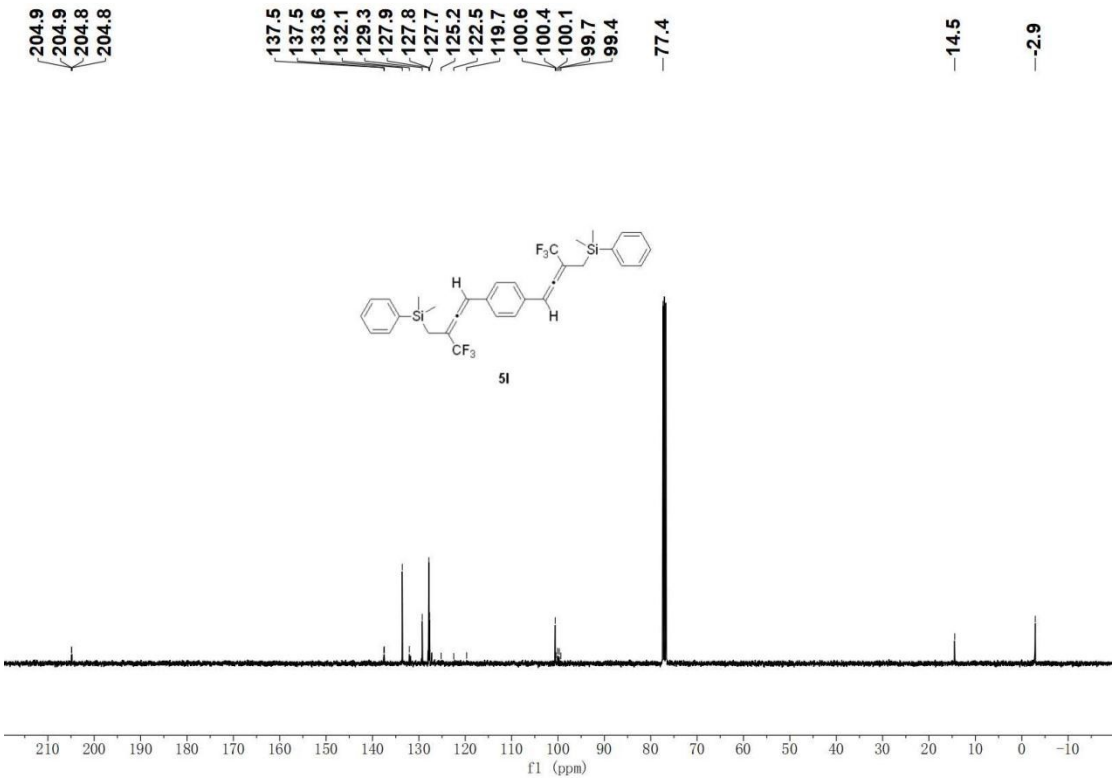
5k

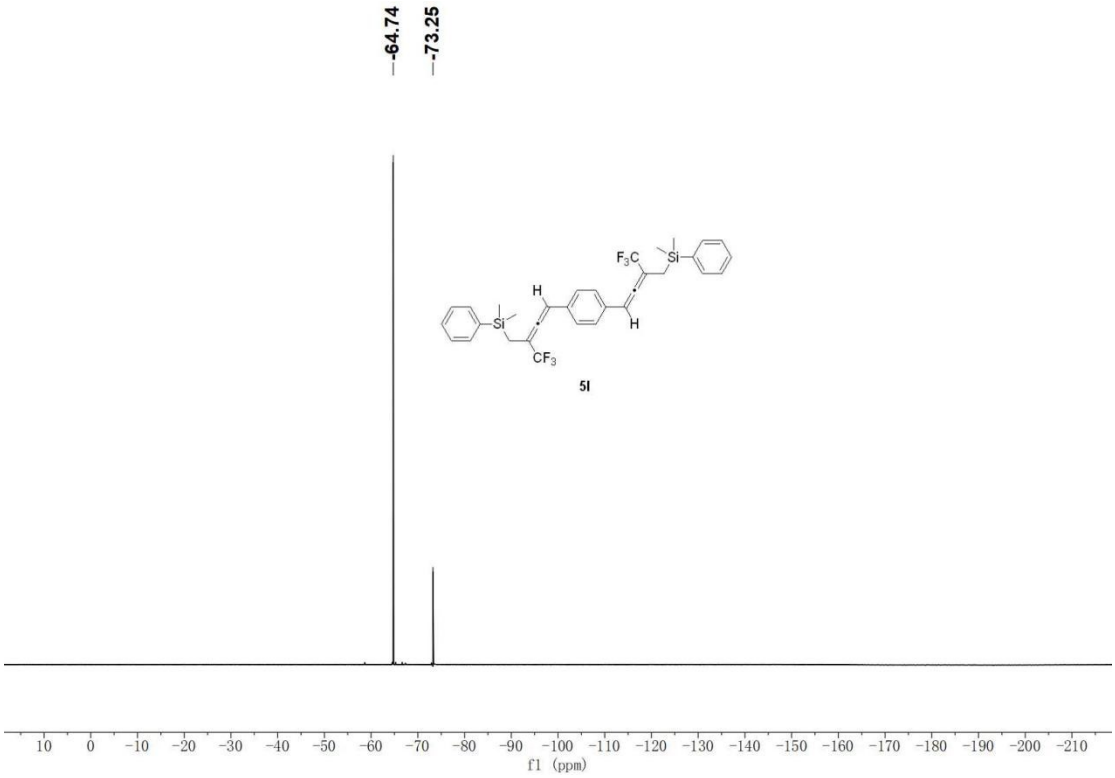

f1 (ppm)



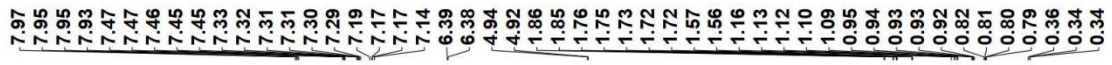
1,4-bis(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-yl)benzene(5l)

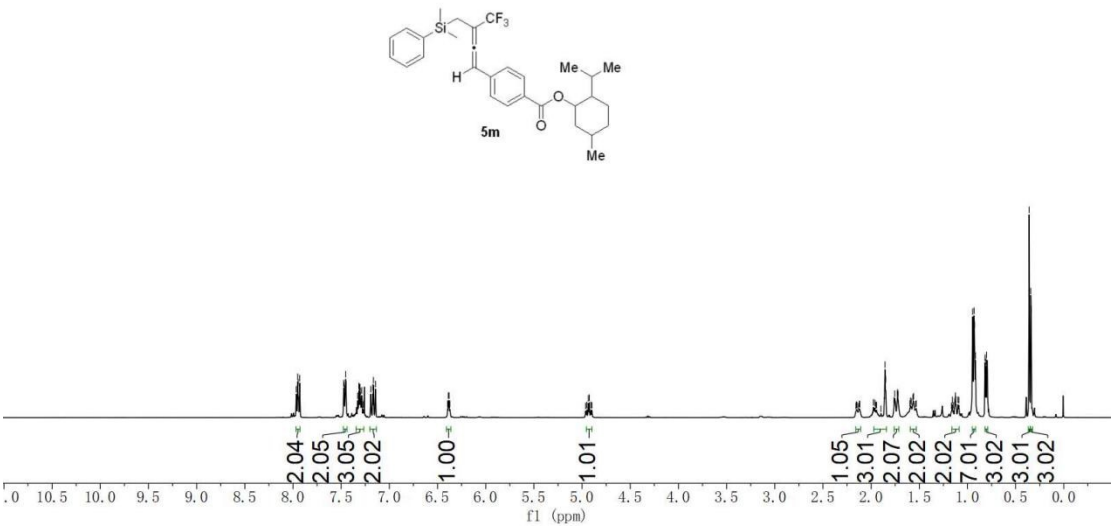


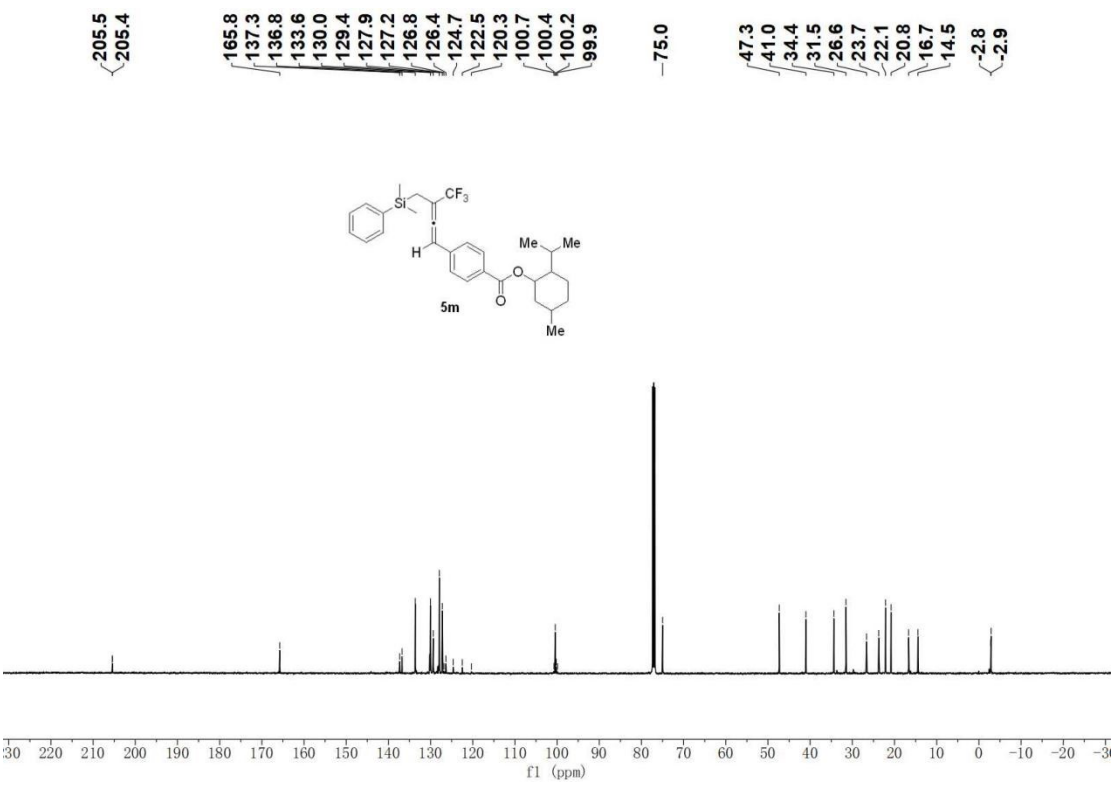


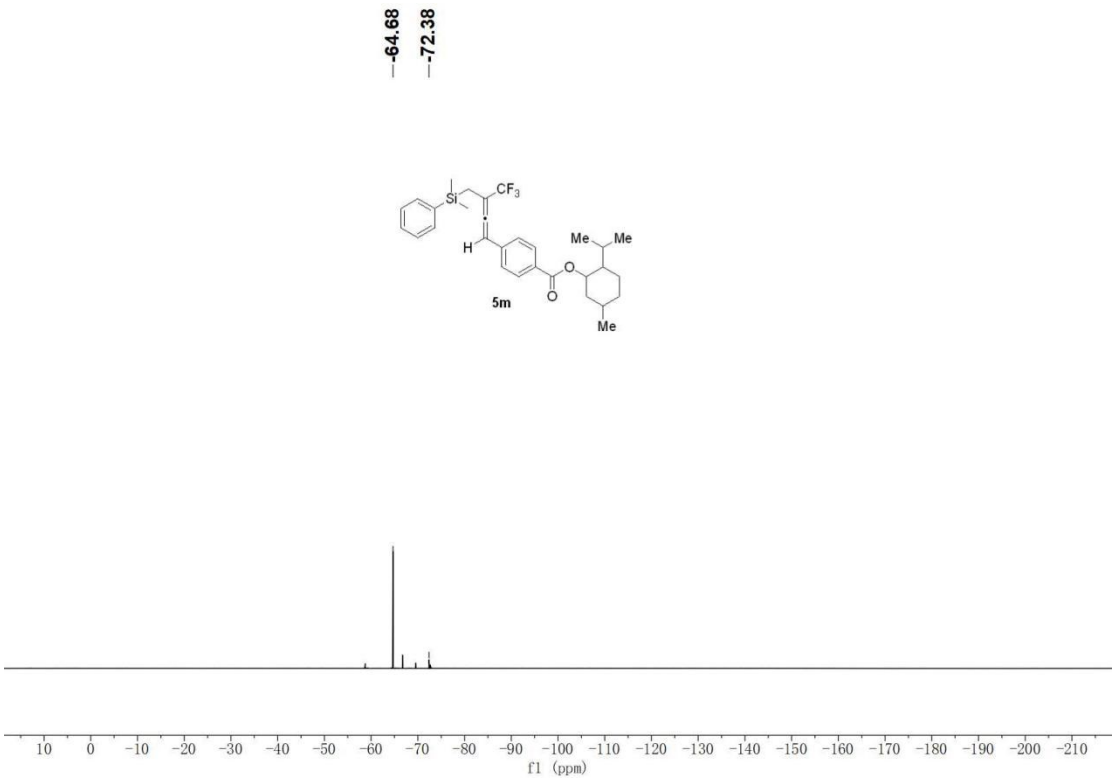


2-isopropyl-5-methylcyclohexyl 4-(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-yl)benzoate(5m)

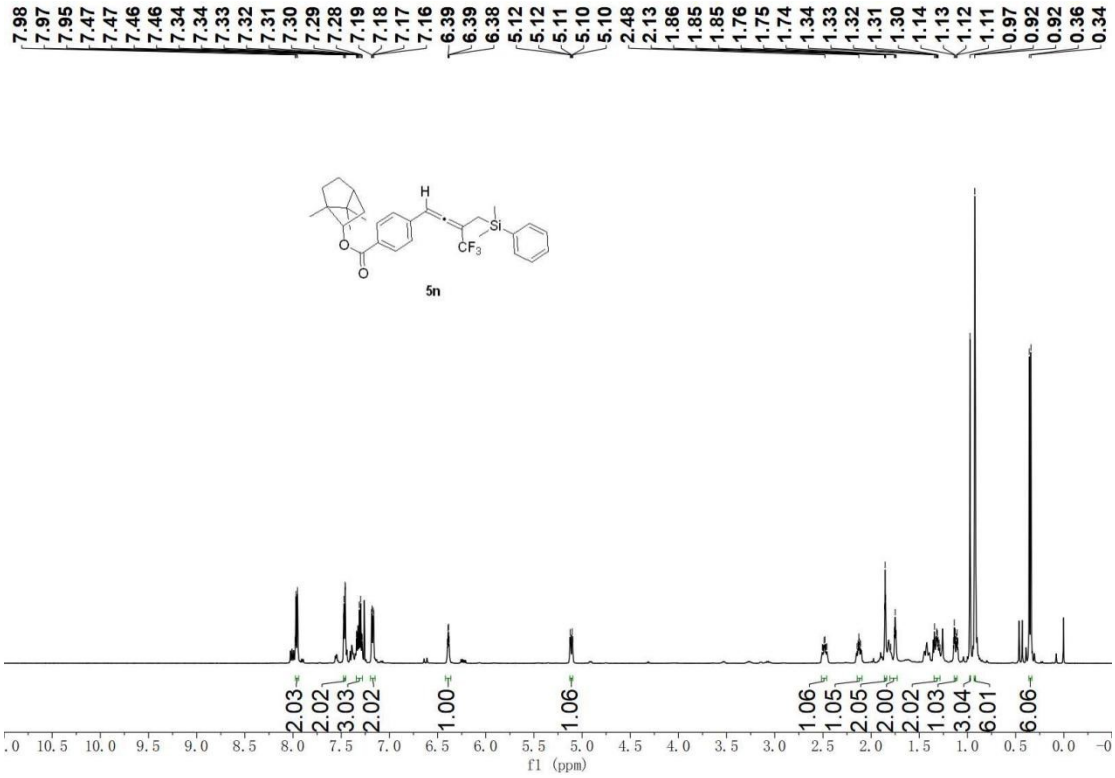

7.97
7.95
7.95
7.93
7.47
7.47
7.46
7.45
7.45
7.33
7.32
7.31
7.31
7.30
7.29
7.19
7.17
7.17
7.14
6.39
6.38
4.94
4.92
1.86
1.85
1.76
1.75
1.73
1.72
1.72
1.57
1.56
1.16
1.13
1.12
1.10
1.09
0.95
0.94
0.93
0.93
0.92
0.82
0.81
0.80
0.79
0.36
0.34
0.34

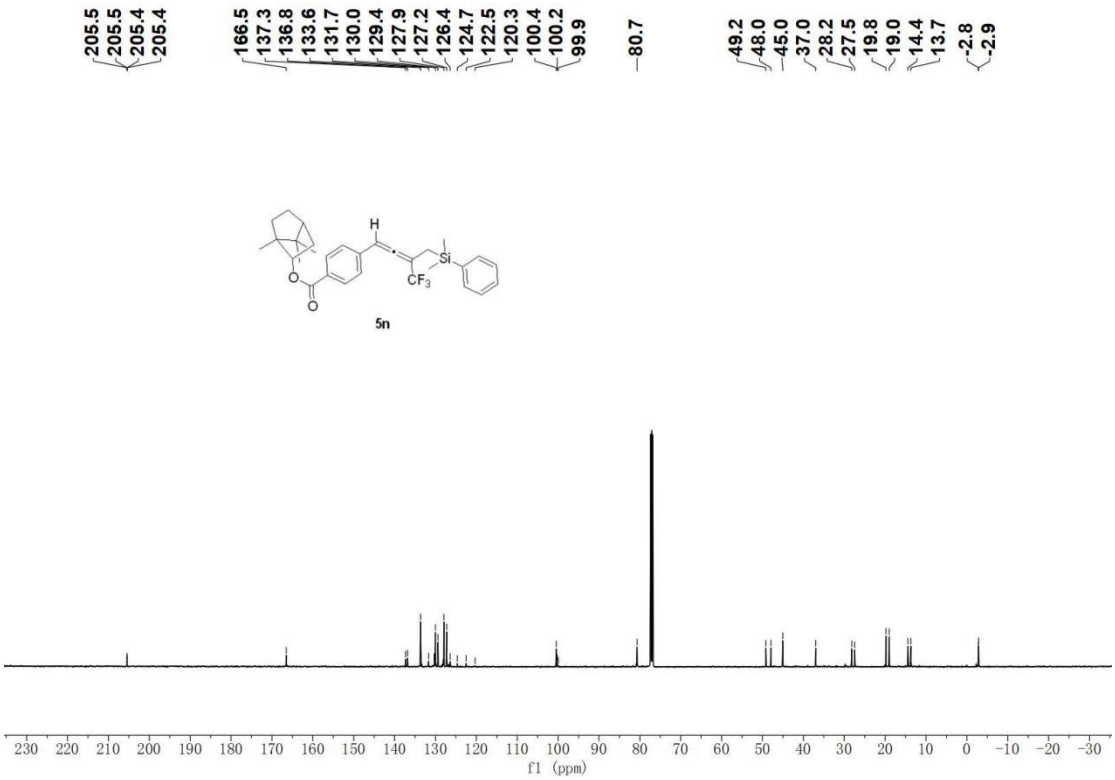

CF3
Si
H
Me
Me
O
O
Me
5m
2.04
2.05
3.05
2.02
1.00
1.01
1.05
3.01
2.07
2.02
2.02
7.01
3.02
3.01
3.02
f1 (ppm)

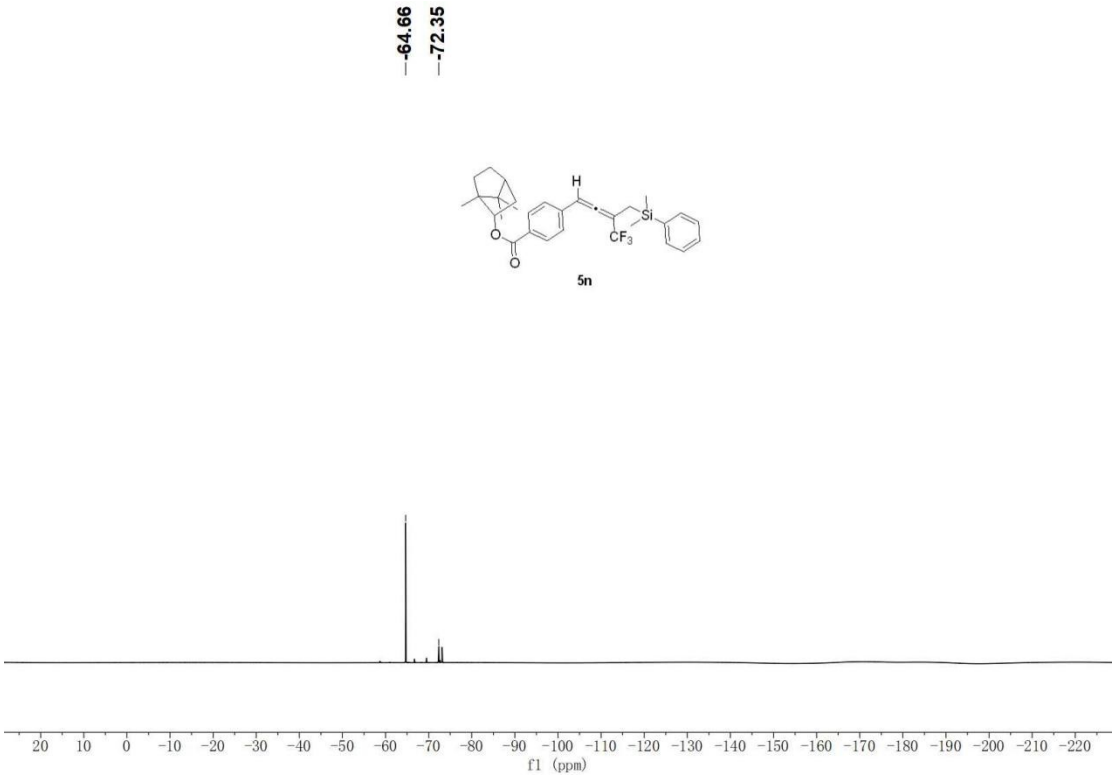

205.5
205.4
165.8
137.3
136.8
133.6
130.0
129.4
127.9
127.2
126.8
126.4
124.7
122.5
120.3
100.7
100.4
100.2
99.9
75.0
47.3
41.0
34.4
31.5
26.6
23.7
22.1
20.8
16.7
14.5
-2.8
-2.9
CF3
Si
H
Me
Me
O
O
Me
5m
f1 (ppm)



1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl 4-(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-yl)benzoate(5n)

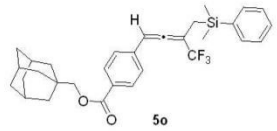




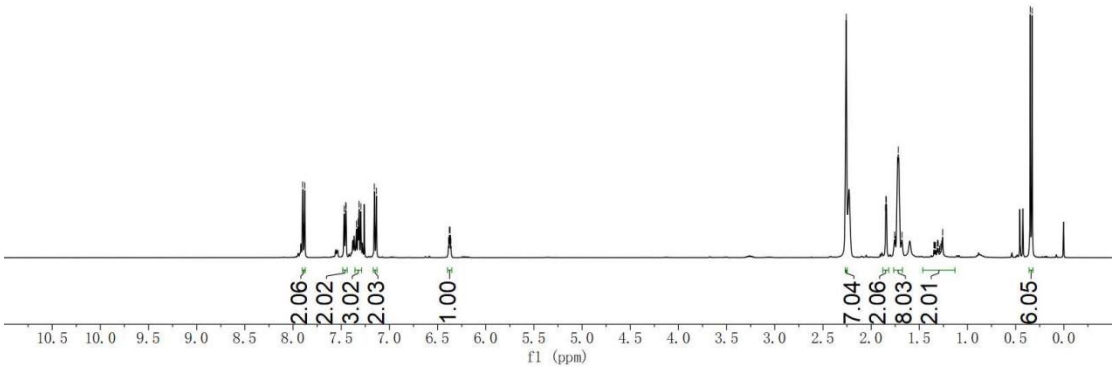


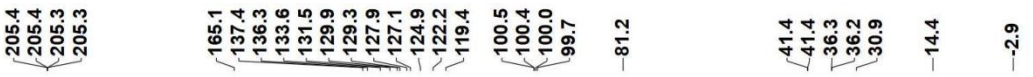
((1s,3s)-adamantan-1-yl)methyl 4-(3-((dimethyl(phenyl)silyl)methyl)-4,4,4-trifluorobuta-1,2-dien-1-yl)benzoate(5o)

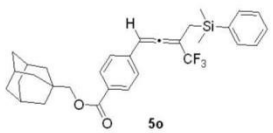

7.90
7.90
7.88
7.88
7.47
7.47
7.45
7.45
7.34
7.33
7.32
7.31
7.30
7.30
7.16
7.15
7.14
7.14
6.39
6.38
6.37
6.36
2.26
1.85
1.85
1.84
1.84
1.76
1.75
1.73
1.72
1.71
1.68
1.35
1.34
1.33
1.31
1.30
1.29
1.28
1.27
1.26
0.35
0.33


H
Si
CF3
O
O

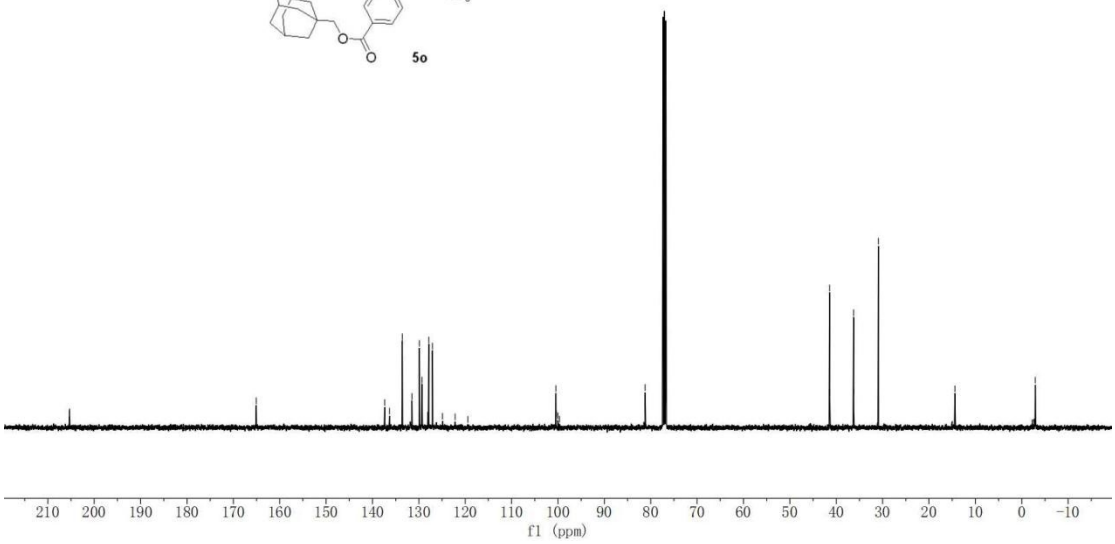
5o

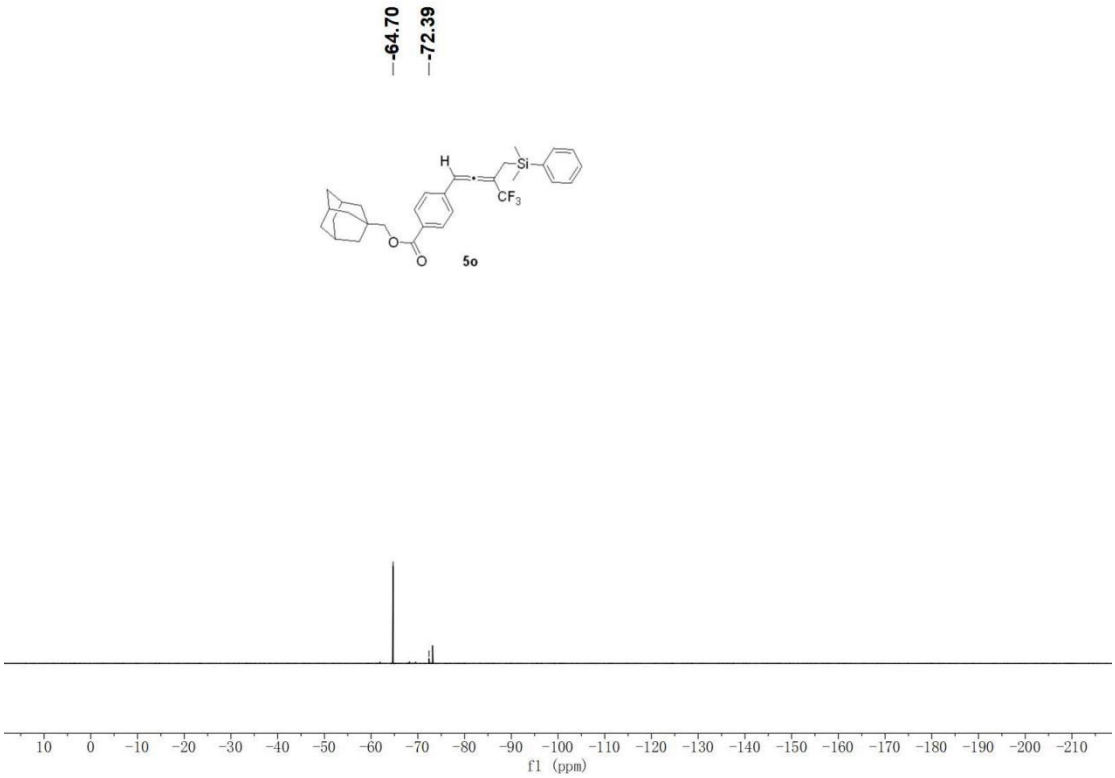

2.06
2.02
3.02
2.03
1.00
7.04
2.06
8.03
2.01
6.05
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)


205.4
205.4
205.3
205.3
165.1
137.4
136.3
133.6
131.5
129.9
129.3
127.9
127.1
124.9
122.2
119.4
100.5
100.4
100.0
99.7
81.2
41.4
41.4
36.3
36.2
30.9
14.4
2.9

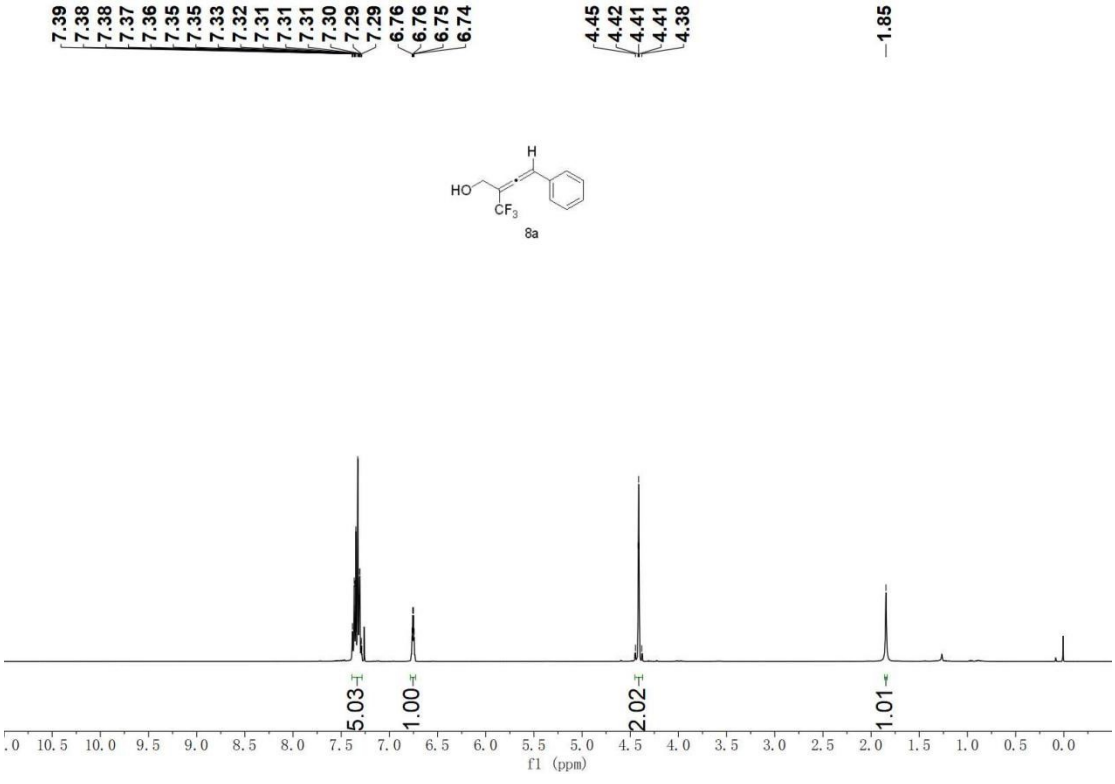

H
Si
CF3
O
O

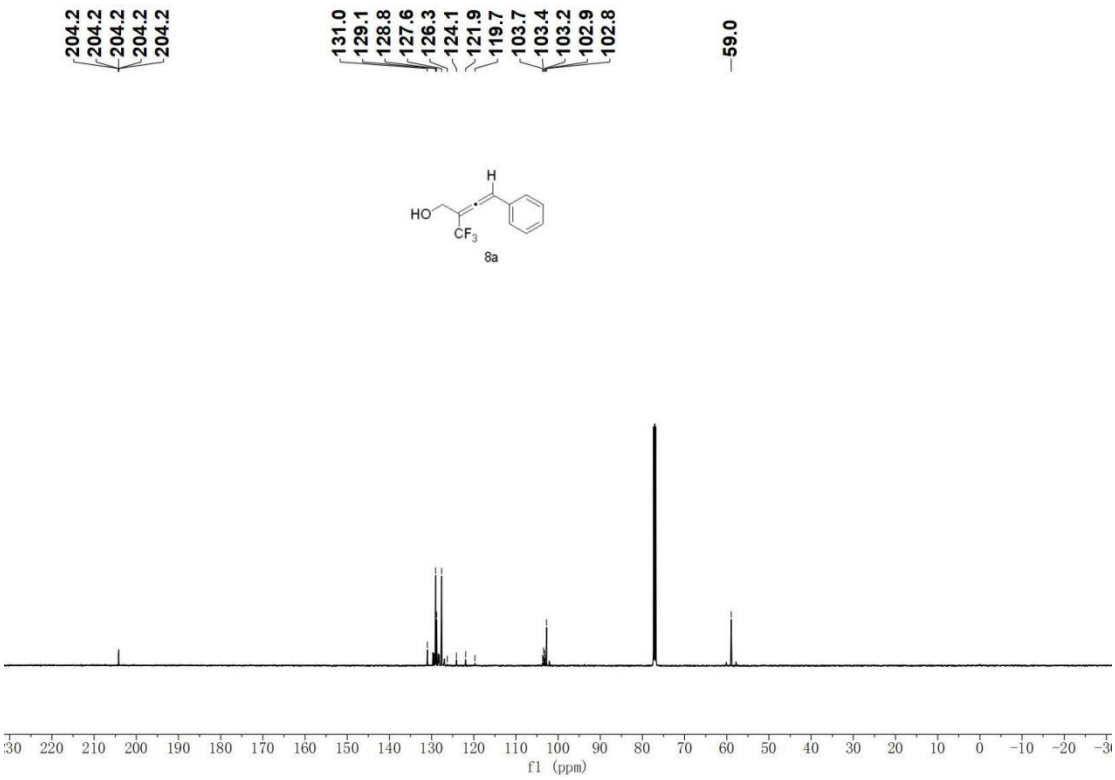
5o

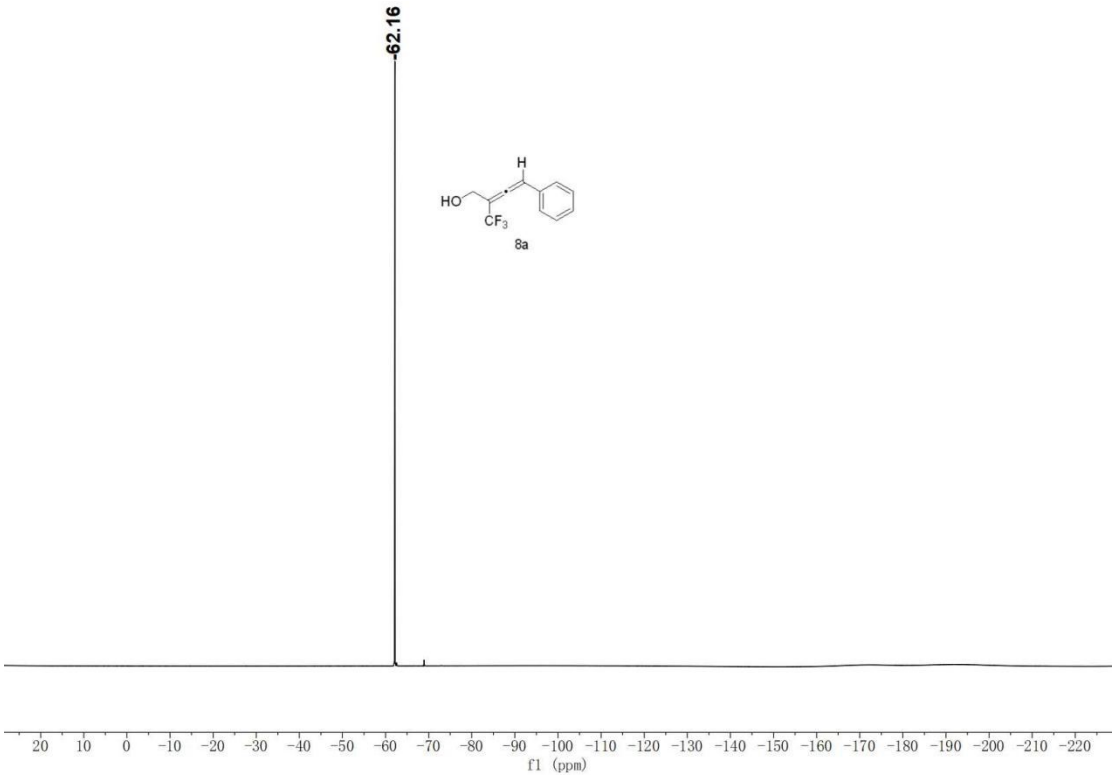

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



4-phenyl-2-(trifluoromethyl)buta-2,3-dien-1-ol(8a)

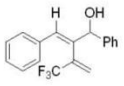




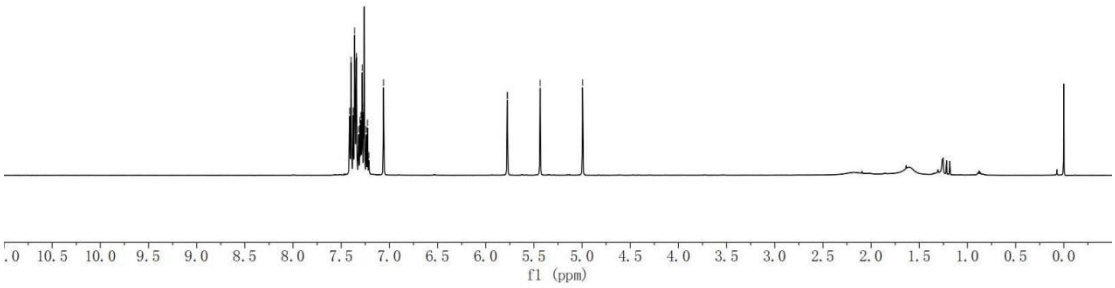


(E)-2-benzylidene-1-phenyl-3-(trifluoromethyl)but-3-en-1-ol(9a)

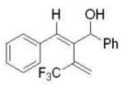

7.41
7.40
7.38
7.36
7.36
7.35
7.34
7.32
7.31
7.30
7.28
7.28
7.27
7.27
7.24
7.24
7.24
7.23
7.23
7.22
7.21
7.06
5.78
5.77
5.44
4.99


H
OH
Ph
F3C

9a

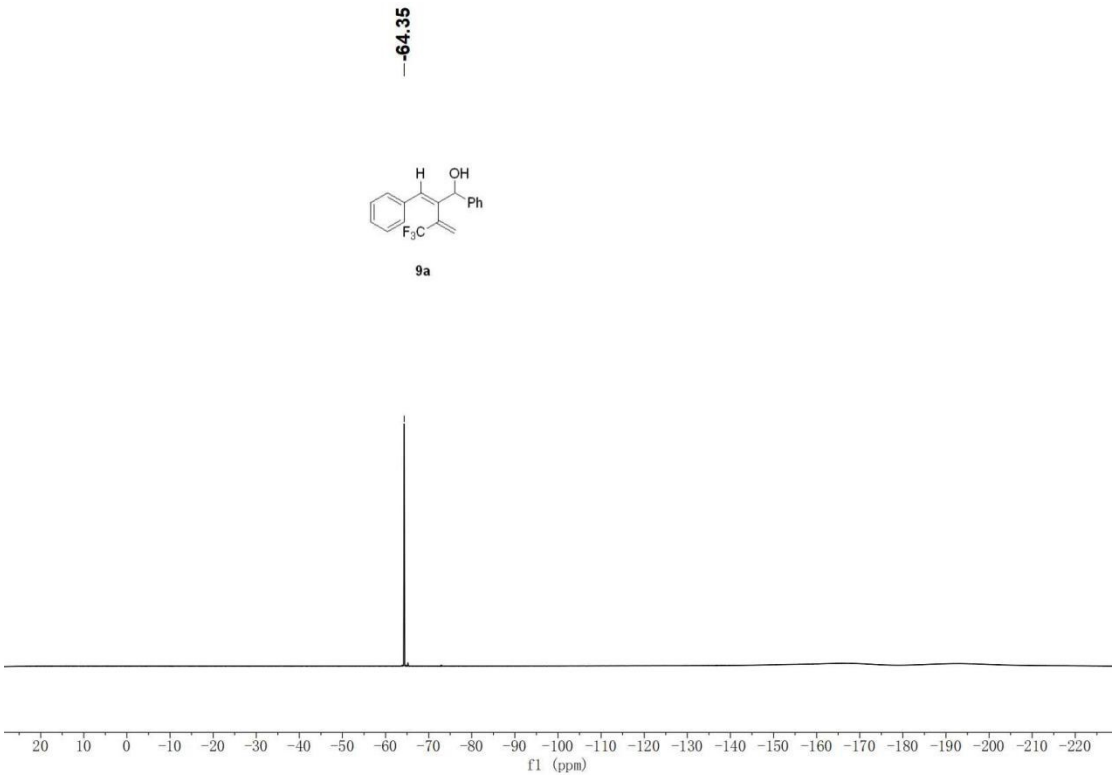

10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


140.8
136.8
135.7
135.4
135.1
134.9
131.0
129.1
128.6
128.2
128.2
127.7
127.2
126.0
126.0
125.9
125.9
124.1
121.9
119.7
76.5


H
OH
Ph
F3C

9a

230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
−10
−20
−30
f1 (ppm)


-64.35
H
OH
Ph
F3C
9a
20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220
f1 (ppm)