Supplementary Information

Diastereoselectivity construction of spiro-cyclopropyl-pyrazoles via a [2+1] annulation reaction of iminoindoline-derived alkenes and 4-bromo-pyrazolons

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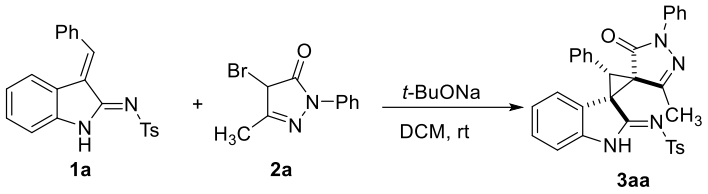
1. General Information

Commercial grade solvent was dried and purified by standard procedures as specified in Purification of Laboratory Chemicals. ^{1}H NMR and ^{13}C NMR spectra were recorded on a Bruker Avance (400, 600 for ^{1}H NMR, 100, 150 for ^{13}C NMR) instrument. Data for ^{1}H NMR are reported as chemical shift (ppm, tetramethylsilane as theinternal standard), integration, multiplicity (s = singlet, d =doublet, t = triplet, q = quartet, m = multiplet), coupling con-stant (Hz). Data for^{13}C NMR are reported as chemical shift. High resolution mass spectra were obtained with Thermo Scientific LTQ Orbitrap XL mass spectrometer. Flash column chromatography was carried out using silica gel eluting with ethyl acetate and petroleum ether. Reactions were monitored by TLC and visualized with ultraviolet light. Melting points were recorded on a Buchi Melting Point B-545. X-ray crystallographic analyses were obtained on Bruker D8 Venture.

2. General Procedure for the Syntheses of Reactants 1 and 2.

iminoindoline-derived alkenes [1,2] and 4-bromo pyrazolones [3] were prepared as reported procedures. Unless otherwise noted, materials were purchased from commercial suppliers and used without further purification.

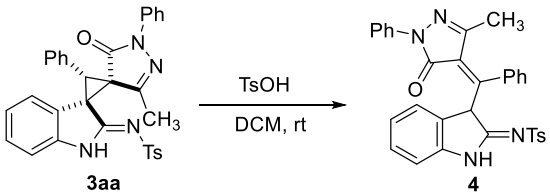
3. General procedure for the synthesis of 3aa



Scheme S1 General procedure for the synthesis of **3aa**

A mixture of 0.1 mmol **1a** (37.4 mg), 0.12 mmol **2a** (30.2 mg) and 0.15 mmol *t*-BuONa (14.6 mg) in 1 ml DCM was stirred at room temperature. After the reaction was completed by TLC, the crude product was directly purified by silica gel chromatography with petroleum ether/ethyl acetate 10/1 to give the desired product **3aa** (48.3 mg, R_f= 0.2). Other reactants were operated by the same procedures.

4. transformation of product 3aa



Scheme S2 Transformation of product **3aa**

A mixture of 0.1 mmol **3aa** (54.6 mg), 0.2 mmol TsOH (34.0 mg) in 1 ml DCM was stirred at room temperature. After the reaction was completed by TLC, the crude product was directly purified by silica gel chromatography with petroleum ether/ethyl acetate 8/1 to give the desired product **4** (38.2 mg, R_f= 0.2).

1 R. E. Harmon, G. Wellman, S. K. Gupta, *J. Org. Chem*. 1973, **38**, 11-16.

2 K. Moriyama, K. Ishida, H. Togo, *Chem. Commun.* 2015, **51**, 2273-2276.

3 Y. Zhang, D. Stephens, G. Hernandez, R. Mendoza, O. V. Larionov, *Chem.- Eur. J.*, 2012, **18**, 16612.

5. X-ray crystallographic data of compound 3da

5.1 Sample preparation and crystal growth

Approximately 30 mg sample **3da** was dissolved in 1 mL of dichloromethane in a 5 mL transparent glass vial. Next, 3 mL n-hexane was slowly added to each solution. The vials were then loosely covered and placed in an undisturbed cabinet to allow for slow solvent evaporation. This process yielded a single crystal of sample, suitable for X-ray crystallographic analysis.

Table 1 Crystal data and structure refinement for mo_250226LCY_0m.

Identification code	mo_250226LCY_0m
Empirical formula	C32H26BrN4O3S
Formula weight	626.54
Temperature/K	297.00
Crystal system	triclinic
Space group	P-1
a/Å	11.1261(4)
b/Å	12.1877(4)
c/Å	24.0151(8)
α/°	84.6530(10)
β/°	78.8130(10)
γ/°	78.2160(10)
Volume/Å3	3122.41(18)
Z	4
ρcalcg/cm3	1.333
μ/mm⁻1	1.421
F(000)	1284.0
Crystal size/mm3	0.2 × 0.15 × 0.1
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	3.802 to 56.6
Index ranges	-14 ≤ h ≤ 14, -13 ≤ k ≤ 16, -32 ≤ l ≤ 31
Reflections collected	79843
Independent reflections	15497 [Rint = 0.0806, Rsigma = 0.0657]
Data/restraints/parameters	15497/0/743
Goodness-of-fit on F2	1.054
Final R indexes [I>=2σ (I)]	R1 = 0.0704, wR2 = 0.2164
Final R indexes [all data]	R1 = 0.1189, wR2 = 0.2521
Largest diff. peak/hole / e Å-3	1.06/-1.69

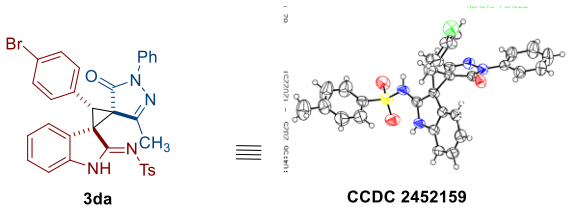
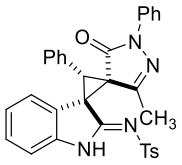


Figure S1 XRD structure of **3da**: molecular structure shown as 50% probability ellipsoids

6. The data of the products

(3aa)

4-methyl-N-((2'S,3R,3'S,Z)-3''-methyl-5''-oxo-1'',3'-diphenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 86% yield, 45.3 mg; mp = 167.6-169.2 °C; dr 10:1；

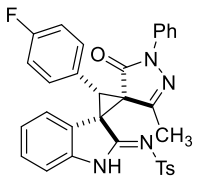
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.10 (s, 1H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.67 (d, *J* = 8.1 Hz, 2H), 7.27 – 7.18 (m, 8H), 7.05 (d, *J* = 8.0 Hz, 2H), 6.95 (dd, *J* = 7.6, 4.4 Hz, 3H), 6.82 (t, *J* = 7.8 Hz, 1H), 4.57 (s, 1H), 2.37 (s, 3H), 2.23 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.4, 164.6, 156.2, 144.1, 141.7, 138.3, 138.1, 130.6, 130.4, 129.9, 129.5, 128.9, 128.4, 127.9, 126.9, 125.2, 122.4, 120.0, 119.0, 110.6, 52.7, 51.0, 40.3, 21.8, 19.3.

HRMS(ESI) m/z: $[M+Na]^+$ calcd for $C_{32}H_{26}N_4O_3SNa^+$ 569.1623, found 569.1622.

(3ba)

N-((2'S,3R,3'S,Z)-3'-(4-fluorophenyl)-3''-methyl-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 92% yield, 51.9 mg; mp = 170.3-172.1 °C; dr 5:1

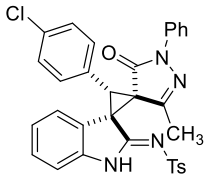
^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.17 (s, 1H), 7.88 (d, *J* = 8.3 Hz, 2H), 7.74 (d, *J* = 7.5 Hz, 2H), 7.36 – 7.23 (m, 6H), 7.12 (d, *J* = 7.6 Hz, 2H), 7.03 (d, *J* = 7.6 Hz, 1H), 6.99 (d, *J* = 7.6 Hz, 3H), 6.91 (t, *J* = 7.8 Hz, 1H), 4.58 (d, *J* = 1.8 Hz, 1H), 2.44 (s, 3H), 2.28 (s, 3H).

^{13}C NMR (100 MHz, Chloroform-*d*) δ 165.2, 164.6, 162.7 (d, *J* = 250 Hz), 156.1, 144.2, 141.8, 138.2, 138.0, 132.2 (d, *J* = 10 Hz), 130.4, 129.9, 129.6, 129.5, 129.0, 128.9, 126.9, 126.7, 125.3, 122.5, 119.8, 119.0, 115.5 (d, *J* = 20 Hz) , 110.7, 52.6, 51.0, 39.4, 21.8, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}FN_4O_3SH^+$ 565.1710, found 565.1711.

(3ca)

N-((2'S,3R,3'S,Z)-3'-(4-chlorophenyl)-3''-methyl-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 80% yield, 46.4 mg; mp = 173.9-175.7 °C; dr 5:1

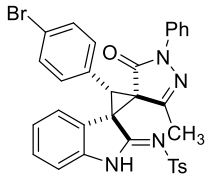
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.12 (s, 1H), 7.80 (d, *J* = 8.2 Hz, 2H), 7.68 – 7.62 (m, 2H), 7.27 – 7.18 (m, 7H), 7.07 – 7.03 (m, 2H), 6.96 (d, *J* = 7.9 Hz, 1H), 6.91 – 6.83 (m, 3H), 4.50 (s, 1H), 2.37 (s, 3H), 2.20 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.1, 164.5, 156.1, 144.2, 141.8, 138.1, 138.0, 134.4, 131.7, 131.1, 130.3, 129.9, 129.7, 129.6, 129.0, 128.9, 128.6, 128.1, 126.9, 126.6, 126.4, 125.3, 122.5, 119.7, 119.0, 110.8, 52.5, 50.9, 39.4, 21.8, 19.3.

HRMS(ESI) m/z: $[M+Na]^+$ calcd for $C_{32}H_{25}ClN_4O_3SNa^+$ 603.1234, found 603.1235.

(3da)

N-((2'S,3R,3'S,Z)-3'-(4-bromophenyl)-3''-methyl-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 73% yield, 45.6 mg; mp = 160.1-161.6 °C; dr 5:1

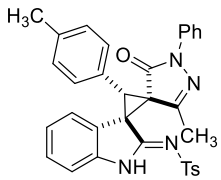
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.12 (s, 1H), 7.80 (d, *J* = 8.0 Hz, 2H), 7.65 (d, *J* = 8.1 Hz, 2H), 7.36 (dd, *J* = 19.4, 8.2 Hz, 2H), 7.27 – 7.19 (m, 5H), 7.06 (t, *J* = 7.7 Hz, 2H), 6.96 (d, *J* = 8.0 Hz, 1H), 6.84 (dd, *J* = 18.8, 8.0 Hz, 3H), 4.48 (s, 1H), 2.37 (s, 3H), 2.19 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.09, 164.49, 156.04, 144.22, 141.77, 138.12, 137.96, 132.06, 131.58, 131.45, 131.08, 130.31, 129.87, 129.70, 129.63, 129.00, 128.88, 126.97, 126.94, 126.60, 125.28, 122.57, 119.72, 119.10, 118.97, 110.73, 52.39, 50.85, 39.42, 21.77, 19.32.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}BrN_4O_3SH^+$ 625.0909, found 625.0912.

(3ea)

4-methyl-N-((2'S,3R,3'S,Z)-3''-methyl-5''-oxo-1''-phenyl-3'-(p-tolyl)-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 91% yield, 51.0 mg; mp = 170.4-172.1 °C; dr 10:1

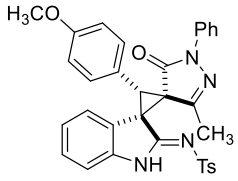
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.21 (s, 1H), 7.89 (d, *J* = 8.0 Hz, 2H), 7.76 (d, *J* = 7.6 Hz, 2H), 7.35 – 7.29 (m, 4H), 7.26 – 7.18 (m, 1H), 7.16 – 7.09 (m, 4H), 7.03 (d, *J* = 7.8 Hz, 1H), 6.93 – 6.88 (m, 3H), 4.62 (s, 1H), 2.44 (s, 3H), 2.34 (s, 3H), 2.30 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.4, 164.6, 156.3, 144.1, 141.7, 138.3, 138.2, 138.1, 130.6, 130.2, 129.8, 129.4, 129.3, 129.1, 128.8, 126.9, 125.1, 124.7, 122.3, 120.1, 119.0, 110.6, 52.8, 51.1, 40.2, 21.7, 21.4, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{33}H_{28}N_4O_3SH^+$561.1960, found 561.1958.

(3fa)

N-((2'S,3R,3'S,Z)-3'-(4-methoxyphenyl)-3''-methyl-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 82% yield, 47.2 mg; mp = 171.6-173.1 °C; dr 10:1

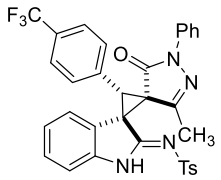
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.23 (s, 1H), 7.89 (d, *J* = 8.3 Hz, 2H), 7.76 (d, *J* = 7.4 Hz, 2H), 7.36 – 7.29 (m, 4H), 7.26 – 7.18 (m, 1H), 7.13 (dd, *J* = 25.2, 8.3 Hz, 2H), 7.04 (d, *J* = 7.9 Hz, 1H), 6.95 – 6.89 (m, 3H), 6.82 (d, *J* = 8.7 Hz, 2H), 4.60 (s, 1H), 3.79 (s, 3H), 2.44 (s, 3H), 2.30 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.4, 164.7, 159.5, 156.3, 144.1, 141.7, 138.3, 138.1, 131.5, 131.0, 130.6, 129.8, 129.4, 129.3, 128.9, 128.8, 126.9, 126.7, 125.1, 122.4, 120.1, 119.7, 119.0, 113.8, 110.6, 55.3, 52.9, 51.1, 39.9, 21.7, 19.3.

HRMS(ESI) m/z: $[M+Na]^+$ calcd for $C_{33}H_{28}N_4O_4SNa^+$ 599.1729, found 599.1727.

(3ga)

4-methyl-N-((2'S,3R,3'S,Z)-3''-methyl-5''-oxo-1''-phenyl-3'-(4-(trifluoromethyl)phenyl)-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 85% yield, 52.2 mg; mp = 168.6-169.2 °C; dr 5:1

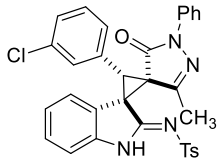
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.19 (s, 1H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.64 (d, *J* = 8.1 Hz, 2H), 7.47 (d, *J* = 8.0 Hz, 2H), 7.22 (ddd, *J* = 28.9, 14.7, 8.0 Hz, 5H), 7.02 (ddd, *J* = 29.8, 16.6, 7.9 Hz, 5H), 6.83 (t, *J* = 7.8 Hz, 1H), 4.56 (s, 1H), 2.36 (s, 3H), 2.21 (s, 3H).

13C NMR (150 MHz, Chloroform-d) δ 164.9, 164.5, 156.0, 144.3, 141.9, 138.1, 137.9, 132.1, 130.8, 130.6 (d, *J* = 32.6 Hz), 130.3, 130.1, 129.9, 129.8, 129.6, 129.0, 128.9, 127.0, 126.6, 125.3 (dd, *J* = 7.0, 3.2 Hz), 124.0 (d, *J* = 275.3 Hz), 122.7, 119.6, 119.1, 119.0, 110.9, 52.3, 50.8, 39.4, 21.8, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{33}H_{25}F_3N_4O_3SH^+$ 615.1678, found 615.1679.

(3ha)

N-((2'S,3R,3'S,Z)-3'-(3-chlorophenyl)-3''-methyl-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 83% yield, 48.1 mg; mp = 165.8-167.2 °C; dr 10:1

^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.14 (s, 1H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.64 (dd, *J* = 9.0, 4.8 Hz, 2H), 7.27 – 7.17 (m, 6H), 7.02 (d, *J* = 7.9 Hz, 1H), 6.93 (td, *J* = 17.9, 8.3 Hz, 5H), 6.81 (t, *J* = 7.8 Hz, 1H), 4.57 (s, 1H), 2.36 (s, 3H), 2.23 (s, 3H).

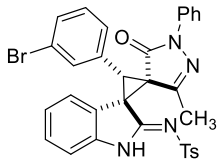
^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.0, 164.4, 156.0, 144.2, 141.8, 138.1, 138.0, 134.1, 130.3, 130.2, 130.0, 129.9, 129.7, 129.6, 129.53 129.0, 128.9, 128.6, 126.9, 126.5, 125.3, 122.6, 119.6, 119.1, 119.0, 110.8, 52.3, 50.9,

39.2, 21.7, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}ClN_4O_3SH^+$ 581.1414, found 581.1415.

(3ia)

N-((2'S,3R,3'S,Z)-3'-(3-bromophenyl)-3''-methyl-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 65% yield, 40.6 mg; mp = 135,2-136.8 °C; dr 10:1

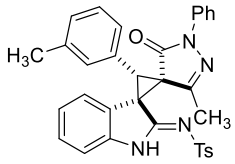
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.18 (s, 1H), 7.88 (d, *J* = 8.3 Hz, 2H), 7.74 (d, *J* = 8.7 Hz, 2H), 7.47 – 7.44 (m, 1H), 7.36 – 7.27 (m, 5H), 7.20 – 7.16 (m, 3H), 7.12 (t, *J* = 7.4 Hz, 1H), 7.04 (d, *J* = 7.8 Hz, 1H), 6.99 – 6.93 (m, 2H), 4.59 (d, *J* = 1.5 Hz, 1H), 2.45 (s, 3H), 2.29 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.0, 164.4, 156.0, 144.2, 141.8, 138.1, 137.1, 133.2, 131.5, 130.3, 130.3, 129.9, 129.9, 129.7, 129.1, 128.9, 127.0, 125.3, 122.6, 122.2, 119.6, 119.0, 110.8, 52.3, 50.9, 39.1, 21.8, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}BrN_4O_3SH^+$ 625.0909, found 625.0908.

(3ja)

4-methyl-N-((2'S,3R,3'S,Z)-3''-methyl-5''-oxo-1''-phenyl-3'-(m-tolyl)-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 95% yield, 53.2 mg; mp = 170.1-171.8 °C; dr 10:1

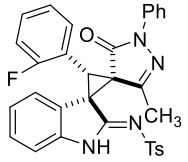
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.12 (d, *J* = 6.2 Hz, 1H), 7.80 (d, *J* = 8.4 Hz, 2H), 7.71 – 7.66 (m, 2H), 7.27 – 7.21 (m, 4H), 7.19 – 7.16 (m, 1H), 7.08 – 7.00 (m, 4H), 6.95 (d, *J* = 7.9 Hz, 1H), 6.85 – 6.80 (m, 3H), 4.53 (s, 1H), 2.36 (s, 3H), 2.26 (s, 3H), 2.22 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.5, 164.6, 156.3, 1441, 141.7, 138.3, 138.2, 138.1, 130.9, 130.7, 129.8, 129.5, 129.1, 128.9, 128.3, 127.8, 127.4, 126.9, 125.1, 122.4, 120.1, 119.0, 110.5, 52.7, 51.2, 40.3, 21.8, 21.5, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{33}H_{28}N_4O_3SH^+$561.1960, found 561.1964.

(3ka)

N-((2'S,3R,3'S,Z)-3'-(2-fluorophenyl)-3''-methyl-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 65% yield, 36.7 mg; mp = 173.2-174.8 °C; dr 10:1

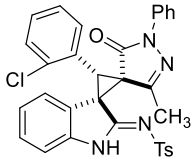
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.17 – 10.10 (m, 1H), 7.81 (d, *J* = 8.1 Hz, 2H), 7.64 (d, *J* = 7.5 Hz, 2H), 7.27 – 7.23 (m, 4H), 7.22 – 7.17 (m, 3H), 7.03 (t, *J* = 7.4 Hz, 1H), 7.01 – 6.93 (m, 4H), 6.84 (td, *J* = 7.8, 1.1 Hz, 1H), 4.34 (s, 1H), 2.36 (s, 3H), 2.22 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.3, 164.9, 161.4 (d, *J* = 248.2 Hz), 155.9, 144.1, 141.8, 138.2, 138.03, 132.1, 132.1, 130.4 (d, *J* = 8.2 Hz), 129.9, 129.8, 129.6, 128.8, 126.9, 126.9, 125.2, 123.7, 123.7, 122.6, 120.3, 119.2, 115.8 (d, *J* = 21.2 Hz), 110.7, 51.2, 50.6, 34.6, 21.7, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}FN_4O_3SH^+$ 565.1710, found 565.1708.

(3la)

N-((2'S,3R,3'S,Z)-3'-(2-chlorophenyl)-3''-methyl-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 88% yield, 51.0 mg; mp = 187.6-189.3 °C; dr 10:1

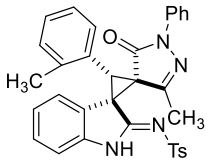
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.27 (s, 1H), 7.90 (d, *J* = 8.1 Hz, 2H), 7.74 – 7.69 (m, 2H), 7.37 – 7.27 (m, 8H), 7.21 (d, *J* = 7.8 Hz, 1H), 7.15 – 7.09 (m, 2H), 7.06 (d, *J* = 7.8 Hz, 1H), 6.93 (t, *J* = 7.8 Hz, 1H), 4.44 (s, 1H), 2.44 (s, 3H), 2.34 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.2, 164.8, 156.1, 144.1, 141.7, 138.2, 138.1, 135.3, 132.1, 129.9, 129.9, 129.8, 129.8, 129.6, 128.8, 126.9, 126.6, 126.3, 125.3, 122.7, 120.4, 119.3, 110.7, 51.8, 51.7, 38.7, 21.7, 19.4.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}ClN_4O_3SH^+$ 581.1414, found 581.1413.

(3ma)

4-methyl-N-((2'S,3R,3'S,Z)-3''-methyl-5''-oxo-1''-phenyl-3'-(o-tolyl)-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 92% yield, 51.5 mg; mp = 175.4-177.1 °C; dr 10:1

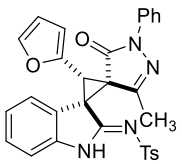
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.19 (s, 1H), 7.86 – 7.78 (m, 2H), 7.30 (dd, *J* = 7.7, 1.8 Hz, 1H), 7.26 (dd, *J* = 9.7, 7.9 Hz, 3H), 7.23 – 7.14 (m, 6H), 7.00 – 6.93 (m, 4H), 6.75 (t, *J* = 7.8 Hz, 1H), 4.61 (d, *J* = 2.3 Hz, 1H), 2.35 (s, 3H), 2.22 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.4, 164.8, 156.3, 144.1, 141.5, 138.4, 138.1, 137.7, 130.7, 130.6, 130.0, 129.8, 129.5, 128.9, 128.6, 126.8, 126.5, 125.6, 125.2, 122.6, 120.5, 119.1, 110.6, 52.5, 51.3, 39.8, 21.8, 19.5, 19.4.

HRMS(ESI) m/z: $[M+Na]^+$ calcd for $C_{33}H_{28}N_4O_3SNa^+$583.1780, found 583.1780.

(3na)

N-((2'S,3S,3'R,Z)-3'-(furan-2-yl)-3''-methyl-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 53% yield, 28.4 mg; mp =180.0-181.7 °C; dr 10:1

^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.19 (s, 1H), 7.91 – 7.87 (m, 2H), 7.75 (dt, *J* = 8.1, 1.2 Hz, 2H), 7.35 – 7.29 (m,

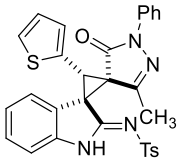
7H), 7.13 – 7.12 (m, 1H), 7.03 (ddt, *J* = 6.6, 4.4, 1.3 Hz, 3H), 6.90 (td, *J* = 7.8, 1.1 Hz, 1H), 4.65 (d, *J* = 1.1 Hz, 1H), 2.45 (s, 3H), 2.31 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.4, 164.6, 156.2, 144. 1, 141.7, 138.3, 138.1, 130.6, 130.4, 129.8, 129.5, 128.8, 128.4, 127.9, 126.9, 125.2, 122.4, 120.0, 119.0, 110.6, 52.7, 51.0, 40.3, 21.8, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{30}H_{24}N_4O_4SH^+$ 537.1597, found 537.1600.

(3oa)

4-methyl-N-((2'S,3R,3'S,Z)-3''-methyl-5''-oxo-1''-phenyl-3'-(thiophen-2-yl)-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 60% yield, 33.1 mg; mp = 159.1-160.8 °C; dr 10:1

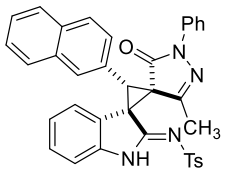
^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.08 (s, 1H), 7.90 – 7.85 (m, 2H), 7.75 (d, *J* = 8.1 Hz, 2H), 7.44 (d, *J* = 8.0 Hz, 1H), 7.36 – 7.28 (m, 6H), 7.15 – 7.10 (m, 1H), 6.98 (dt, *J* = 13.7, 8.0 Hz, 3H), 6.86 (dd, *J* = 3.6, 1.7 Hz, 1H), 4.57 (s, 1H), 2.45 (s, 3H), 2.28 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.1, 164.5, 156.1, 144.2, 141.8, 138.1, 138.0, 134.4, 131.8, 130.4, 129.9, 129.7, 128.9, 128.7, 128.2, 127.0, 125.3, 122.6, 119.0, 110.7, 52.5, 50.9, 39.4, 21.8, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{30}H_{24}N_4O_3S_2H^+$ 553.1268, found 553.1270.

(3pa)

4-methyl-N-((2'S,3S,3'R,Z)-3''-methyl-3'-(naphthalen-2-yl)-5''-oxo-1''-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 85% yield, 50.7 mg; mp = 179.1-180.5 °C; dr 5:1

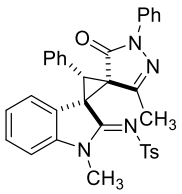
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.20 (s, 1H), 7.91 (d, *J* = 8.3 Hz, 2H), 7.82 (d, *J* = 7.0 Hz, 1H), 7.80 – 7.65 (m, 4H), 7.54 – 7.40 (m, 4H), 7.36 – 7.27 (m, 4H), 7.15 – 7.08 (m, 3H), 7.04 (d, *J* = 7.5 Hz, 1H), 6.83 (td, *J* = 7.8, 1.1 Hz, 1H), 4.86 – 4.77 (m, 1H), 2.45 (s, 3H), 2.34 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.4, 164.6, 156.2, 144.2, 141.7, 138.3, 138.1, 133.1, 133.0, 130.6, 129.9, 129.8, 129.5, 129.0, 128.9, 128.2, 128.0, 127.9, 127.6, 127.0, 126.6, 126.5, 126.2, 125.4, 125.2, 122.5, 120.0, 119.1, 119.0, 110.6, 52.8, 51.2, 40.4, 21.8, 19.4.

HRMS(ESI) m/z: $[M+Na]^+$ calcd for $C_{36}H_{28}N_4O_3SNa^+$ 619.1780, found 619.1782.

(3qa)

N-((2'S,3R,3'S,Z)-1,3''-dimethyl-5''-oxo-1'',3'-diphenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 45% yield, 25.2 mg; mp = 161.9-163.3 °C; dr 10:1

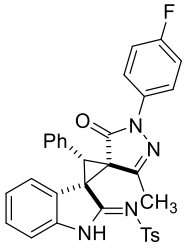
^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.88 (d, *J* = 8.0 Hz, 2H), 7.75 (d, *J* = 8.2 Hz, 2H), 7.32 (qd, *J* = 10.8, 9.9, 4.7 Hz, 8H), 7.15 (d, *J* = 7.9 Hz, 1H), 7.11 (t, *J* = 7.3 Hz, 1H), 7.04 (d, *J* = 7.3 Hz, 2H), 7.01 (d, *J* = 7.9 Hz, 1H), 6.96 (t, *J* = 7.8 Hz, 1H), 4.49 (s, 1H), 3.97 (s, 3H), 2.43 (s, 3H), 2.23 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 164.6, 161.6, 156.0, 145.4, 143.1, 140.4, 138.1, 130.3, 130.1, 129.6, 129.5, 129.0, 128.9, 128.4, 128.3, 128.3, 126.5, 125.1, 122.7, 120.7, 118.9, 109.3, 53.3, 50.9, 40.4, 34.4, 21.7, 19.7.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{33}H_{28}N_4O_3SH^+$561.1960, found 561.1978.

(3ab)

N-((2'S,3R,3'S,Z)-1''-(4-fluorophenyl)-3''-methyl-5''-oxo-3'-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 88% yield, 49.6 mg; mp = 170.3-172.1 °C; dr 10:1

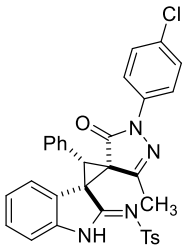
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.12 (s, 1H), 7.98 – 7.89 (m, 1H), 7.86 – 7.78 (m, 2H), 7.30 – 7.11 (m, 8H), 7.09 (d, *J* = 8.0 Hz, 1H), 7.06 – 7.01 (m, 1H), 6.95 (dd, *J* = 19.4, 7.5 Hz, 3H), 6.83 (td, *J* = 7.7, 3.8 Hz, 1H), 4.59 (d, *J* = 9.6 Hz, 1H), 2.37 (s, 3H), 2.23 (d, *J* = 11.6 Hz, 3H).

^{13}C NMR (100 MHz, Chloroform-*d*) δ 165.3, 164.5, 160.0 (d, *J* = 240 Hz), 156.4, 144.1, 141.7, 138.3 (d, *J* = 2.7 Hz), 130.6, 130.3, 129.9, 129.6, 128.4, 127.8, 126.9, 122.4, 120.8, 120.7, 119.9, 115.5 (d, *J* = 10 Hz), 110.6, 52.8, 51.0, 40.3, 21.8, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}FN_4O_3SH^+$ 565.1710, found 565.1714.

(3ac)

N-((2'S,3R,3'S,Z)-1''-(4-chlorophenyl)-3''-methyl-5''-oxo-3'-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 95% yield, 55.1 mg; mp = 140.7-142.5 °C; dr 10:1

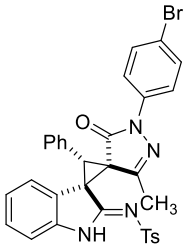
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.17 (s, 1H), 7.88 (d, *J* = 8.1 Hz, 2H), 7.85 (t, *J* = 2.0 Hz, 1H), 7.69 (d, *J* = 8.5 Hz, 1H), 7.34 (d, *J* = 8.1 Hz, 3H), 7.30 (dd, *J* = 14.4, 7.5 Hz, 3H), 7.22 (t, *J* = 8.2 Hz, 1H), 7.09 (dd, *J* = 15.7, 7.9 Hz, 2H), 7.02 (dd, *J* = 14.4, 7.7 Hz, 3H), 6.91 (t, *J* = 7.8 Hz, 1H), 4.66 (s, 1H), 2.45 (s, 3H), 2.30 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.4, 165.3, 156.5, 144.1, 141.6, 138.3, 134.7, 131.6, 130.5, 130.4, 130.4, 129.8, 129.7, 129.4, 128.9, 128.3, 128.3, 127.8, 127.5, 126.9, 122.4, 119.9, 110.6, 52.7, 49.8, 40.1, 21.7, 19.3.

HRMS(ESI) m/z: $[M+Na]^+$ calcd for $C_{32}H_{25}ClN_4O_3SNa^+$ 603.1234, found 603.1236.

(3ad)

N-((2'S,3R,3'S,Z)-1''-(4-bromophenyl)-3''-methyl-5''-oxo-3'-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 72% yield, 45.0 mg; mp = 168.5-170.2 °C; dr 10:1

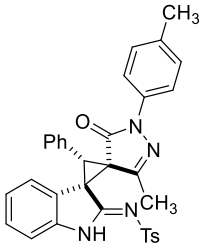
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.14 (s, 1H), 7.81 (d, *J* = 8.0 Hz, 2H), 7.66 (d, *J* = 8.1 Hz, 2H), 7.27 – 7.14 (m, 7H), 7.10 (d, *J* = 7.9 Hz, 1H), 7.04 (t, *J* = 7.5 Hz, 1H), 6.98 – 6.94 (m, 2H), 6.85 (t, *J* = 8.0 Hz, 2H), 4.51 (s, 1H), 2.37 (s, 3H), 2.22 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.2, 164.6, 156.7, 144.2, 141.8, 138.2, 137.2, 131.8, 130.5, 130.3, 129.9, 129.6, 128.5, 128.4, 127.72, 126.9, 122.4, 120.4, 119.8, 117.9, 110.6, 52.9, 51.0, 40.3, 21.8, 19.4.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}BrN_4O_3SH^+$ 625.0909, found 625.0908.

(3ae)

4-methyl-N-((2'S,3R,3'S,Z)-3''-methyl-5''-oxo-3'-phenyl-1''-(p-tolyl)-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 68% yield, 38.1 mg; mp = 148.6-150.3 °C; dr 10:1

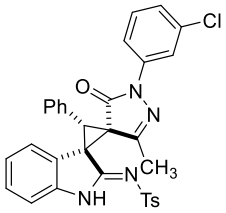
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.13 (s, 1H), 7.81 (d, *J* = 8.3 Hz, 2H), 7.53 (d, *J* = 8.5 Hz, 2H), 7.26 – 7.17 (m, 6H), 7.04 (dd, *J* = 10.3, 7.8 Hz, 3H), 6.96 – 6.93 (m, 3H), 6.80 (t, *J* = 7.8 Hz, 1H), 4.56 (s, 1H), 2.36 (s, 3H), 2.21 (d, *J* = 3.4 Hz, 6H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.4, 164.5, 156.0, 144.1, 141.7, 138.3, 135.7, 130.6, 130.4, 129.8, 129.4, 129.3, 128.3, 128.3, 127.9, 126.9, 122.4, 120.1, 119.1, 110.6, 52.6, 51.0, 40.3, 21.7, 21.0, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{33}H_{28}N_4O_3SH^+$561.1960, found 561.1958.

(3af)

N-((2'S,3S,3'R,Z)-1''-(3-chlorophenyl)-3''-methyl-5''-oxo-3'-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 78% yield, 45.3 mg; mp = 168.8-170.3 °C; dr 10:1

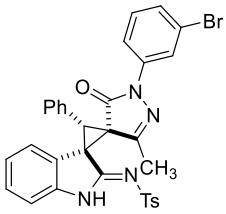
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.16 (s, 1H), 7.88 (d, *J* = 8.3 Hz, 2H), 7.84 (t, *J* = 2.1 Hz, 1H), 7.37 – 7.27 (m, 7H), 7.22 (t, *J* = 8.2 Hz, 1H), 7.12 – 7.07 (m, 2H), 7.04 – 7.00 (m, 3H), 6.91 (td, *J* = 7.8, 1.1 Hz, 1H), 4.66 (s, 1H), 2.45 (s, 3H), 2.30 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.2, 164.7, 156.7, 144.2, 141.7, 139.1, 138.2, 134.6, 130.6, 130.3, 129.9, 129.7, 129.6, 128.5, 128.4, 127.7, 126.9, 125.0, 122.5, 119.8, 118.8, 116.7, 110.6, 52.9, 51.1, 40.3, 21.8, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}ClN_4O_3SH^+$ 581.1414, found 581.1416.

(3ag)

N-((2'S,3R,3'S,Z)-1''-(3-bromophenyl)-3''-methyl-5''-oxo-3'-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 82% yield, 51.2 mg; mp = 169.5-171.3 °C; dr 10:1;

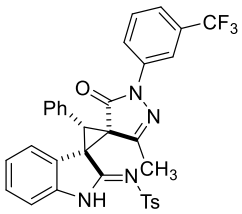
^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.12 (s, 1H), 8.03 (d, *J* = 30.9 Hz, 1H), 7.87 (d, *J* = 7.9 Hz, 2H), 7.35 (dp, *J* = 15.2, 7.3 Hz, 7H), 7.24 – 7.07 (m, 3H), 7.01 (t, *J* = 6.3 Hz, 3H), 6.92 (t, *J* = 8.1 Hz, 1H), 4.65 (s, 1H), 2.45 (s, 3H), 2.30 (s, 3H).

13C NMR (150 MHz, Chloroform-*d*) δ 165.2, 164.6, 156.7, 144.2, 141.8, 139.2, 138.2, 130.5, 130.3, 130.1, 129.9, 129.4, 129.4, 128.5, 128.4, 128.4, 127.9, 127.7, 126.9, 122.5, 121.6, 119.8, 117.2, 110.7, 53.0, 51.0, 40.3, 21.8, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{25}BrN_4O_3SH^+$ 625.0909, found 625.0907.

(3ah)

4-methyl-N-((2'S,3R,3'S,Z)-3''-methyl-5''-oxo-3'-phenyl-1''-(4-(trifluoromethyl)phenyl)-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 80% yield, 49.1 mg; mp = 162.2-163.8 °C; dr 10:1

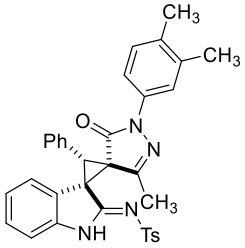
^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.13 (s, 1H), 8.14 – 7.95 (m, 2H), 7.88 (d, *J* = 7.9 Hz, 2H), 7.36 (tt, *J* = 18.2, 7.7 Hz, 8H), 7.12 (d, *J* = 7.9 Hz, 1H), 7.02 (dd, *J* = 8.3, 3.7 Hz, 3H), 6.92 (t, *J* = 7.8 Hz, 1H), 4.67 (s, 1H), 2.46 (s, 3H), 2.32 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.1, 164.8, 156.9, 144.2, 141.8, 138.6, 138.2, 131.3 (d, *J* = 32.5 Hz), 130.5, 130.3, 129.9, 129.7, 129.4, 128.5, 128.5, 127.7, 126.9, 124.0 (d, *J* = 272.6 Hz), 122.5, 121.7, 121.4 (d, *J* = 3.9 Hz), 119.8, 115.6, 110.7, 53.1, 51.1, 40.4, 21.8, 19.3.

HRMS(ESI) m/z: $[M+Na]^+$ calcd for $C_{33}H_{25}F_3N_4O_3SNa^+$ 637.1497, found 637.1497.

(3ai)

N-((2'S,3R,3'S,Z)-1''-(3,4-dimethylphenyl)-3''-methyl-5''-oxo-3'-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)-4-methylbenzenesulfonamide



yellow solid, 67% yield, 38.5 mg; mp = 183.6-185.2 °C; dr 10:1

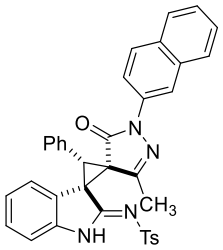
^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.12 (s, 1H), 7.81 (d, *J* = 8.3 Hz, 2H), 7.42 (d, *J* = 2.3 Hz, 1H), 7.36 (dd, *J* = 8.3, 2.5 Hz, 1H), 7.26 – 7.16 (m, 6H), 7.05 (d, *J* = 7.9 Hz, 1H), 6.98 – 6.92 (m, 4H), 6.81 (td, *J* = 7.8, 1.1 Hz, 1H), 4.55 (d, *J* = 1.1 Hz, 1H), 2.36 (s, 3H), 2.21 (s, 3H), 2.13 (s, 3H), 2.11 (s, 3H).

^{13}C NMR (150 MHz, Chloroform-*d*) δ 165.5, 164.4, 156.0, 144.1, 141.7, 138.3, 137.1, 135.9, 133.6, 130.6, 130.4, 129.8, 129.8, 129.4, 128.3, 128.3, 128.0, 126.9, 122.4, 120.3, 120.1, 116.7, 110.5, 52.6, 51.0, 40.3, 21.7, 20.0, 19.4, 19.3.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{34}H_{31}N_4O_3SH^+$575.2117, found 575.2120.

(3aj)

4-methyl-N-((2'S,3R,3'S,Z)-3''-methyl-1''-(naphthalen-2-yl)-5''-oxo-3'-phenyl-1'',5''-dihydrodispiro[indoline-3,1'-cyclopropane-2',4''-pyrazol]-2-ylidene)benzenesulfonamide



yellow solid, 97% yield, 57.8 mg; mp = 172.8-174.7 °C; dr 10:1

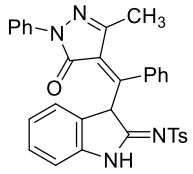
^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.18 (s, 1H), 8.23 (s, 1H), 7.98 – 7.84 (m, 3H), 7.81 – 7.71 (m, 3H), 7.44 – 7.25 (m, 8H), 7.17 (d, *J* = 8.0 Hz, 1H), 7.06 – 7.01 (m, 3H), 6.92 (t, *J* = 8.3 Hz, 1H), 4.68 (s, 1H), 2.44 (s, 3H), 2.35 (s, 3H).

^{13}C NMR (100 MHz, Chloroform-*d*) δ 165.4, 164.8, 156.4, 144.1, 141.8, 138.3, 135.7, 133.6, 131.1, 130.6, 130.4, 129.9, 129.6, 128.7, 128.4, 128.1, 127.9, 127.7, 126.9, 126.5, 125.4, 122.5, 120.0, 118.6, 116.1, 110.6, 52.8, 51.2, 40.4, 21.8, 19.4.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{36}H_{28}N_4O_3SH^+$ 597.1960, found 597.1965

(4)

4-methyl-N-((Z)-3-((E)-(3-methyl-5-oxo-1-phenyl-1,5-dihydro-4H-pyrazol-4-ylidene)(phenyl)methyl)indolin-2-ylidene)benzenesulfonamide



yellow solid, 67% yield, 36.6 mg; mp = 174.5-176.3 °C;

^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.25 (s, 1H), 7.91 (d, *J* = 8.1 Hz, 2H), 7.63 (d, *J* = 8.1 Hz, 2H), 7.54 (t, *J* = 7.5 Hz, 1H), 7.43 (dt, *J* = 19.3, 7.7 Hz, 4H), 7.31 – 7.25 (m, 4H), 7.18 – 7.09 (m, 5H), 6.74 (t, *J* = 7.7 Hz, 1H), 5.93 (d, *J* = 8.1 Hz, 1H), 2.31 (s, 3H), 1.35 (s, 3H).

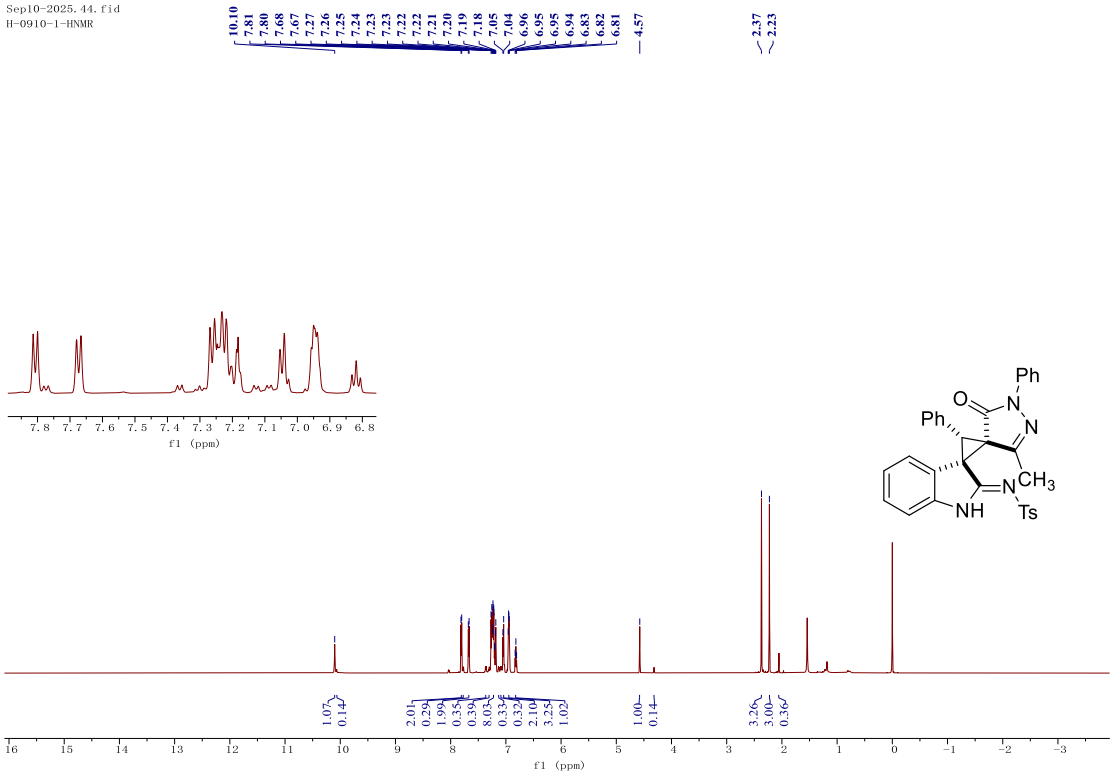
^{13}C NMR (150 MHz, Chloroform-*d*) δ 160.0, 154.9, 150.8, 144.1, 143.7, 140.7, 138.2, 137.6, 136.0, 130.9, 130.6, 129.8, 129.8, 129.0, 128.9, 126.7, 126.6, 126.5, 126.1, 125.3, 123.1, 122.4, 121.0, 111.5, 29.8, 21.7, 16.4.

HRMS(ESI) m/z: $[M+H]^+$ calcd for $C_{32}H_{26}N_4O_3SH^+$ 547.1804, found 547.1808.

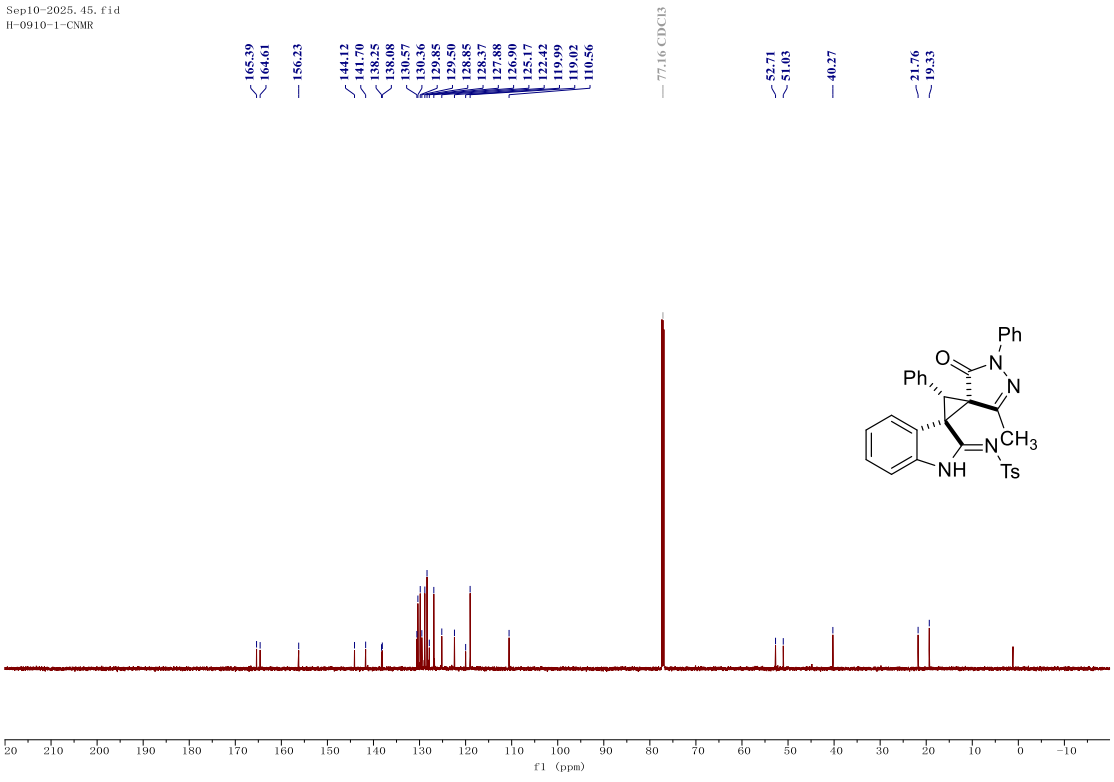
7 The copies of ^{1}H NMR and ^{13}C NMR spectra for compounds

3aa

^{1}H NMR (600 MHz, Chloroform-*d*)

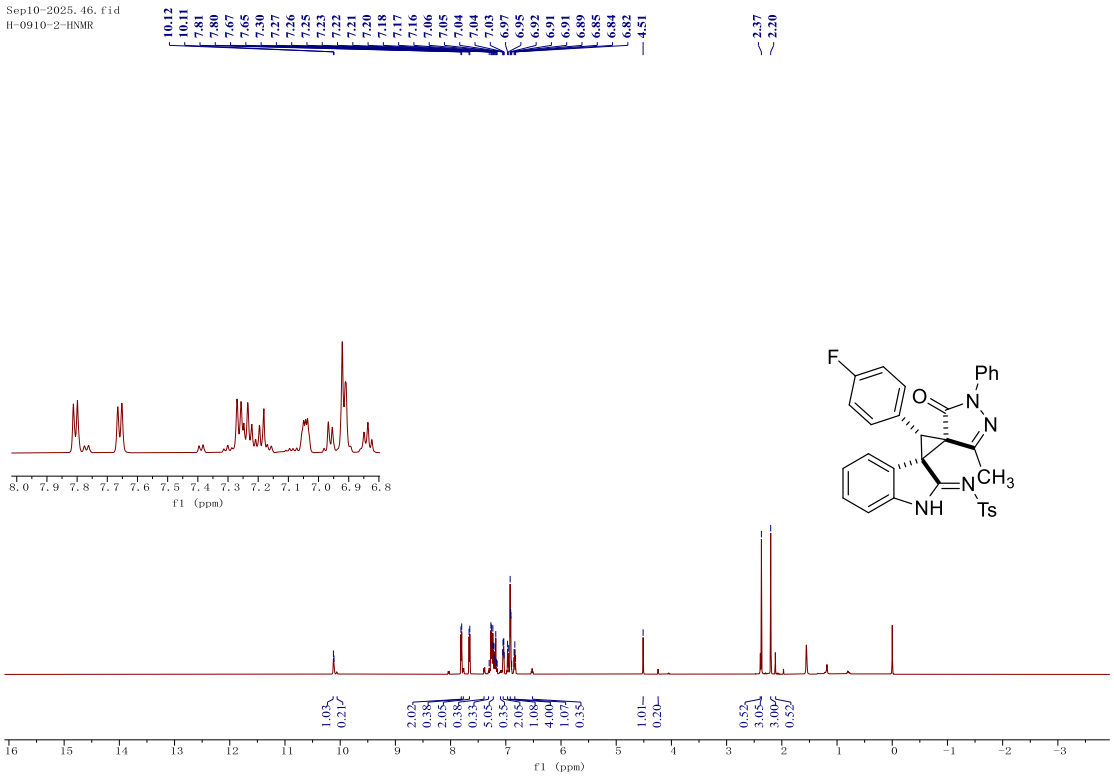


^{13}C NMR (150 MHz, Chloroform-*d*)

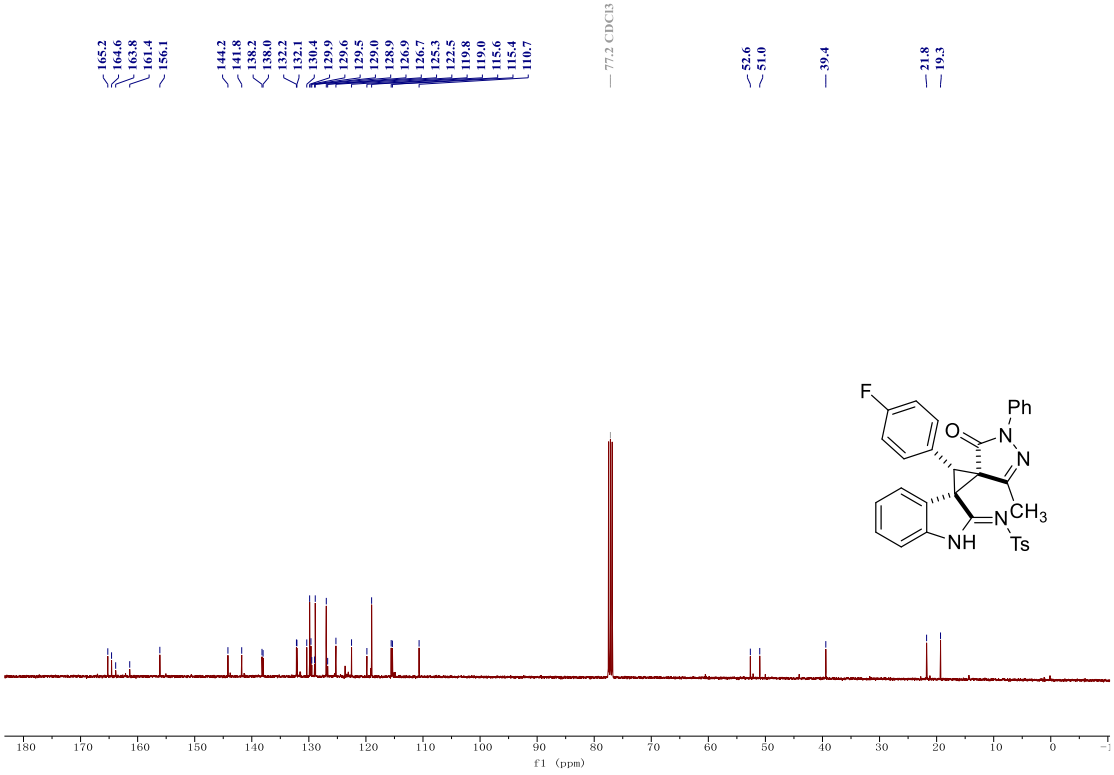


3ba

^{1}H NMR (400 MHz, Chloroform-*d*)

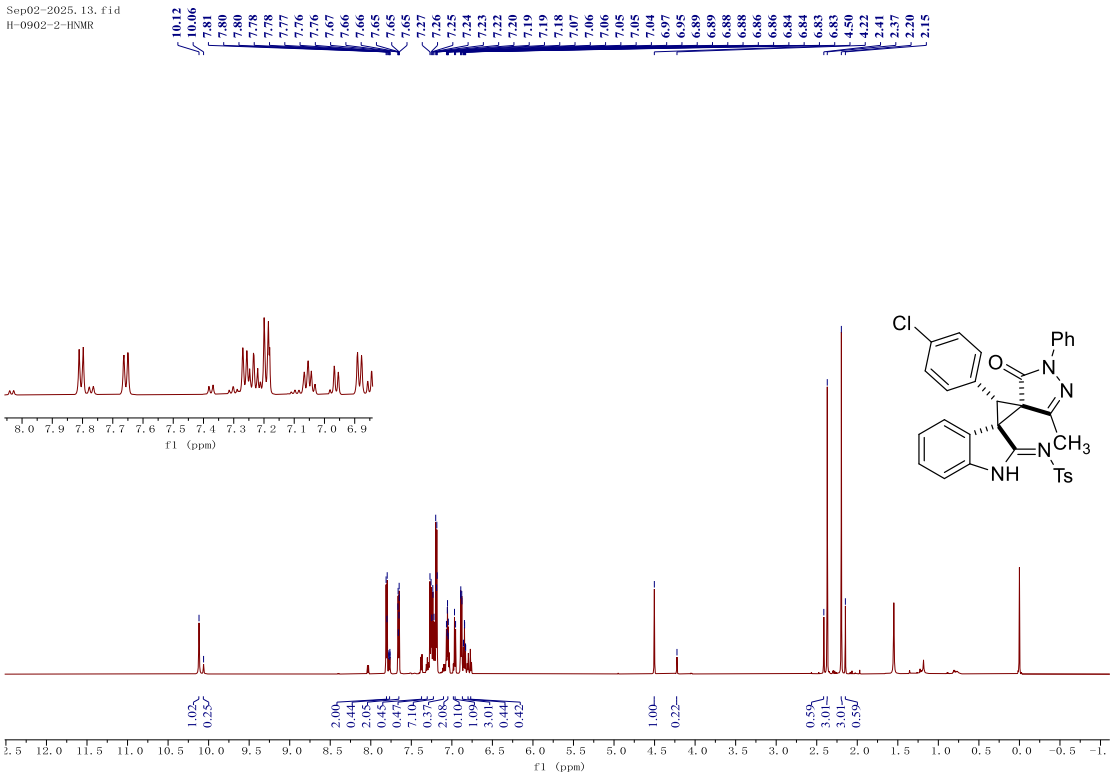


^{13}C NMR (100 MHz, Chloroform-*d*)

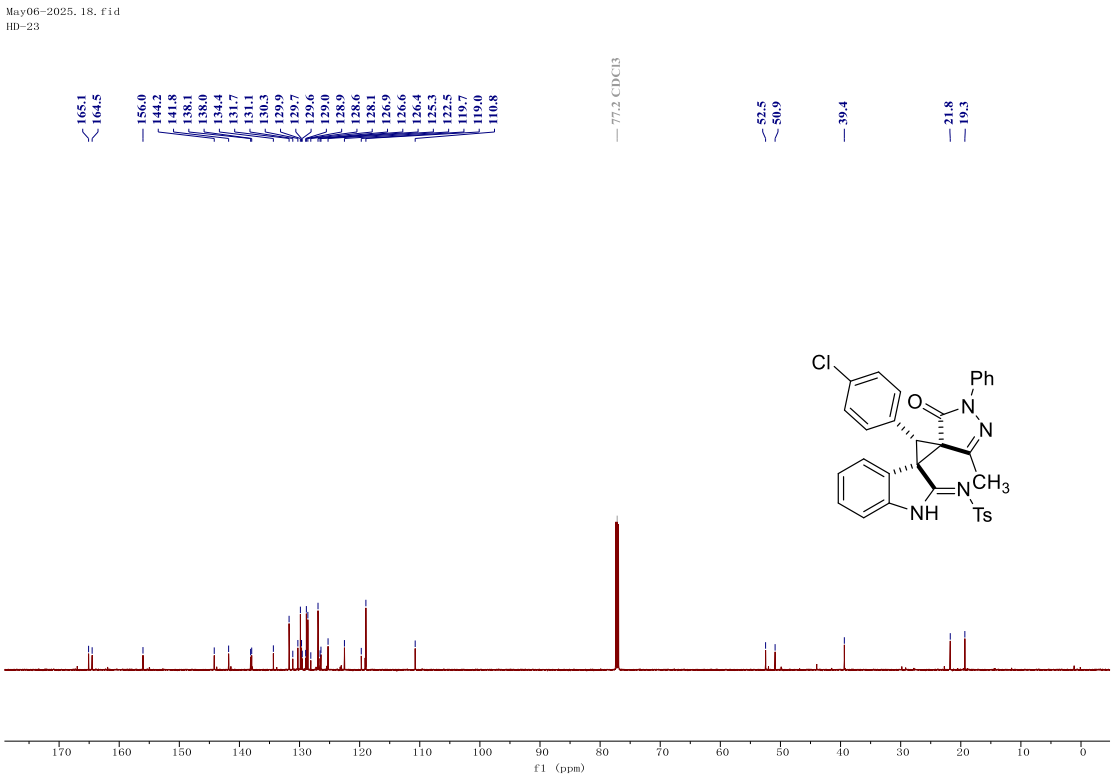


3ca

^{1}H NMR (600 MHz, Chloroform-*d*)

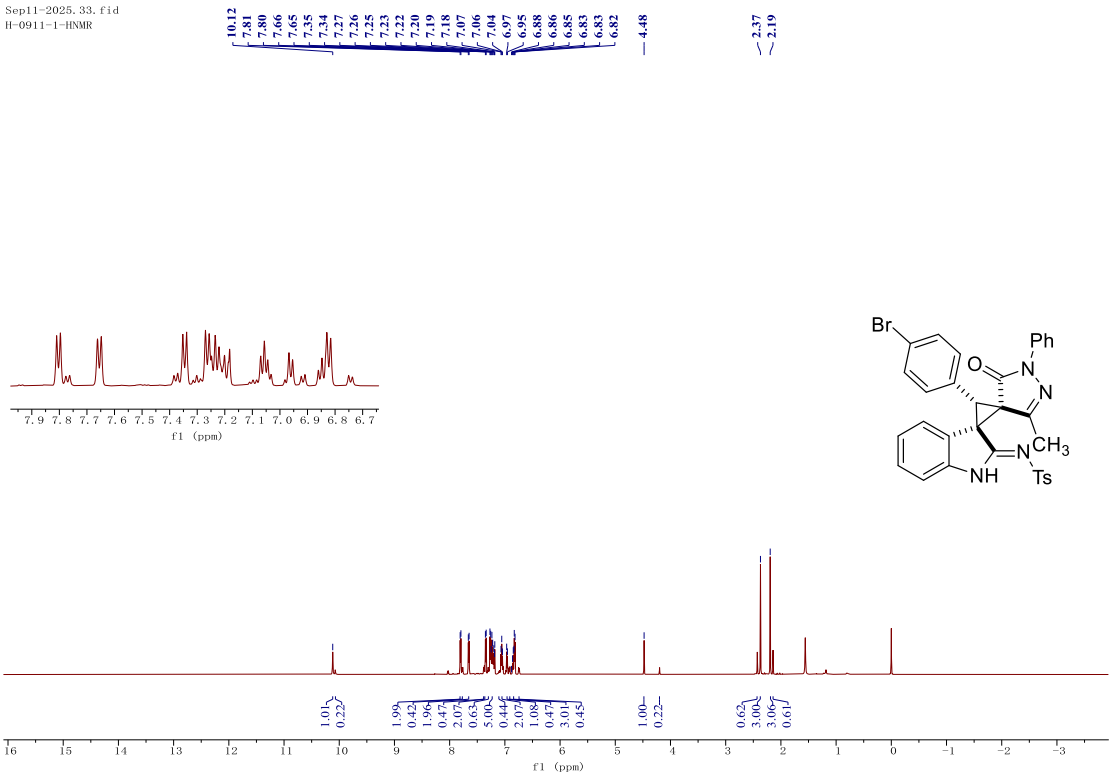


^{13}C NMR (150 MHz, Chloroform-*d*)

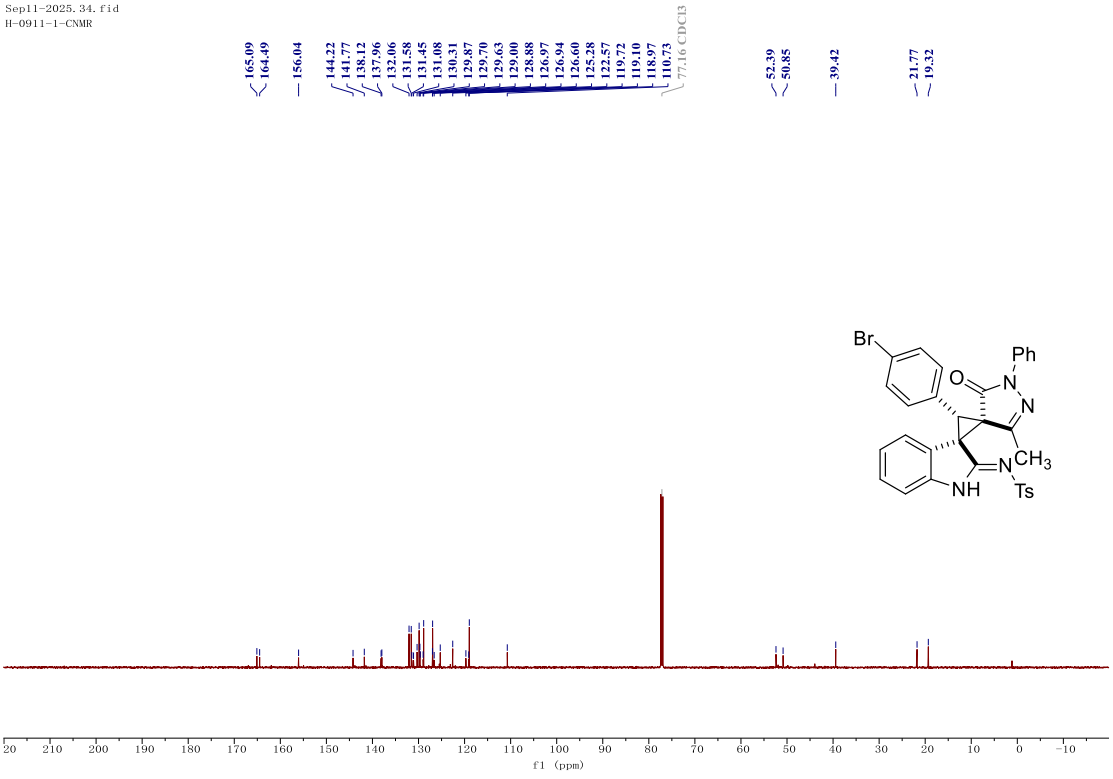


3da

^{1}H NMR (600 MHz, Chloroform-*d*)

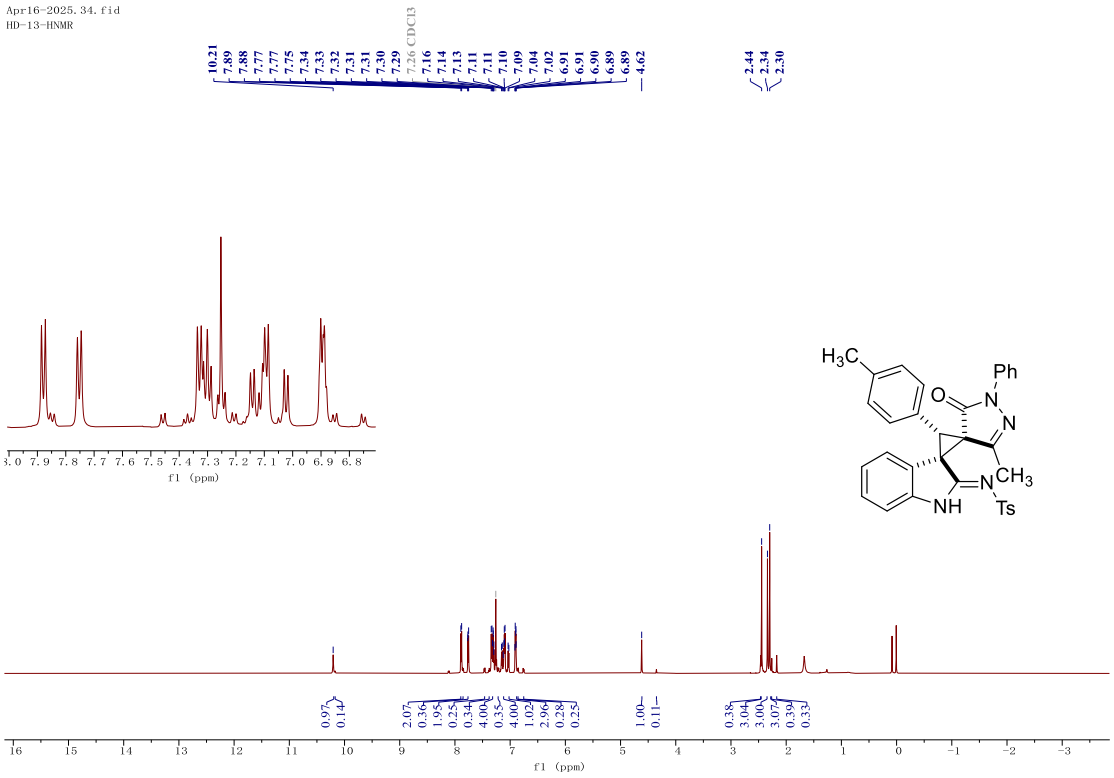


^{13}C NMR (150 MHz, Chloroform-*d*)

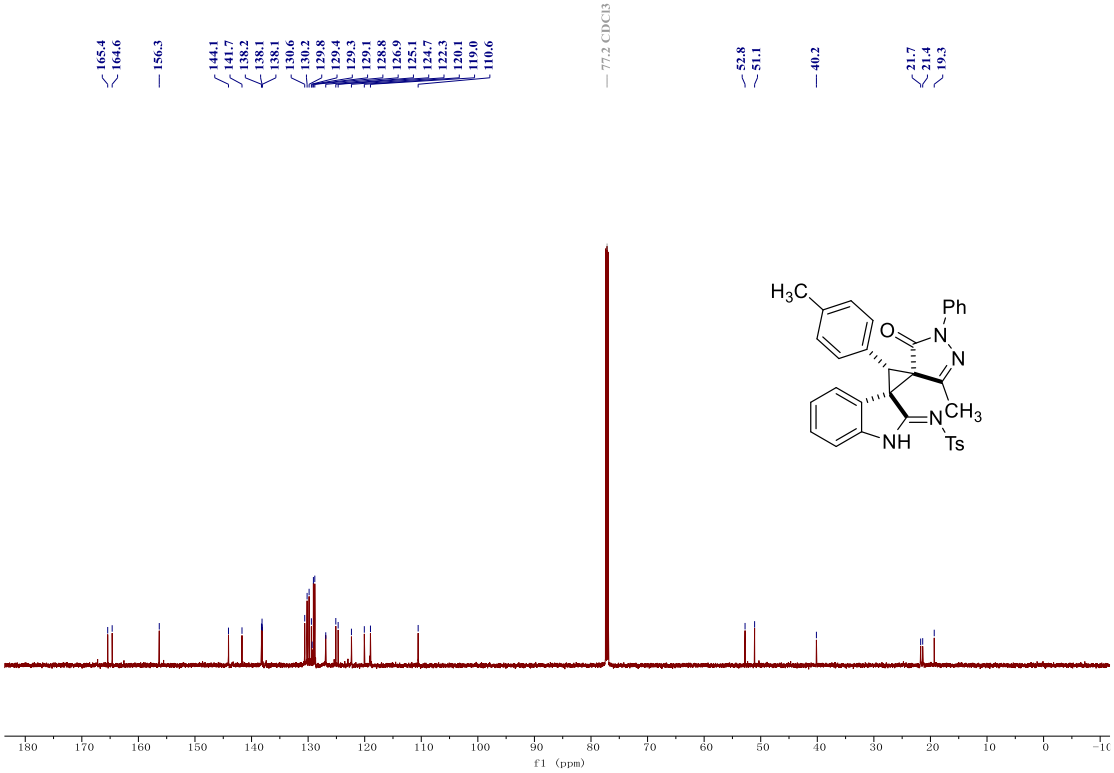


3ea

^{1}H NMR (600 MHz, Chloroform-*d*)

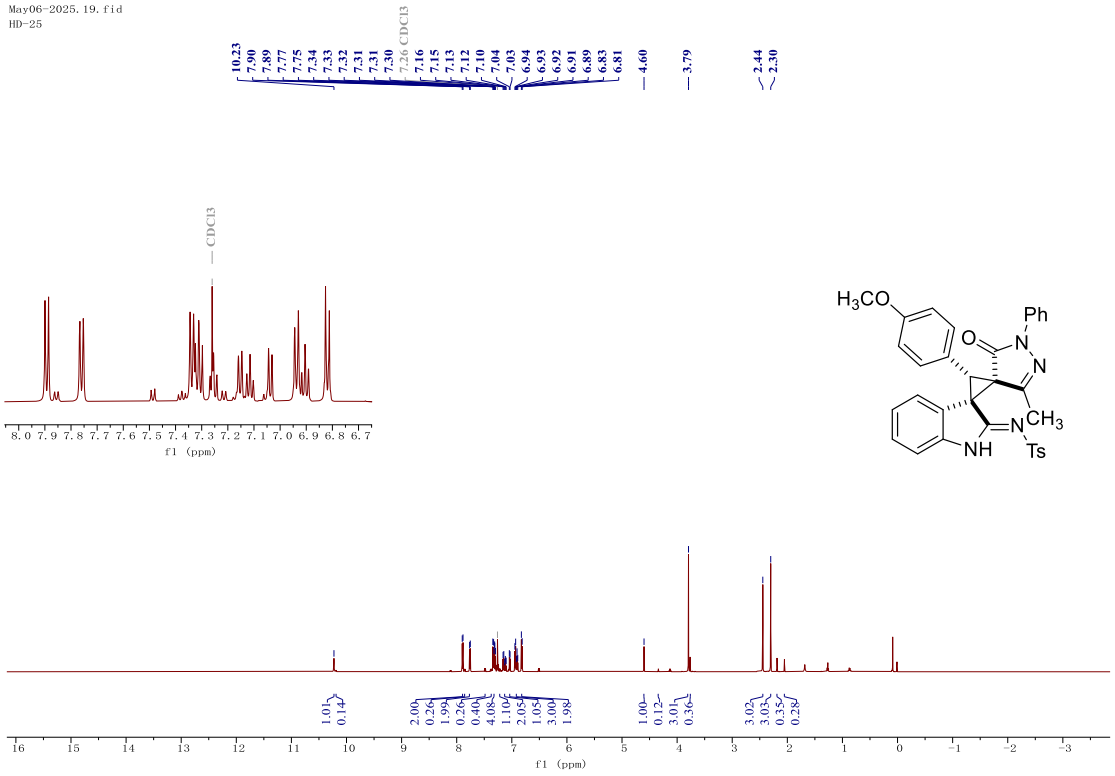


^{13}C NMR (150 MHz, Chloroform-*d*)

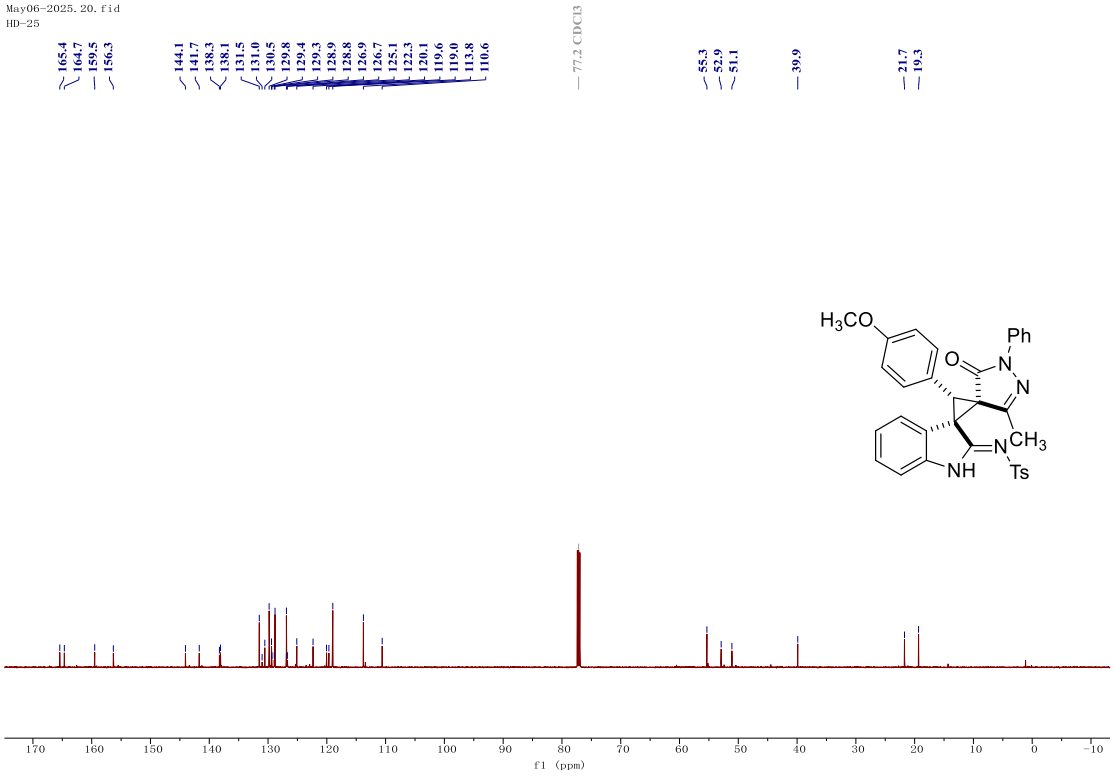


3fa

^{1}H NMR (600 MHz, Chloroform-*d*)

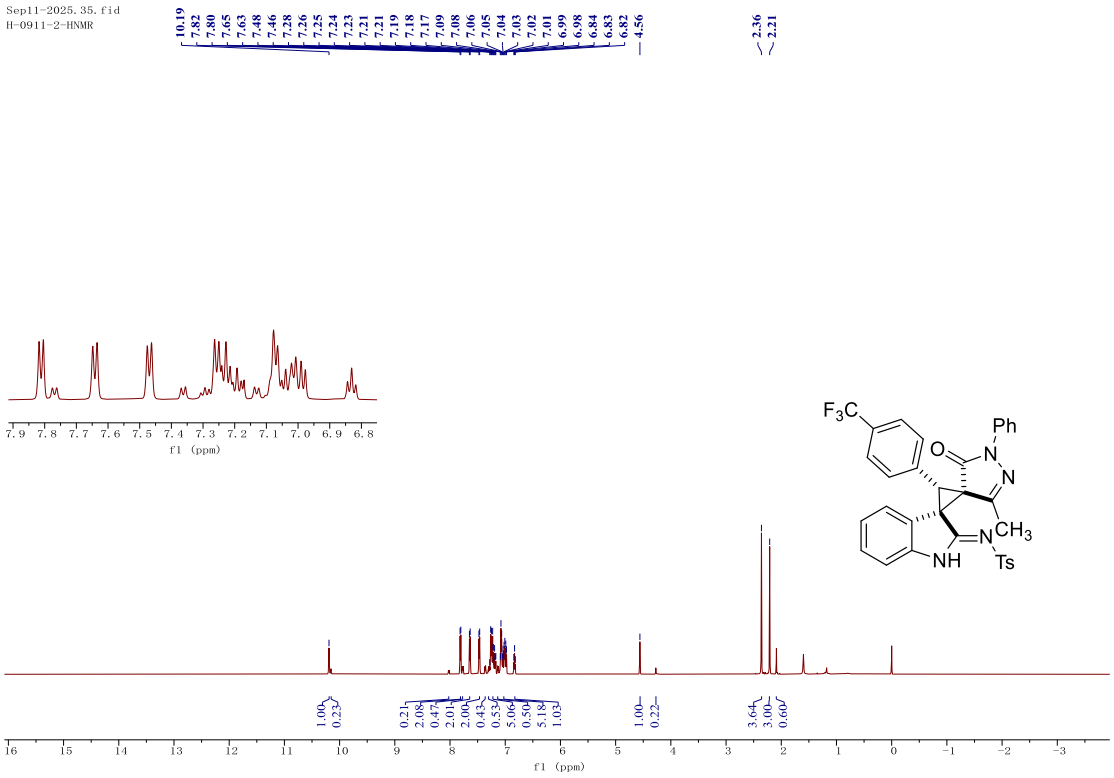


^{13}C NMR (150 MHz, Chloroform-*d*)

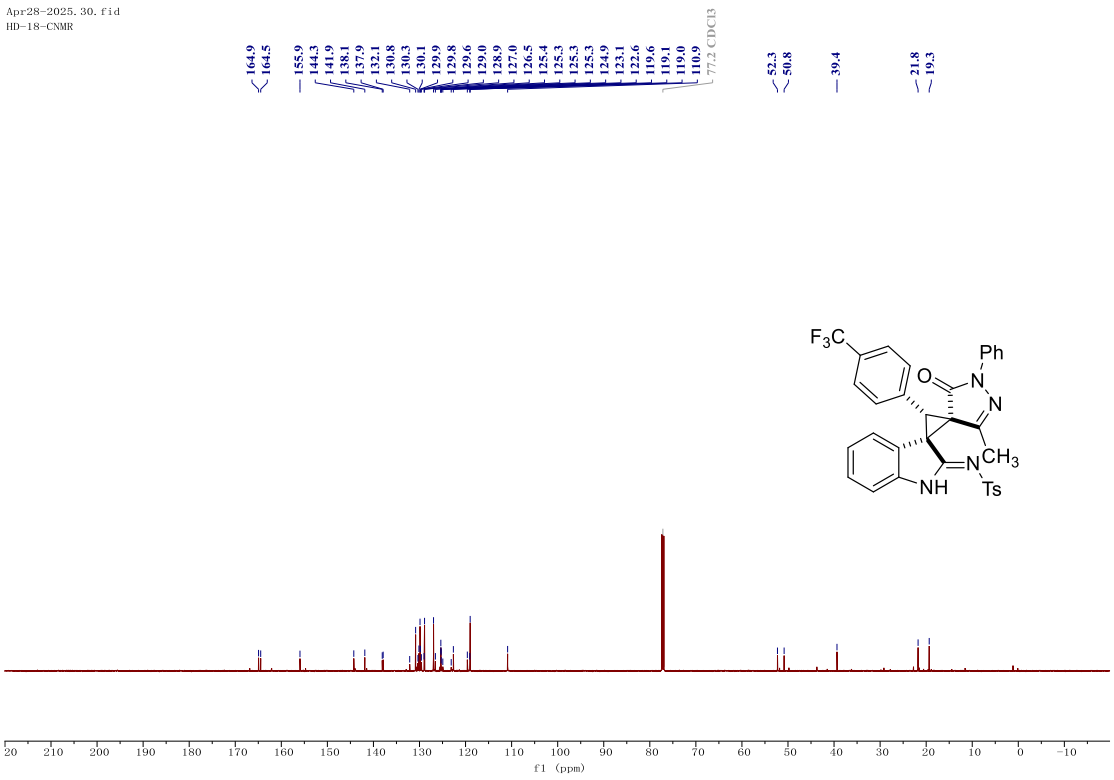


3ga

^{1}H NMR (600 MHz, Chloroform-*d*)

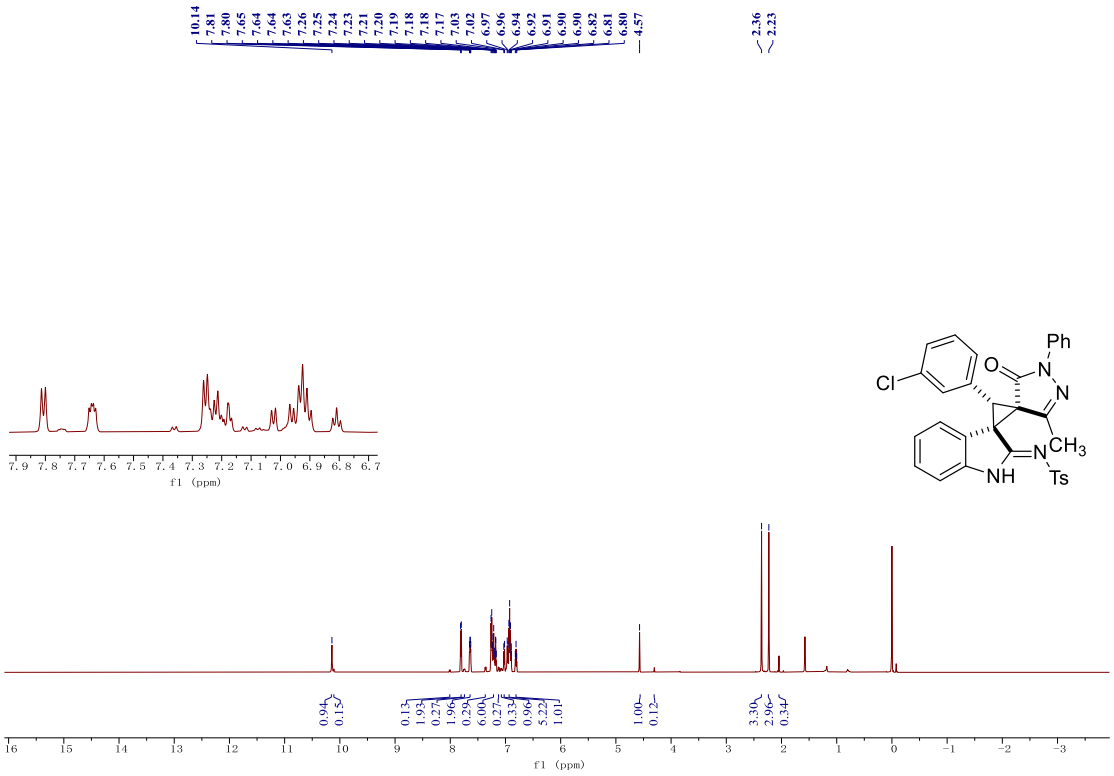


^{13}C NMR (150 MHz, Chloroform-*d)*

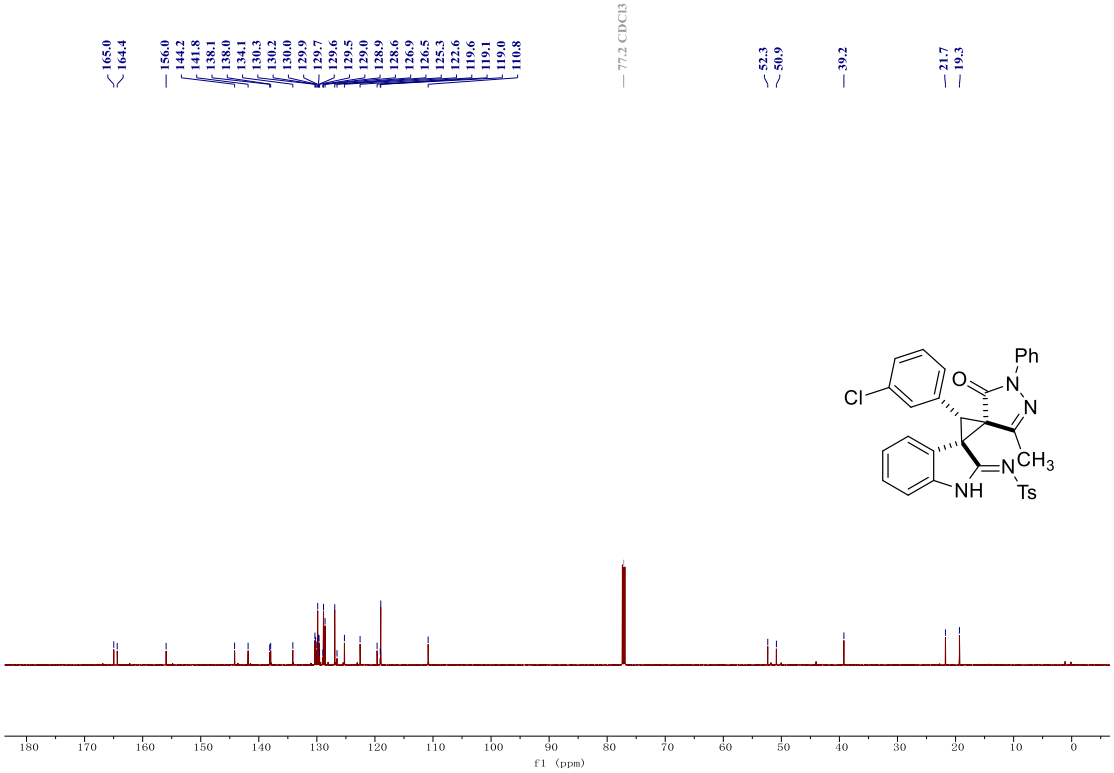


3ha

^{1}H NMR (600 MHz, Chloroform-*d*)

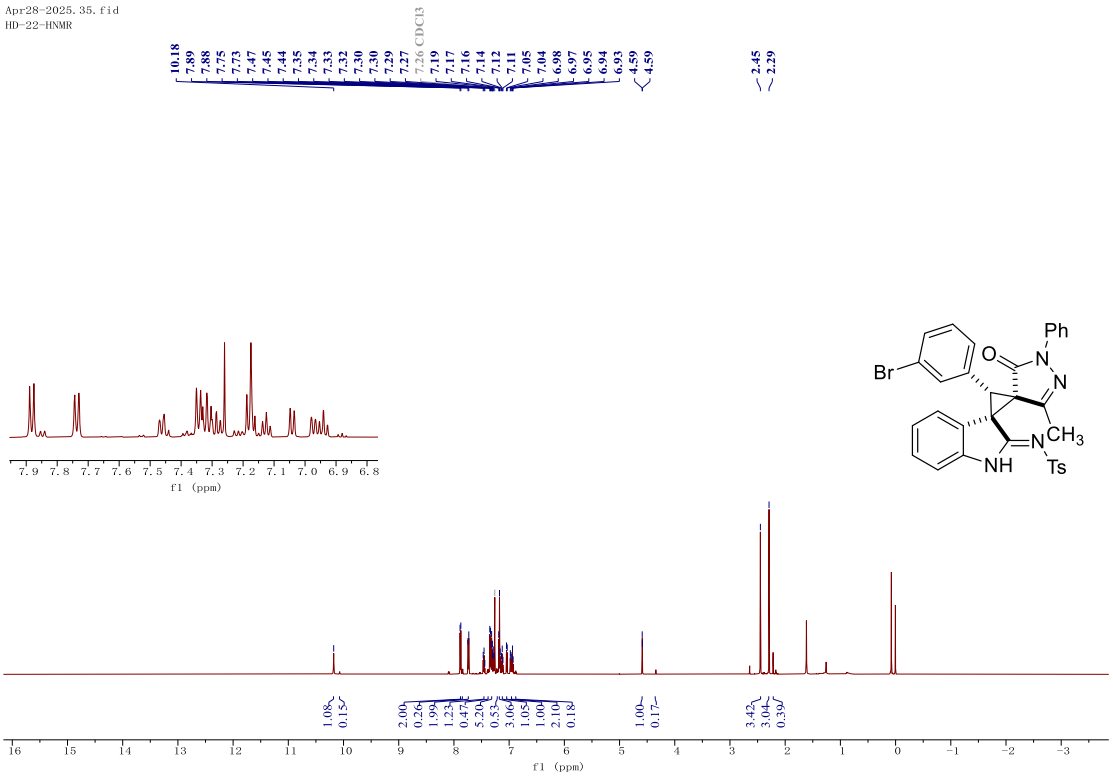


^{13}C NMR (150 MHz, Chloroform-*d)*

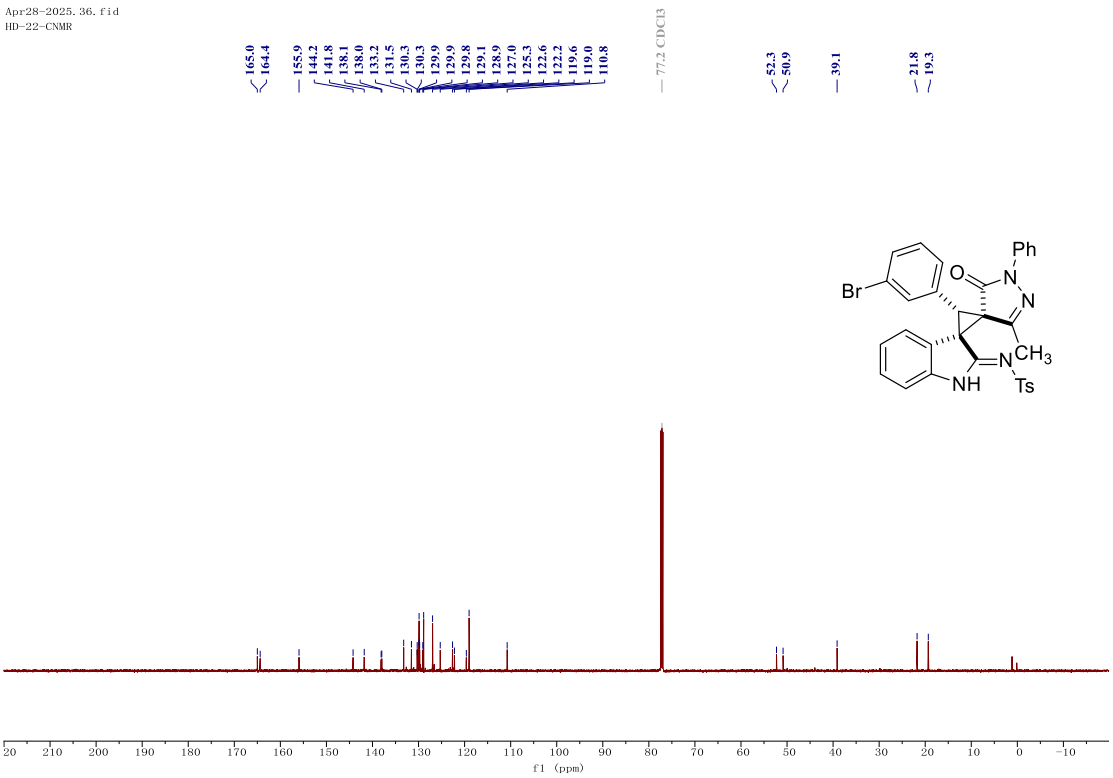


3ia

^{1}H NMR (600 MHz, Chloroform-*d*)

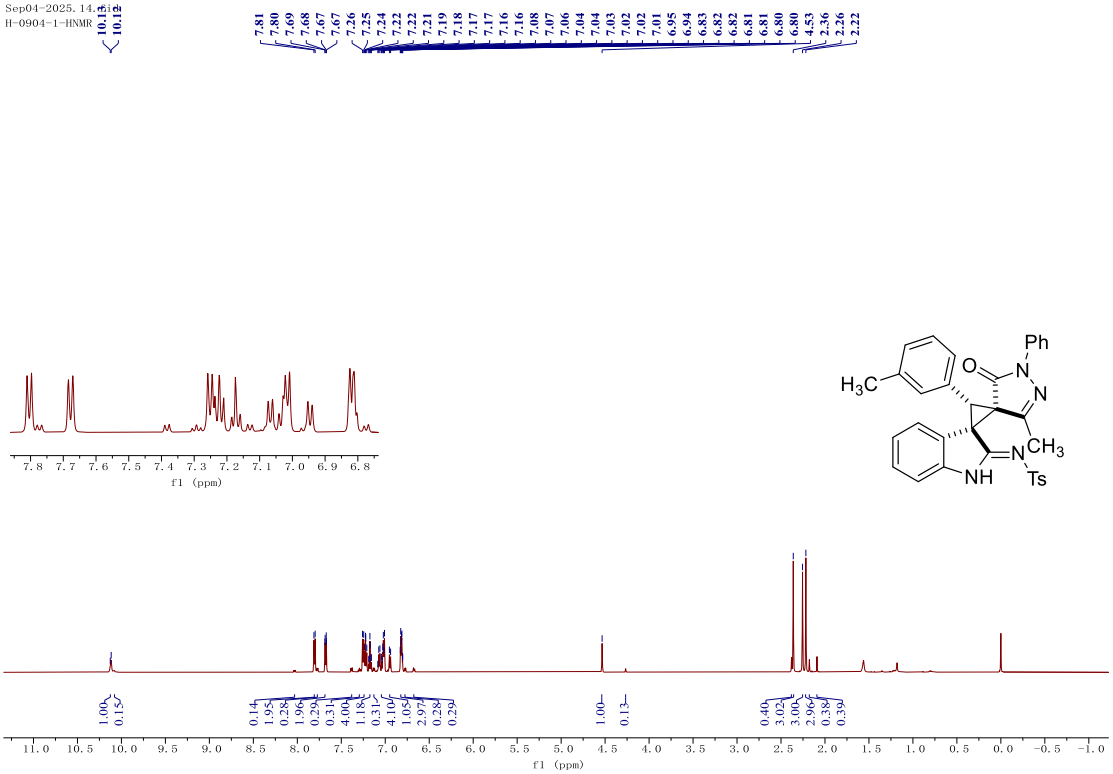


^{13}C NMR (150 MHz, Chloroform-*d)*

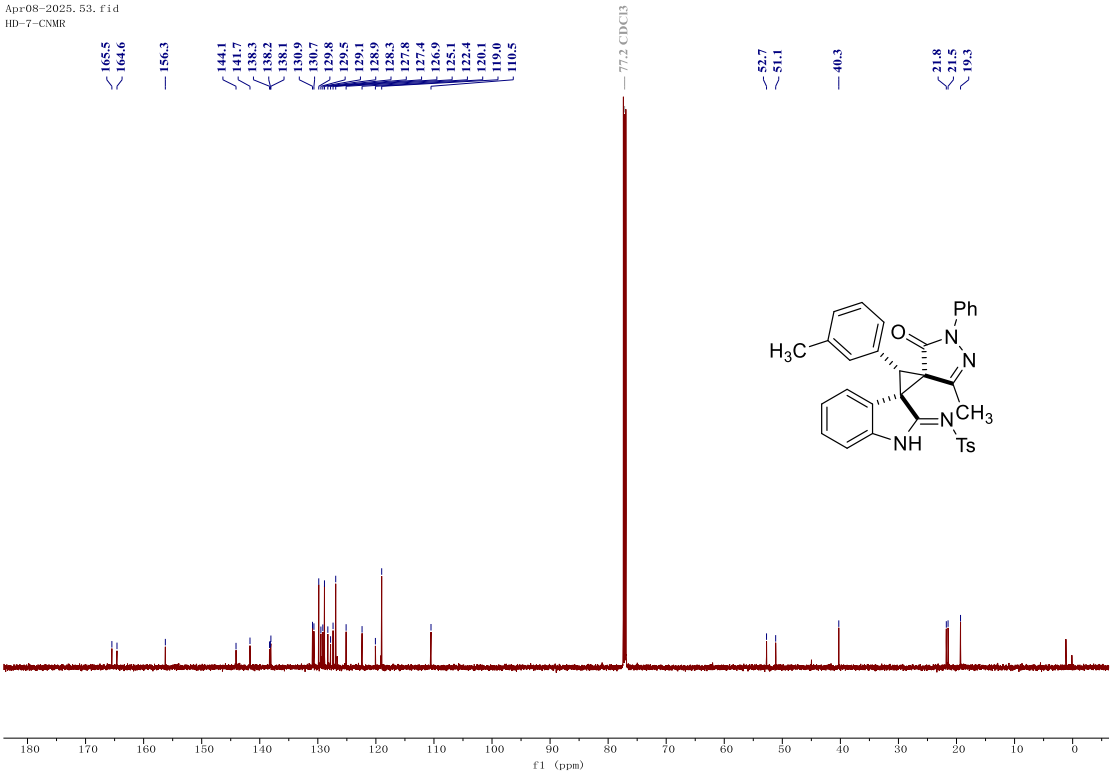


3ja

^{1}H NMR (600 MHz, Chloroform-*d*)

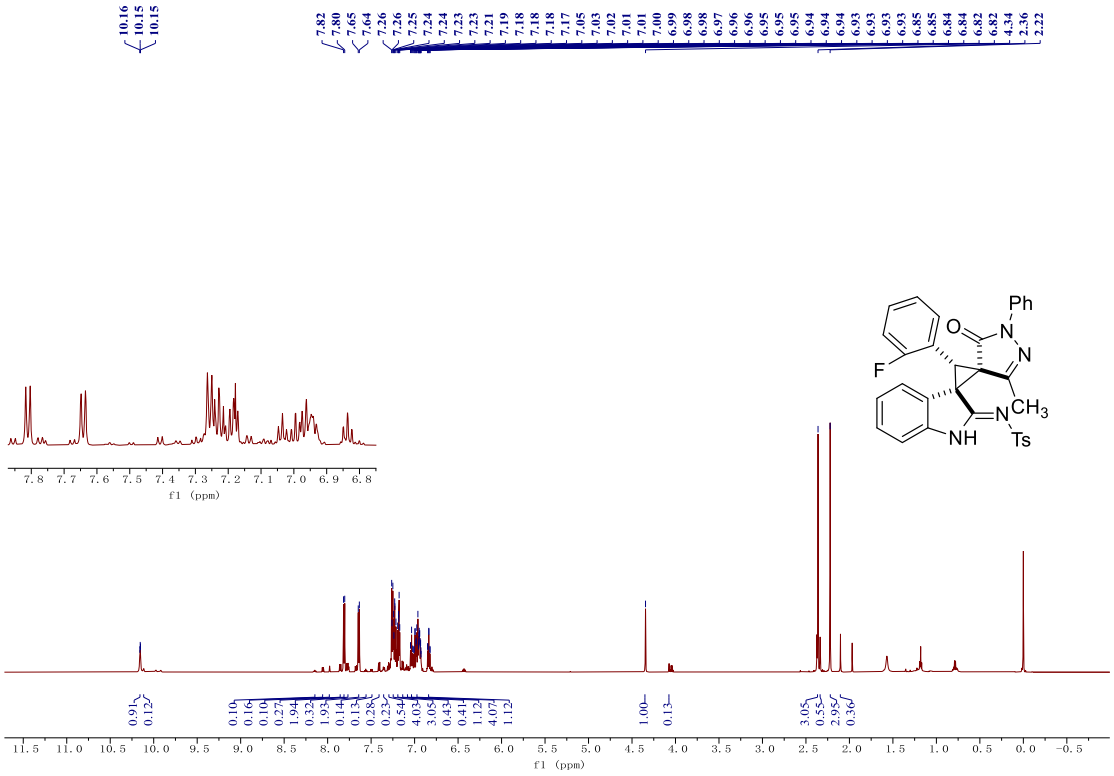


^{13}C NMR (150 MHz, Chloroform-*d)*

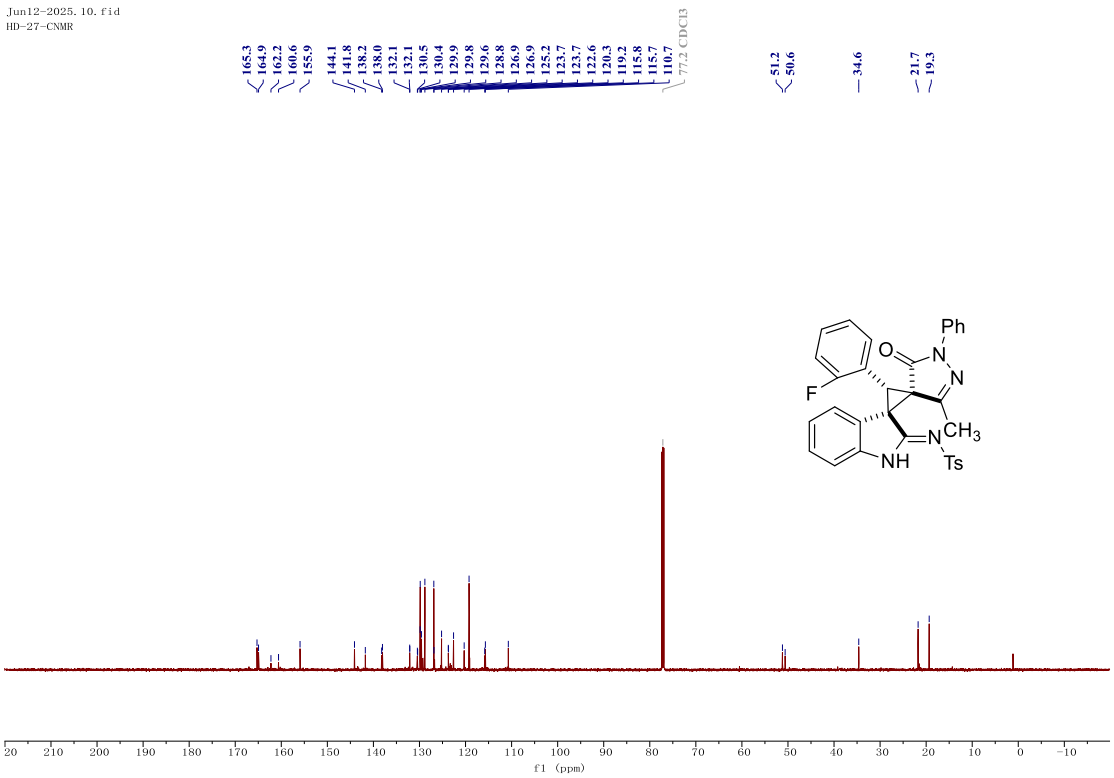


3ka

^{1}H NMR (600 MHz, Chloroform-*d*)

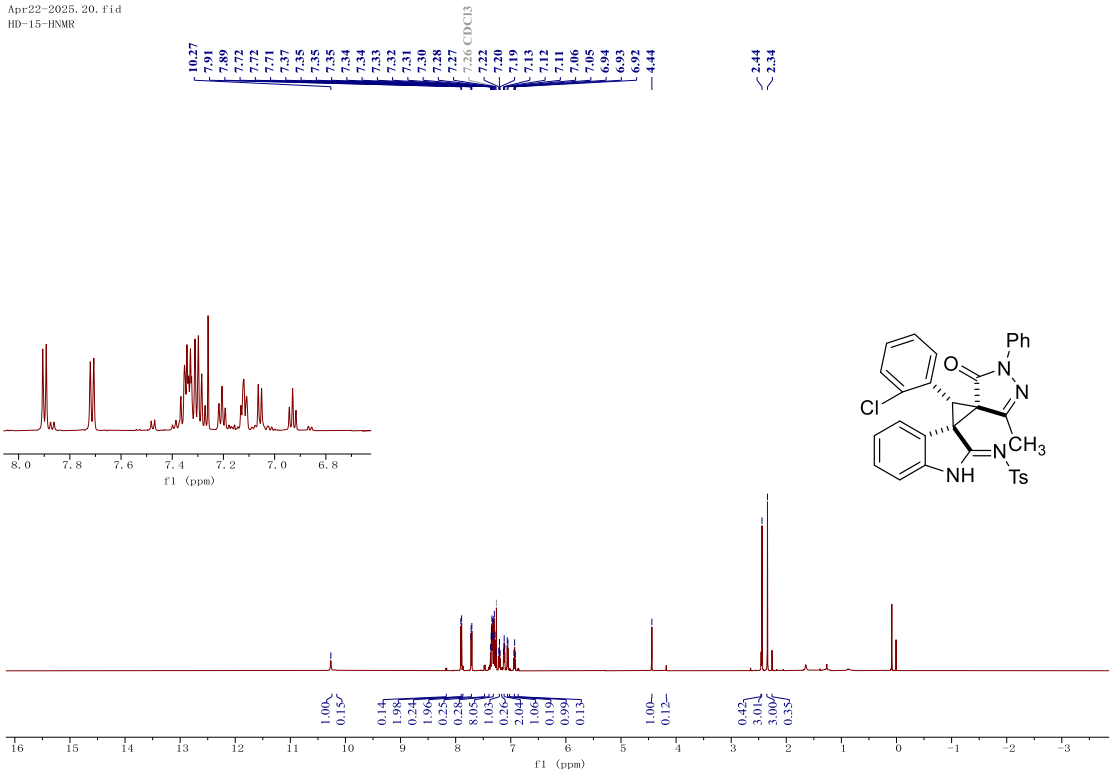


^{13}C NMR (150 MHz, Chloroform-*d)*

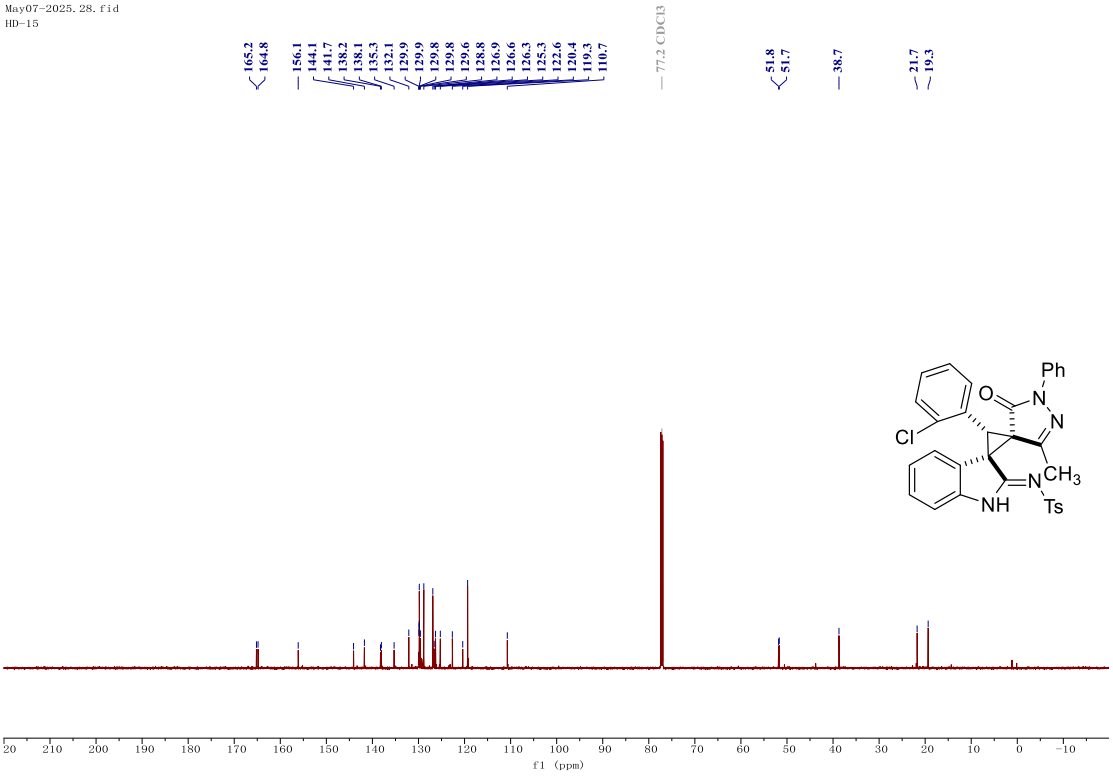


3la

^{1}H NMR (600 MHz, Chloroform-*d*)

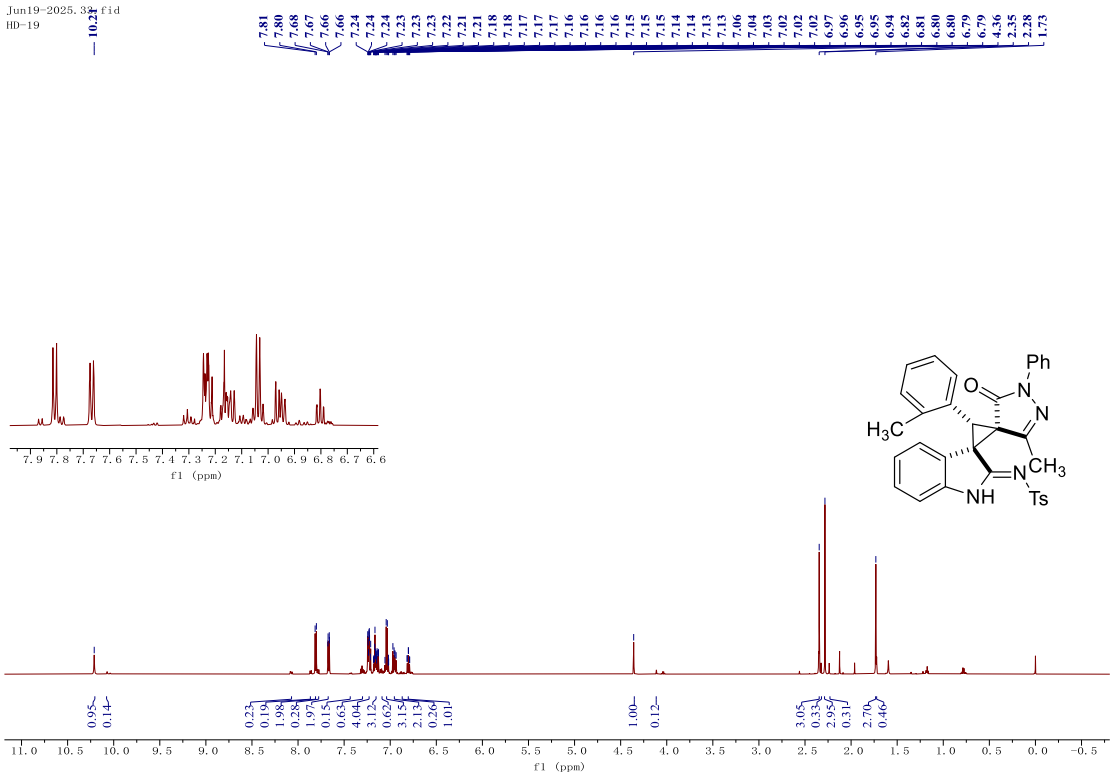


^{13}C NMR (150 MHz, Chloroform-*d)*

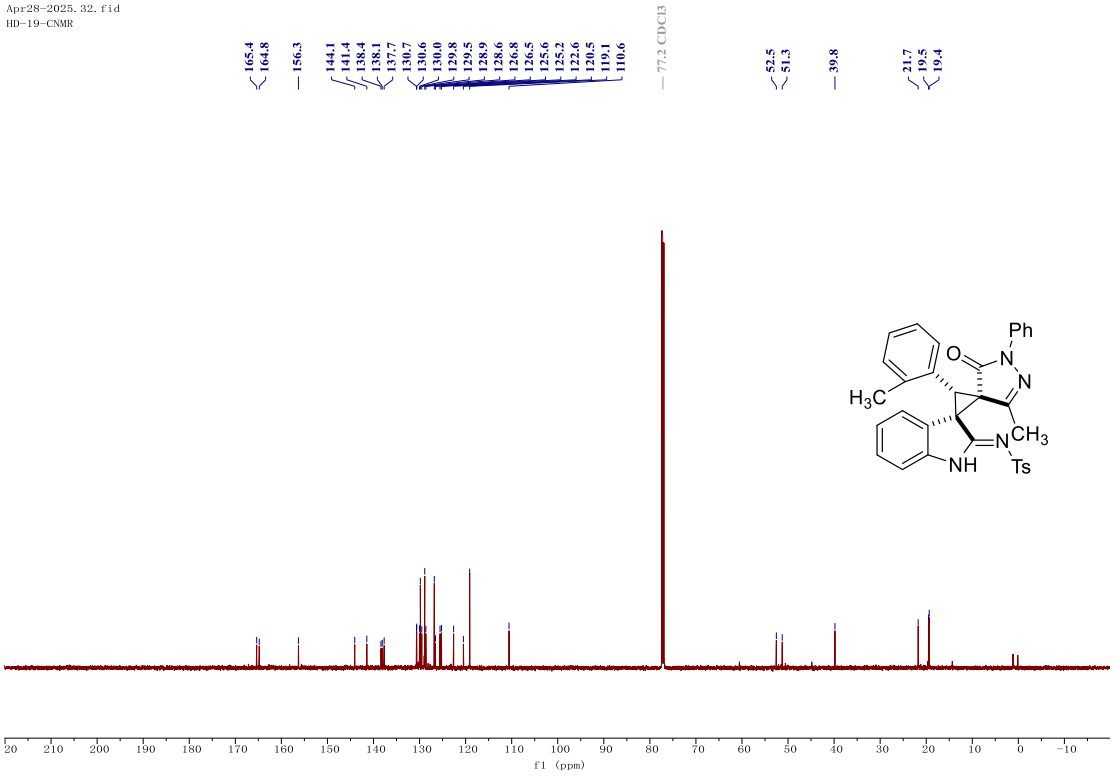


3ma

^{1}H NMR (600 MHz, Chloroform-*d*)

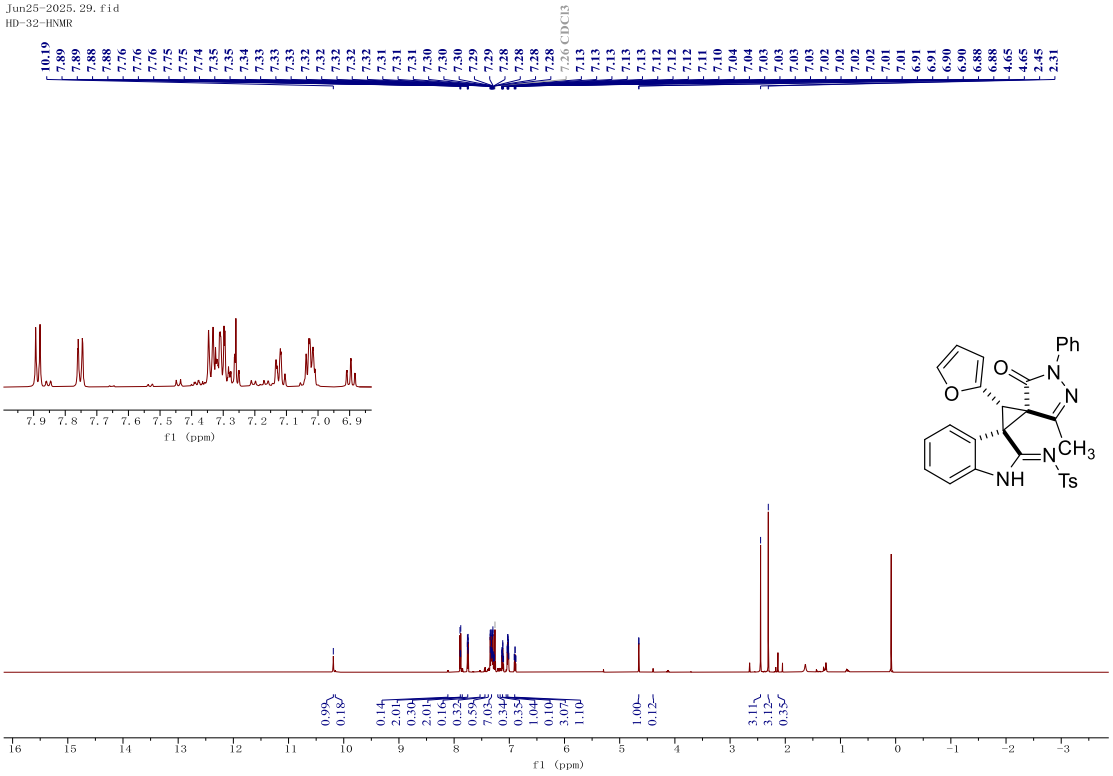


^{13}C NMR (150 MHz, Chloroform-*d*)

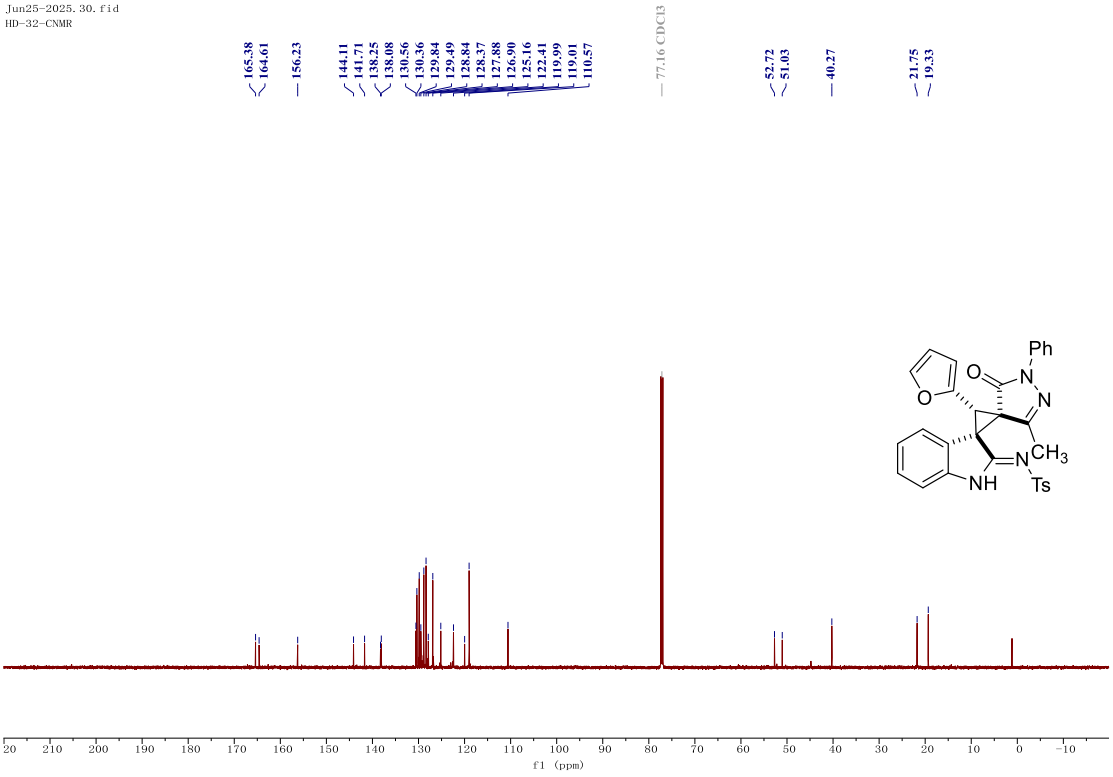


3na

^{1}H NMR (600 MHz, Chloroform-*d*)

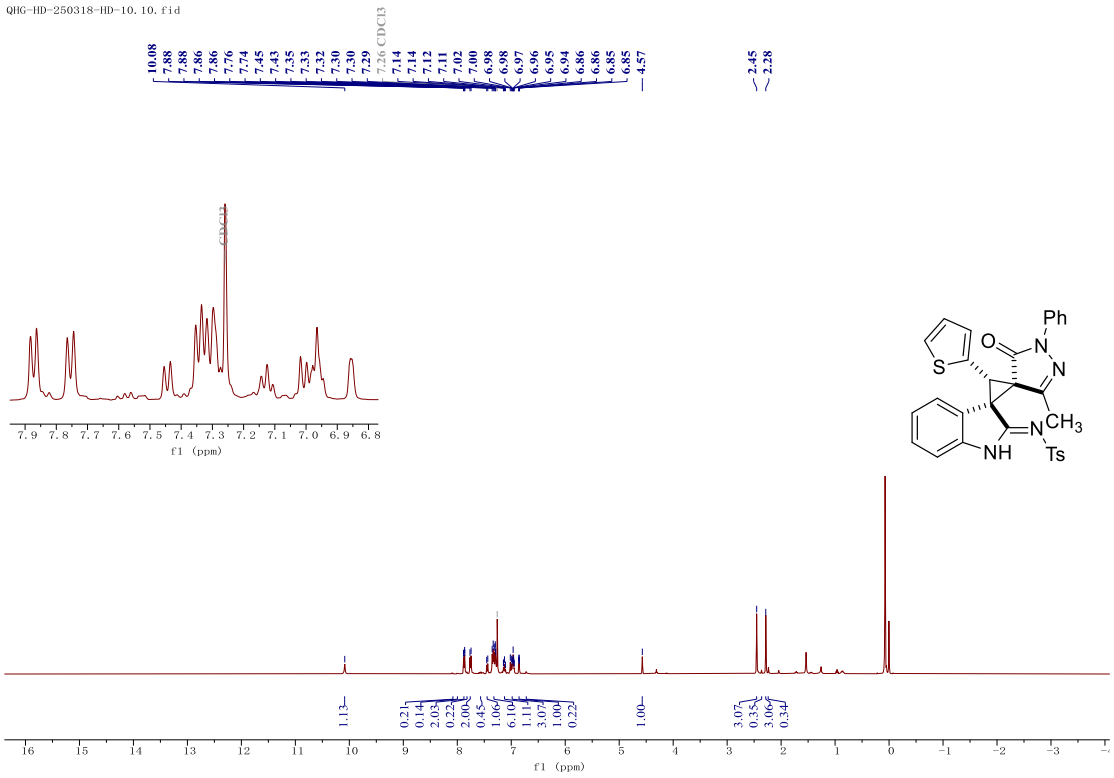


^{13}C NMR (150 MHz, Chloroform-*d*)

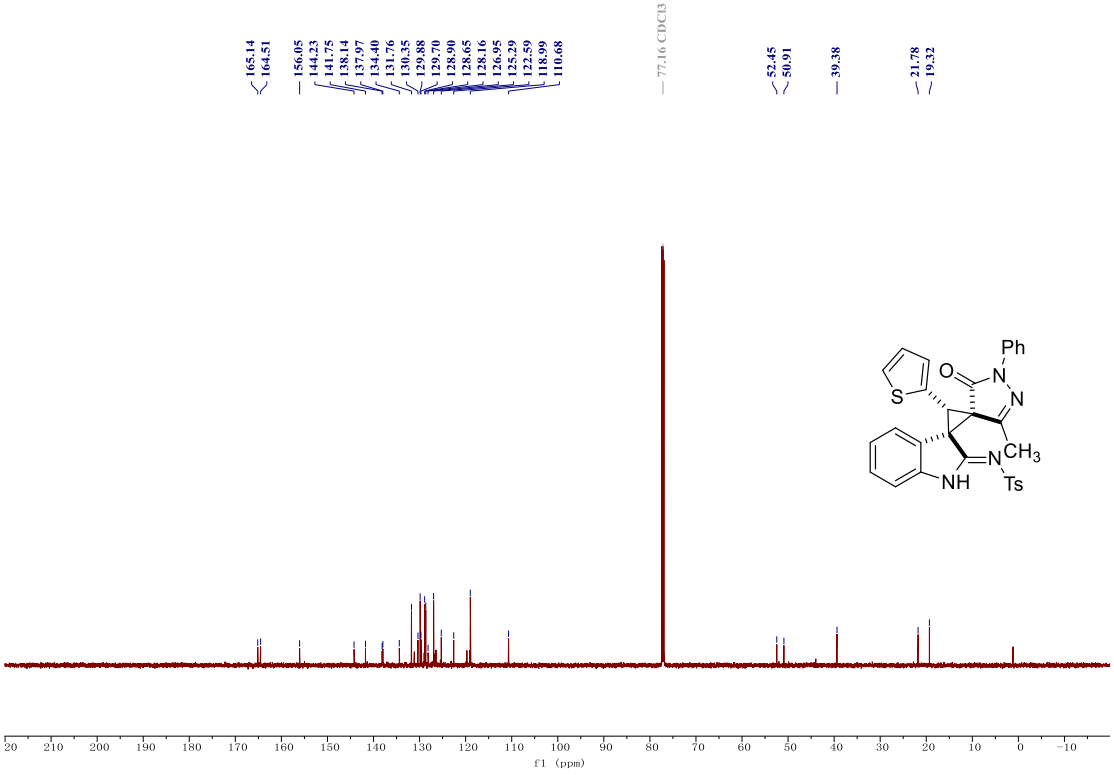


3oa

^{1}H NMR (400 MHz, Chloroform-*d*)

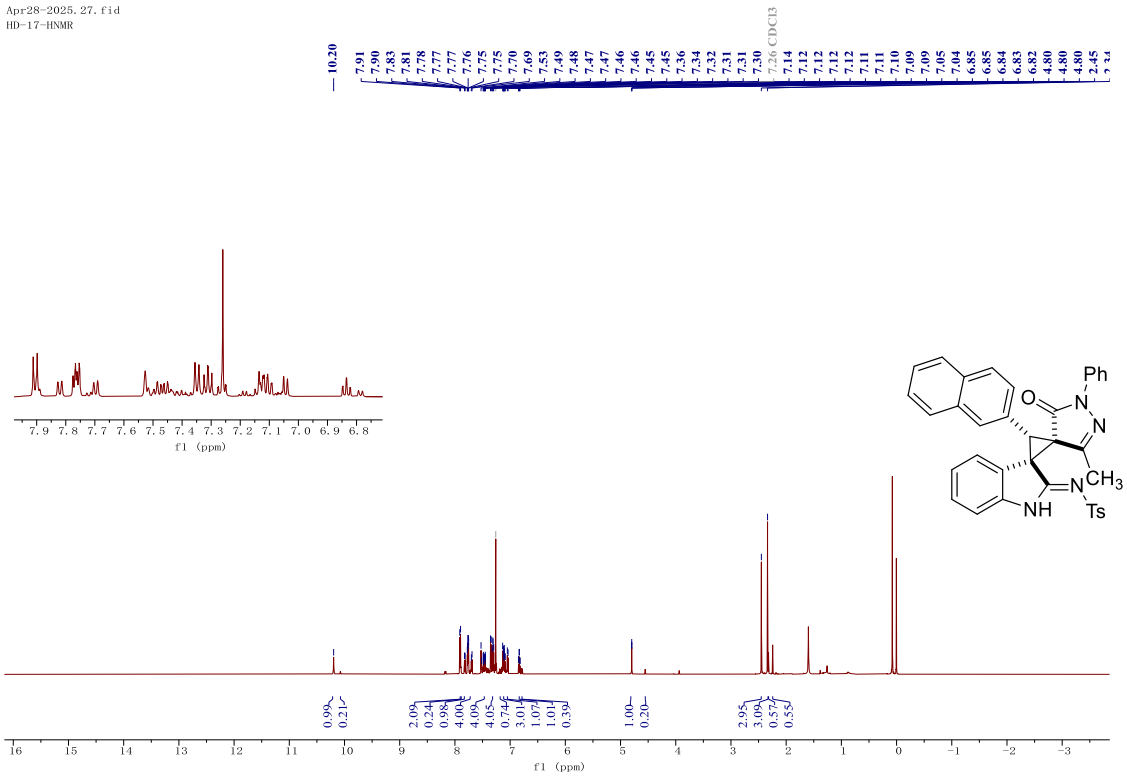


^{13}C NMR (150 MHz, Chloroform-*d*)

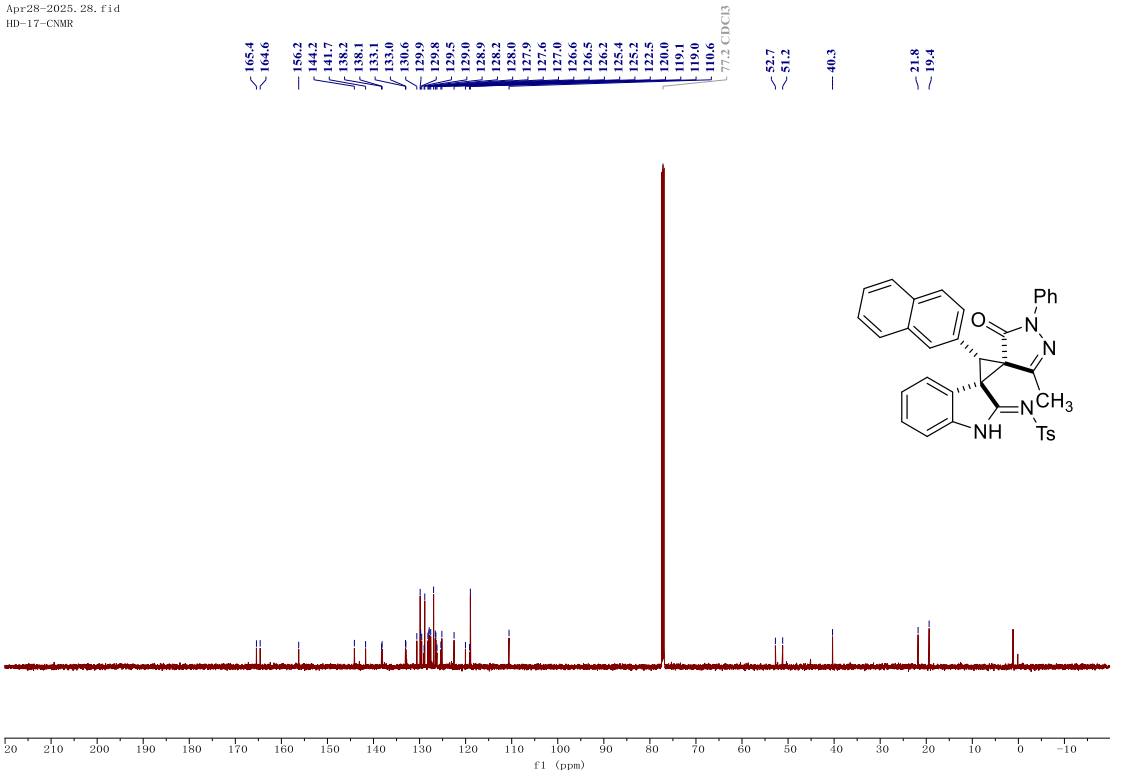


3pa

^{1}H NMR (600 MHz, Chloroform-*d*)

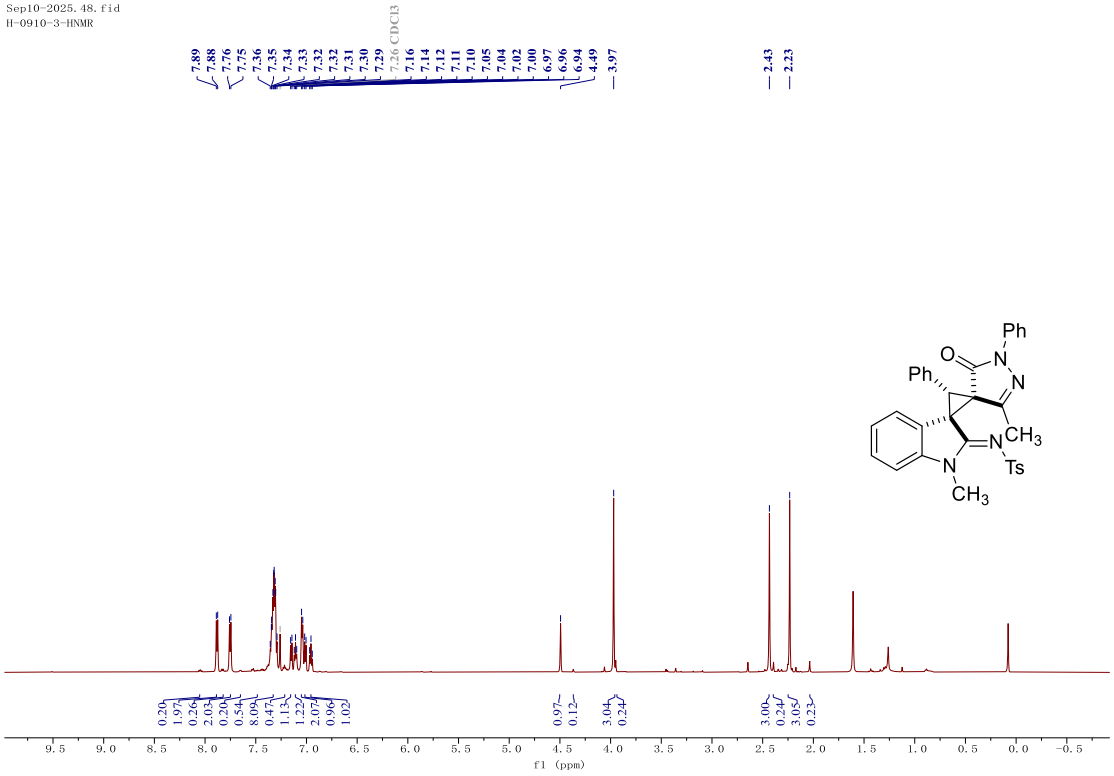


^{13}C NMR (150 MHz, Chloroform-*d*)

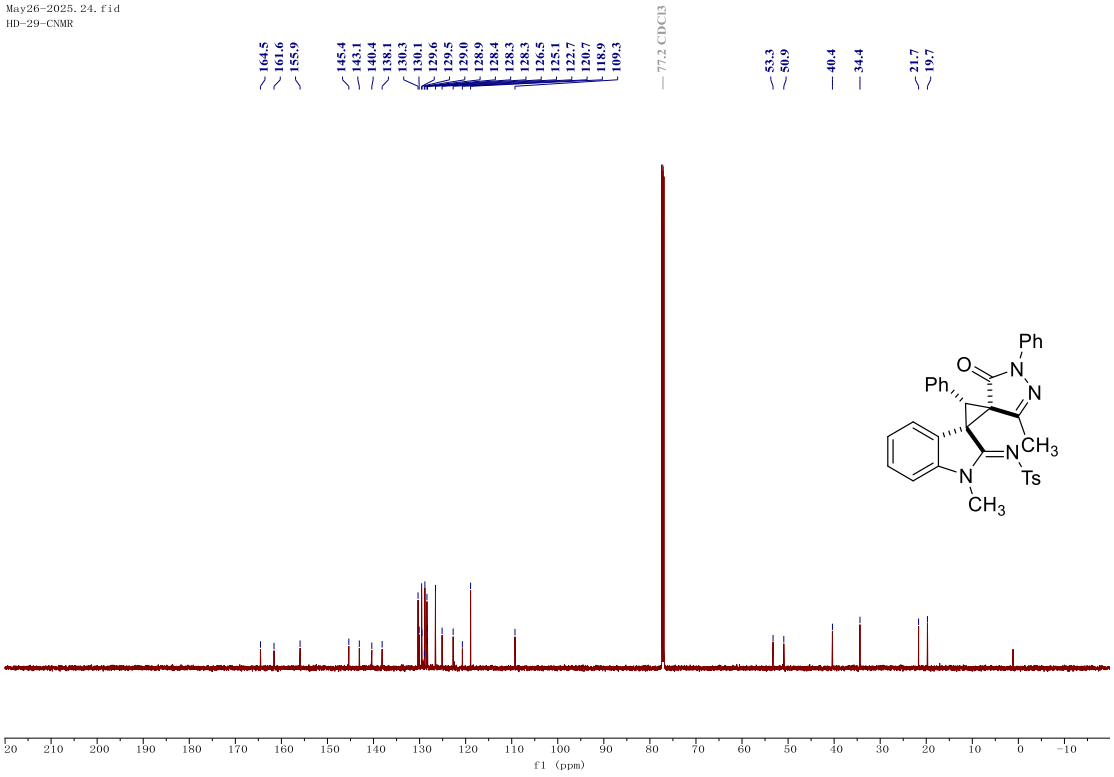


3qa

^{1}H NMR (600 MHz, Chloroform-*d*)

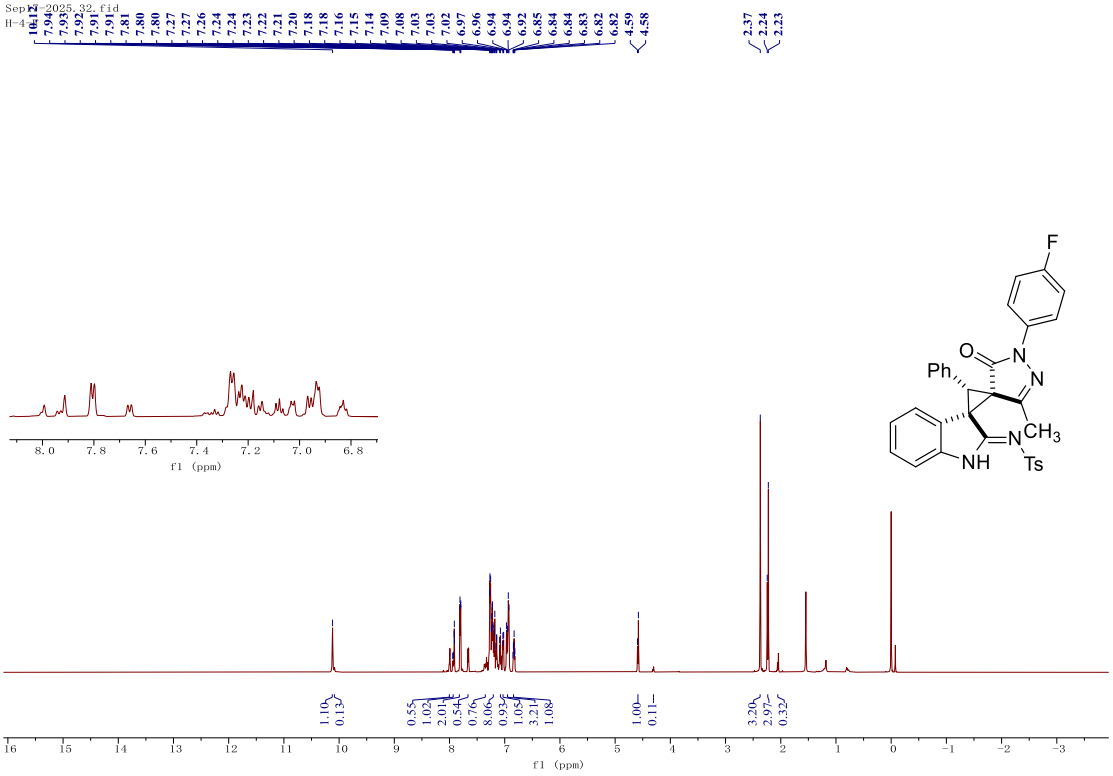


^{13}C NMR (150 MHz, Chloroform-*d*)

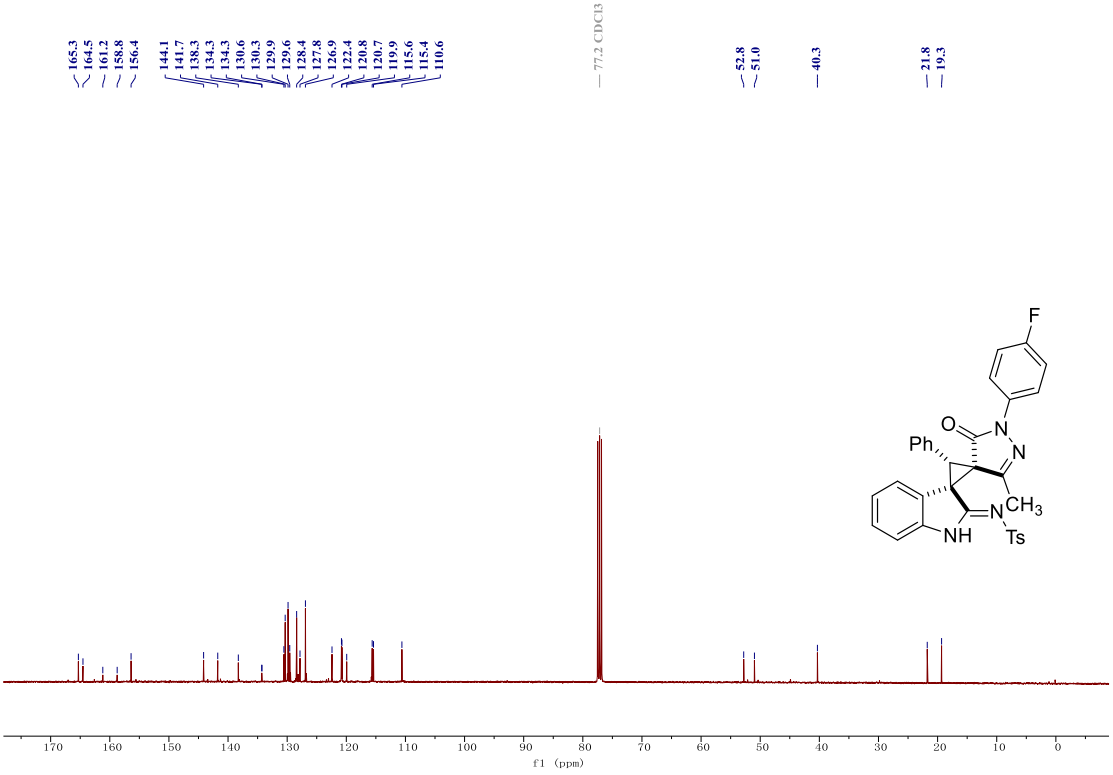


3ab

^{1}H NMR (400 MHz, Chloroform-*d*)

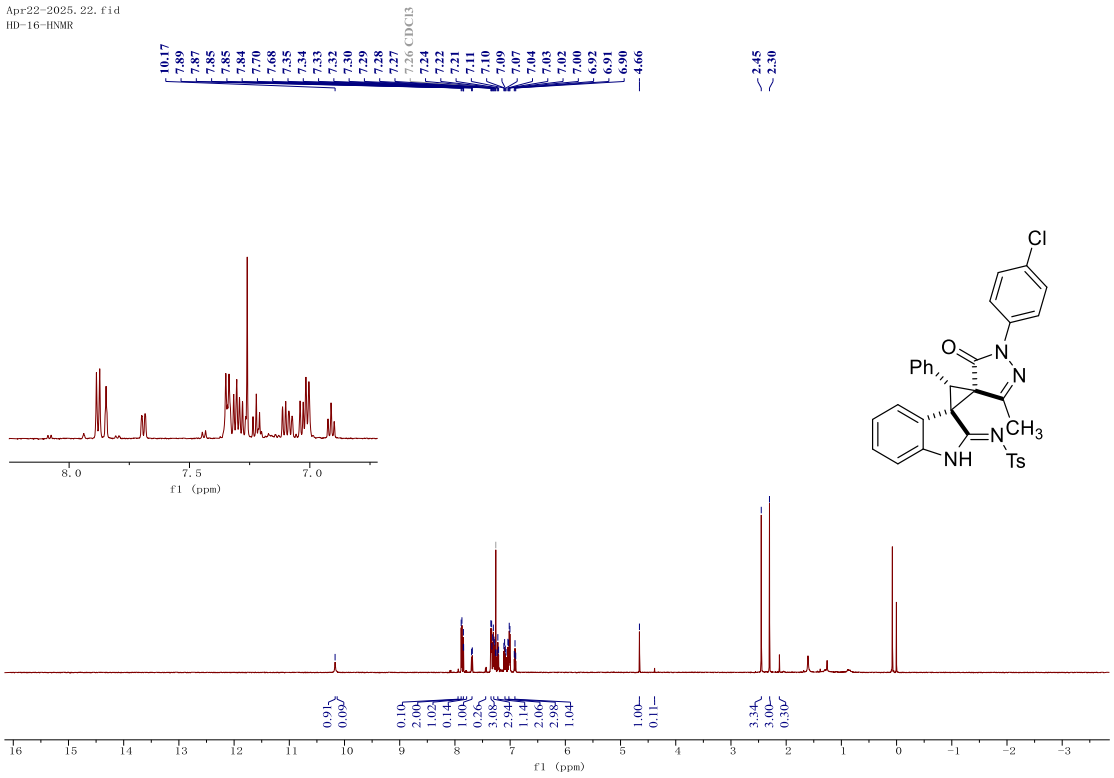


^{13}C NMR (100 MHz, Chloroform-*d*)

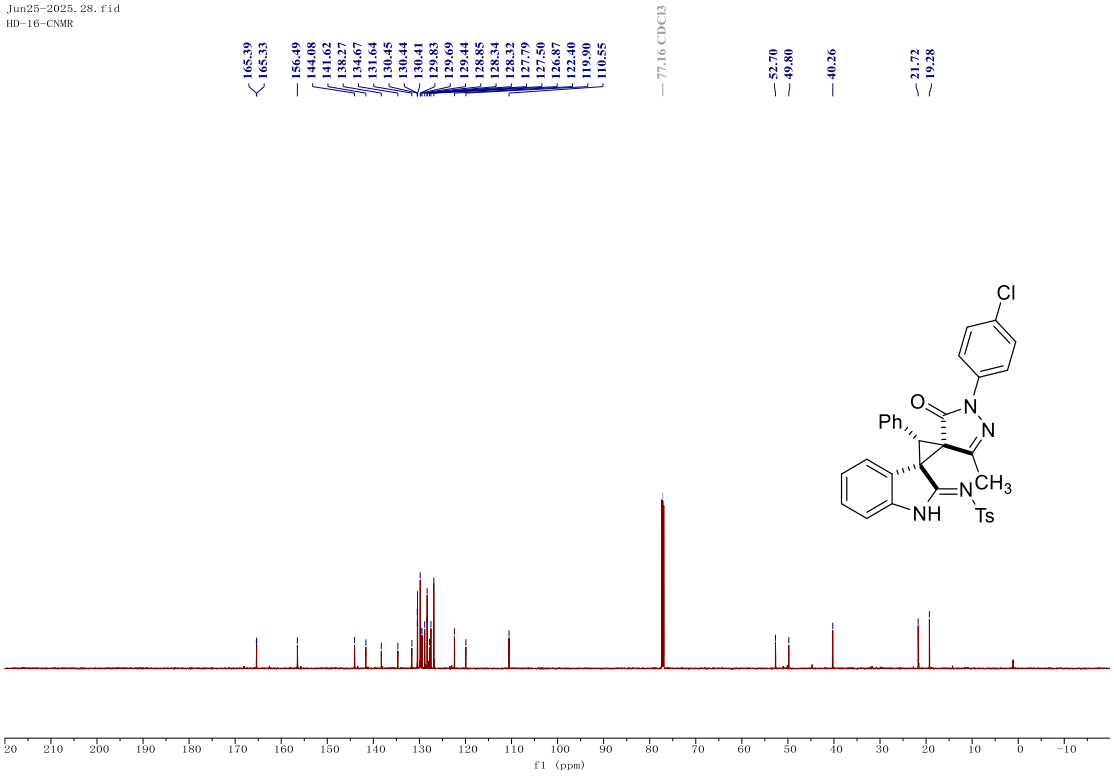


3ac

^{1}H NMR (600 MHz, Chloroform-*d*)

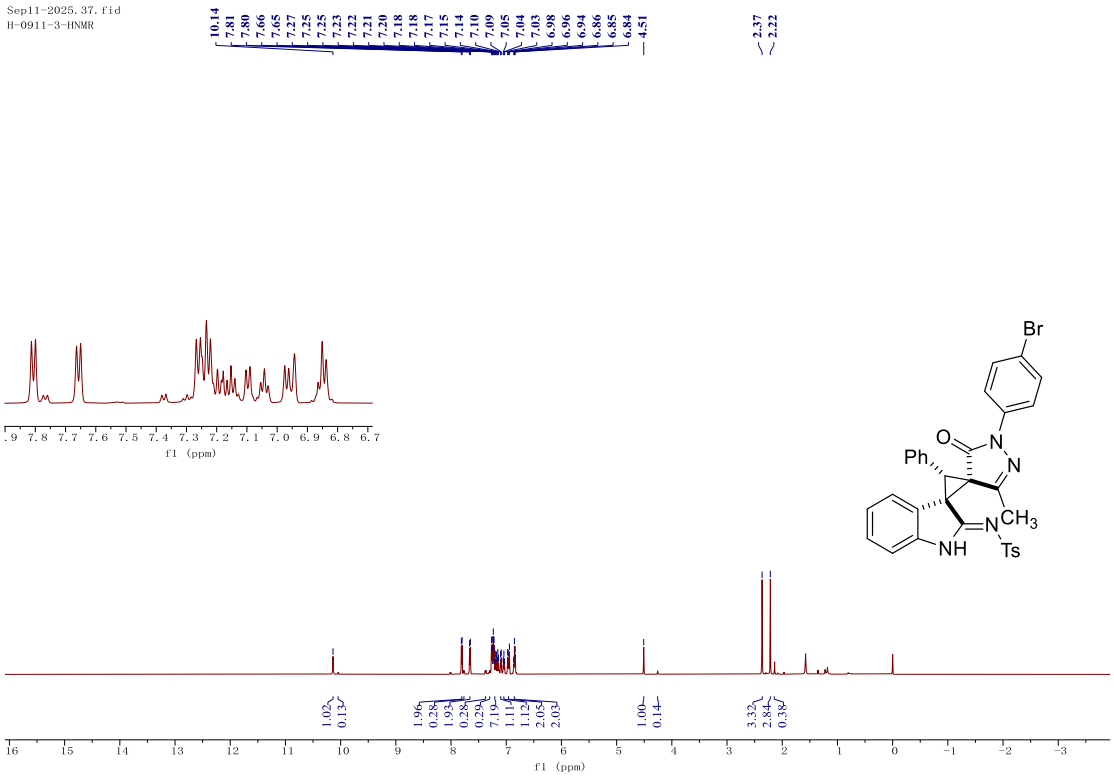


^{13}C NMR (150 MHz, Chloroform-*d*)

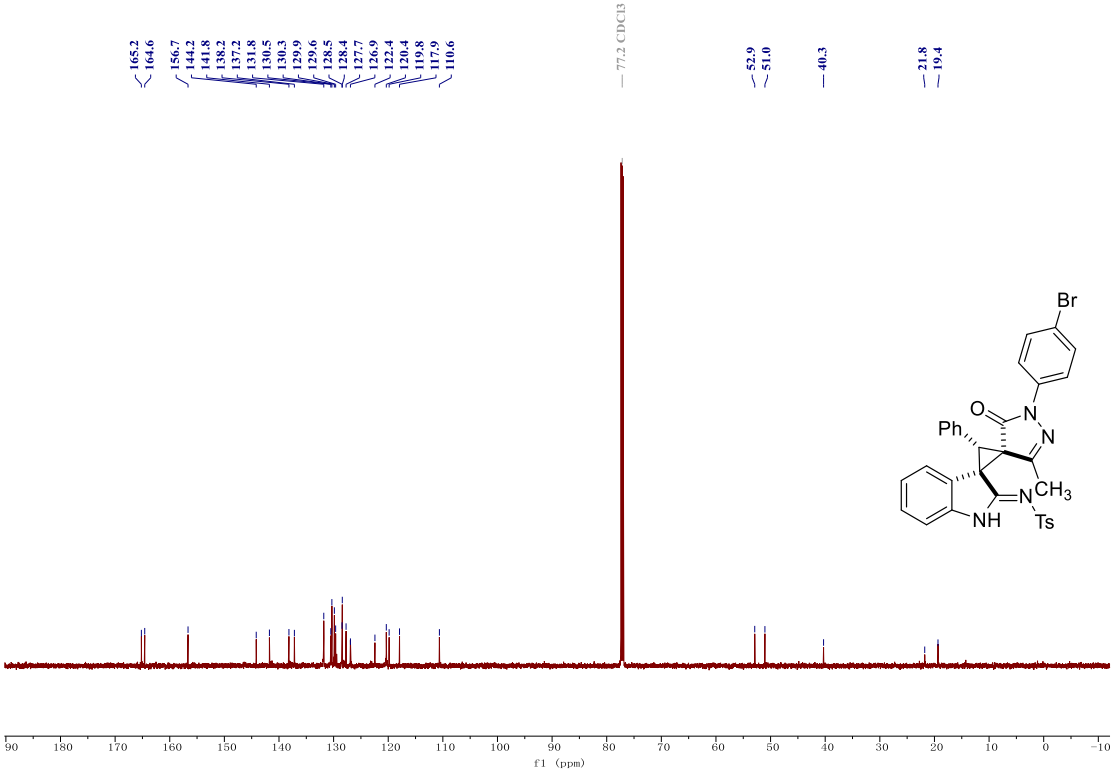


3ad

^{1}H NMR (600 MHz, Chloroform-*d*)

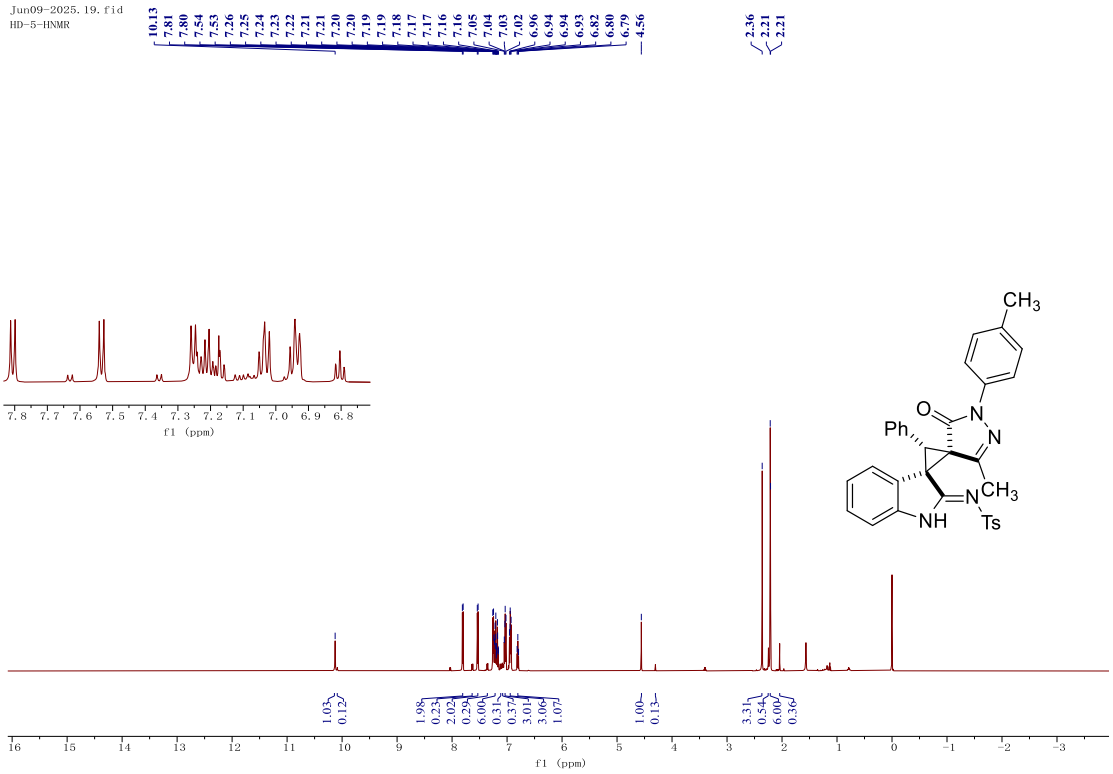


^{13}C NMR (150 MHz, Chloroform-*d*)

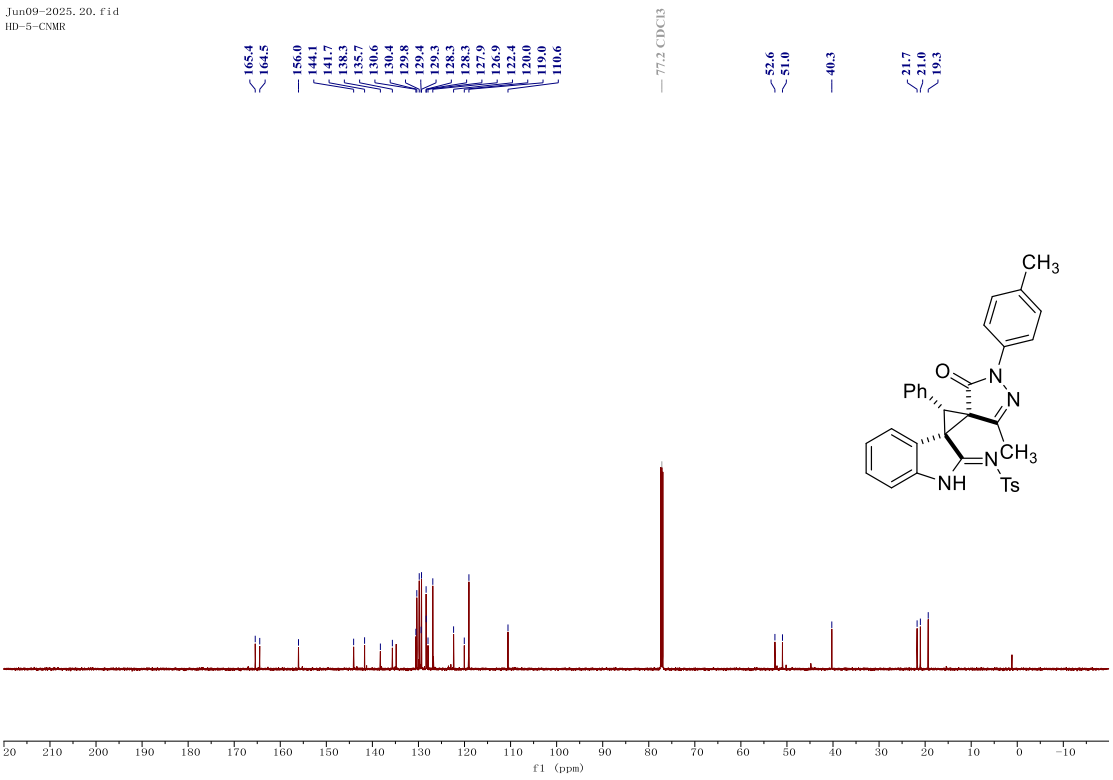


3ae

^{1}H NMR (600 MHz, Chloroform-*d*)

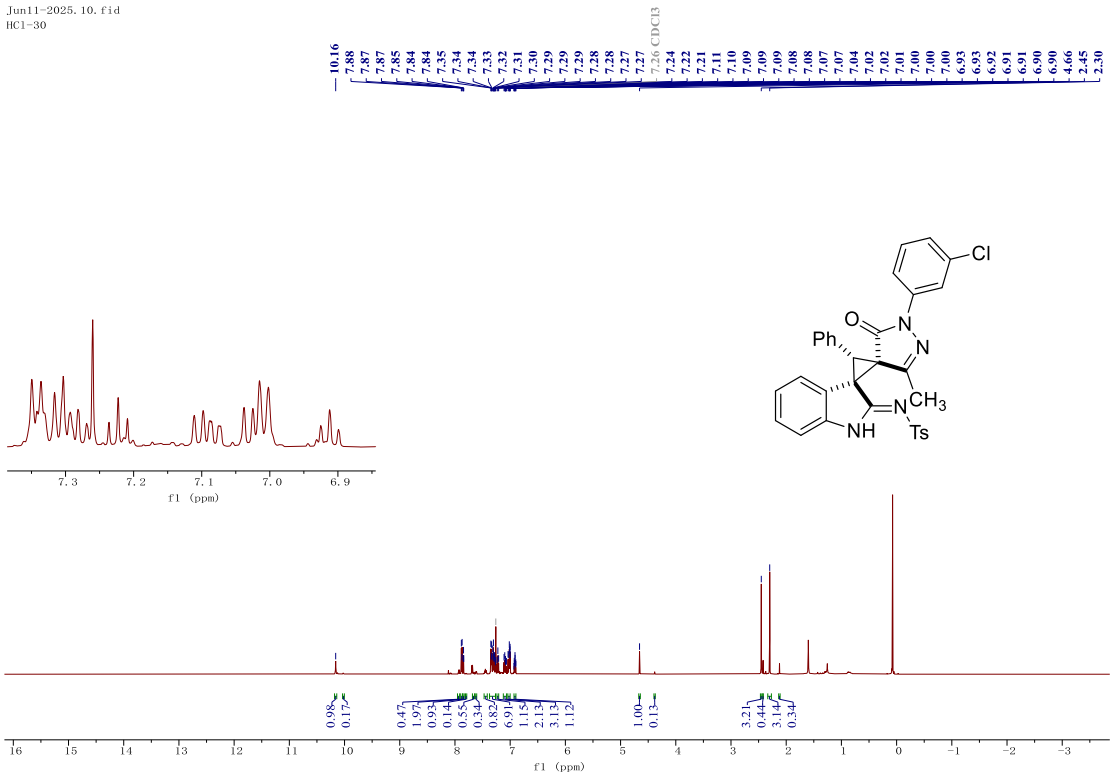


^{13}C NMR (150 MHz, Chloroform-*d*)

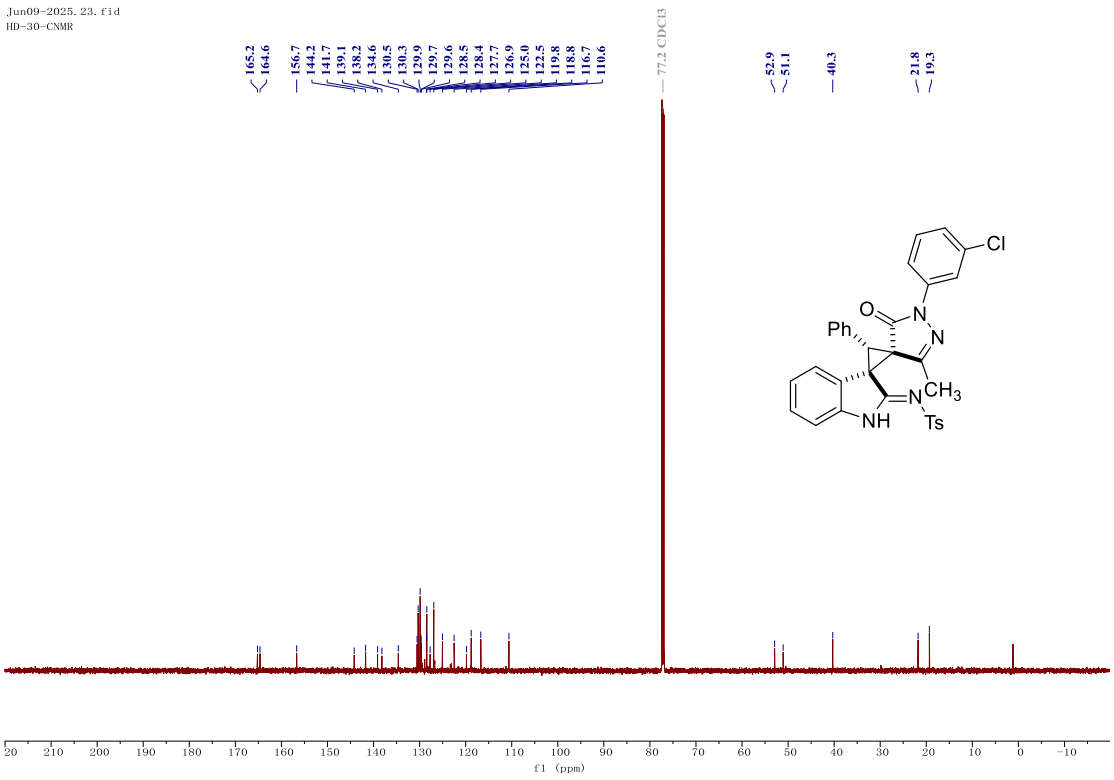


3af

^{1}H NMR (600 MHz, Chloroform-*d*)

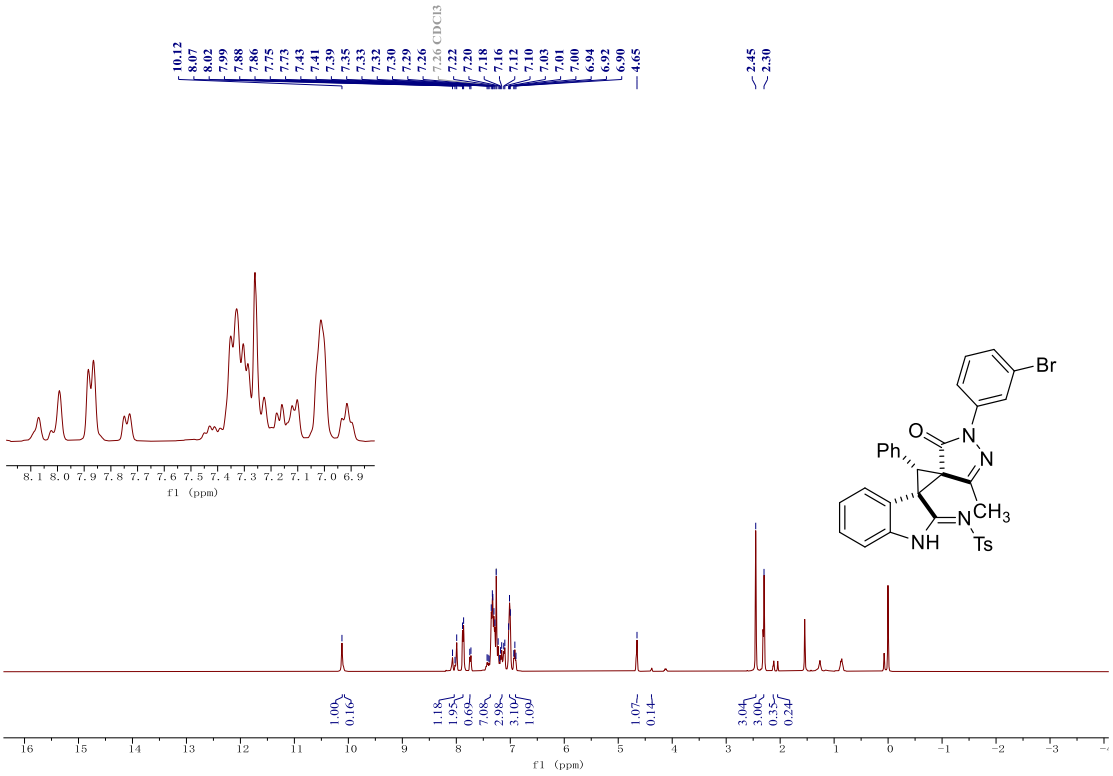


^{13}C NMR (150 MHz, Chloroform-*d*)

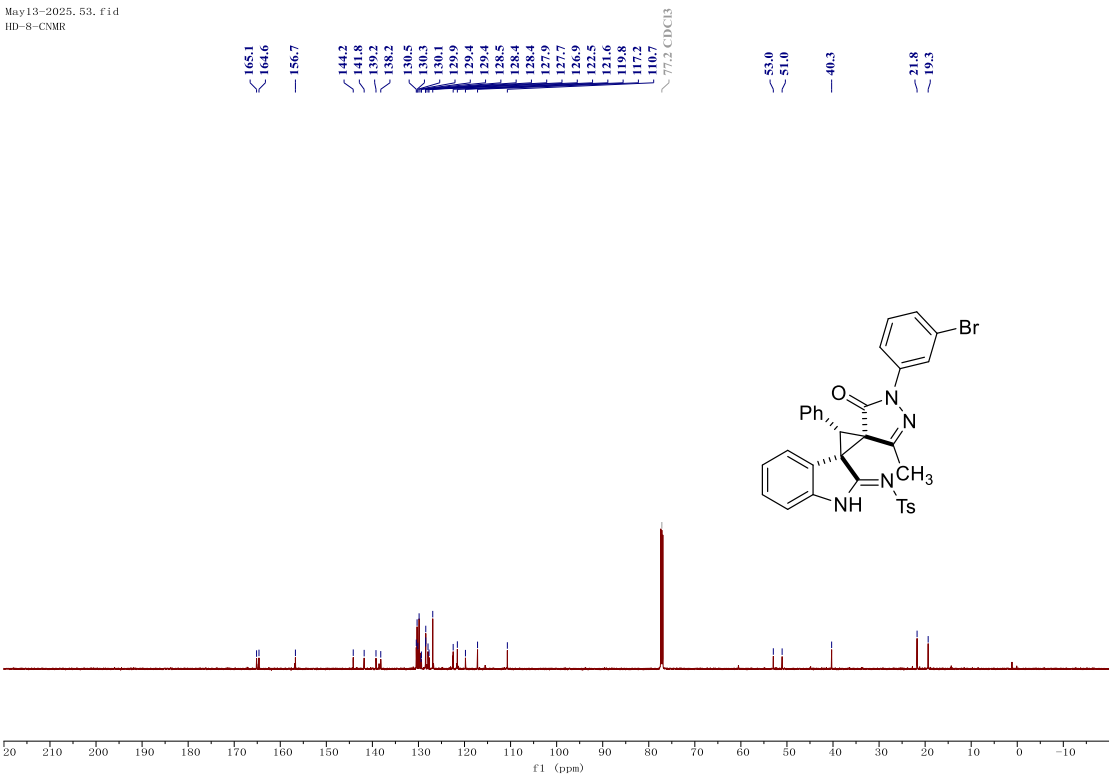


3ag

^{1}H NMR (400 MHz, Chloroform-*d*)

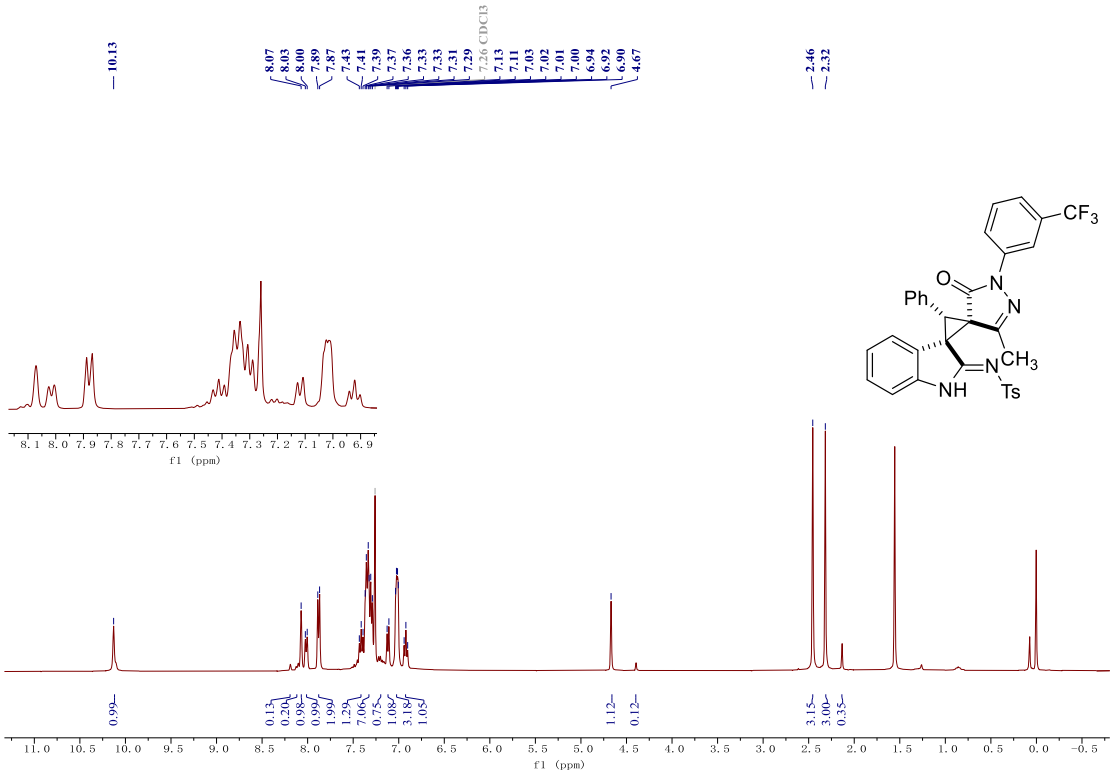


^{13}C NMR (150 MHz, Chloroform-*d*)

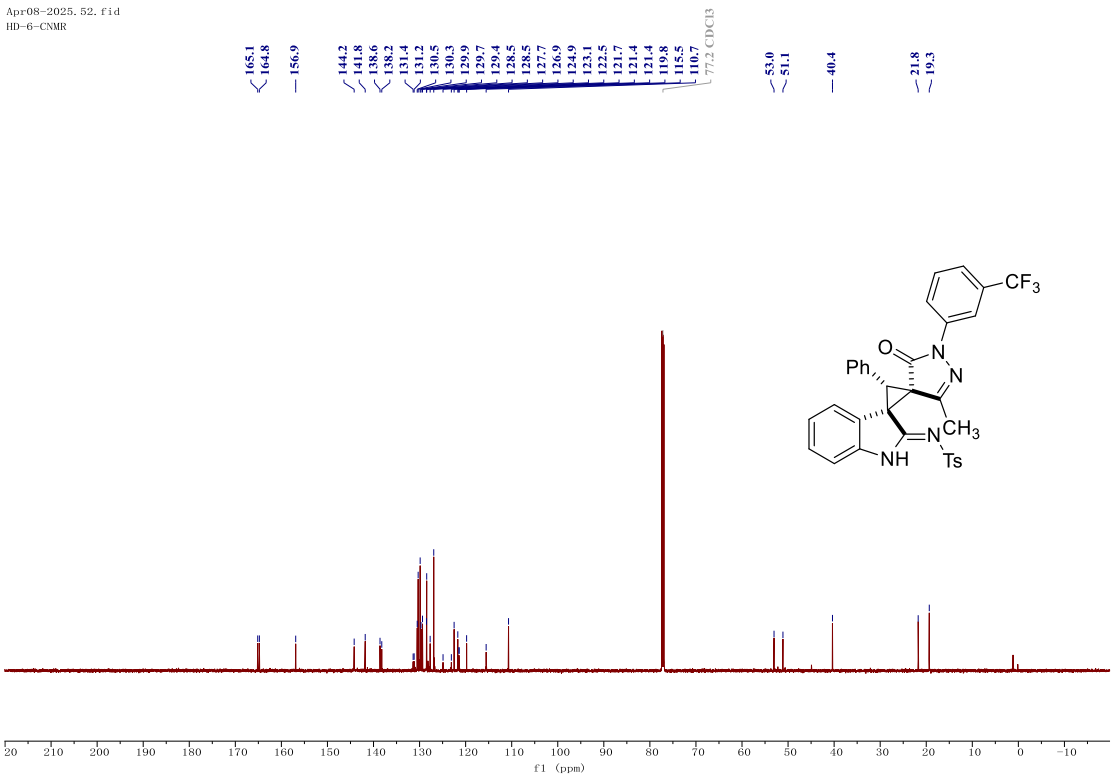


3ah

^{1}H NMR (400 MHz, Chloroform-*d*)

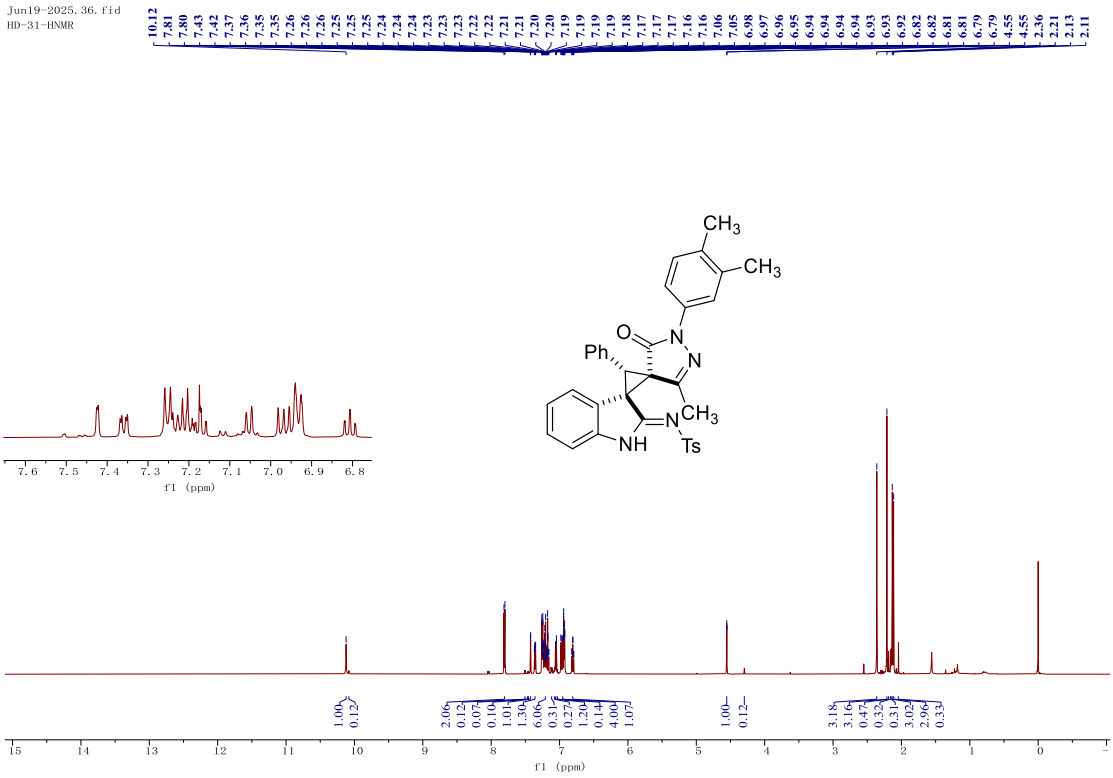


^{13}C NMR (150 MHz, Chloroform-*d*)

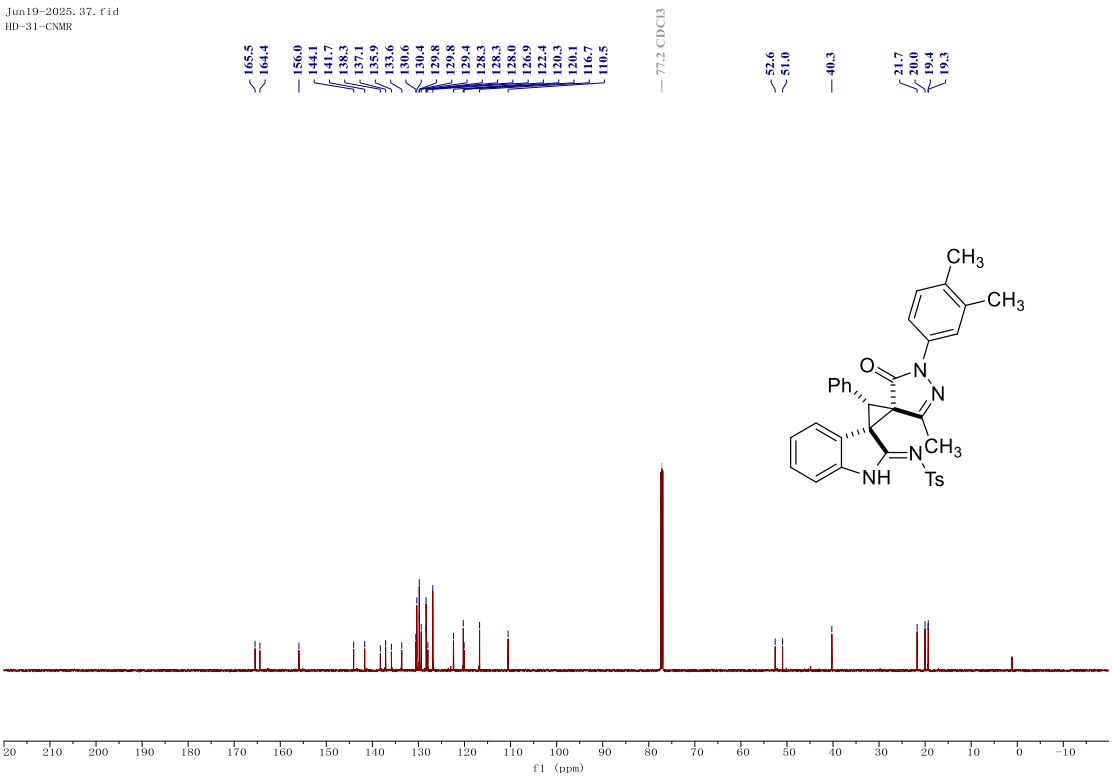


3ai

^{1}H NMR (400 MHz, Chloroform-*d*)

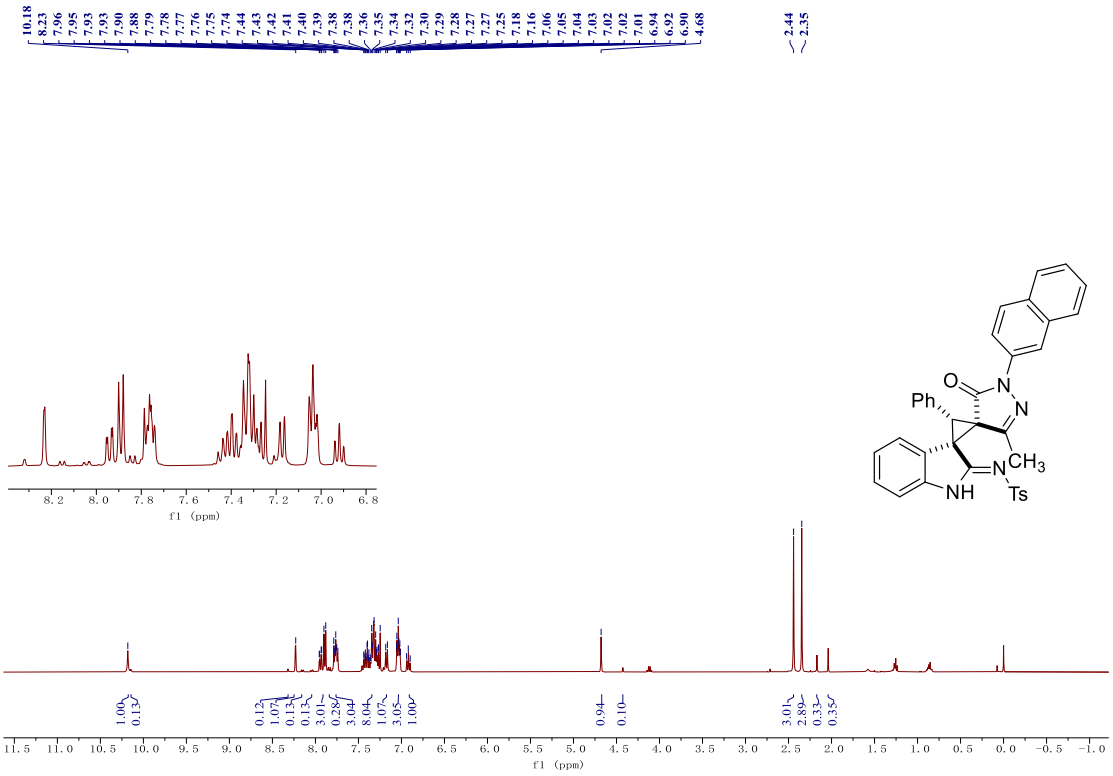


^{13}C NMR (150 MHz, Chloroform-*d*)

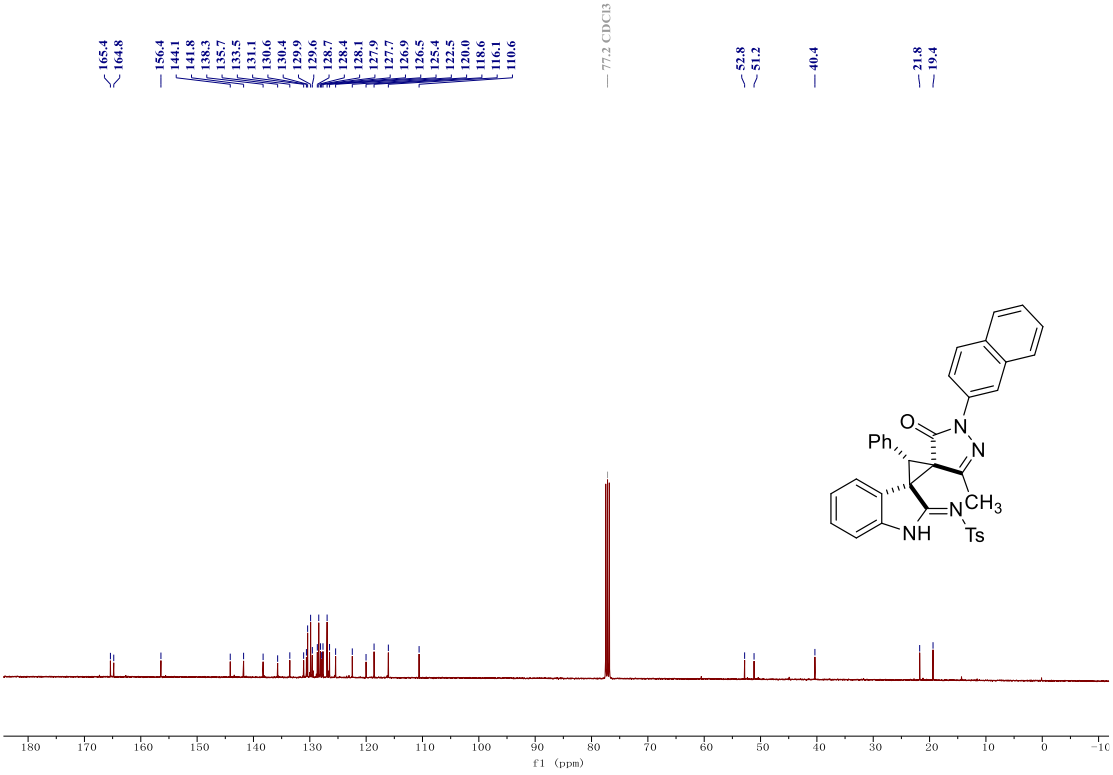


3aj

^{1}H NMR (400 MHz, Chloroform-*d*)

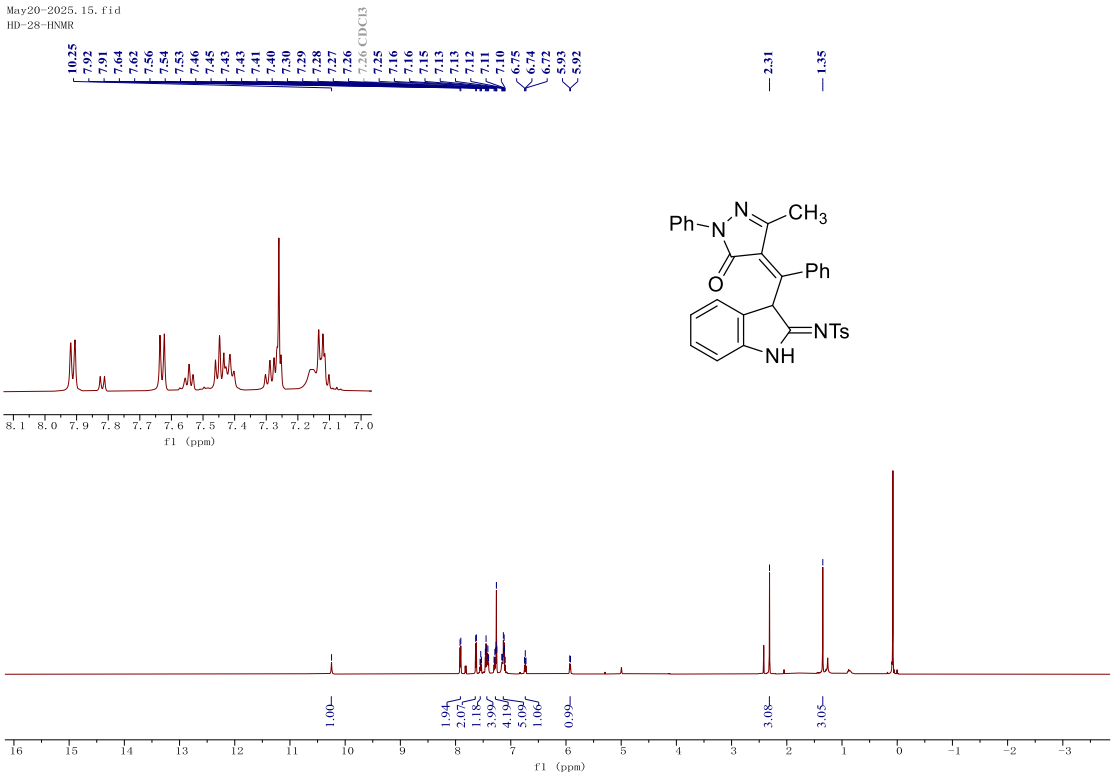


^{13}C NMR (100 MHz, Chloroform-*d*)



4

^{1}H NMR (600 MHz, Chloroform-*d*)



^{13}C NMR (150 MHz, Chloroform-*d*)