Supporting Information

Palladium-Catalyzed Decarbonylative Alkynylation of Amides

Long Liu,[†,‡] Dan Zhou,[‡] Min Liu, [‡] Yongbo Zhou,[‡] Tieqiao Chen[*†,‡]

[†]Key Laboratory of Ministry of Education for Advanced Materials in Tropical Island Resources, College of Materials and Chemical Engineering, Hainan University, Haikou 570228, China

[‡]State Key Laboratory of Chemo/Biosensing and Chemometrics, College of Chemistry and Chemical Engineering, Hunan University, Changsha 410082, China

E-mail: chentieqiao@hnu.edu.cn

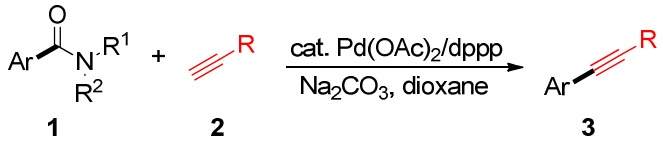
Table of contents

1. General Information

The reactions were carried out in schlenk tubes of 25 mL under N_2 atmosphere. Reagents were used as received unless otherwise noted, and solvents were purified according to standard operation procedure. Column chromatography was performed using Silica Gel 60 (300–400 mesh). The reactions were monitored by GC and GC-MS, GC-MS results were recorded on GC-MS QP2010, and GC analysis was performed on GC 2010 plus. The ^{1}H, and ^{13}C NMR spectra were recorded on a Brucker ADVANCE III spectrometer at 400 MHz, and 100 MHz respectively, and chemical shifts were reported in parts per million (ppm). The electron ionization (EI) method was used as the ionization method for the HRMS measurement, and the mass analyzer type is TOF for EI. All solvents and reagents were purchased from Energy Chemical, Alfa Aesar, and Aladdin.

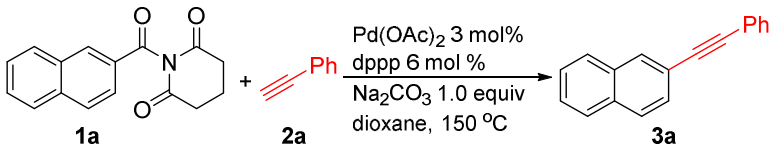
2. Experimental Procedure

2.1 General Experimental Procedure for the Synthesis of Internal Alkynes.



In an oven dried 25 mL Schlenk tube charged with amides **1** (0.2 mmol), $Pd(OAc)_2$ (0.006 mmol, 3 mol %), dppp (0.012 mmol, 6 mol %) and Na_2CO_3 (0.2 mmol, 1.0 equiv), after charging N_2 for three times, the terminal alkynes **2** (0.6 mmol, 3.0 equiv), and dioxane (2 mL) were added. The reaction mixture was reacted at 150 °C for 16 h. After completion of the reaction, the reaction mixture was concentrated under vacuum. The desired product was isolated by column chromatography over silica gel (300-400 mesh) using petroleum ether-DCM as eluent.

2.2 Experimental Procedure for the Preparation of 2-(phenylethynyl)naphthalene for 1 mmol scale.

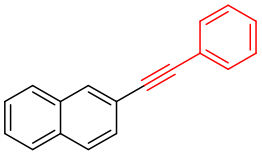


1a **2a** **3a**

In an oven dried 100 mL Schlenk tube charged with 1-(2-naphthoyl)piperidine-2,6-dione **1a** (1.0 mmol), $Pd(OAc)_2$ (3 mol %), dppp (6 mol %) and Na_2CO_3 (1.0 equiv), after charging N_2 for three times, the ethynylbenzene **2a** (4.0 equiv), and dioxane (20 mL) were added. The reaction mixture was reacted at 150 °C for 32 h. After completion of the reaction, the reaction mixture was concentrated under vacuum. The desired product was isolated by column chromatography over silica gel (300-400 mesh) using petroleum ether as eluent to afford a white solid in 71% yield (162.1 mg).

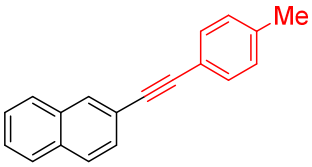
3. Characterization Data for the Products

2-(phenylethynyl)naphthalene (3a)



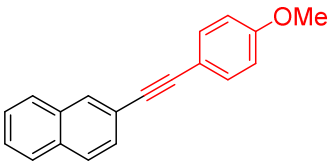
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 78% yield (35.6 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.05 (s, 1H), 7.81–7.78 (m, 3H), 7.57 (d, *J* = 8.0 Hz, 3H), 7.49–7.47 (m, 2H), 7.37–7.34 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 133.1, 132.9, 131.7, 131.5, 128.5, 128.4, 128.3, 128.0, 127.83, 127.82, 126.7, 126.6, 123.4, 120.6, 89.9, 89.8. This compound is known.[1]

2-(p-tolylethynyl)naphthalene (3b)



The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 71% yield (34.4 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.04 (s, 1H), 7.81–7.79 (m, 3H), 7.57 (d, *J* = 7.6 Hz, 3H), 7.49–7.46 (m, 4H), 7.17 (d, *J* = 8.0 Hz, 2H), 2.38 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 138.5, 133.1, 132.8, 131.6, 131.3, 129.2, 128.5, 128.0, 127.8, 126.6, 126.5, 120.8, 120.2, 90.0, 89.2, 21.6. This compound is known.[1]

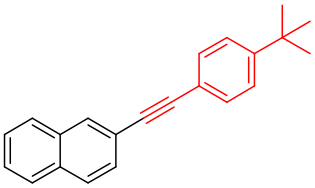
2-((4-methoxyphenyl)ethynyl)naphthalene (3c)



The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether/ DCM (5/1) to afford a white solid in 75% yield (38.7 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.02 (s, 1H), 7.80–7.78 (m, 3H), 7.57–7.46 (m, 5H), 6.89 (d, *J* = 8.0 Hz, 2H), 3.82 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 159.7, 133.2, 133.1, 132.7, 131.1, 128.5, 128.0, 127.8, 127.7, 126.5, 121.0, 115.4,

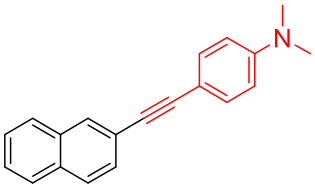
114.1, 89.8, 88.5, 55.3. This compound is known.[1]

2-((4-(*tert*-butyl)phenyl)ethynyl)naphthalene (3d)



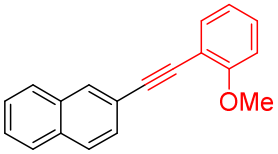
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white in 90% yield (51.2 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.04 (s, 1H), 7.82–7.78 (m, 3H), 7.57 (d, *J* = 8.4 Hz, 1H), 7.52–7.47 (m, 4H), 7.38 (d, *J* = 8.0 Hz, 2H), 1.33 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$): δ151.6, 133.1, 132.8, 131.4, 131.3, 128.5, 128.0, 127.79, 126.6, 126.5, 125.4, 120.9, 120.30, 90.0, 89.2, 34.8, 31.2. This compound is known. [2]

N,N-dimethyl-4-(naphthalen-2-ylethynyl)aniline (3e)



The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether/ DCM (5/1) to afford a white solid in 85% yield (46.1 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.00 (s, 1H), 7.78–7.76 (m, 3H), 7.56 (d, *J* = 8.4 Hz, 1H), 7.45 (d, *J* = 8.4 Hz, 4H), 6.67 (d, *J* = 8.4 Hz, 2H), 2.98 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 150.2, 133.2, 132.8, 132.5, 130.7, 128.6, 127.9, 127.8, 127.7, 126.4, 126.2, 121.5, 111.9, 110.0, 91.1, 87.8, 40.2. This compound is known.[3]

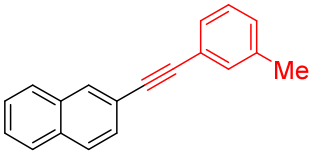
2-((2-methoxyphenyl)ethynyl)naphthalene (3f)



The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether/ DCM (5/1) to afford a white solid in 74% yield (38.2 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.08 (s, 1H), 7.81–7.78 (m, 3H), 7.61 (d, *J* = 8.4 Hz, 1H), 7.54 (d, *J* = 7.2 Hz, 1H), 7.48–7.46 (m, 2H), 7.31 (t, *J* =8.0 Hz, 1H), 7.97–7.89 (m, 2H), 3.92 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 160.0, 133.7,

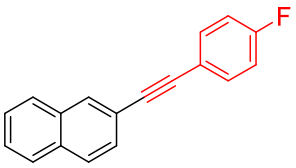
133.07, 132.8, 131.4, 129.9, 128.6, 127.9, 127.8, 127.8, 126.6, 126.5, 120.9, 120.6, 112.5, 110.8, 93.9, 86.2, 55.9. This compound is known.[4]

2-(*m*-tolylethynyl)naphthalene (3g)



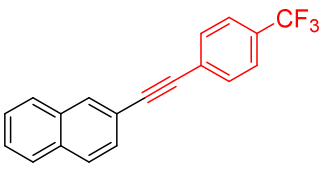
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 72% yield (34.9 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.04 (s, 1H), 7.81–7.79 (m, 3H), 7.57 (d, J = 8.4 Hz, 1H), 7.49–7.47 (m, 2H), 7.41–7.37 (m, 2H), 7.24 (d, J = 7.2 Hz, 1H), 7.15 (d, J = 7.6 Hz, 1H), 2.36 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 138.1, 133.1, 132.8, 132.3, 131.4, 129.3, 128.8, 128.5, 128.3, 128.0, 127.8, 126.7, 126.6, 123.1, 120.7, 90.0, 89.5, 21.30. This compound is known.[5]

2-((4-fluorophenyl)ethynyl)naphthalene (3h)



The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 80% yield (39.4 mg), mp 121–123 °C; ^{1}H NMR (400 M, $CDCl_3$): δ 8.04 (s, 1H), 7.82–7.80 (m, 3H), 7.57–7.54 (m, 3H), 7.50–7.48 (m, 2H), 7.08–7.04 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 162.5 (d, $J_{C\text{-}F}$ = 248.0 Hz), 133.6, 133.5, 132.9 (d, $J_{C\text{-}F}$ = 18.5 Hz), 131.4, 128.3, 128.1, 127.8, 126.7, 126.6, 120.4, 119.4 (d, $J_{C\text{-}F}$ = 4.0 Hz), 115.7 (d, $J_{C\text{-}F}$ = 21.9 Hz), 115.6, 89.5, 88.7. ^{19}F NMR (376 MHz, $CDCl_3$): δ -110.84; HRMS (EI) m/z: $[M]^+$ calcd. for $C_{18}H_{11}F$: 246.0845; found: 246.0841.

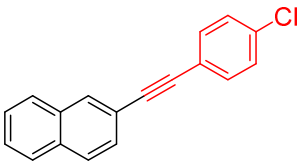
2-((4-(trifluoromethyl)phenyl)ethynyl)naphthalene (3i)



The title compound was prepared according to the general procedure and purified by column chromatography on

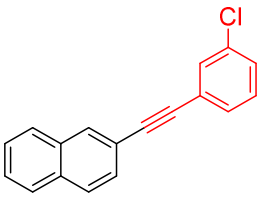
silica gel and eluted with petroleum ether to afford a white solid in 56% yield (33.2 mg), mp 110–112 °C;. ^{1}H NMR (400 M, $CDCl_3$): δ 8.08 (s, 1H), 7.83 (d, J = 7.2 Hz, 3H), 7.68–7.57 (m, 5H), 7.52–7.51 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 133.1, 133.0, 131.9, 131.86, 131.8, 128.3, 128.2, 127.9, 127.8, 127.2, 127.0, 126.7, 126.6, 125.3 (q, $J_{C\text{-}F}$ = 3.7 Hz, $J_{C\text{-}F}$ = 7.4 Hz) , 119.8, 92.2, 88.3. ^{19}F NMR (376 MHz, $CDCl_3$): δ -62.74; HRMS (EI) m/z: $[M]^+$ calcd. for $C_{19}H_{11}F_3$: 296.0813; found: 296.0810.

2-((4-chlorophenyl)ethynyl)naphthalene (3j)



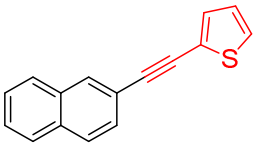
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 53% yield (27.8 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.05 (s, 1H), 7.82–7.80 (m, 3H), 7.56 (d, J = 8.4 Hz, 1H), 7.50 (d, J = 8.0 Hz, 4H), 7.34 (d, J = 7.6 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 134.3, 133.0, 132.9, 132.9, 131.6, 128.8, 128.3, 128.1, 127.8, 127.8, 126.8, 126.6, 121.8, 120.2, 90.8, 88.6. This compound is known.[6]

2-((3-chlorophenyl)ethynyl)naphthalene (3k)



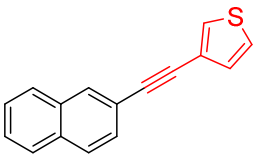
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 58% yield (30.5 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.04 (s, 1H), 7.81–7.79 (m, 3H), 7.56–7.48 (m, 4H), 7.44 (d, J = 7.2 Hz, 1H), 7.32–7.27 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 134.3, 133.0, 131.7, 131.5, 129.8, 129.6, 128.6, 128.3, 128.1, 127.9, 127.8, 126.9, 126.7, 125.1, 120.1, 91.0, 88.3. This compound is known.[7]

2-(naphthalen-2-ylethynyl)thiophene (3l)



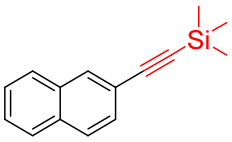
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 75% yield (35.1 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.03 (s, 1H), 7.81–7.79 (m, 3H), 7.55 (d, J = 8.4 Hz, 1H), 7.50–7.48 (m, 2H), 7.32–7.29 (m, 2H), 7.03–7.01 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 133.0, 132.9, 132.0, 131.3, 128.1, 128.1, 127.85, 127.82, 127.4, 127.2, 126.8, 126.6, 123.4, 120.3, 93.5, 83.0. This compound is known.[8]

3-(naphthalen-2-ylethynyl)thiophene (3m)



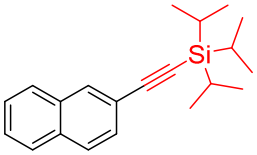
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 76% yield (35.6 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 8.03 (s, 1H), 7.80–7.78 (m, 3H), 7.57–7.47 (m, 4H), 7.30 (s, 1H), 7.23 (d, J = 3.6 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 133.1, 132.8, 131.4, 129.9, 128.7, 128.4, 128.0, 127.8, 126.7, 126.6, 125.5, 122.4, 120.6, 89.3, 84.9. This compound is known.[9]

trimethyl(naphthalen-2-ylethynyl)silane (3n)



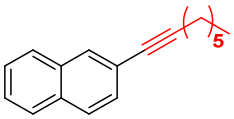
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a colorless oil in 72% yield (32.3 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 7.99 (s, 1 H), 7.78–7.73 (m, 3H), 7.51–7.45 (m, 3H), 0.28 (s, 9 H); ^{13}C NMR (100 MHz, $CDCl_3$): δ132.9, 132.8, 131.9, 128.5, 127.8, 127.7, 127.7, 126.7, 126.5, 120.4, 105.4, 94.5, 0.0. This compound is known.[10]

triisopropyl(naphthalen-2-ylethynyl)silane (3o)



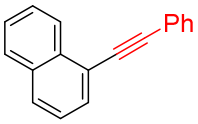
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a colorless oil in 81% yield (50.0 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 7.99 (s, 1 H), 7.79–7.74 (m, 3H), 7.52–7.46 (m, 3H), 1.16–1.10 (m, 21H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 132.9, 132.8, 131.9, 128.8, 127.8, 127.75, 127.73, 126.6, 126.5, 120.9, 107.5, 90.9, 18.7, 11.4. This compound is known.[10]

2-(oct-1-yn-1-yl)naphthalene (3p)



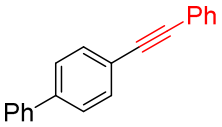
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a pale yellow oil in 86% yield (40.6 mg). ^{1}H NMR (400 M, $CDCl_3$): δ 7.90 (s, 1 H), 7.78–7.72 (m, 3H), 7.46–7.41 (m, 3H), 2.46–2.42 (m, 2H), 1.63 (dt, J_1 = 7.2 Hz, J_2 = 14.4 Hz, 2H), 1.51–1.46 (m, 2H), 1.33 (br, 4H), 0.92–0.89 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 133.1, 132.5, 131.0, 128.8, 127.8, 127.7, 127.6, 126.4, 126.2, 121.5, 90.9, 80.9, 31.5, 28.8, 28.7, 22.6, 19.6, 14.1. This compound is known.[11]

1-(phenylethynyl)naphthalene (3q)



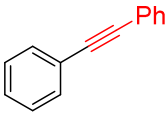
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a pale yellow oil in 80% yield (36.5 mg). ^{1}H NMR (400 M, $CDCl_3$): 8.45 (d, J = 8.4 Hz, 1H), 7.81–7.73 (m, 3H), 7.63 (d, J = 6.8 Hz, 2H), 7.58–7.54 (m, 1H), 7.50–7.46 (m, 1H), 7.41–7.37 (m, 1H), 7.36–7.31 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 133.4, 133.3, 131.8, 130.5, 128.9, 128.6, 128.5, 128.5, 126.9, 126.6, 126.4, 125.4, 123.5, 121.0, 94.5, 87.8. This compound is known.[12]

4-(phenylethynyl)-1,1'-biphenyl (3r)



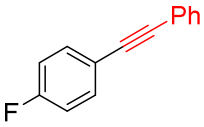
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 60% yield (30.5 mg). ^{1}H NMR (400 M, $CDCl_3$): 7.61–7.54 (m, 8H), 7.46–7.42 (m, 2H), 7.37–7.34 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 141.0, 140.4, 132.1, 131.7, 128.9, 128.4, 128.3, 127.7, 127.1, 123.3, 122.2, 90.1, 89.3. This compound is known.[13]

1,2-diphenylethyne (3s)



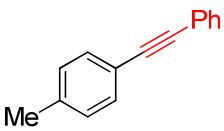
The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 68% yield (24.2 mg). ^{1}H NMR (400 M, $CDCl_3$): 7.54–7.52 (m, 4H), 7.34–7.30 (m, 6H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 131.6, 128.4, 128.3, 123.3, 89.4. This compound is known.[13]

1-fluoro-4-(phenylethynyl)benzene (3t)



The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 63% yield (24.7 mg). ^{1}H NMR (400 M, $CDCl_3$): 7.51–7.48 (m, 4H), 7.33–7.32 (m, 3H), 7.02 (t, J = 8.0 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 163.5 (d, $J_{C\text{-}F}$ = 248.0 Hz), 133.5 (d, $J_{C\text{-}F}$ = 8.3 Hz), 131.6, 128.4, 128.4, 123.1, 119.4 (d, $J_{C\text{-}F}$ = 3.5 Hz), 115.7 (d, $J_{C\text{-}F}$ = 21.9 Hz), 89.1, 88.4. ^{19}F NMR (376 MHz, $CDCl_3$): δ -110.88; This compound is known.[13]

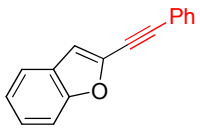
1-methyl-4-(phenylethynyl)benzene (3u)



The title compound was prepared according to the general procedure and purified by column chromatography on

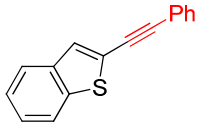
silica gel and eluted with petroleum ether to afford a white solid in 32% yield (12.3 mg). ^{1}H NMR (400 M, $CDCl_3$): 7.52 (d, J = 6.8 Hz, 2H), 7.42 (d, J = 7.6 Hz, 2H), 7.33–7.29 (m, 3H), 7.15 (d, J = 7.6 Hz, 2H), 2.36 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 138.4, 131.6, 131.5, 129.1, 128.3, 128.1, 123.5, 120.2, 89.6, 88.7, 21.6. This compound is known.[11]

2-(phenylethynyl)benzofuran (3w)



The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 76% yield (33.2 mg). ^{1}H NMR (400 M, $CDCl_3$): 7.49 (br, 3H), 7.39 (d, J = 8.0 Hz, 1H), 7.29–7.25 (m, 4H), 7.18–7.15 (m, 1H), 6.92 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 154.9, 138.8, 131.7, 129.2, 128.5, 127.8, 125.6, 123.3, 121.9, 121.2, 111.6, 111.3, 95.1, 79.7. This compound is known.[6]

2-(phenylethynyl)benzo[b]thiophene (3x)



The title compound was prepared according to the general procedure and purified by column chromatography on silica gel and eluted with petroleum ether to afford a white solid in 83% yield (38.9 mg). ^{1}H NMR (400 M, $CDCl_3$): 7.75 (br, 2H), 7.54 (br, 2H), 7.49 (s, 1H), 7.35 (br, 5H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 140.3, 139.2, 131.6, 128.8, 128.7, 128.5, 125.4, 124.8, 123.8, 123.3, 122.6, 122.0, 94.9, 83.0. This compound is known.[6]

4. References

(1) Rao, M. L. N.; Jadhav, D. N.; Dasgupta, P. *Org. Lett*. **2010**, *12*, 2048.

(2) Duchoslavová, Z.; Sivkova, R.; Hanková, V.; Sedláček, J.; Svoboda, J.; Vohlídal, J.; Zedník, J. *Macromol. Chem. Phys*, **2011**, *212*, 1802.

(3) Ho, T.-I.; Elangovan, A.; Hsu, H.-Y.; Yang, S.-W. *J. Phys. Chem. B*. **2005**, *109*, 8626.

(4) Torigoe, T.; Ohmura, T.; Suginome, M. *Chem. Eur. J.* **2016**, *22*, 10415.

(5) Yoshihiro, J.; Hisayasu, M. . Jpn Kokai Tokkyo Koho JP 2006341390; 2006.

(6) Katritzky, A. R.; Abdel-Fattah, A. A. A.; Wang, M. *J. Org. Chem*. **2002**, *67*, 7526.

(7) He, T.; Ge, Y.; Wu, L.; Fu, H.; Chen, H.; Li, X. *Cuihua Xuebao*, **2011**, *32*, 1376.

(8) Pan, C.; Luo, F.; Wang, W.; Ye, Z.; Liu, M. *J. Chem. Res*. **2009**, *8*, 478.

(9) Stein, A. L.; da Rocha, J.; Menezes, P. H.; Zeni, G. *Eur. J. Org. Chem*. **2010**, 705.

(10) Srimontree, W.; Chatupheeraphat, A.; Liao, H.-H.; Rueping, M. *Org. Lett*. **2017**, *19*, 3091.

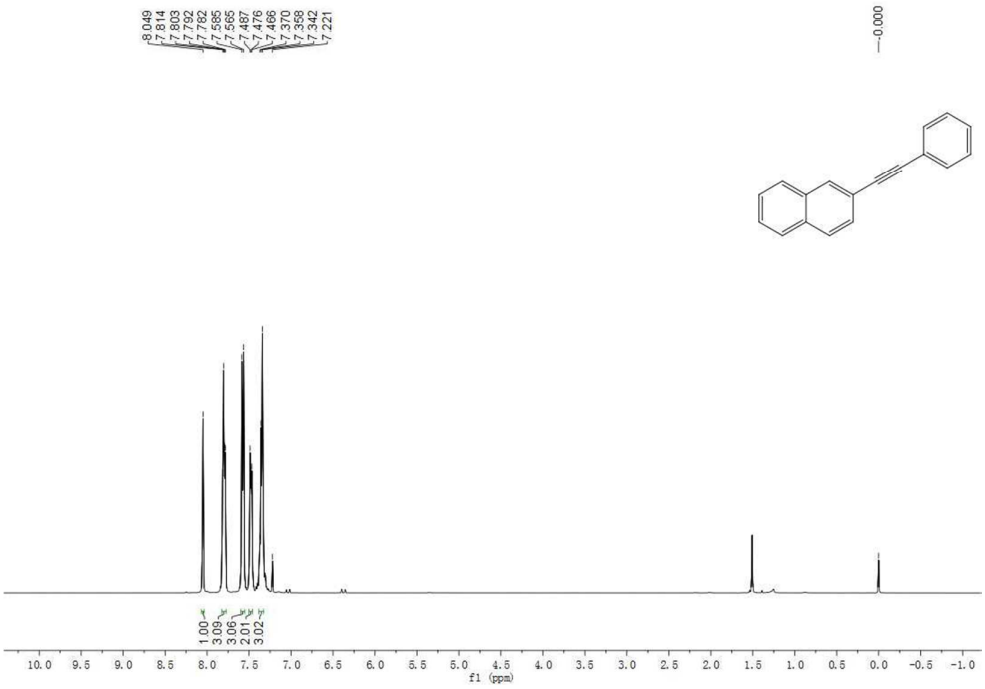
(11) Penney, J. M.; Miller, J. A. *Tetrahedron Lett*. **2004**, *45*, 4989.

(12) Malapit, C. A.; Ichiishi, N.; Sanford, M. S. *Org. Lett*. **2017**, *19*, 4142.

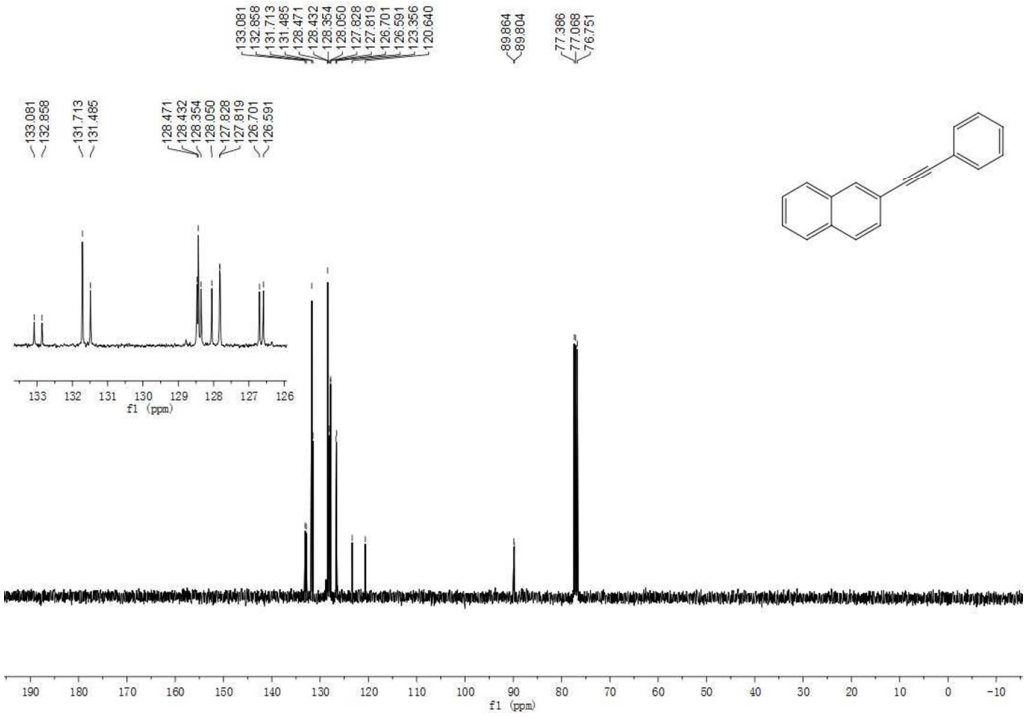
(13) Raja, G. C. E.; Irudayanathan, F. M.; Kim, H.-S.; Kim, J.; Lee, S. *J. Org. Chem*. **2016**, *81*, 5244.

5. Copies of ^{1}H, ^{13}C NMR Spectra of the Products

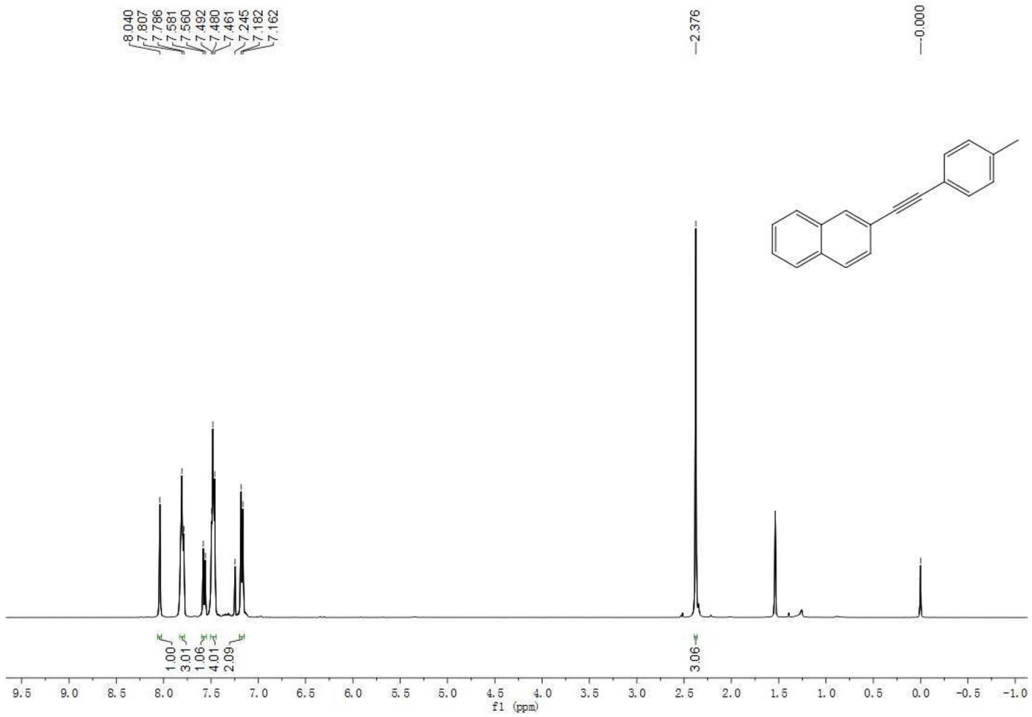
^{1}H NMR Spectrum of 2-(phenylethynyl)naphthalene **(3a)**



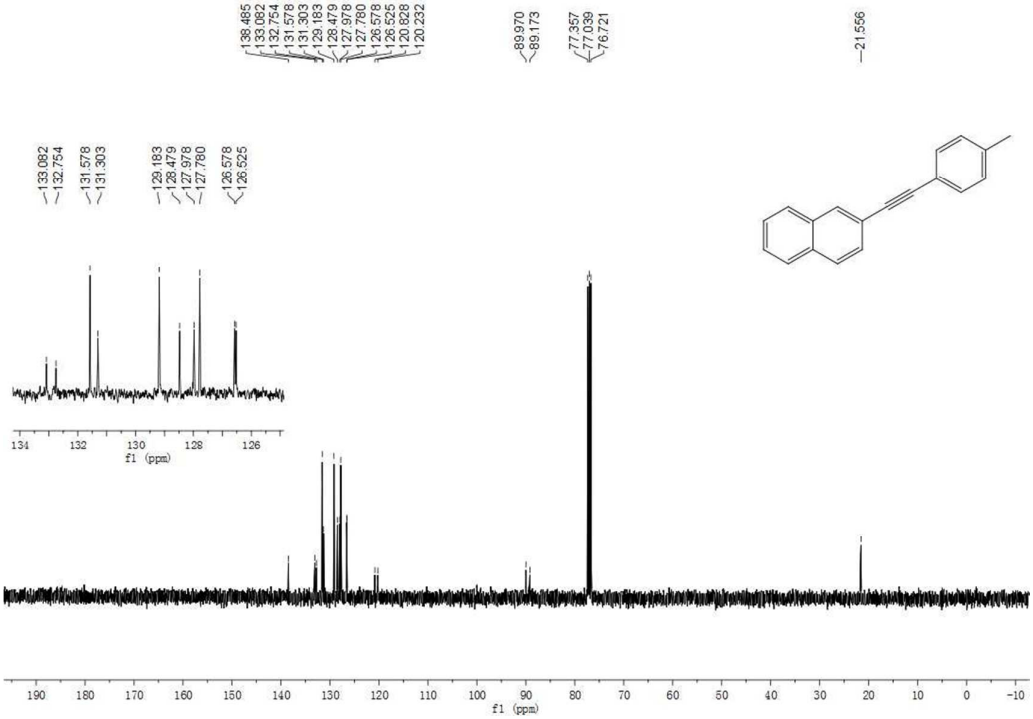
^{13}C NMR Spectrum of 2-(phenylethynyl)naphthalene **(3a)**



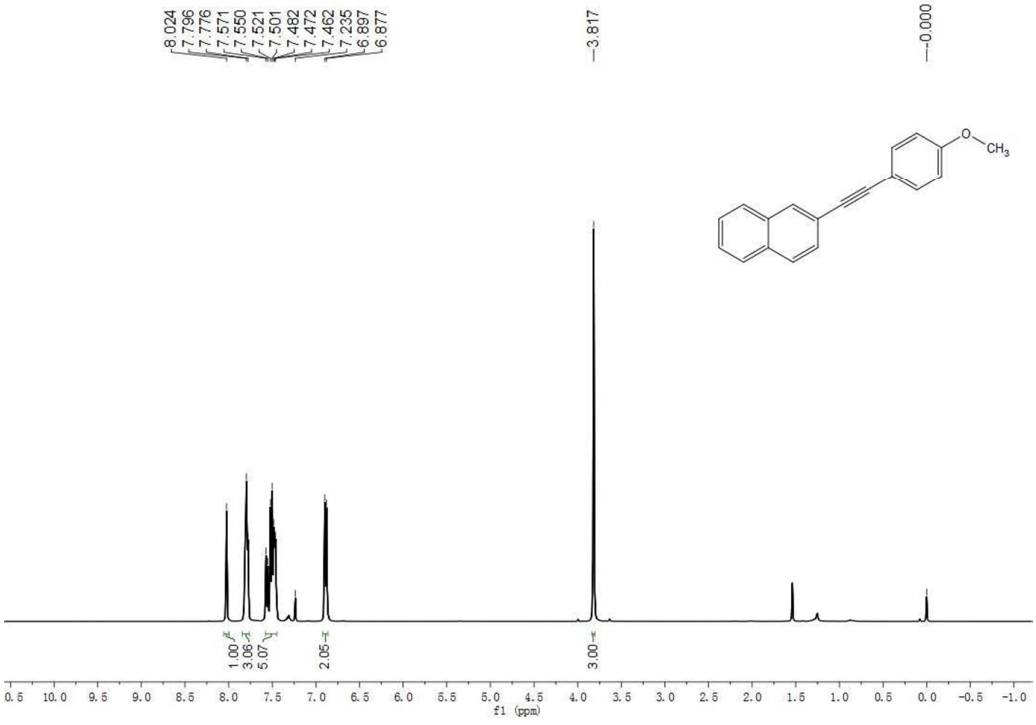
^{1}H NMR Spectrum of 2-(p-tolylethynyl)naphthalene **(3b)**



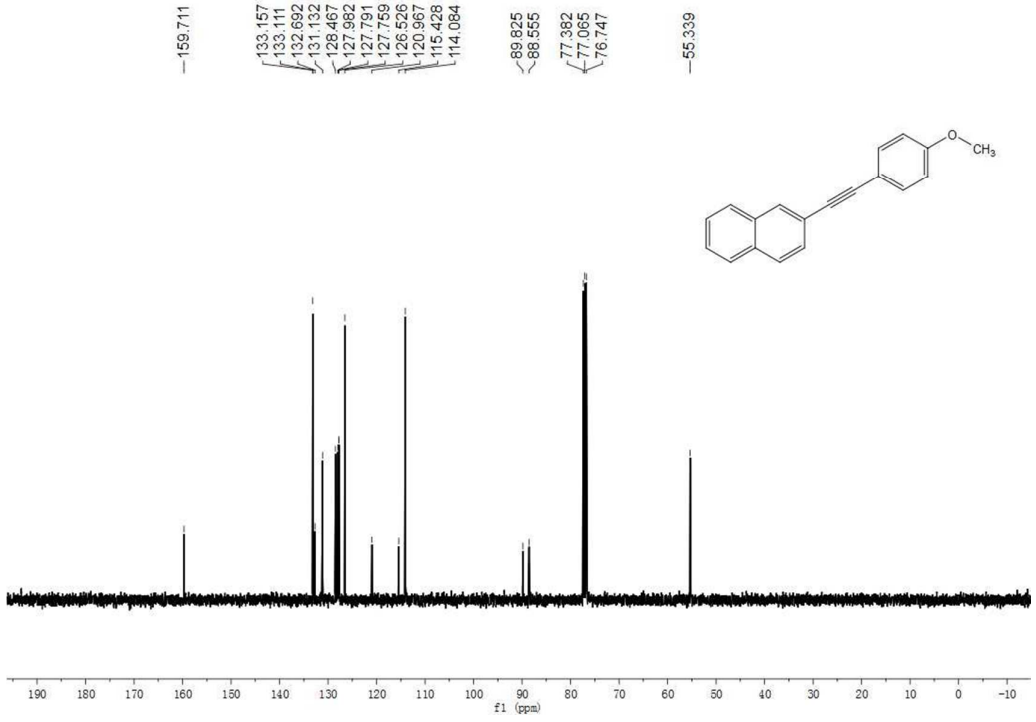
^{13}C NMR Spectrum of 2-(p-tolylethynyl)naphthalene **(3b)**



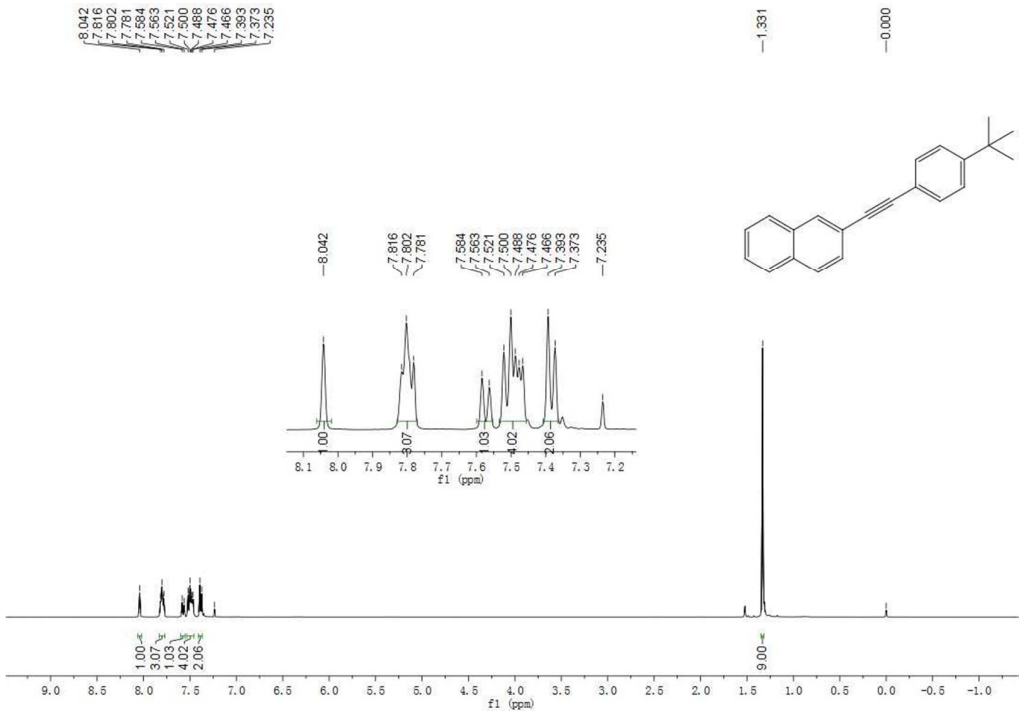
^{1}H NMR Spectrum of 2-((4-methoxyphenyl)ethynyl)naphthalene **(3c)**



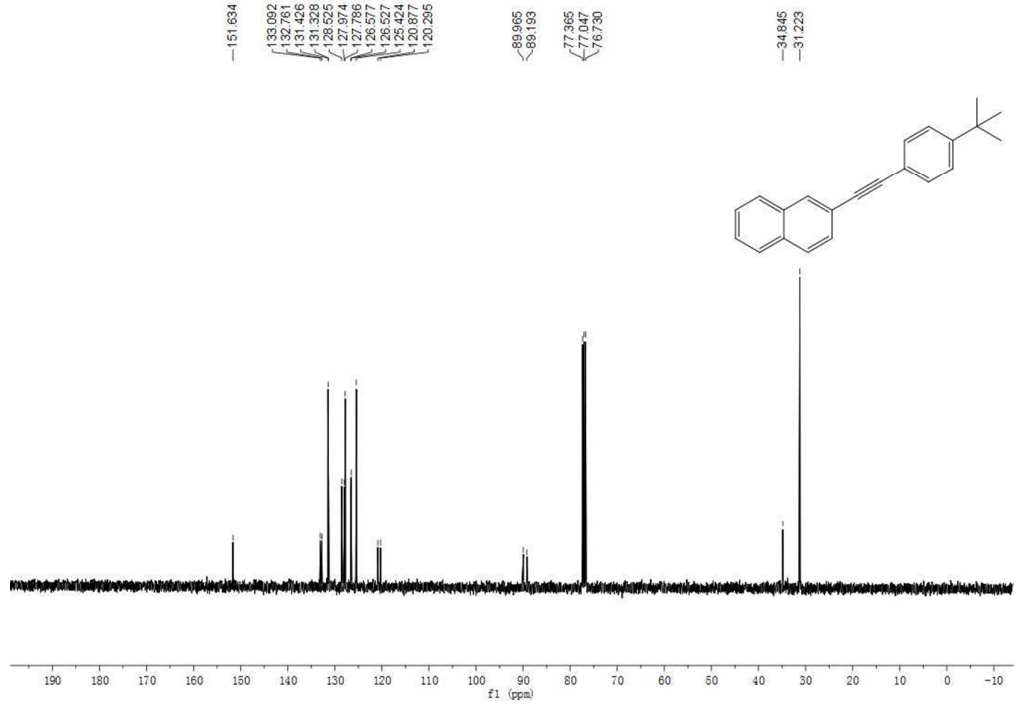
^{13}C NMR Spectrum of 2-((4-methoxyphenyl)ethynyl)naphthalene **(3c)**



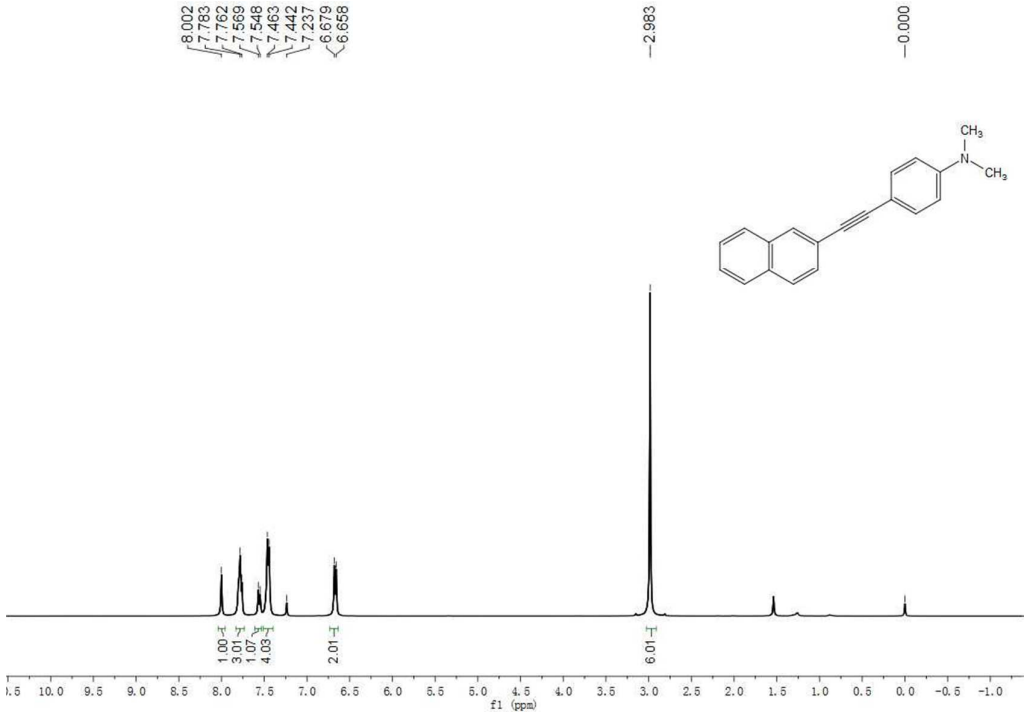
^{1}H NMR Spectrum of 2-((4-(tert-butyl)phenyl)ethynyl)naphthalene **(3d)**



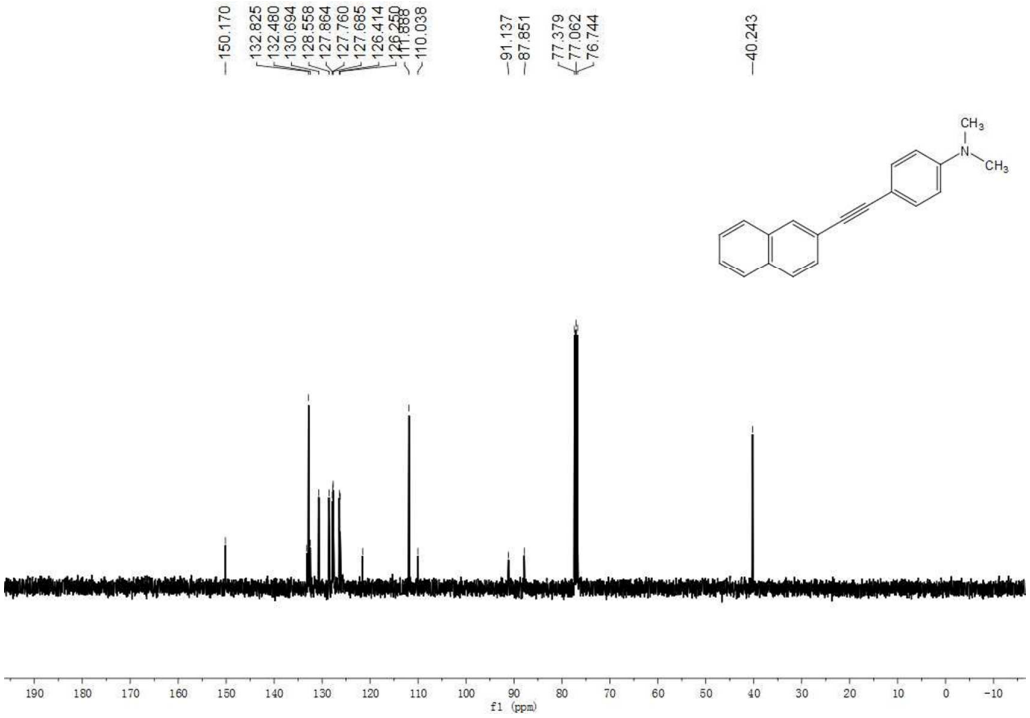
^{13}C NMR Spectrum of 2-((4-(tert-butyl)phenyl)ethynyl)naphthalene **(3d)**



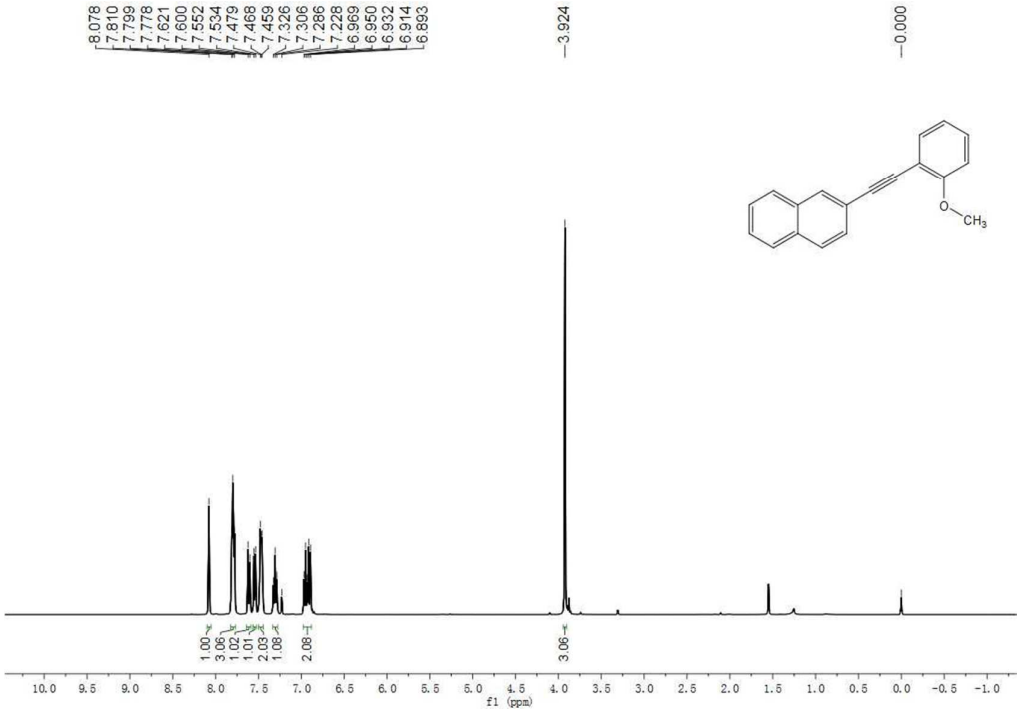
^{1}H NMR Spectrum of N,N-dimethyl-4-(naphthalen-2-ylethynyl)aniline **(3e)**



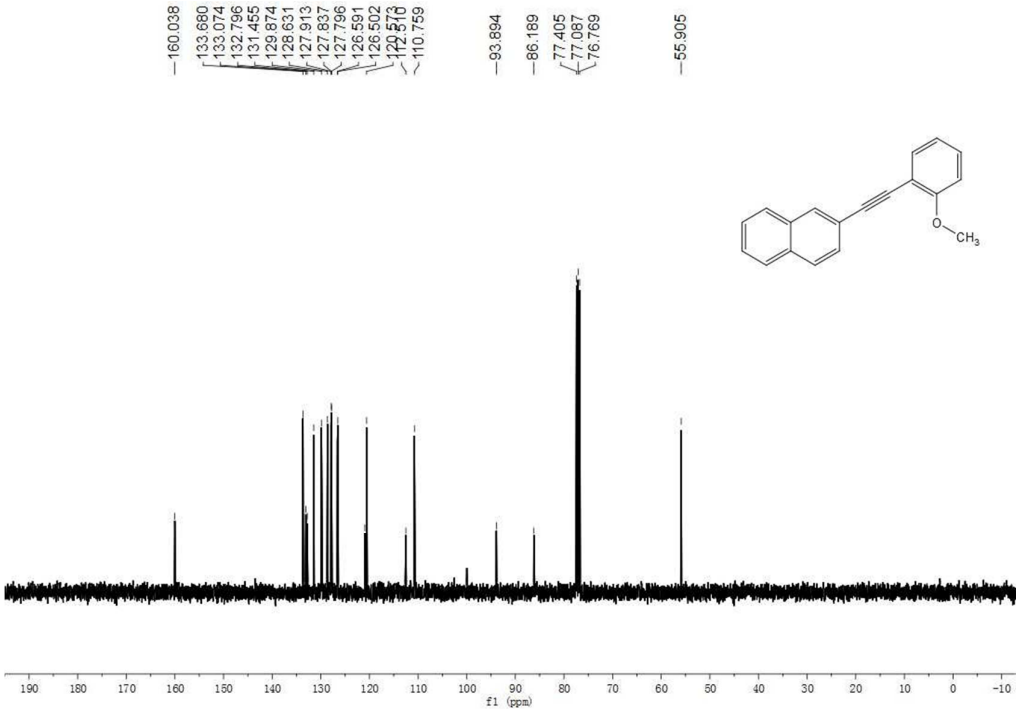
^{13}C NMR Spectrum of N,N-dimethyl-4-(naphthalen-2-ylethynyl)aniline **(3e)**



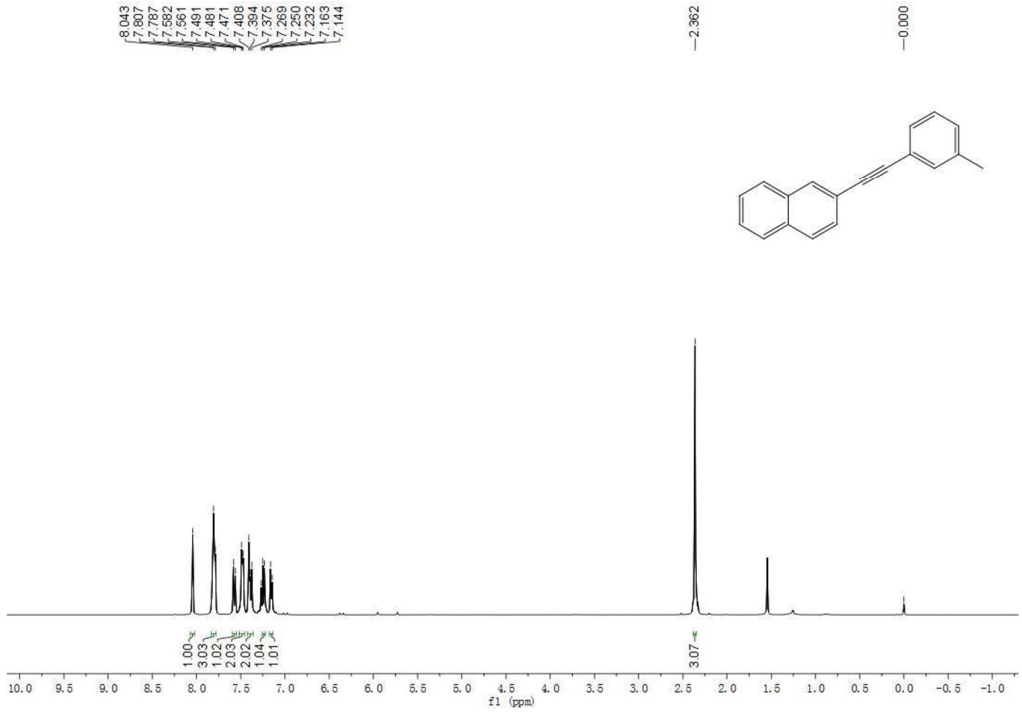
^{1}H NMR Spectrum of 2-((2-methoxyphenyl)ethynyl)naphthalene **(3f)**



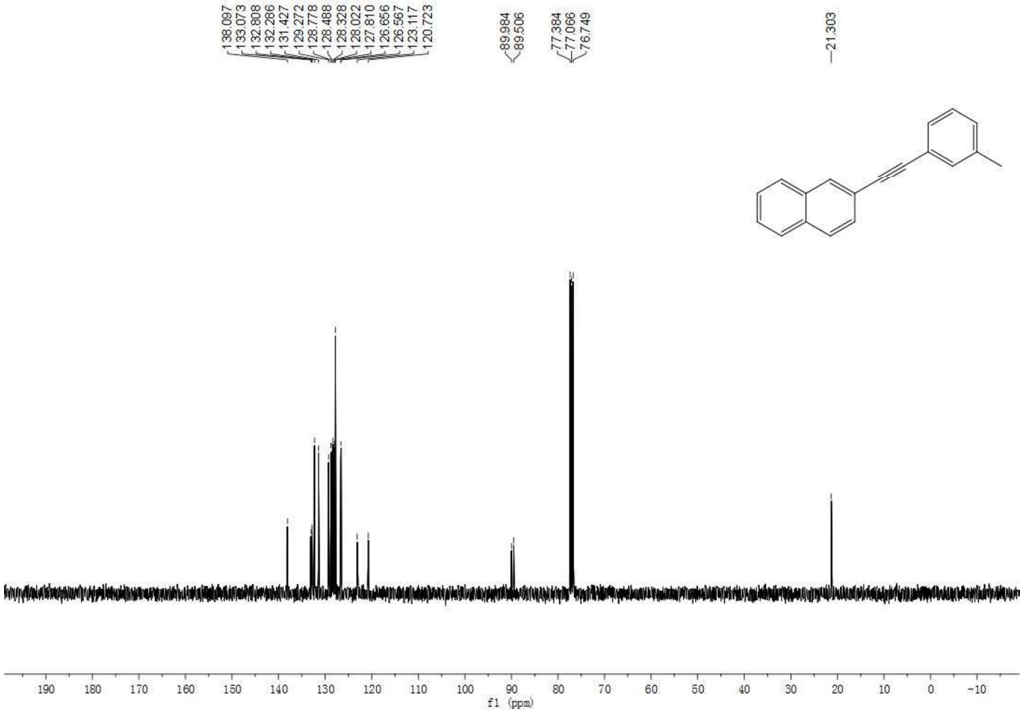
^{13}C NMR Spectrum of 2-((2-methoxyphenyl)ethynyl)naphthalene **(3f)**



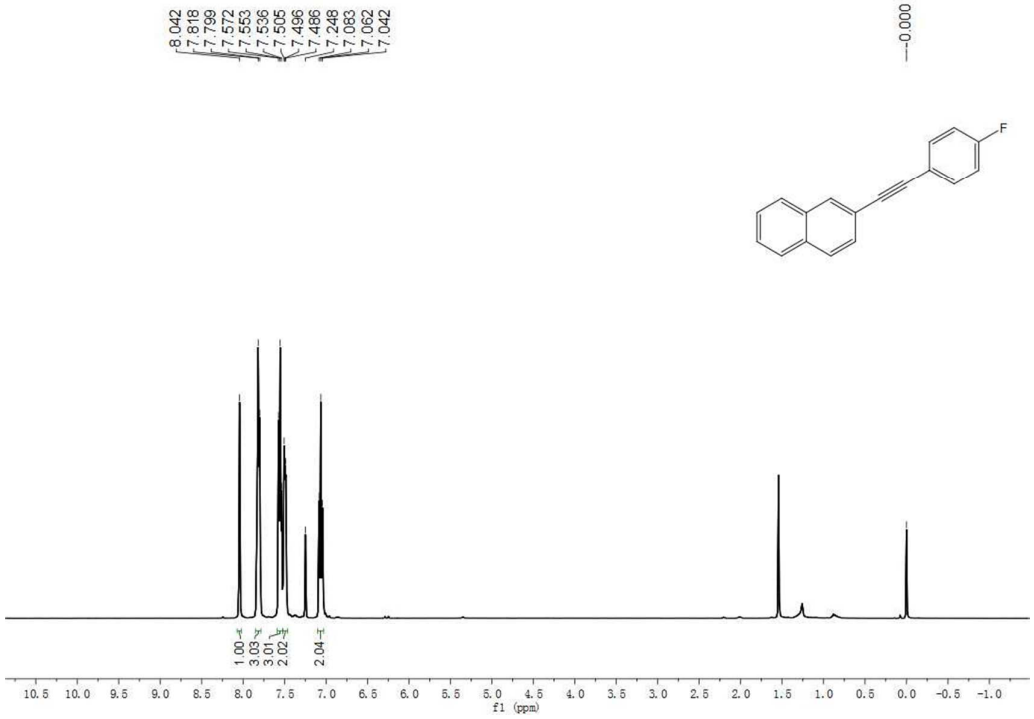
^{1}H NMR Spectrum of 2-(m-tolylethynyl)naphthalene **(3g)**



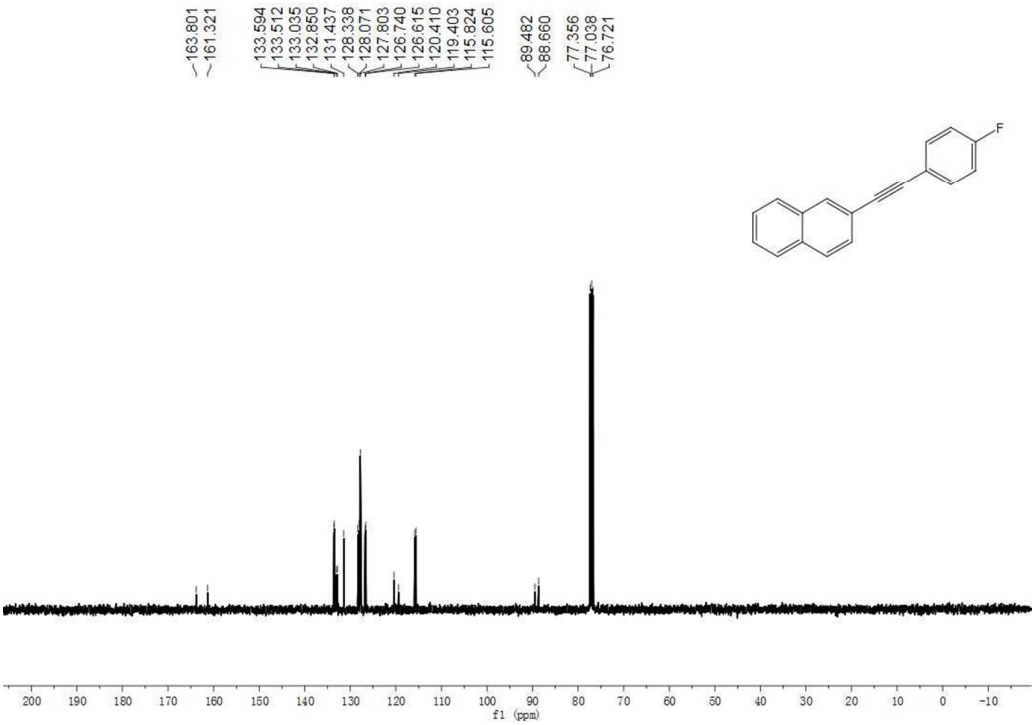
^{13}C NMR Spectrum of 2-(m-tolylethynyl)naphthalene **(3g)**



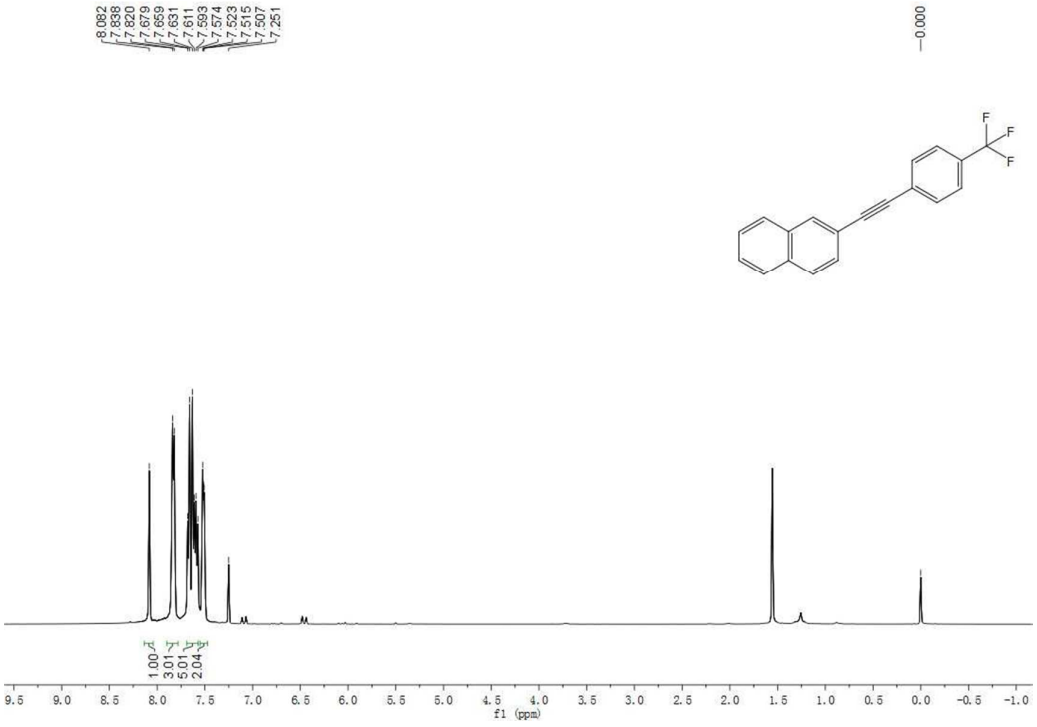
^{1}H NMR Spectrum of 2-((4-fluorophenyl)ethynyl)naphthalene **(3h)**



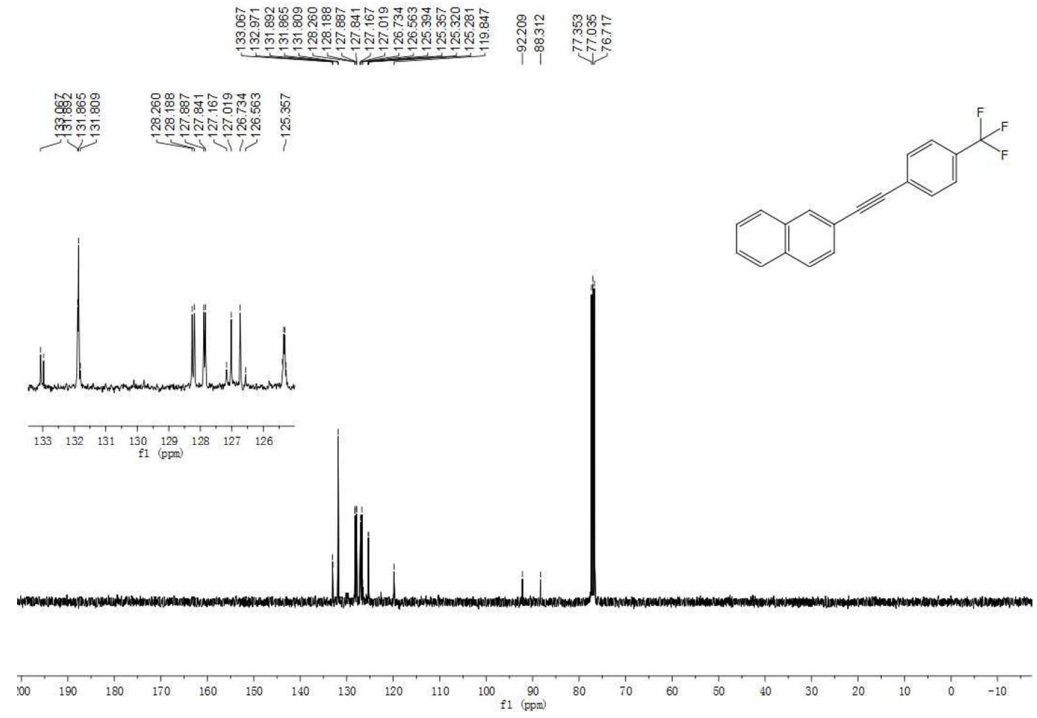
^{13}C NMR Spectrum of 2-((4-fluorophenyl)ethynyl)naphthalene **(3h)**



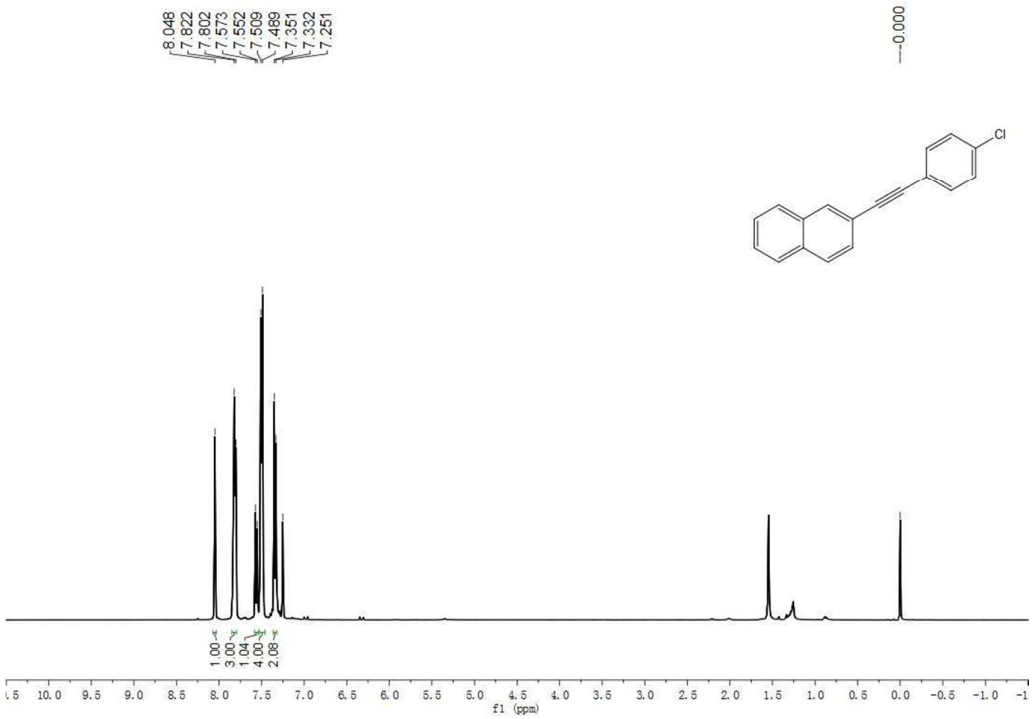
^{1}H NMR Spectrum of 2-((4-(trifluoromethyl)phenyl)ethynyl)naphthalene **(3i)**



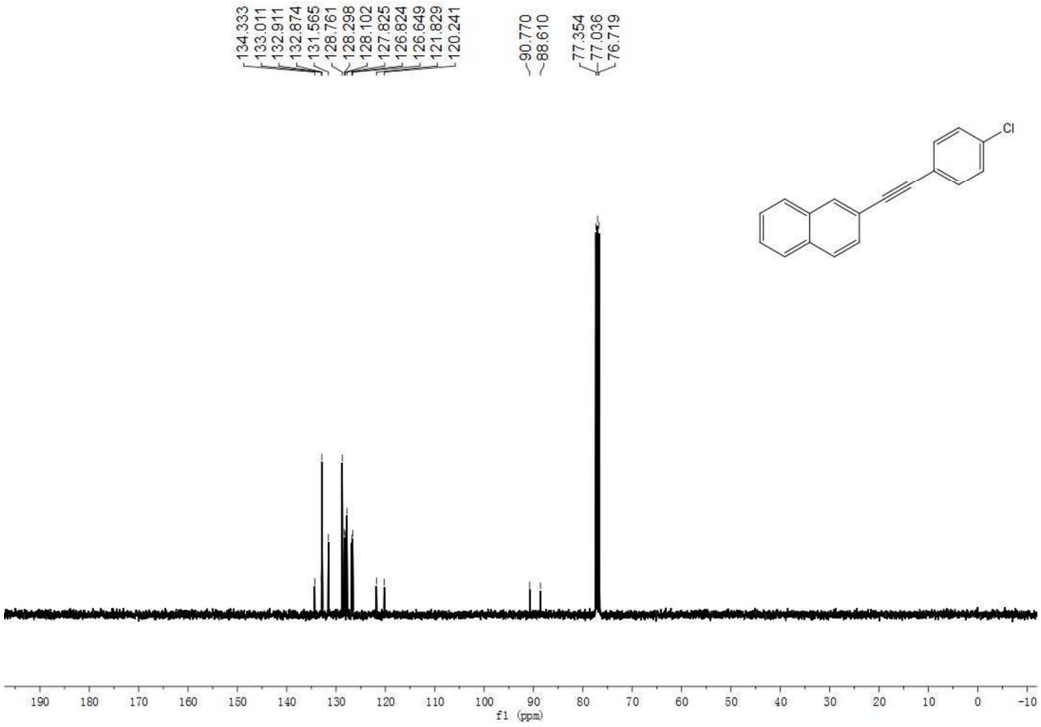
^{13}C NMR Spectrum of 2-((4-(trifluoromethyl)phenyl)ethynyl)naphthalene **(3i)**



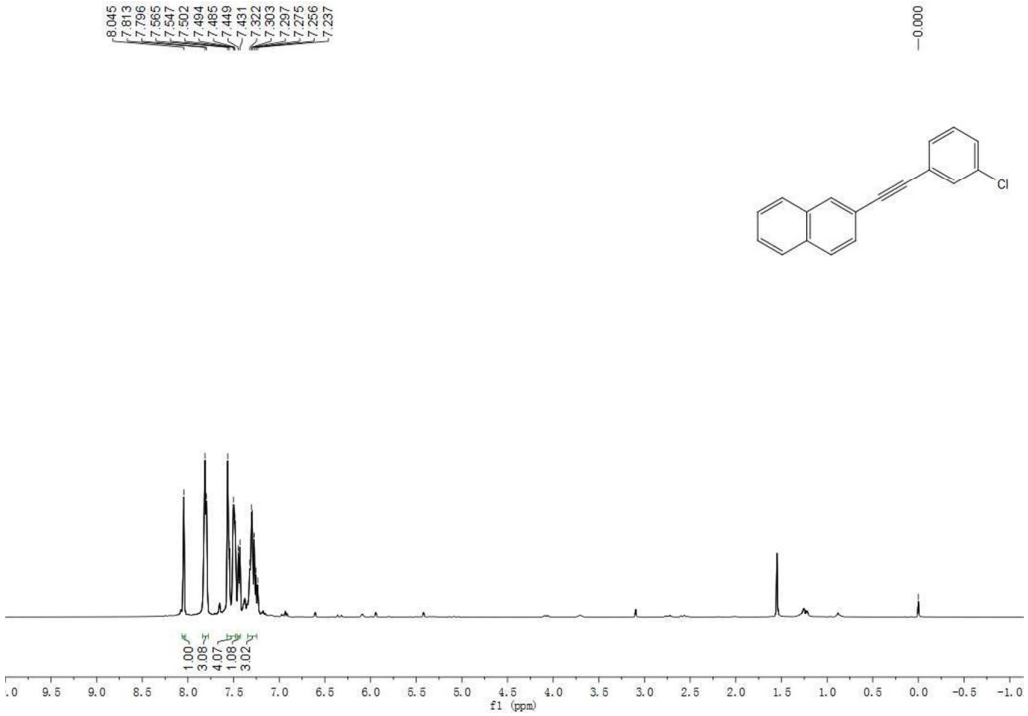
^{1}H NMR Spectrum of 2-((4-chlorophenyl)ethynyl)naphthalene **(3j)**



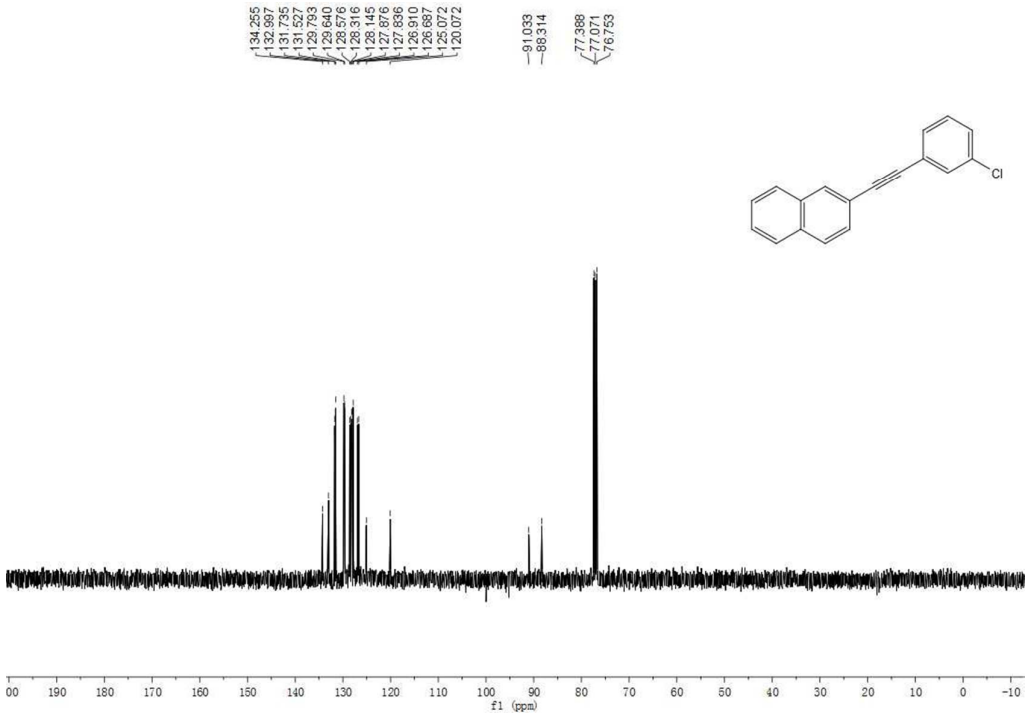
^{13}C NMR Spectrum of 2-((4-chlorophenyl)ethynyl)naphthalene **(3j)**



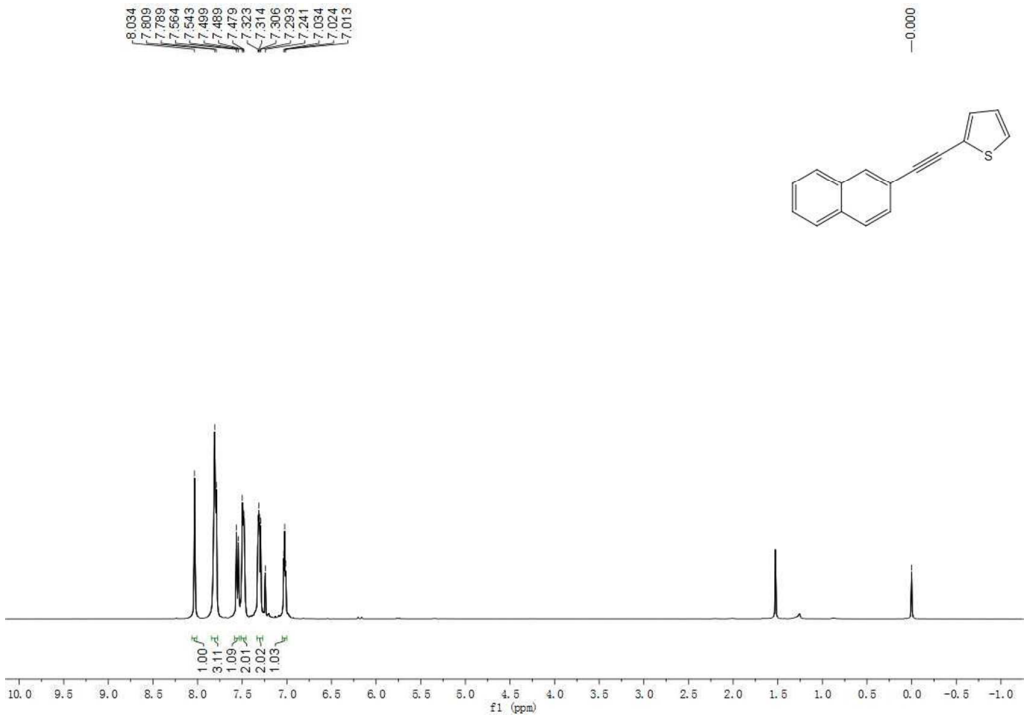
^{1}H NMR Spectrum of 2-((3-chlorophenyl)ethynyl)naphthalene **(3k)**



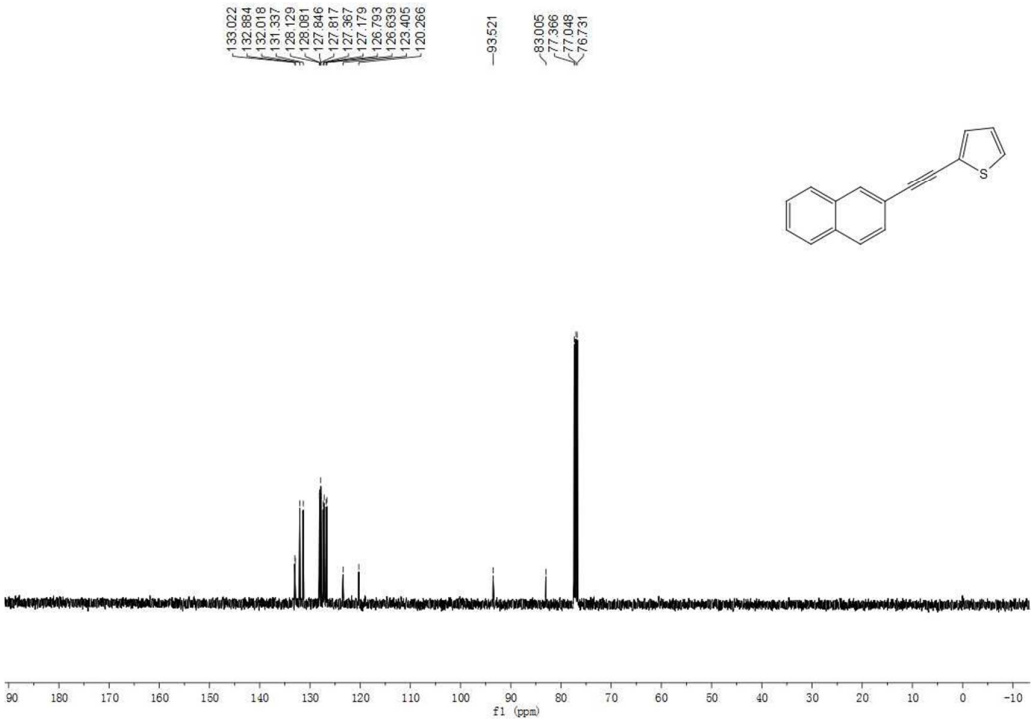
^{13}C NMR Spectrum of 2-((3-chlorophenyl)ethynyl)naphthalene **(3k)**



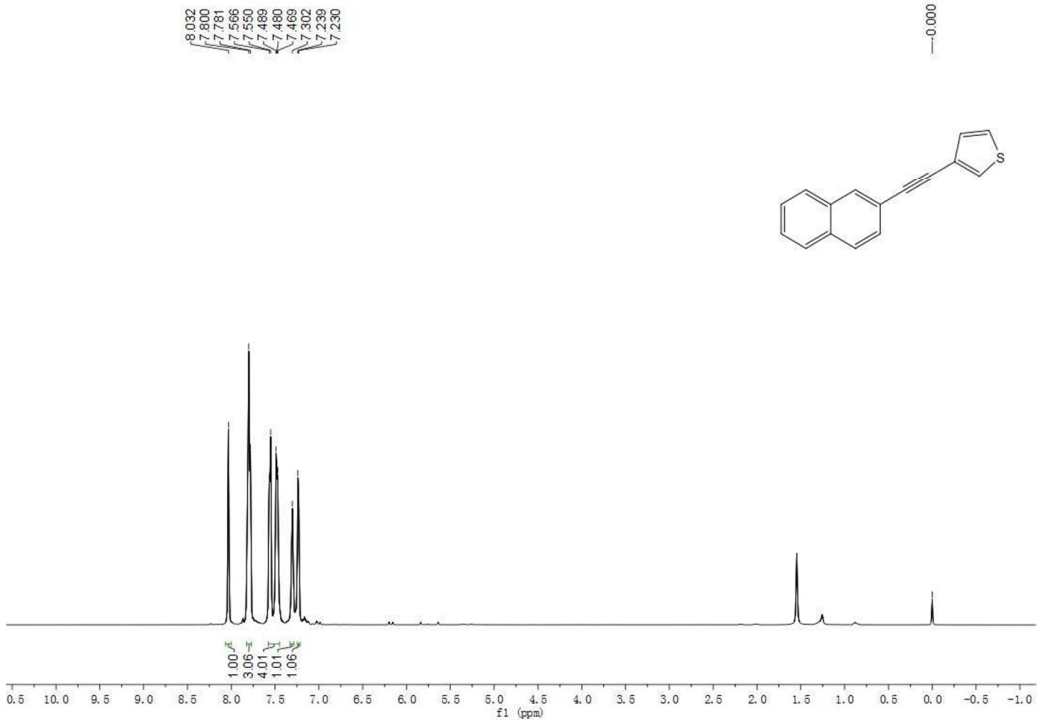
^{1}H NMR Spectrum of 2-(naphthalen-2-ylethynyl)thiophene **(3l)**



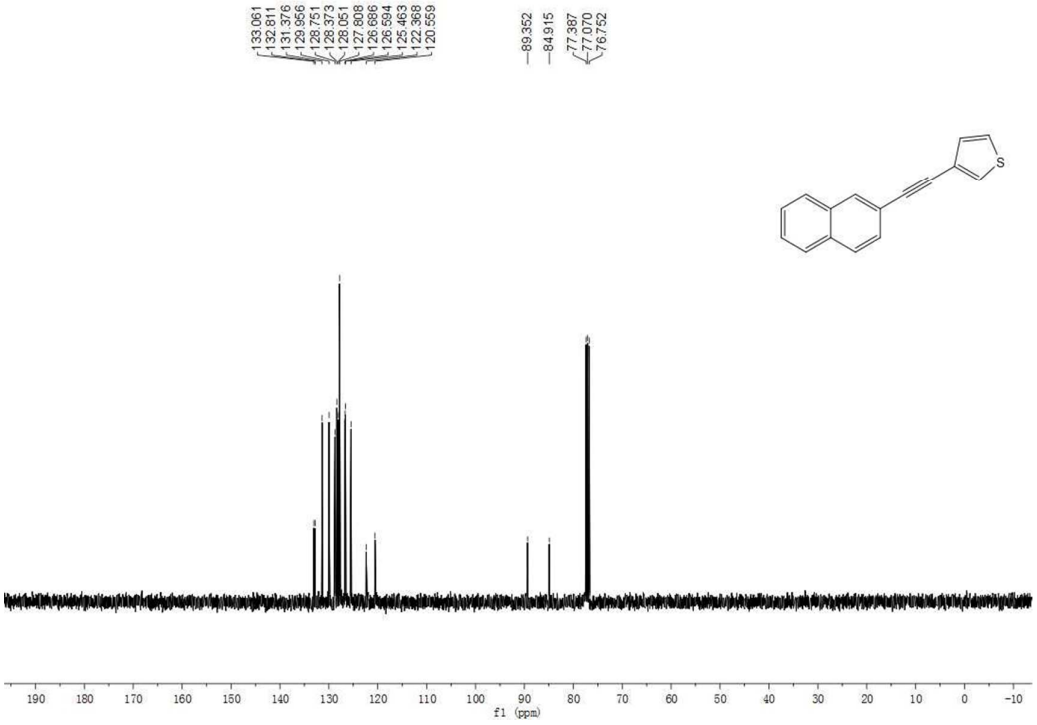
^{13}C NMR Spectrum of 2-(naphthalen-2-ylethynyl)thiophene **(3l)**



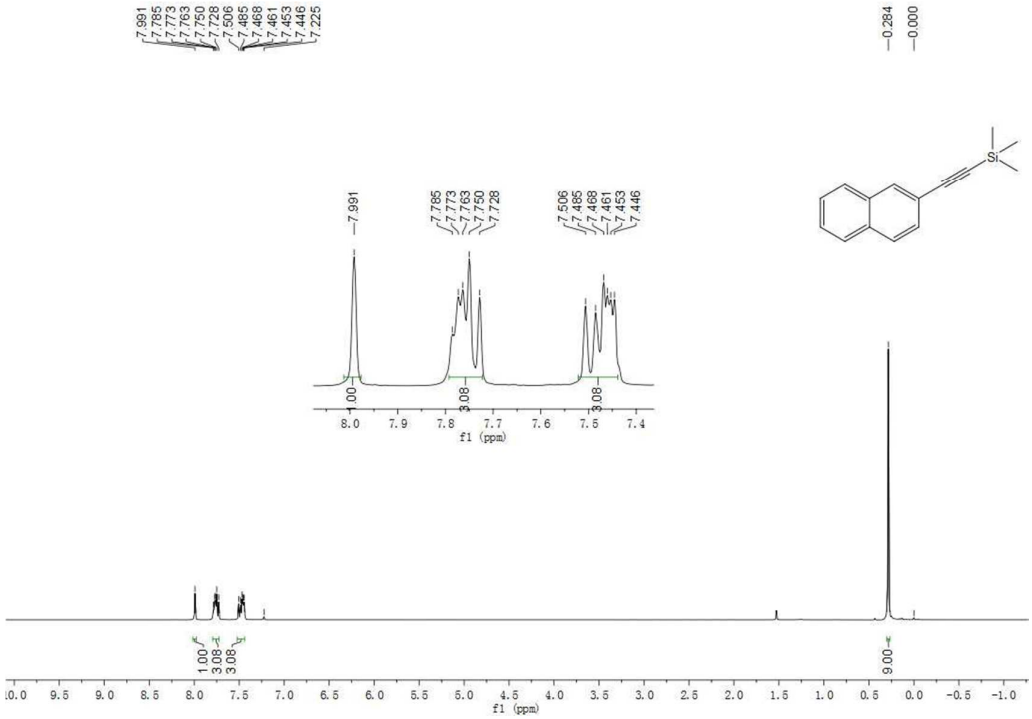
^{1}H NMR Spectrum of 3-(naphthalen-2-ylethynyl)thiophene **(3m)**



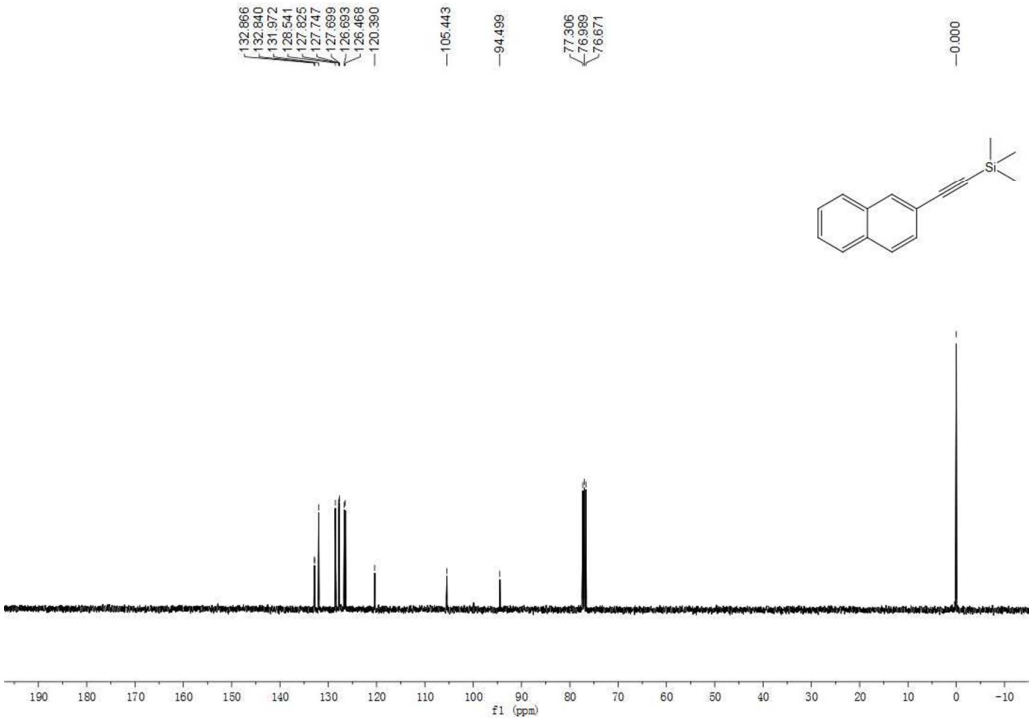
^{13}C NMR Spectrum of 3-(naphthalen-2-ylethynyl)thiophene **(3m)**



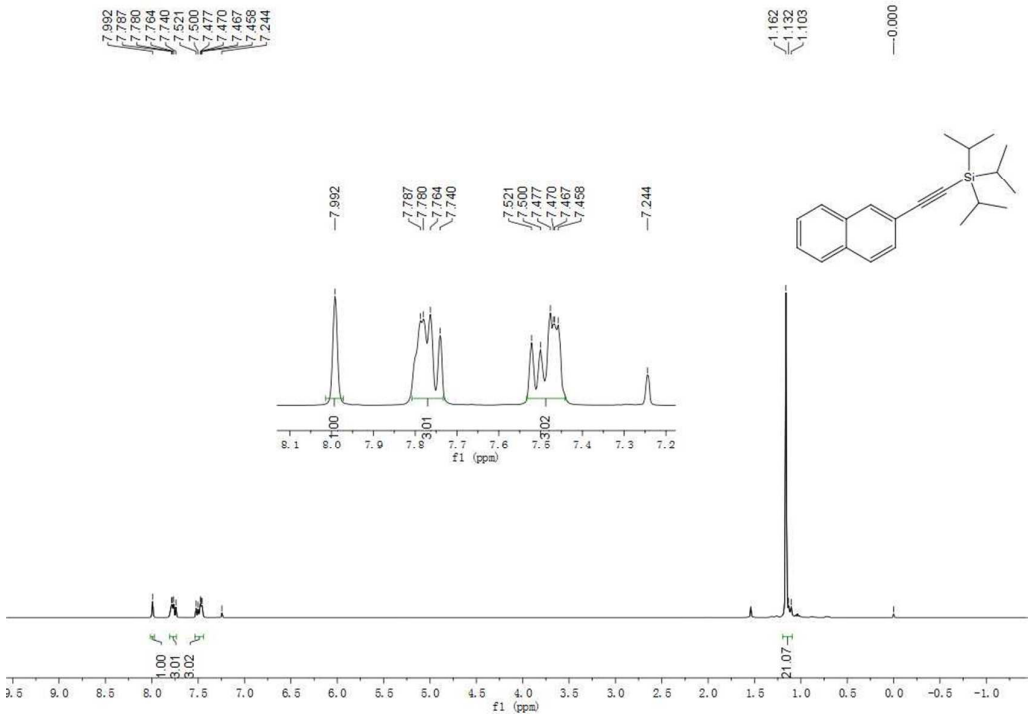
[1]H NMR Spectrum of trimethyl(naphthalen-2-ylethynyl)silane **(3n)**



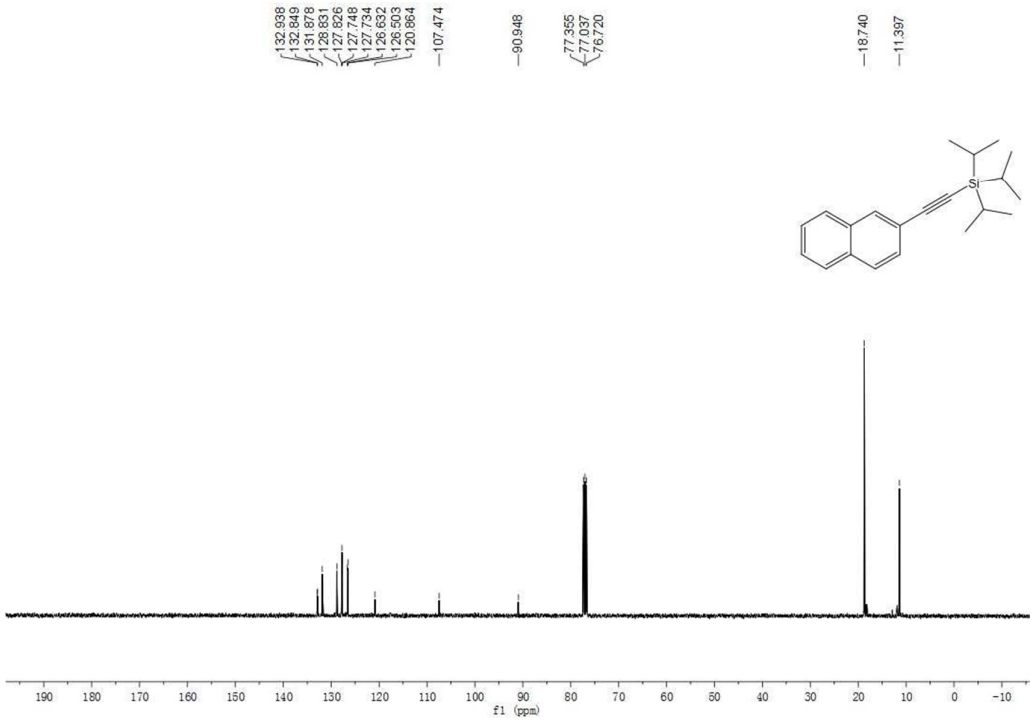
[13]C NMR Spectrum of trimethyl(naphthalen-2-ylethynyl)silane **(3n)**



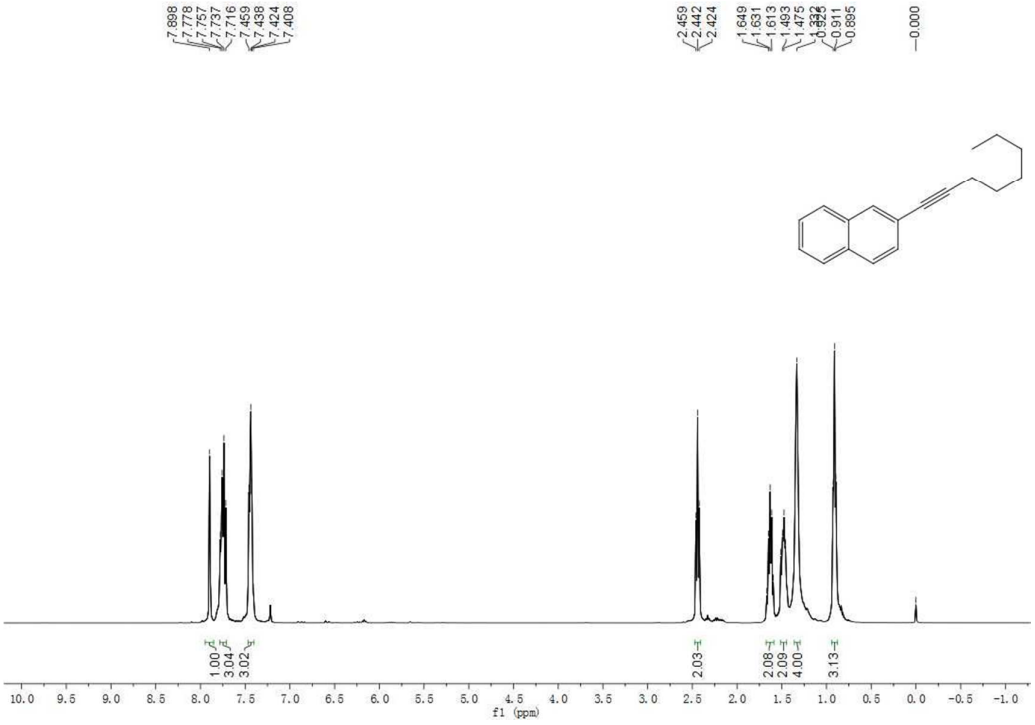
^{1}H NMR Spectrum of triisopropyl(naphthalen-2-ylethynyl)silane **(3o)**



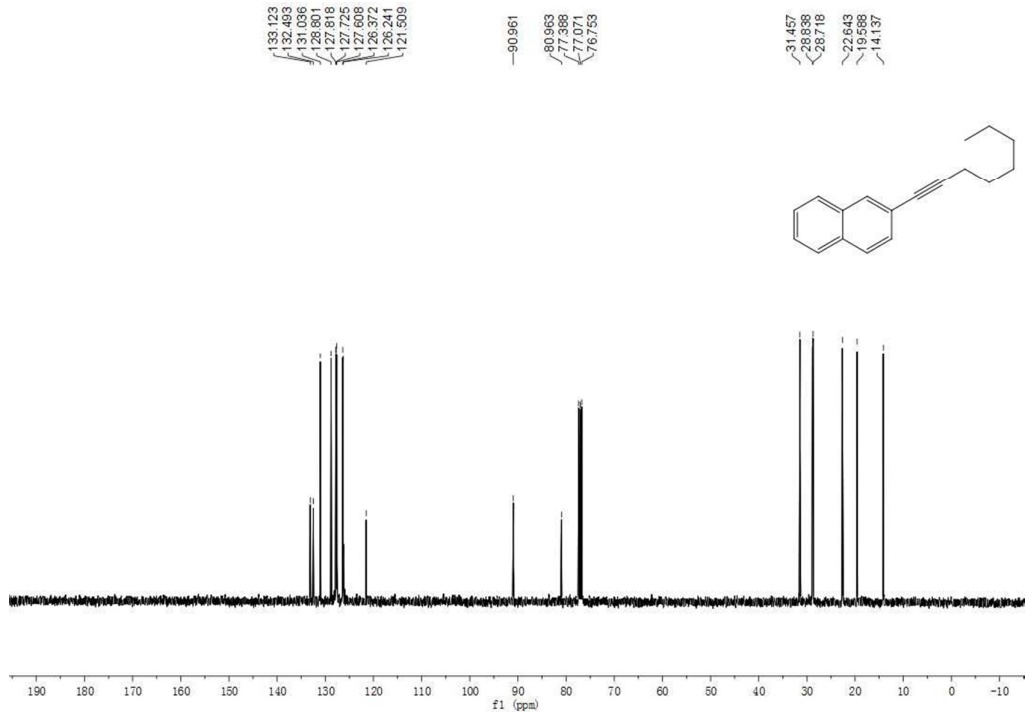
^{13}C NMR Spectrum of triisopropyl(naphthalen-2-ylethynyl)silane **(3o)**



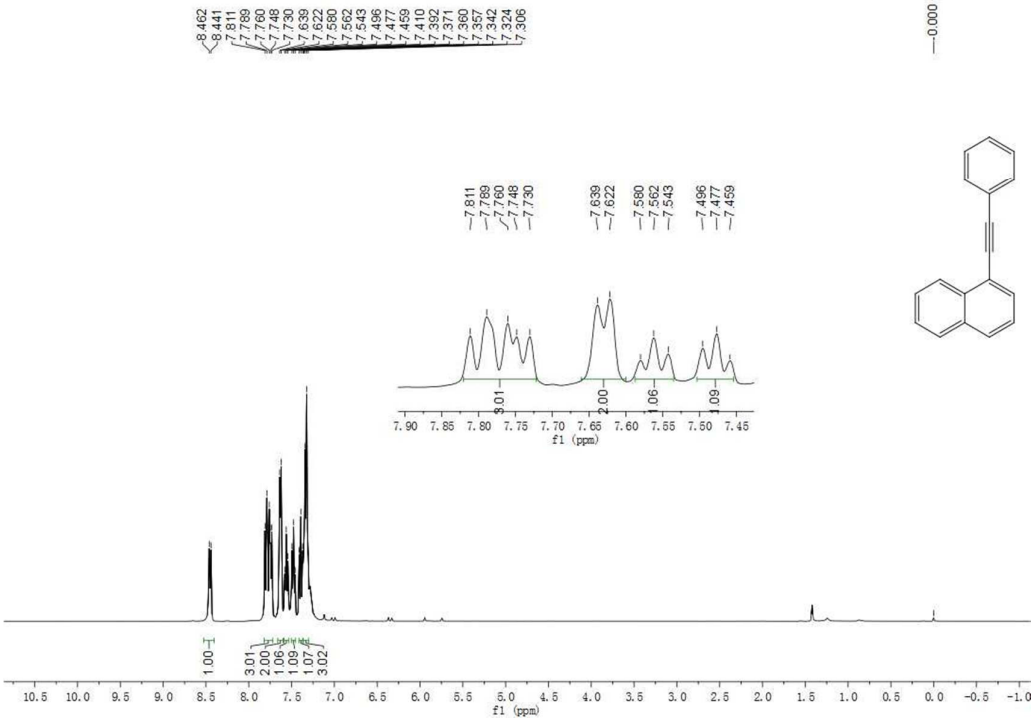
^{1}H NMR Spectrum of 2-(oct-1-yn-1-yl)naphthalene **(3p)**



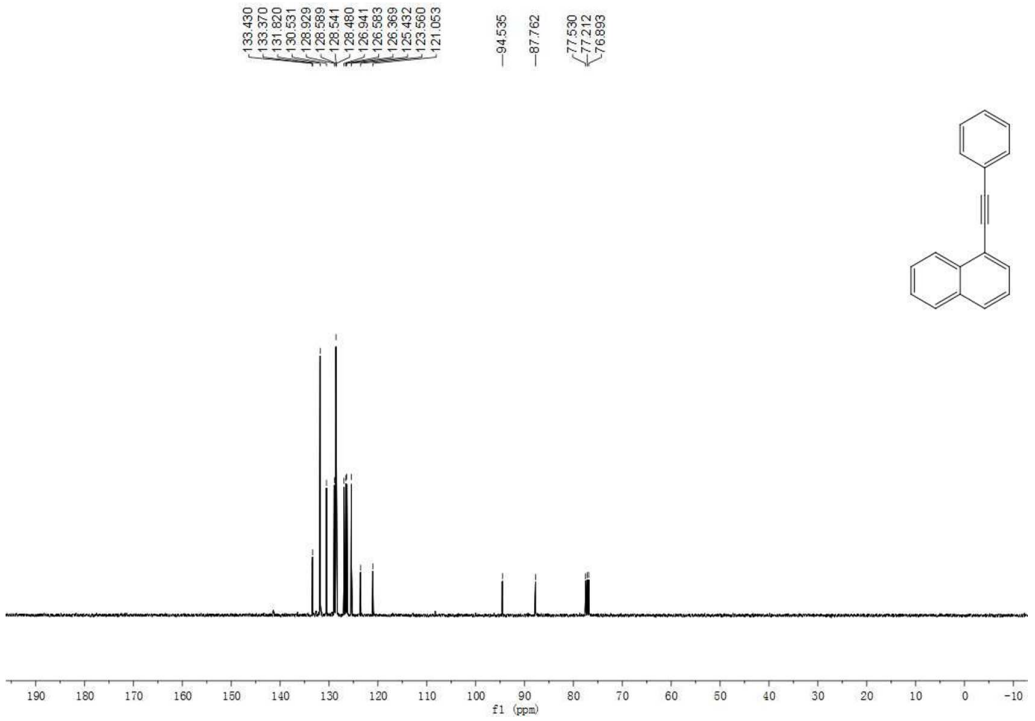
^{13}C NMR Spectrum of 2-(oct-1-yn-1-yl)naphthalene **(3p)**



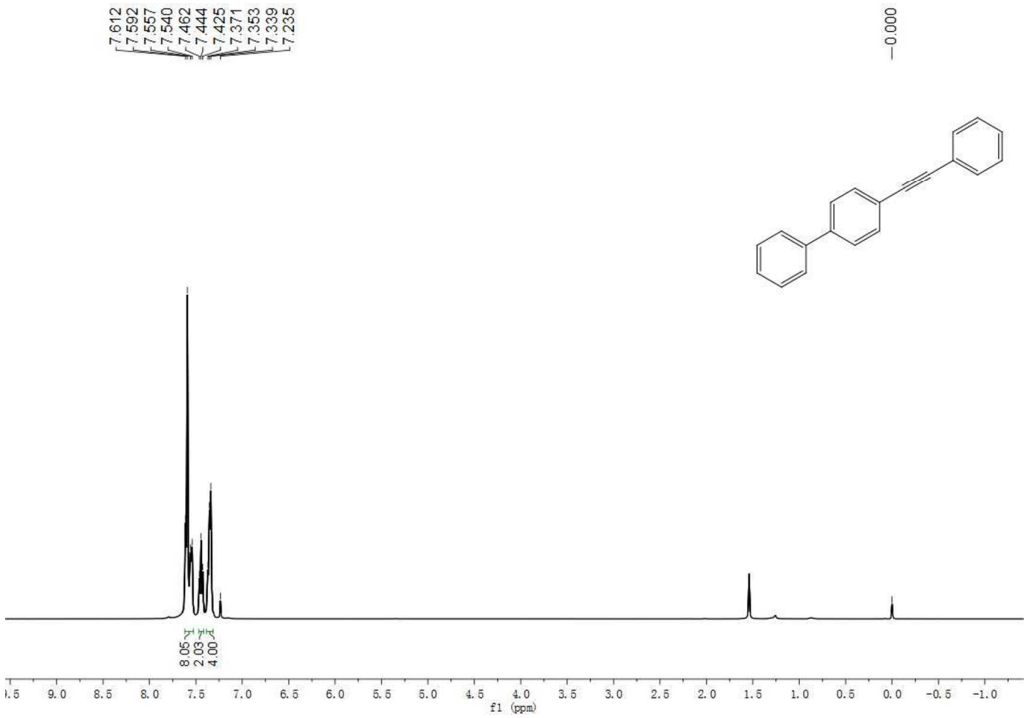
^{1}H NMR Spectrum of 1-(phenylethynyl)naphthalene **(3q)**



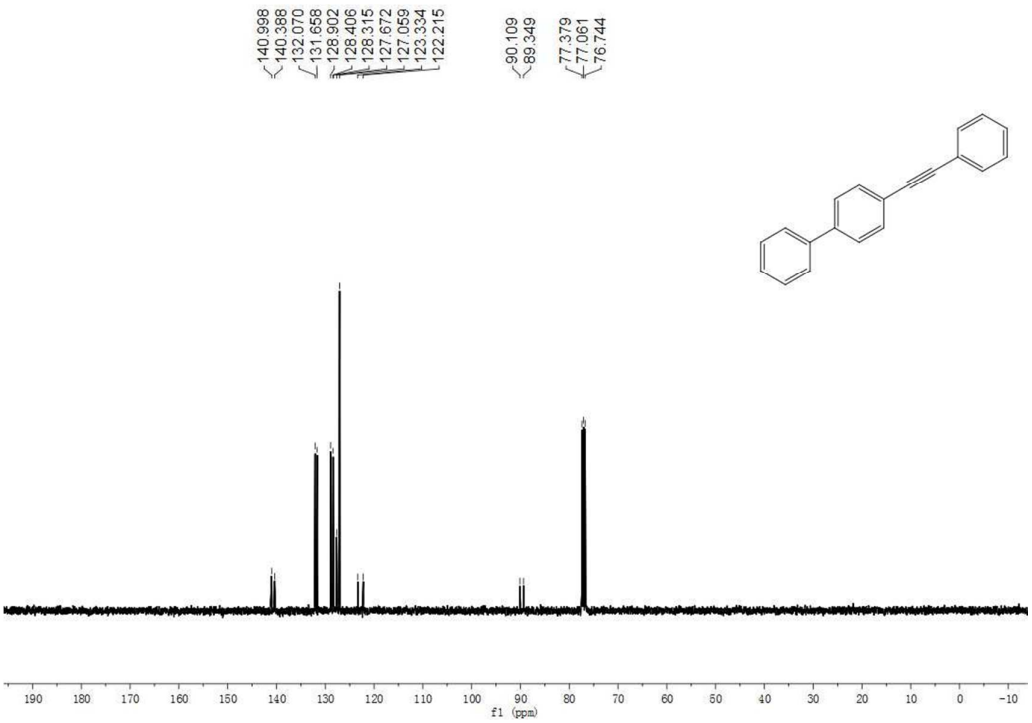
^{13}C NMR Spectrum of 1-(phenylethynyl)naphthalene **(3q)**



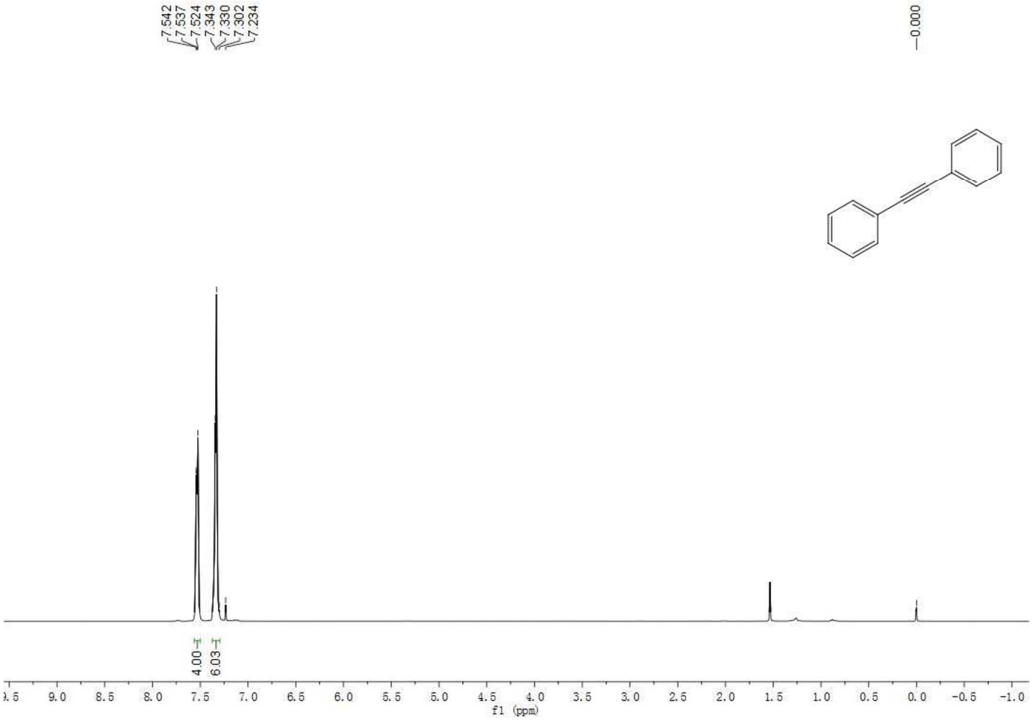
^{1}H NMR Spectrum of 4-(phenylethynyl)-1,1'-biphenyl **(3r)**



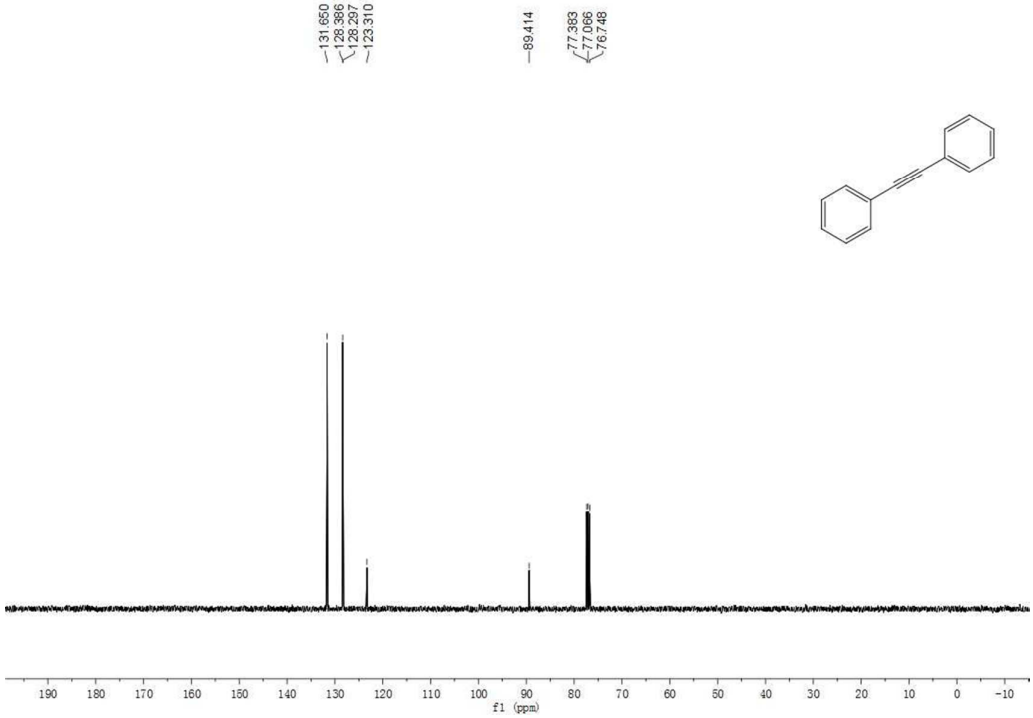
^{13}C NMR Spectrum of 4-(phenylethynyl)-1,1'-biphenyl **(3r)**



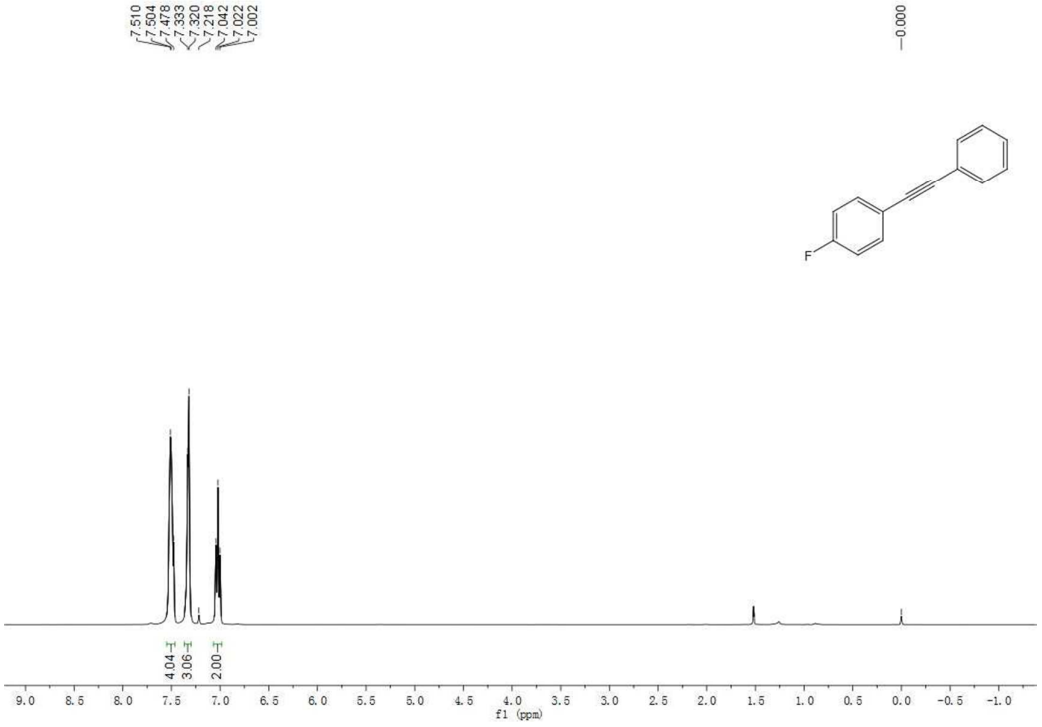
^{1}H NMR Spectrum of 1,2-diphenylethyne **(3s)**



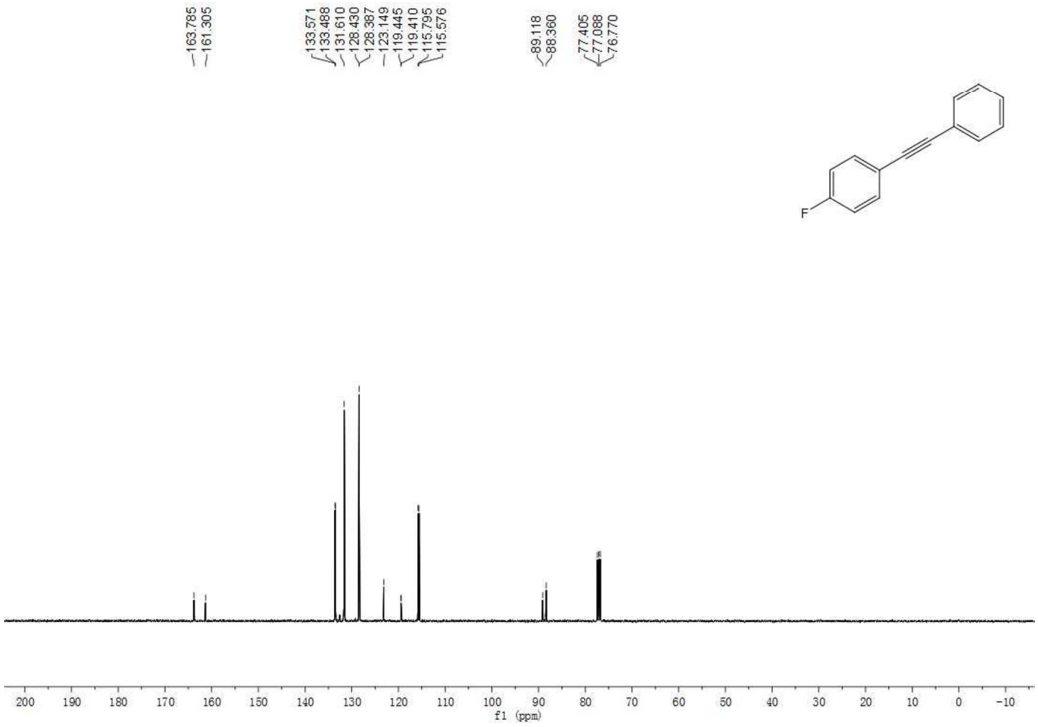
^{13}C NMR Spectrum of 1,2-diphenylethyne **(3s)**



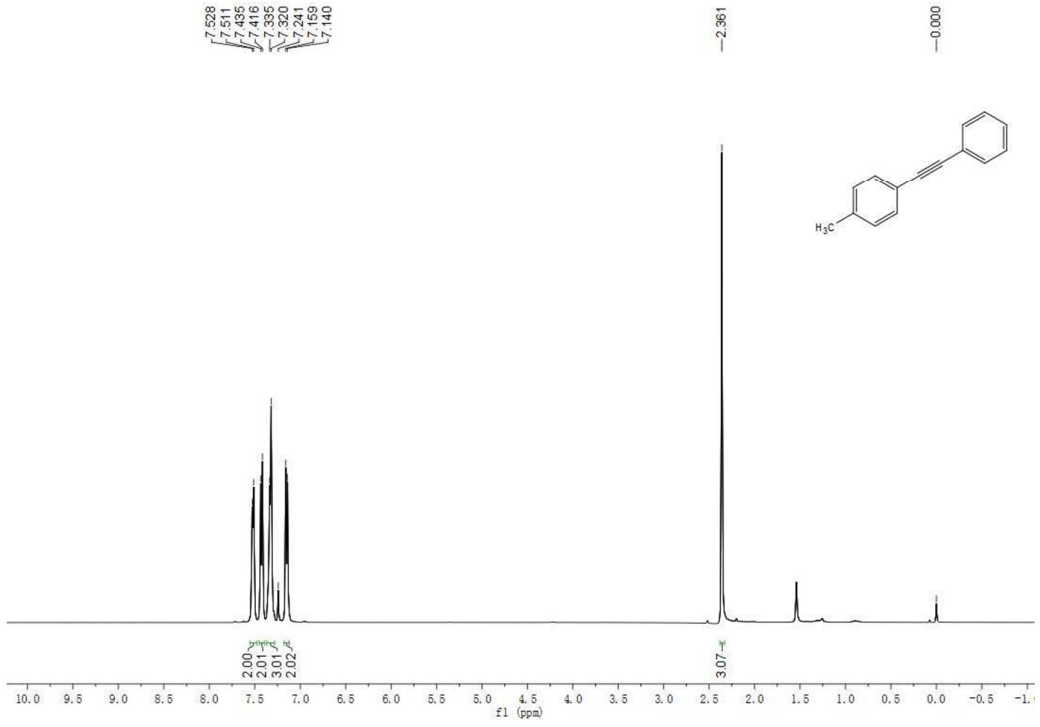
^{1}H NMR Spectrum of 1-fluoro-4-(phenylethynyl)benzene **(3t)**



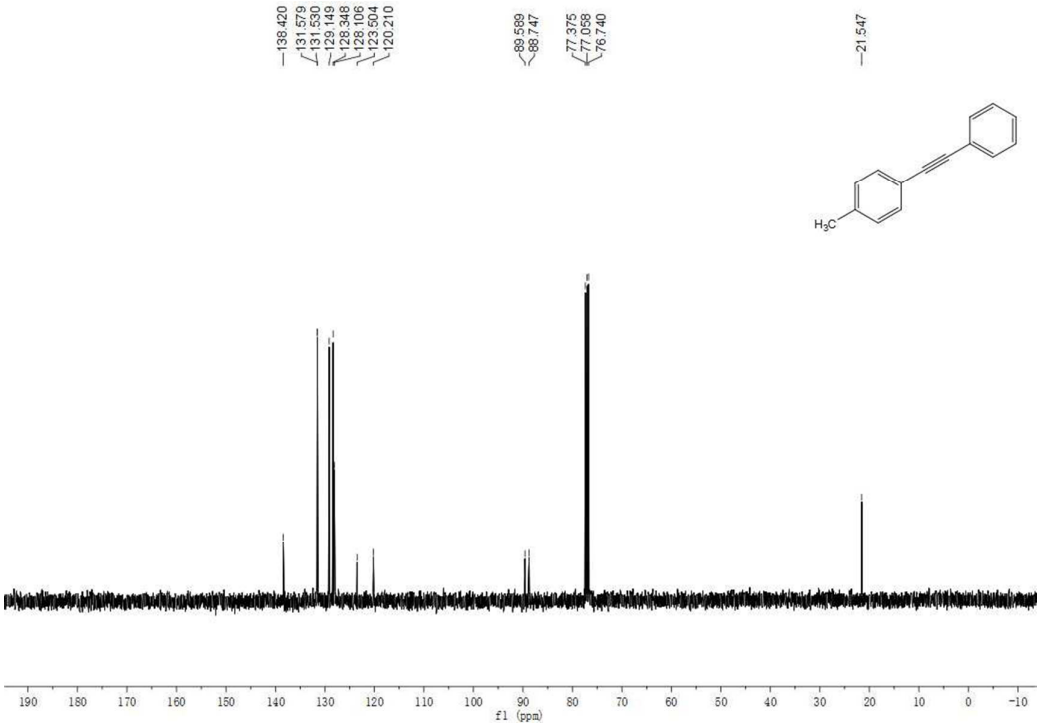
^{13}C NMR Spectrum of 1-fluoro-4-(phenylethynyl)benzene **(3t)**



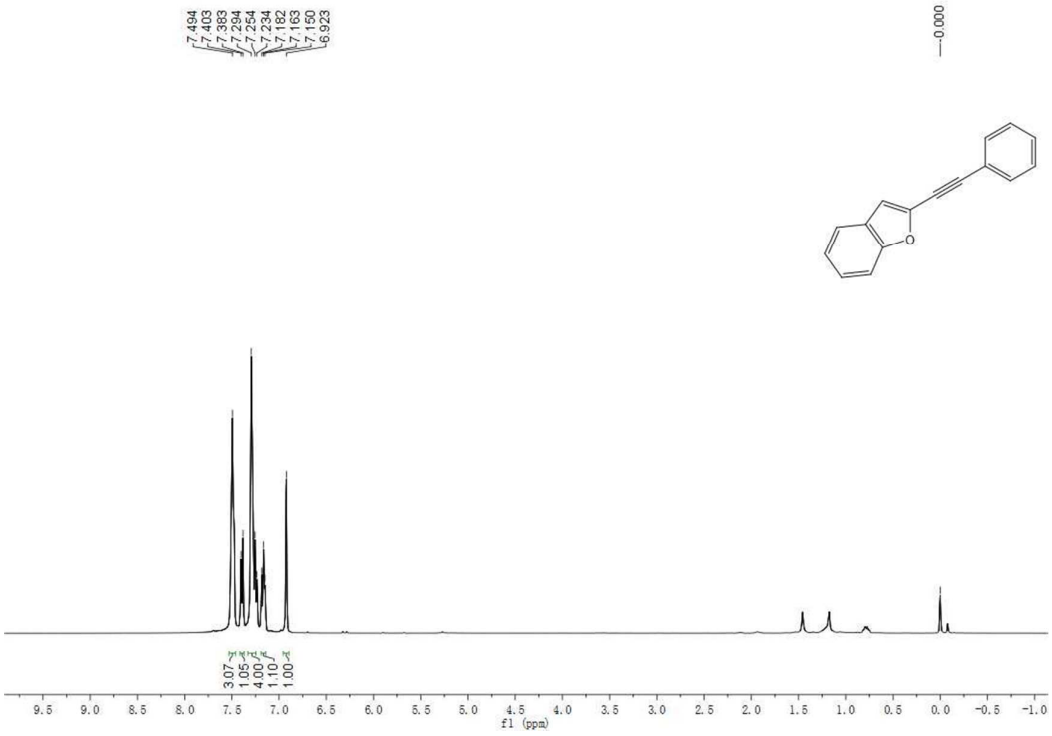
^{1}H NMR Spectrum of 1-methyl-4-(phenylethynyl)benzene (**3u**)



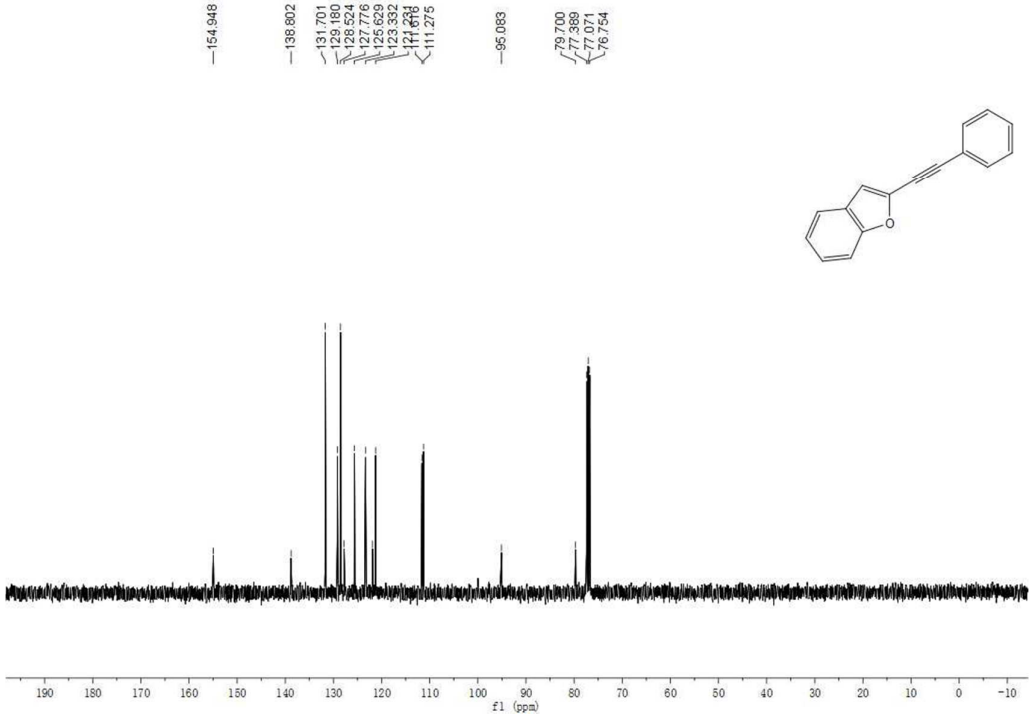
^{13}C NMR Spectrum of 1-methyl-4-(phenylethynyl)benzene (**3u**)



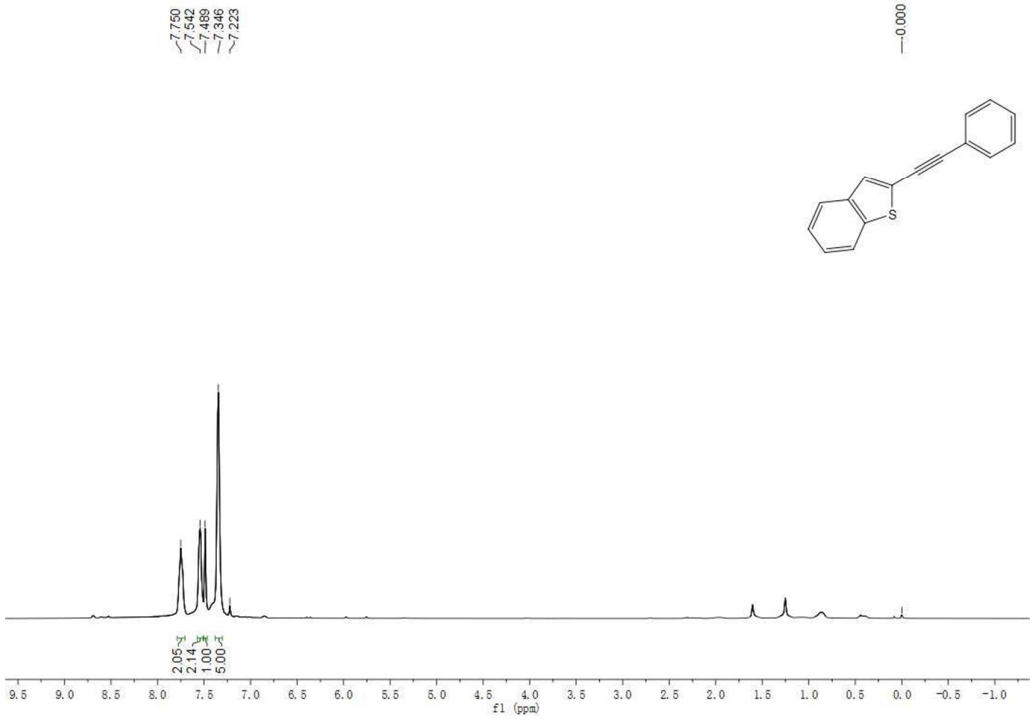
^{1}H NMR Spectrum of 2-(phenylethynyl)benzofuran (**3w**)



^{13}C NMR Spectrum of 2-(phenylethynyl)benzofuran (**3w**)



^{1}H NMR Spectrum of 2-(phenylethynyl)benzo[*b*]thiophene (**3x**)



^{13}C NMR Spectrum of 2-(phenylethynyl)benzo[*b*]thiophene (**3x**)