Electronic Supplementary Material (ESI) for ChemComm.

Cooperative catalysis-enabled C-N bond cleavage of biaryl lactams with activated isocyanides

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Supplementary Information

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I. General information

^{1}H, ^{13}C, ^{19}F and ^{31}P NMR spectra were recorded on a JNM-ECZ 400S (400 MHz) spectrometer or Bruker AVIII 500M (500 MHz) spectrometer. Chemical shifts were reported in parts per million (ppm), and the residual solvent peak was used as an internal reference: ^{1}H (chloroform δ 7.26; DMSO δ 2.50), ^{13}C (chloroform δ 77.16; DMSO δ 39.52). Data are reported as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, br = broad, dd = doublet of doublets, dt = doublet of triplets, dq = doublet of quartets, ddd = doublet of doublet of doublets), coupling constants (Hz) and integration. Melting point (**MP**) was obtained on Buchi M-560. For thin layer chromatography (**TLC**), Huanghai TLC plates (HSGF 254) were used, and compounds were visualized with a UV light at 254 nm. High resolution mass spectra (**HRMS**) were obtained on an Agilent G6545 spectrometer using an electron spray ionization time-of flight (ESI-TOF) source. X-ray diffraction analysis was performed on a Bruker D8 Venture diffractometer. **Optical rotations** were recorded on an InsMark IP-digi 300 automatic polarimeter. Enantiomeric excesses (**ee**) were determined by HPLC analysis on an Agilent HPLC 1260 Infinity II; column, Chiralpak IA and IB N-5.

Unless otherwise noted, all reactions were carried out under an ambient atmosphere; exclusion of air or moisture was not required. Anhydrous and deuterated solvents were purchased from commercial suppliers and used as received without further purification. Chiral catalysts **C1**-**C8** are known compounds and were prepared according to literature procedures.[1] *p*-Toluenesulfonylmethyl isocyanide (**2i**), diethyl α-isocyanomethylphosphonate (**2j**), *tert*-butyl isocyanoacetate (**2k**), and other chemicals were purchased from commercial suppliers and used directly without further purification.

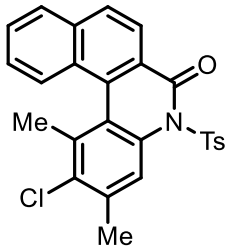
II. Synthesis of biaryl lactams 1

Biaryl lactams **1a**, **1b**, **1e-t** were prepared according to literature procedures.[2] **1c** and **1d** were prepared from **1a** and *N*-chlorosuccinimide (NCS) or *N*-bromosuccinimide (NBS), respectively.

1a **1c** (X = Cl) **1d** (X = Br)

To a solution of biaryl lactam **1a** (0.3 mmol) in dry DMF (6.0 mL) was added NCS or NBS (0.6 mmol, 2.0 equiv) at 0 °C, then the reaction mixture was stirred at 25 °C for 24 hours. Upon completion, the reaction was quenched with water, and the solution was extracted with dichloromethane. The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4, then concentrated and purified by flash chromatography (PE/EtOAc/CH_2Cl_2) to afford **1c** or **1d**.

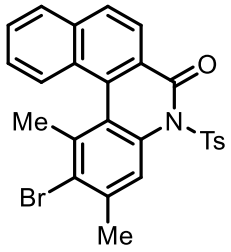
2-Chloro-1,3-dimethyl-5-tosylbenzo[*k*]phenanthridin-6(5*H*)-one (**1c**)



1c

White solid, 110 mg, 79% yield. **MP**: 194-195 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.11-8.03 (m, 3H), 7.99-7.89 (m, 3H), 7.86 (d, *J* = 8.4 Hz, 1H), 7.71-7.52 (m, 2H), 7.30 (d, *J* = 8.1 Hz, 2H), 2.56 (s, 3H), 2.40 (s, 3H), 2.11 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 162.9, 145.3, 137.3, 136.5, 135.8, 134.8, 134.3, 133.7, 132.2, 129.8, 129.3, 128.9, 128.73, 128.68, 128.5, 128.41, 128.38, 126.7, 122.7, 121.9, 119.8, 23.7, 21.79, 21.77; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{26}H_{20}ClNNaO_3S$ 484.0745; Found 484.0749.

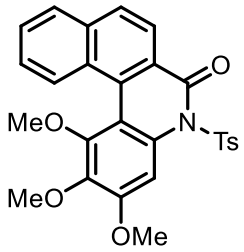
2-Bromo-1,3-dimethyl-5-tosylbenzo[*k*]phenanthridin-6(5*H*)-one (1d)



1d

White solid, 118 mg, 78% yield. **MP**: 192-193 ºC; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.11-8.04 (m, 3H), 7.98-7.89 (m, 3H), 7.86 (dd, *J* = 8.5, 1.3 Hz, 1H), 7.68-7.56 (m, 2H), 7.37-7.28 (m, 2H), 2.60 (s, 3H), 2.40 (s, 3H), 2.15 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 162.9, 145.4, 139.3, 136.6, 136.5, 135.8, 134.3, 132.9, 129.8, 129.4, 129.0, 128.8, 128.7, 128.5, 128.42, 128.38, 126.8, 126.7, 122.7, 121.8, 119.4, 27.0, 25.0, 21.8; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{26}H_{20}BrNNaO_3S$ 528.0239; Found 528.0238.

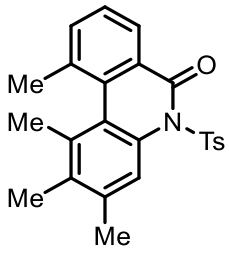
1,2,3-Trimethoxy-5-tosylbenzo[*k*]phenanthridin-6(5*H*)-one (1g)



1g

Pale yellow solid, 88 mg, 36% yield. **MP**: 197-199 ºC; **^{1}H NMR** (500 MHz, $CDCl_3$): δ 8.12 (dd, *J* = 8.5, 1.1 Hz, 1H), 8.10-7.97 (m, 3H), 7.90-7.79 (m, 2H), 7.69-7.60 (m, 1H), 7.57-7.51 (m, 1H), 7.50 (s, 1H), 7.36-7.27 (m, 2H), 4.02 (s, 3H), 4.00 (s, 3H), 3.07 (s, 3H), 2.39 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$): δ 162.9, 153.7, 151.1, 145.4, 140.5, 136.5, 136.2, 133.1, 130.6, 130.4, 129.8, 128.70, 128.65, 128.5, 128.4, 127.4, 126.9, 125.2, 122.6, 110.7, 100.8, 61.7, 60.7, 56.5, 21.8; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{27}H_{23}NNaO_6S$ 512.1138; Found 512.1138.

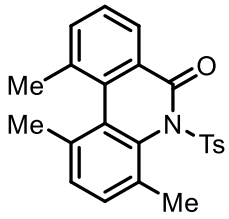
1,2,3,10-Tetramethyl-5-tosylphenanthridin-6(5*H*)-one (1i)



1i

Pale yellow solid, 81 mg, 40% yield. **MP**: 113-114 °C; **^{1}H NMR** (500 MHz, $CDCl_3$): δ 8.11-8.03 (m, 2H), 7.94 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.60 (s, 1H), 7.54 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.37 (t, *J* = 7.6 Hz, 1H), 7.32 (d, *J* = 8.2 Hz, 2H), 2.43 (s, 3H), 2.38 (s, 3H), 2.36 (s, 3H), 2.23 (s, 3H), 2.19 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$): δ 163.9, 144.9, 137.1, 137.1, 136.2, 135.6, 135.0, 134.8, 133.5, 131.5, 131.2, 129.7, 128.3, 127.1, 125.7, 121.5, 118.7, 21.8, 21.4, 21.2, 20.2, 16.0; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{23}NNaO_3S$ 428.1291; Found 428.1293.

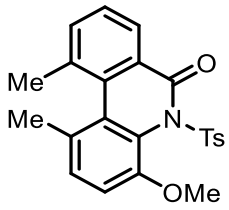
1,4,10-Trimethyl-5-tosylphenanthridin-6(5*H*)-one (1j)



1j

White solid, 76 mg, 39% yield. **MP**: 182-184 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.56 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.37-7.31 (m, 1H), 7.28 (d, *J* = 8.1 Hz, 1H), 7.25-7.18 (m, 3H), 7.12 (t, *J* = 7.6 Hz, 1H), 6.91-6.84 (m, 2H), 2.69 (s, 3H), 2.25 (s, 3H), 2.20 (s, 3H), 2.16 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 166.8, 144.1, 136.1, 135.7, 134.6, 133.5, 133.2, 132.3, 131.8, 130.7, 128.8, 127.9, 127.7, 127.1, 126.8, 21.5, 21.3, 21.1, 20.9; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{21}NNaO_3S$ 414.1134; Found 414.1137.

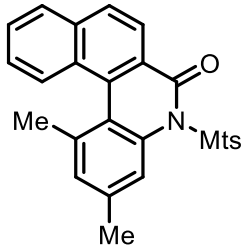
4-Methoxy-1,10-dimethyl-5-tosylphenanthridin-6(5*H*)-one (1k)



1k

White solid, 67 mg, 33% yield. **MP**: 214-216 °C; **^{1}H NMR** (500 MHz, $CDCl_3$): δ 8.16-8.03 (m, 2H), 7.94 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.55 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.37 (t, *J* = 7.6 Hz, 1H), 7.28 (d, *J* = 8.0 Hz, 2H), 7.20 (d, *J* = 8.6 Hz, 1H), 6.93 (d, *J* = 8.6 Hz, 1H), 3.58 (s, 3H), 2.45 (s, 3H), 2.42 (s, 3H), 2.23 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$): δ 165.2, 150.7, 143.6, 138.6, 136.5, 136.1, 135.3, 133.1, 130.2, 128.9, 127.9, 127.8, 127.6, 127.4, 126.4, 123.3, 112.5, 55.5, 21.7, 21.4, 21.0; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{21}NNaO_4S$ 430.1083; Found 430.1081.

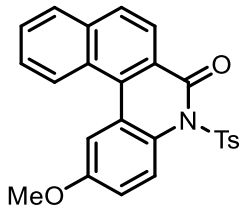
5-(Mesitylsulfonyl)-1,3-dimethylbenzo[*k*]phenanthridin-6(5*H*)-one (**1m**)



1m

White solid, 159 mg, 70% yield. **MP**: 207-208 °C; **^{1}H NMR** (500 MHz, $CDCl_3$): δ 8.05 (d, *J* = 1.6 Hz, 1H), 7.96-7.89 (m, 3H), 7.80 (d, *J* = 8.6 Hz, 1H), 7.64 (ddd, *J* = 8.1, 6.8, 1.3 Hz, 1H), 7.58 (ddd, *J* = 8.2, 6.8, 1.4 Hz, 1H), 7.14 (d, *J* = 1.6 Hz, 1H), 6.74 (s, 2H), 2.53 (s, 3H), 2.36 (s, 6H), 2.18 (s, 3H), 2.09 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$): δ 162.5, 143.5, 141.0, 139.1, 136.6, 135.7, 134.8, 133.9, 133.4, 131.7, 130.1, 129.1, 128.9, 128.5, 128.2, 127.1, 126.2, 122.6, 119.5, 119.2, 24.4, 22.0, 21.9, 21.1; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{28}H_{25}NNaO_3S$ 478.1447; Found 478.1445.

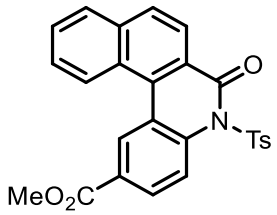
2-Methoxy-5-tosylbenzo[*k*]phenanthridin-6(5*H*)-one (**1p**)



1p

White solid, 150 mg, 53% yield. **MP**: 178-179 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.82-8.76 (m, 1H), 8.17-8.07 (m, 4H), 7.97-7.92 (m, 1H), 7.86-7.79 (m, 2H), 7.71-7.64 (m, 2H), 7.35-7.29 (m, 2H), 7.08 (dd, *J* = 9.2, 2.9 Hz, 1H), 3.88 (s, 3H), 2.41 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 162.2, 156.4, 145.3, 137.0, 136.6, 134.5, 129.7, 129.1, 129.0, 128.8, 128.4, 127.8, 127.4, 127.3, 126.4, 123.9, 123.3, 122.8, 114.4, 114.0, 55.8, 21.8; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{25}H_{19}NNaO_4S$ 452.0927; Found 452.0928.

Methyl 6-oxo-5-tosyl-5,6-dihydrobenzo[*k*]phenanthridine-2-carboxylate (**1r**)

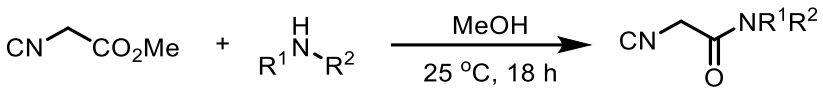


1r

White solid, 50 mg, 22% yield. **MP**: 217-218 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 9.66-9.62 (m, 1H), 9.03-8.98 (m, 1H), 8.29 (dd, *J* = 8.5, 1.8 Hz, 1H), 8.24-8.18 (m, 3H), 8.04-7.97 (m, 3H), 7.80-7.70 (m, 2H), 7.45-7.39 (m, 2H), 4.02 (s, 3H), 2.47 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 167.0, 155.0, 145.9, 145.7, 135.5, 135.3, 134.4, 130.0, 129.8, 129.7, 129.6, 129.23, 129.18, 128.8, 128.7, 128.6, 127.94, 127.89, 127.86, 123.6, 120.4, 118.4, 52.7, 21.9; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{26}H_{19}NNaO_5S$ 480.0876; Found 480.0875.

III. Synthesis of isocyanoacetamides 2

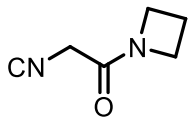
Isocyanoacetamides **2** were synthesized according to the literature reported by Zhu, in which **2a**, **2c-f**, and **2h** are known compounds.[3]



S1 **S2** **2**

General procedure. To a solution of methyl isocyanoacetate **S1** (10.1 mmol) in dry MeOH (5.0 mL) was added the corresponding amine **S2** (11.1 mmol, 1.1 equiv) and the reaction mixture was stirred at 25 °C for 18 hours, concentrated and purified by flash chromatography (PE/EtOAc) to afford the product **2**.

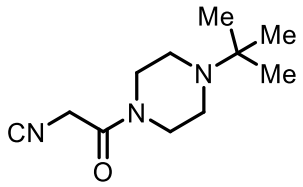
1-(Azetidin-1-yl)-2-isocyanoethan-1-one (**2b**)



2b

Pale yellow solid, 1.09 g, 87% yield. **MP**: 54-55 °C; **^{1}H NMR** (500 MHz, DMSO-d_6): δ 4.41 (s, 2H), 4.10-4.05 (m, 2H), 3.89 (t, J = 7.8 Hz, 2H), 2.25-2.18 (m, 2H); **^{13}C NMR** (126 MHz, DMSO-d_6): δ 162.6, 158.4, 49.7, 48.2, 42.4, 15.2; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_6H_8N_2NaO$ 147.0529; Found 147.0530.

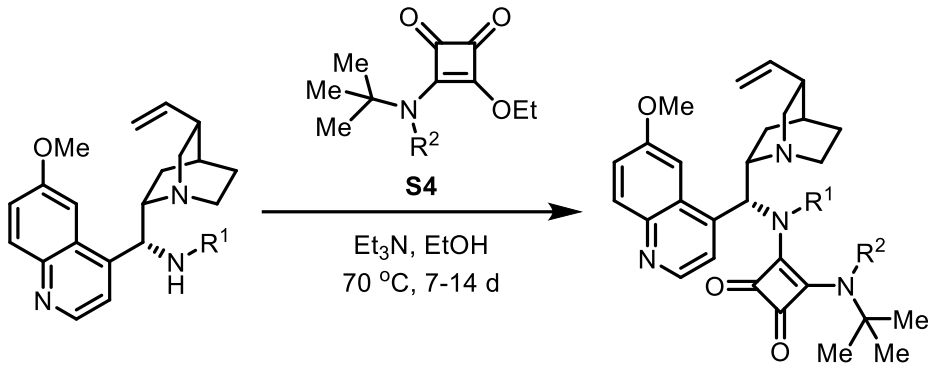
1-(4-(*Tert*-butyl)piperazin-1-yl)-2-isocyanoethan-1-one (**2g**)



2g

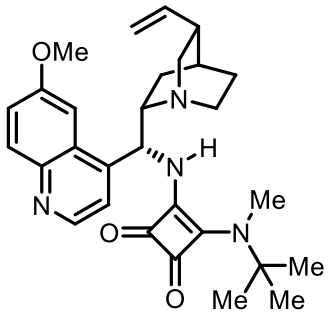
White solid, 1.58 g, 75% yield. **MP**: 57-58 °C; **^{1}H NMR** (500 MHz, $CDCl_3$): δ 4.27 (s, 2H), 3.59 (t, J = 5.2 Hz, 2H), 3.43-3.26 (m, 2H), 2.60-2.57 (m, 2H), 2.55 (t, J = 5.2 Hz, 2H), 1.04 (s, 9H); **^{13}C NMR** (126 MHz, $CDCl_3$): δ 161.0, 160.7, 54.2, 46.3, 45.8, 45.4, 44.4, 43.2, 25.9; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{11}H_{19}N_3NaO$ 232.1420; Found 232.1421.

IV. Synthesis of C9-C11



General procedure. To a solution of substituted 9-amino-9-deoxyepiquinidine **S3** (2.0 mmol) in dry EtOH (10 mL) was added Et_3N (10.0 mmol, 5.0 equiv) and the corresponding substituted 3-(*tert*-butylamino)-4-ethoxycyclobut-3-ene-1,2-dione **S4** (4.0 mmol, 2.0 equiv). The reaction mixture was stirred at 70 °C for 7-14 days, concentrated and purified by flash chromatography (CH_2Cl_2/MeOH) to afford the product **C9**-**C11**.

3-(*tert*-Butyl(methyl)amino)-4-(((*R*)-(6-methoxyquinolin-4-yl)((1*S*,2*S*,4*S*,5*R*)-5-vin -ylquinuclidin-2-yl)methyl)amino)cyclobut-3-ene-1,2-dione (C9)

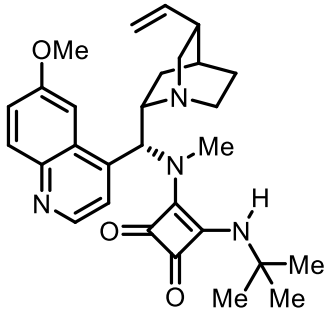


C9

White solid, 684 mg, 70% yield. **MP**: 260-263 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.69 (d, *J* = 4.6 Hz, 1H), 7.98 (d, *J* = 9.2 Hz, 1H), 7.81 (d, *J* = 2.8 Hz, 1H), 7.50 (d, *J* = 4.6 Hz, 1H), 7.36 (dd, *J* = 9.2, 2.6 Hz, 1H), 6.36 (br s, 1H), 5.92-5.80 (m, 1H), 5.27-5.19 (m, 1H), 5.15-5.08 (m, 1H), 3.99 (s, 3H), 3.37 (q, *J* = 9.5 Hz, 1H), 3.32-3.18 (m, 1H), 3.12-2.90 (m, 6H), 2.38-2.27 (m, 1H), 1.76-1.48 (m, 3H), 1.35 (s, 9H), 1.24-1.15 (m,

1H), 1.09-0.99 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 183.6, 183.5, 171.5, 168.8, 158.5, 147.5, 144.9, 139.7, 131.5, 128.2, 122.9, 119.2, 115.4, 101.5, 60.7, 58.1, 56.1, 49.4, 46.5, 38.8, 34.3, 29.8, 29.3, 27.5, 26.3, 25.4; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{29}H_{36}N_4NaO_3$ 511.2680; Found 511.2679; **Optical Rotation**: $[\alpha]^{20}_D$ = +214.6 (c = 0.25, CH_2Cl_2).

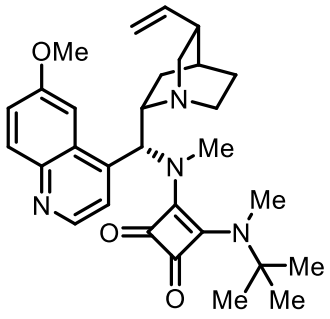
3-(*tert*-Butylamino)-4-(((*R*)-(6-methoxyquinolin-4-yl)((1*S*,2*S*,4*S*,5*R*)-5-vinylquinu -clidin-2-yl)methyl)(methyl)amino)cyclobut-3-ene-1,2-dione (C10)



C10

White solid, 498 mg, 51% yield. **MP**: 164-165 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.58 (d, *J* = 4.6 Hz, 1H), 8.02-7.90 (m, 2H), 7.37 (dd, *J* = 9.1, 2.6 Hz, 1H), 7.19 (d, *J* = 4.6 Hz, 1H), 6.69 (d, *J* = 11.1 Hz, 1H), 5.90-5.70 (m, 1H), 5.45 (s, 1H), 5.33-5.21 (m, 1H), 5.11-5.01 (m, 1H), 3.94 (s, 3H), 3.58 (q, *J* = 9.4 Hz, 1H), 3.52-3.42 (m, 1H), 3.30-2.79 (m, 7H), 2.36-2.24 (m, 1H), 1.75-1.65 (m, 3H), 1.35 (s, 9H), 1.13-1.02 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 183.8, 180.9, 169.1, 168.8, 159.3, 146.5, 145.5, 139.5, 138.8, 131.7, 129.4, 123.4, 119.9, 115.4, 101.7, 57.4, 56.8, 54.2, 54.1, 50.1, 46.2, 39.0, 30.7, 30.6, 27.8, 26.7, 26.1; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{29}H_{36}N_4NaO_3$ 511.2680; Found 511.2684; **Optical Rotation**: $[\alpha]^{20}_D$ = -260.0 (c = 0.125, CH_2Cl_2).

3-(*tert*-Butyl(methyl)amino)-4-(((*R*)-(6-methoxyquinolin-4-yl)((1*S*,2*S*,4*S*,5*R*)-5-vin -ylquinuclidin-2-yl)methyl)(methyl)amino)cyclobut-3-ene-1,2-dione (C11)

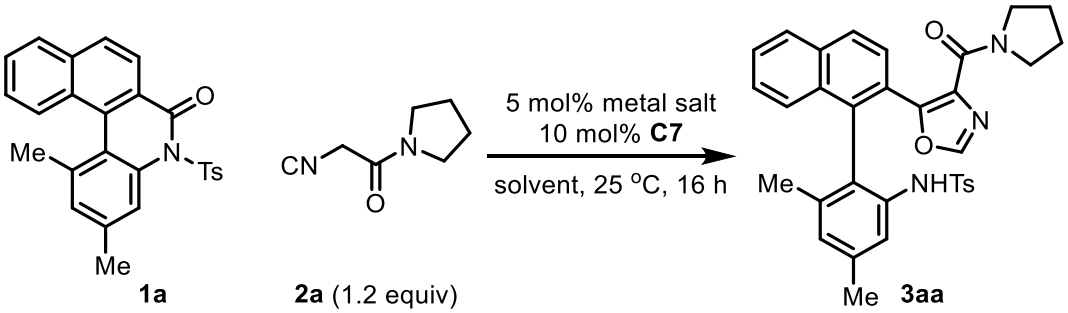


C11

White solid, 211 mg, 21% yield. **MP**: 231-232 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.77 (d, *J* = 4.6 Hz, 1H), 8.01 (d, *J* = 9.2 Hz, 1H), 7.94 (d, *J* = 2.6 Hz, 1H), 7.39 (dd, *J* = 9.2, 2.7 Hz, 1H), 7.32 (d, *J* = 4.6 Hz, 1H), 6.55 (d, *J* = 11.1 Hz, 1H), 5.86-5.74 (m, 1H), 5.28-5.20 (m, 1H), 5.10-5.02 (m, 1H), 3.97 (s, 3H), 3.61 (q, *J* = 9.5 Hz, 1H), 3.45-3.25 (m, 1H), 3.08-2.96 (m, 2H), 2.92-2.82 (m, 4H), 2.71 (s, 3H), 2.35-2.23 (m, 1H), 1.90-1.60 (m, 4H), 1.37 (s, 9H), 1.14-1.04 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 186.9, 184.7, 174.4, 159.3, 146.6, 145.6, 139.8, 139.1, 131.8, 129.3, 123.5, 120.0, 115.3, 101.5, 57.4, 57.1, 56.8, 54.2, 49.9, 46.3, 39.2, 37.3, 32.3, 28.2, 27.9, 26.9, 26.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{30}H_{38}N_4NaO_3$ 525.2836; Found 525.2834; **Optical Rotation**: $[\alpha]^{20}_D$ = -243.3 (c = 0.175, CH_2Cl_2).

V. Optimization of the reaction conditions

Table S1. Metal salt and solvent screening[a]



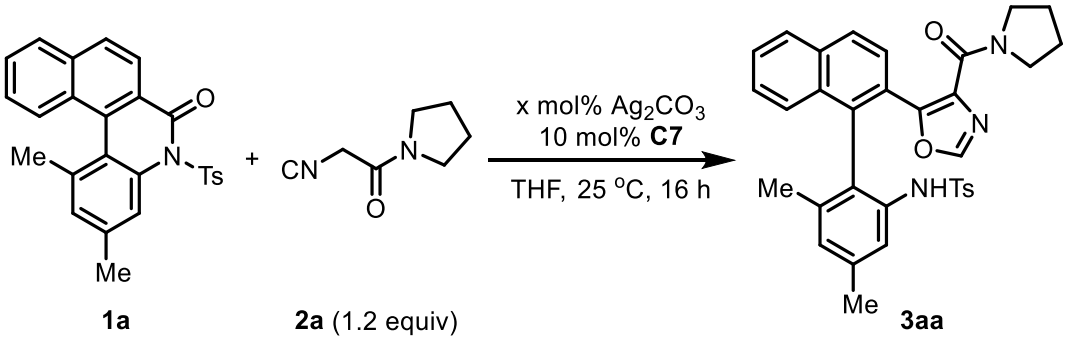
1a **2a** (1.2 equiv) **3aa**

Entry	Metal salt	Solvent	Yield (%)[b]	ee (%)[c]
1	Ag_2O	THF	96	97
2	AgOAc	THF	96	97
3	$Cu(OAc)_2$	THF	trace	/
4	Cu_2O	THF	trace	/

5	Ag_2CO_3	1,4-dioxane	98	96
6	Ag_2CO_3	CH_2Cl_2	98	95
7	Ag_2CO_3	$CHCl_3$	99	93
8	Ag_2CO_3	EtOAc	96	96
9	Ag_2CO_3	toluene	97	96
10[d]	Ag_2CO_3	THF	99	96
11[e]	Ag_2CO_3	THF	98	98

[a]Reaction conditions: **1a** (0.1 mmol), **2a** (0.12 mmol), metal salt (5 mol%) and **C7** (10 mol%) in 1.0 mL of solvent at 25 °C for 16 h. [b]Isolated yields. [c]Determined by chiral HPLC. [d]In 0.5 mL of THF for 8 h. [e]In 5.0 mL of THF for 48 h.

Table S2. Effect of Ag_2CO_3/**C7** ratio[a]

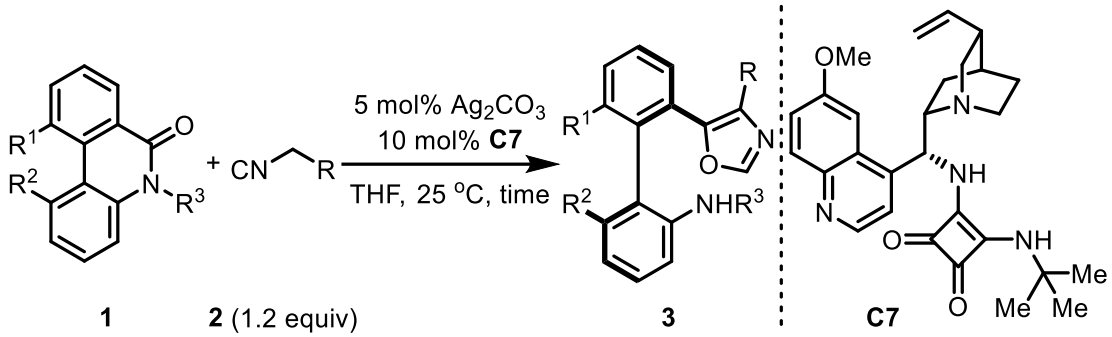


1a **2a** (1.2 equiv) **3aa**

Entry	x	Ag_2CO_3:**C7**	Yield (%)[b]	ee (%)[c]
1	10	1:1	97	97
2	20	2:1	75	96
3	40	4:1	74	96
4	60	6:1	69	94
5	100	10:1	69	95

[a]Reaction conditions: **1a** (0.1 mmol), **2a** (0.12 mmol), Ag_2CO_3 (x mol%) and **C7** (10 mol%) in 1.0 mL of THF at 25 °C for 16 h. [b]Isolated yields. [c]Determined by chiral HPLC.

VI. General procedure for the synthesis of 3

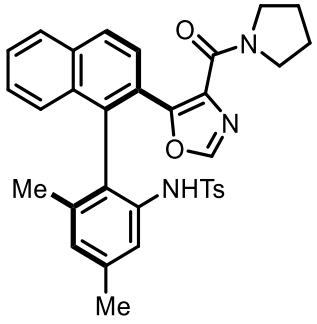


General procedure. To a 10 mL vial charged with **C7** (4.7 mg, 0.010 mmol) and Ag_2CO_3 (1.4 mg, 0.005 mmol) was added anhydrous THF. Then biaryl lactam **1** (0.1 mmol) and activated isocyanide **2** (0.12 mmol) were added successively. The reaction mixture was stirred at 25 °C for the given time, then concentrated and purified by flash chromatography (PE/EtOAc) to afford the product **3**.

Racemic sample for the standard of chiral HPLC spectra was prepared using 10 mol% Ag_2CO_3 as catalyst.

VII. Characterization of compounds 3

(*R*)-*N*-(3,5-dimethyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-4-methylbenzenesulfonamide (**3aa**)

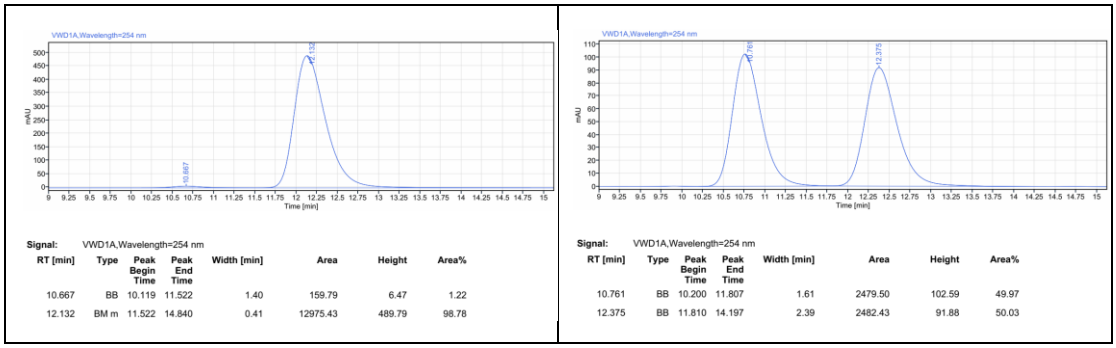


3aa

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 55.4 mg, 98% yield. **MP**: 171-173 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.91 (dd, *J* = 8.6, 0.8 Hz, 1H), 7.85-7.80 (m, 1H), 7.74 (s, 1H), 7.63-7.52 (m, 2H), 7.44 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H), 7.34 (dt, *J* = 1.6, 0.8 Hz, 1H), 7.24-7.15 (m, 2H), 7.01 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.85-6.73 (m, 4H), 3.95-3.81 (m, 1H), 3.79-3.64

(m, 2H), 3.59-3.51 (m, 1H), 2.31 (s, 3H), 2.26 (s, 3H), 2.02-1.96 (m, 1H), 1.90-1.82 (m, 3H), 1.77 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.8, 153.9, 148.9, 142.5, 138.4, 138.3, 137.6, 135.2, 134.0, 132.7, 131.8, 129.1, 128.6, 128.0, 127.5, 127.2, 126.9, 126.7, 126.4, 125.8, 121.1, 48.5, 46.9, 26.5, 23.9, 21.6, 21.5, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{33}H_{31}N_3NaO_4S$ 588.1927; Found 588.1930.

Optical Rotation: $[\alpha]^{20}_D$ = +207.5 (c = 0.25, CH_2Cl_2). The absolute configuration of **3aa** was assigned by analogy to **3ma** and **3ah**. 98% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 10.7 min for minor isomer, t_R = 12.1 min for major isomer).



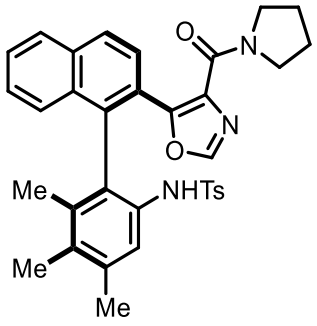
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.667	BB	10.119	11.522	1.40	159.79	6.47	1.22
12.132	BM m	11.522	14.840	0.41	12975.43	489.79	98.78

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.761	BB	10.200	11.807	1.61	2479.50	102.59	49.97
12.375	BB	11.810	14.197	2.39	2482.43	91.88	50.03

(*R*)-4-methyl-*N*-(3,4,5-trimethyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)benzenesulfonamide (3ba)

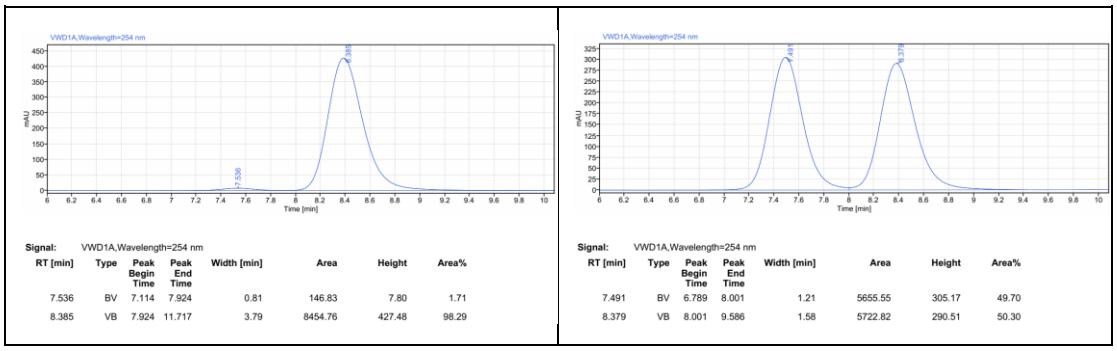


3ba

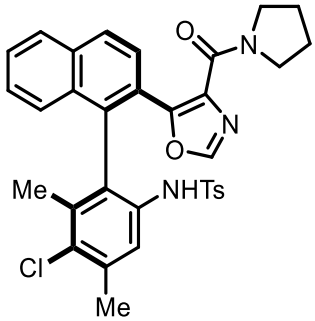
The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). Pale yellow solid, 56.2 mg, 97% yield. **MP**: 119-120 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.89 (dd, *J* = 8.6, 0.8 Hz, 1H), 7.83-7.77 (m, 1H), 7.71 (s, 1H), 7.61-7.50 (m, 2H), 7.42 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H), 7.32 (s, 1H), 7.20-7.11 (m, 2H), 6.99 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.77-6.71 (m, 3H), 3.90-3.80 (m, 1H), 3.76-3.64 (m, 2H), 3.60-

3.50 (m, 1H), 2.29 (s, 3H), 2.24 (s, 3H), 2.12 (s, 3H), 2.05-1.94 (m, 1H), 1.92-1.82 (m, 3H), 1.72 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.9, 154.0, 149.0, 142.3, 137.7, 136.8, 136.6, 136.3, 133.9, 132.6, 132.4, 132.1, 131.8, 129.0, 128.4, 127.9, 127.7, 127.4, 126.8, 126.6, 126.6, 126.3, 126.1, 122.5, 48.5, 46.9, 26.5, 23.9, 21.6, 21.1, 17.9, 15.7; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{34}H_{33}N_3NaO_4S$ 602.2084; Found 602.2083.

Optical Rotation: $[\alpha]^{20}_D$ = +135.3 (c = 0.3, CH_2Cl_2). The absolute configuration of **3ba** was assigned by analogy to **3ma** and **3ah**. 97% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 70:30, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 7.5 min for minor isomer, t_R = 8.4 min for major isomer).



(*R*)-*N*-(4-chloro-3,5-dimethyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-4-methylbenzenesulfonamide (**3ca**)

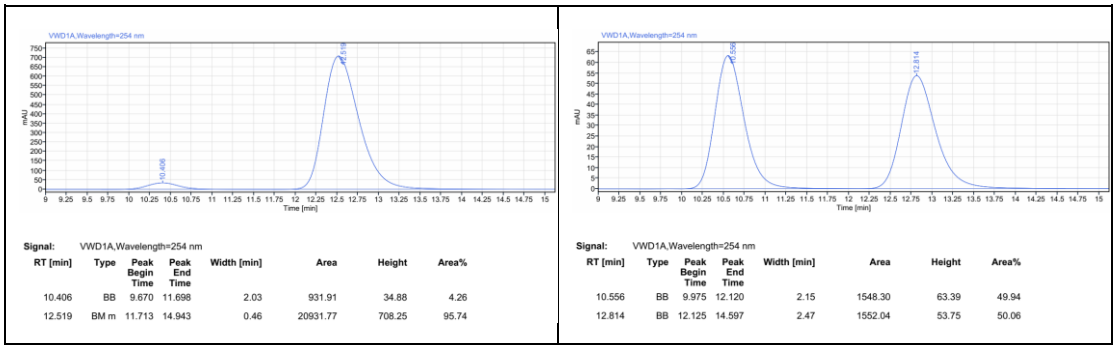


3ca

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 58.8 mg, 98% yield. **MP**: 168-170 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.95-7.90 (m, 2H), 7.83 (dt, *J* = 8.3, 0.9 Hz, 1H), 7.61 (s, 1H), 7.54 (d, *J* = 8.5 Hz, 1H), 7.49-7.40 (m, 2H), 7.20-7.12 (m, 2H), 7.06-6.98 (m, 1H), 6.83-6.68 (m, 3H), 3.99-

3.90 (m, 1H), 3.80-3.65 (m, 2H), 3.64-3.51 (m, 1H), 2.39 (s, 3H), 2.26 (s, 3H), 2.05-1.98 (m, 1H), 1.96-1.83 (m, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.7, 153.9, 149.2, 142.6, 137.5, 136.8, 136.7, 135.0, 134.0, 133.5, 132.9, 131.7, 131.4, 129.12, 129.06, 129.0, 128.1, 127.5, 127.1, 126.9, 126.6, 126.5, 125.7, 123.3, 48.6, 47.0, 26.6, 23.9, 21.6, 21.3, 18.7; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{33}H_{30}ClN_3NaO_4S$ 622.1538; Found 622.1539.

Optical Rotation: $[\alpha]^{20}_D$ = +203.8 (c = 0.125, CH_2Cl_2). The absolute configuration of **3ca** was assigned by analogy to **3ma** and **3ah**. 91% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 10.4 min for minor isomer, t_R = 12.5 min for major isomer).



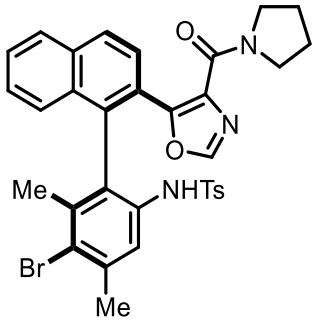
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.406	BB	9.670	11.698	2.03	931.91	34.88	4.26
12.519	BM m	11.713	14.943	0.46	20931.77	708.25	95.74

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.556	BB	9.975	12.120	2.15	1548.30	63.39	49.94
12.814	BB	12.125	14.597	2.47	1552.04	53.75	50.06

(*R*)-*N*-(4-bromo-3,5-dimethyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-4-methylbenzenesulfonamide (3da)

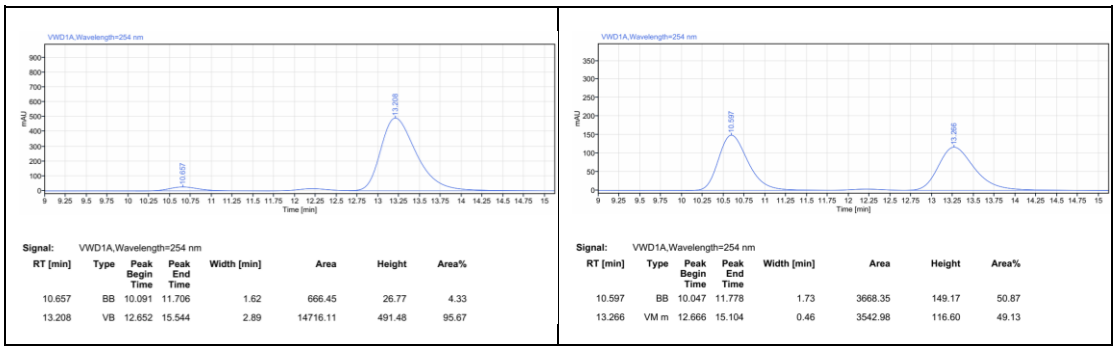


3da

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 63.2 mg, 98% yield. **MP**: 210-211 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.94-7.89 (m, 2H), 7.87-7.77 (m, 1H), 7.61 (s, 1H), 7.55 (d, *J* = 8.5 Hz, 1H), 7.49-7.43 (m, 2H), 7.18-7.12 (m, 2H), 7.06-7.00 (m, 1H), 6.82-6.74 (m, 2H), 6.71 (dt, *J* =

8.5, 1.0 Hz, 1H), 3.98-3.90 (m, 1H), 3.82-3.63 (m, 2H), 3.64-3.48 (m, 1H), 2.43 (s, 3H), 2.26 (s, 3H), 2.05-1.97 (m, 1H), 1.95-1.86 (m, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.7, 153.8, 149.2, 142.7, 138.8, 138.5, 137.4, 135.1, 134.3, 134.0, 132.9, 131.7, 129.1, 129.0, 128.8, 128.1, 127.5, 127.2, 126.9, 126.7, 126.5, 125.7, 124.2, 123.0, 48.6, 47.0, 26.6, 24.5, 23.9, 22.0, 21.6; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{33}H_{30}BrN_3NaO_4S$ 666.1033; Found 666.1031.

Optical Rotation: $[\alpha]^{20}_D$ = +159.2 (c = 0.4, CH_2Cl_2). The absolute configuration of **3da** was assigned by analogy to **3ma** and **3ah**. 91% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 10.7 min for minor isomer, t_R = 13.2 min for major isomer).



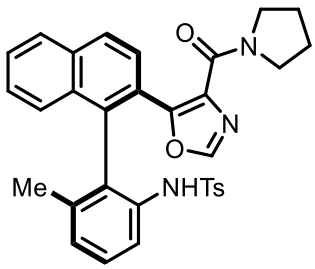
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.657	BB	10.091	11.706	1.62	666.45	26.77	4.33
13.208	VB	12.652	15.544	2.89	14716.11	491.48	95.67

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.597	BB	10.047	11.778	1.73	3668.35	149.17	50.87
13.266	VM m	12.666	15.104	0.46	3542.98	116.60	49.13

(*R*)-4-methyl-*N*-(3-methyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)benzenesulfonamide (3ea)

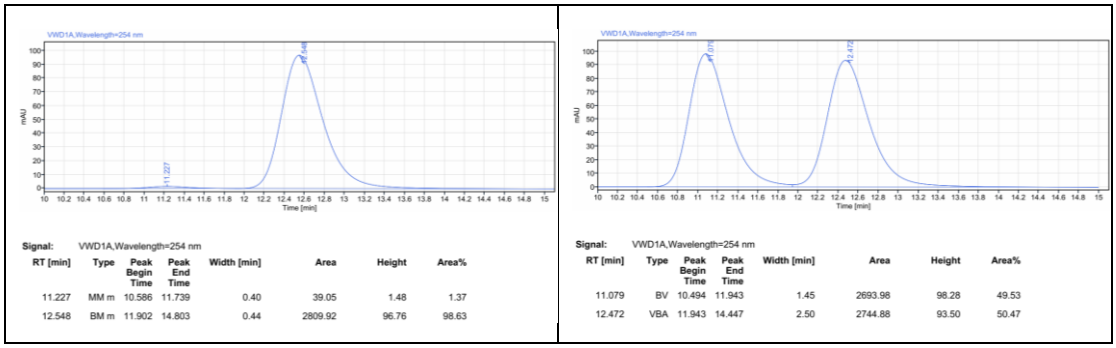


3ea

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 50.7 mg, 92% yield. **MP**: 176-177 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.93 (d, *J* = 8.5 Hz, 1H), 7.88-7.74 (m, 2H), 7.62-7.53 (m, 2H), 7.51 (dd, *J* = 8.5, 1.1 Hz, 1H), 7.45 (ddd, *J* = 8.1, 6.7, 1.2 Hz, 1H), 7.25-7.16 (m, 3H), 7.07-6.93 (m, 2H), 6.79 (d, *J* = 8.1 Hz, 2H), 6.74 (dd, *J* = 8.5, 1.1 Hz, 1H), 3.90-3.80 (m, 1H), 3.76-3.64

(m, 2H), 3.61-3.41 (m, 1H), 2.26 (s, 3H), 2.02-1.96 (m, 1H), 1.92-1.84 (m, 3H), 1.82 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.8, 153.7, 149.0, 142.6, 138.8, 137.5, 135.5, 135.0, 134.0, 132.7, 131.5, 129.7, 129.1, 128.7, 128.5, 128.1, 127.5, 127.0, 126.8, 126.7, 126.3, 126.2, 125.6, 120.4, 48.4, 46.9, 26.5, 23.9, 21.6, 20.4; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{32}H_{29}N_3NaO_4S$ 574.1771; Found 574.1766.

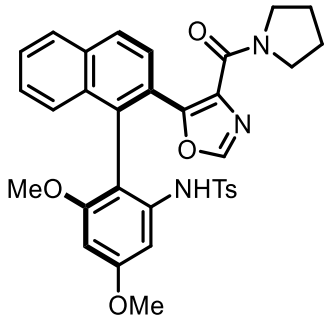
Optical Rotation: $[\alpha]^{20}_D$ = +179.8 (c = 0.125, CH_2Cl_2). The absolute configuration of **3ea** was assigned by analogy to **3ma** and **3ah**. 97% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 11.2 min for minor isomer, t_R = 12.5 min for major isomer).



Signal: VWD1A,Wavelength=254 nm							
RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
11.227	MM m	10.586	11.739	0.40	39.05	1.48	1.37
12.548	BM m	11.902	14.803	0.44	2809.92	96.76	98.63

Signal: VWD1A,Wavelength=254 nm							
RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
11.079	BV	10.494	11.943	1.45	2693.98	98.28	49.53
12.472	VBA	11.943	14.447	2.50	2744.88	93.50	50.47

(*S*)-*N*-(3,5-dimethoxy-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-4-methylbenzenesulfonamide (**3fa**)

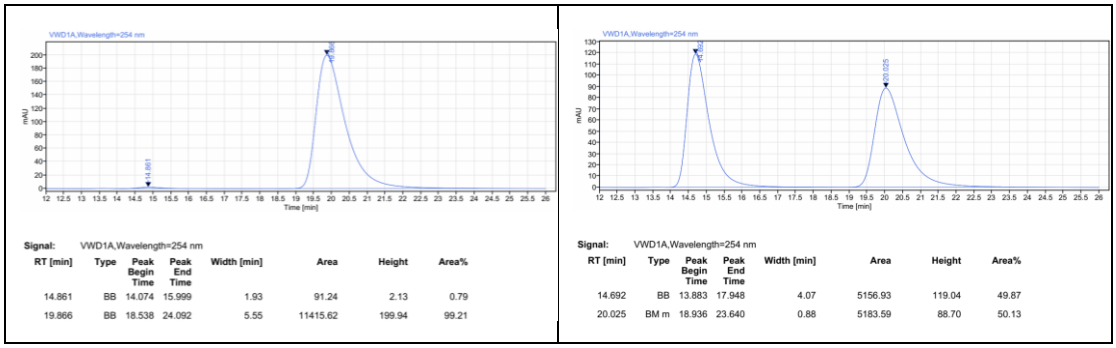


3fa

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 1:1). Pale yellow solid, 59.2 mg, 99% yield. **MP**: 184-185 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.90 (d, *J* = 8.4 Hz, 1H), 7.82 (d, *J* = 8.1 Hz, 1H), 7.76 (s, 1H), 7.59 (s, 1H), 7.56 (d, *J* = 8.5 Hz, 1H), 7.47-7.40 (m, 1H), 7.31-7.19 (m, 2H), 7.08-7.02 (m, 1H), 6.93-6.86 (m, 2H), 6.82 (d, *J* = 8.0 Hz, 2H), 6.26 (d, *J* = 2.3 Hz, 1H), 3.82 (s, 3H), 3.80-3.60

(m, 3H), 3.61-3.51 (m, 1H), 3.49 (s, 3H), 2.27 (s, 3H), 2.01-1.79 (m, 4H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.0, 160.7, 158.8, 154.0, 149.0, 142.8, 137.3, 137.1, 134.0, 132.5, 132.4, 132.2, 129.1, 128.7, 127.9, 127.18, 127.15, 126.9, 126.59, 126.57, 126.1, 111.6, 99.2, 95.5, 55.8, 55.5, 48.4, 46.8, 26.4, 23.9, 21.6; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{33}H_{31}N_3NaO_6S$ 620.1826; Found 620.1829.

Optical Rotation: $[\alpha]^{20}_D$ = +203.3 (c = 0.25, CH_2Cl_2). The absolute configuration of **3fa** was assigned by analogy to **3ma** and **3ah**. 98% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 14.9 min for minor isomer, t_R = 19.9 min for major isomer).



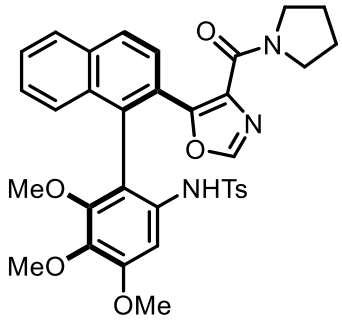
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
14.861	BB	14.074	15.999	1.93	91.24	2.13	0.79
19.866	BB	18.538	24.092	5.55	11415.62	199.94	99.21

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
14.692	BB	13.883	17.948	4.07	5156.93	119.04	49.87
20.025	BM m	18.936	23.640	0.88	5183.59	88.70	50.13

(*S*)-4-methyl-*N*-(3,4,5-trimethoxy-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)benzenesulfonamide (**3ga**)

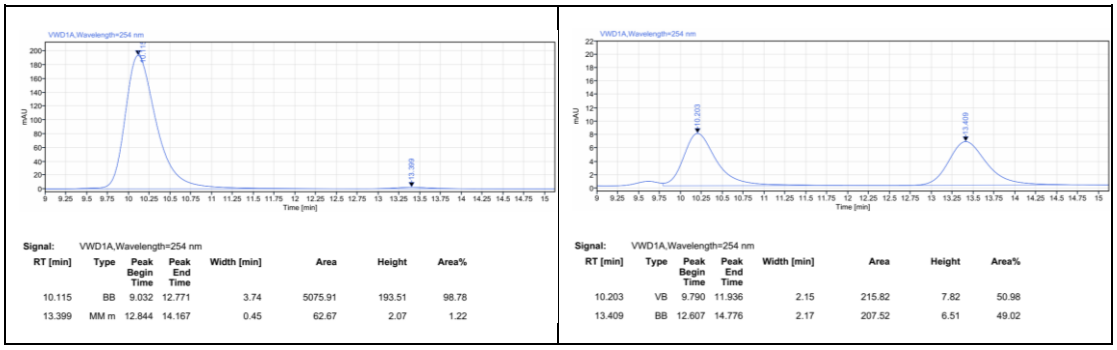


3ga

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 1:1). Pale yellow solid, 59.0 mg, 94% yield. **MP**: 196-197 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.13 (s, 1H), 7.88 (dd, *J* = 8.7, 0.8 Hz, 1H), 7.84-7.76 (m, 1H), 7.60 (s, 1H), 7.50 (d, *J* = 8.5 Hz, 1H), 7.42 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H), 7.22-7.13 (m, 2H), 7.08-6.99 (m, 2H), 6.89 (dq, *J* = 8.5, 0.9 Hz, 1H), 6.77-6.67 (m, 2H), 3.98-3.89 (m, 1H), 3.87

(s, 3H), 3.82 (s, 3H), 3.81-3.74 (m, 1H), 3.73-3.64 (m, 1H), 3.62-3.53 (m, 1H), 3.50 (s, 3H), 2.23 (s, 3H), 2.08-1.73 (m, 4H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.0, 154.3, 153.3, 151.8, 148.9, 142.5, 139.2, 137.5, 133.8, 132.6, 132.5, 131.1, 129.0, 128.7, 127.8, 127.1, 126.8, 126.60, 126.56, 126.5, 126.2, 117.7, 104.1, 60.9, 60.8, 56.0, 48.5, 46.9, 26.5, 23.9, 21.6; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{34}H_{33}N_3NaO_7S$ 650.1931; Found 650.1931.

Optical Rotation: $[\alpha]^{20}_D$ = +270.9 (c = 0.25, CH_2Cl_2). The absolute configuration of **3ga** was assigned by analogy to **3ma** and **3ah**. 98% ee (HPLC condition: Chiralpak IA column, *n*-hexane/*i*-PrOH = 70:30, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 10.1 min for major isomer, t_R = 13.4 min for minor isomer).



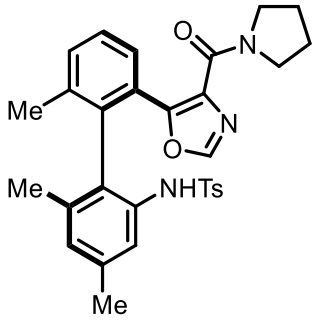
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.115	BB	9.032	12.771	3.74	5075.91	193.51	98.78
13.399	MM m	12.844	14.167	0.45	62.67	2.07	1.22

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.203	VB	9.790	11.936	2.15	215.82	7.82	50.98
13.409	BB	12.607	14.776	2.17	207.52	6.51	49.02

(*R*)-4-methyl-*N*-(2',4,6-trimethyl-6'-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)-[1,1'-biphenyl]-2-yl)benzenesulfonamide (3ha)

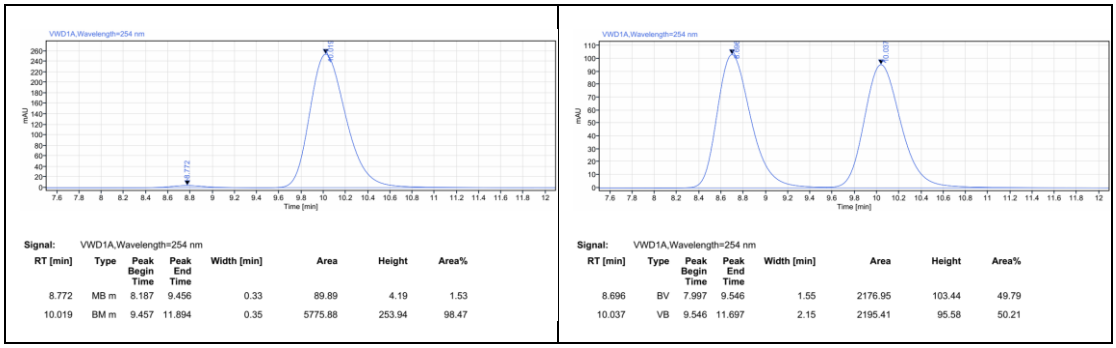


3ha

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 37.6 mg, 71% yield. **MP**: 115-116 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.82 (s, 1H), 7.62-7.57 (m, 2H), 7.45 (s, 1H), 7.35-7.29 (m, 2H), 7.27-7.18 (m, 1H), 7.14 (d, *J* = 8.1 Hz, 2H), 7.07 (d, *J* = 1.7 Hz, 1H), 6.69 (d, *J* = 1.7 Hz, 1H), 3.81-3.70

(m, 1H), 3.69-3.59 (m, 1H), 3.57-3.46 (m, 2H), 2.35 (s, 3H), 2.20 (s, 3H), 1.99-1.77 (m, 7H), 1.53 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.0, 153.7, 148.6, 142.9, 139.0, 138.1, 137.8, 137.3, 136.7, 134.7, 132.3, 132.2, 129.4, 128.8, 128.6, 128.22, 128.19, 127.2, 127.1, 120.2, 48.4, 46.8, 26.5, 23.9, 21.6, 21.4, 20.1, 19.4; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{30}H_{31}N_3NaO_4S$ 552.1927; Found 552.1924.

Optical Rotation: $[\alpha]^{20}_D$ = +72.0 (c = 0.6, CH_2Cl_2). The absolute configuration of **3ha** was assigned by analogy to **3ma** and **3ah**. 97% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 8.8 min for minor isomer, t_R = 10.0 min for major isomer).



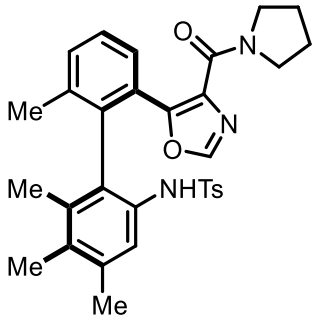
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.772	MB m	8.187	9.456	0.33	89.89	4.19	1.53
10.019	BM m	9.457	11.894	0.35	5775.88	253.94	98.47

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.696	BV	7.997	9.546	1.55	2176.95	103.44	49.79
10.037	VB	9.546	11.697	2.15	2195.41	95.58	50.21

(*R*)-4-methyl-*N*-(2',4,5,6-tetramethyl-6'-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)-[1,1'-biphenyl]-2-yl)benzenesulfonamide (**3ia**)

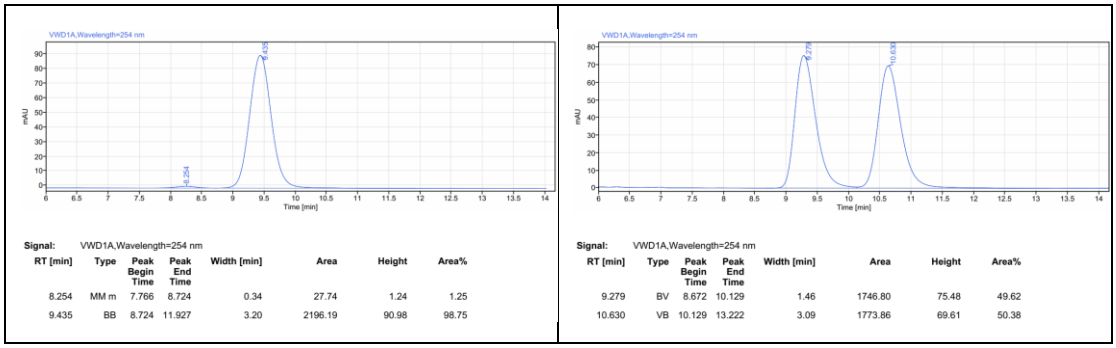


3ia

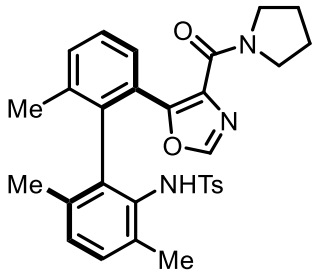
The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 43.0 mg, 79% yield. **MP**: 183-184 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.83 (s, 1H), 7.65-7.53 (m, 2H), 7.47 (s, 1H), 7.35-7.29 (m, 2H), 7.25-7.20 (m, 1H), 7.14 (d, *J* = 8.0 Hz, 2H), 7.08 (s, 1H), 3.87-3.70 (m, 1H), 3.69-3.60 (m, 1H), 3.58-3.48 (m, 2H), 2.37 (s, 3H), 2.19 (s, 3H), 2.07 (s, 3H), 1.97-1.91 (m, 1H), 1.89-1.80 (m, 6H),

1.52 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.0, 153.9, 148.6, 142.7, 139.2, 138.2, 137.8, 136.3, 135.6, 132.2, 132.2, 131.8, 131.8, 129.4, 129.3, 128.7, 128.5, 128.0, 127.1, 121.8, 48.4, 46.8, 26.5, 23.9, 21.6, 21.1, 19.5, 17.4, 15.7; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{31}H_{33}N_3NaO_4S$ 566.2084; Found 566.2086.

Optical Rotation: $[\alpha]^{20}_D$ = +87.4 (c = 0.225, CH_2Cl_2). The absolute configuration of **3ia** was assigned by analogy to **3ma** and **3ah**. 98% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 8.3 min for minor isomer, t_R = 9.4 min for major isomer).



(*R*)-4-methyl-*N*-(2',3,6-trimethyl-6'-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)-[1,1'-biphenyl]-2-yl)benzenesulfonamide (**3ja**)

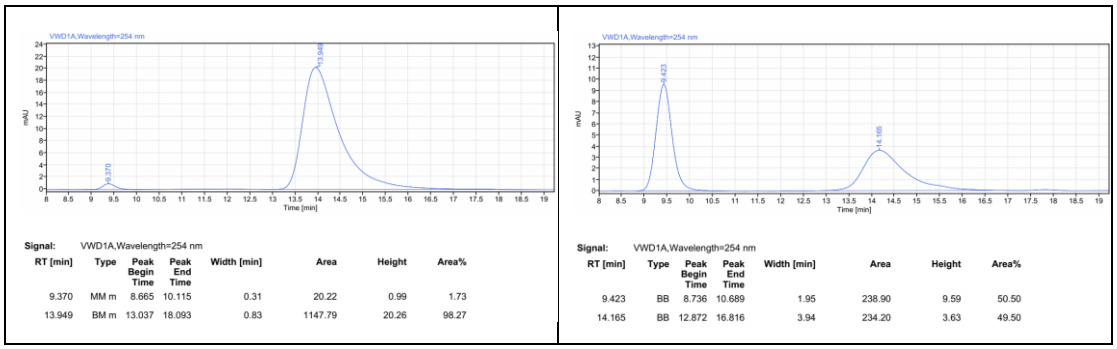


3ja

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 46.6 mg, 88% yield. **MP**: 198-199 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.74 (s, 1H), 7.64 (d, *J* = 7.9 Hz, 2H), 7.48 (s, 1H), 7.21-7.11 (m, 2H), 7.09-6.96 (m, 5H), 4.04-3.92 (m, 1H), 3.76-3.56 (m, 3H), 2.38 (s, 3H), 2.20 (s, 3H), 2.05-1.85 (m, 10H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.5, 154.4, 148.8, 141.5, 140.8, 138.9, 137.9, 137.3, 136.3, 135.1, 133.5, 132.2, 130.3, 128.9, 128.3, 128.1, 127.6, 127.2, 126.1, 48.6, 46.9, 26.6, 24.0, 21.6, 20.2, 20.03, 19.98; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for

$C_{30}H_{31}N_3NaO_4S$ 552.1927; Found 552.1928.

Optical Rotation: $[\alpha]^{20}_D$ = +86.4 (c = 0.125, CH_2Cl_2). The absolute configuration of **3ja** was assigned by analogy to **3ma** and **3ah**. 97% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 9.4 min for minor isomer, t_R = 13.9 min for major isomer).



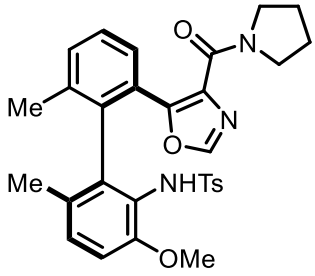
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
9.370	MM m	8.665	10.115	0.31	20.22	0.99	1.73
13.949	BM m	13.037	18.093	0.83	1147.79	20.26	98.27

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
9.423	BB	8.736	10.689	1.95	238.90	9.59	50.50
14.165	BB	12.872	16.816	3.94	234.20	3.63	49.50

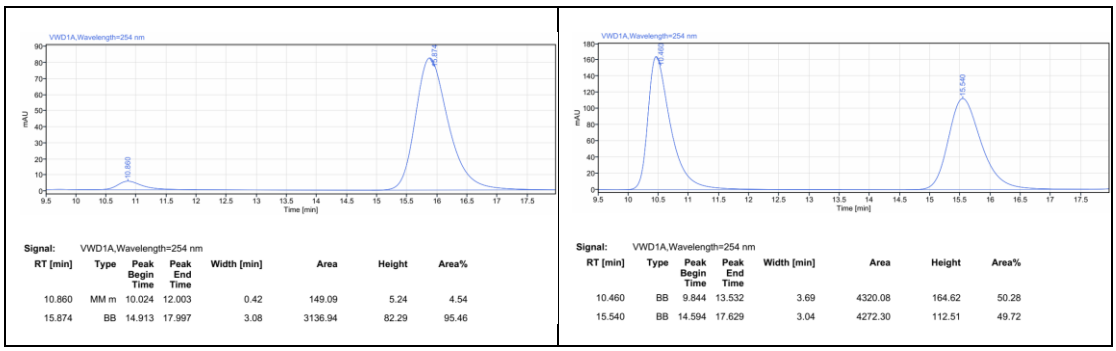
(*R*)-*N*-(3-methoxy-2',6-dimethyl-6'-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)-[1,1'-biphenyl]-2-yl)-4-methylbenzenesulfonamide (**3ka**)



3ka

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 1:1). Pale yellow solid, 47.5 mg, 87% yield. **MP**: 118-119 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.41 (s, 1H), 7.80-7.65 (m, 2H), 7.52 (s, 1H), 7.39-7.30 (m, 2H), 7.24 (ddd, *J* = 7.1, 1.9, 0.7 Hz, 1H), 7.21-7.09 (m, 2H), 6.98 (dd, *J* = 8.4, 0.8 Hz, 1H), 6.66 (d, *J* = 8.4 Hz, 1H), 3.97-3.76 (m, 1H), 3.73-3.58 (m, 2H), 3.58-3.49 (m, 1H), 3.47 (s, 3H), 2.38 (s, 3H), 2.11 (s, 3H), 2.00 (d, *J* = 0.7 Hz, 3H), 1.96-1.74 (m, 4H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.3, 154.3, 153.3, 148.6, 141.5, 141.4, 138.1, 138.0, 137.4, 132.6, 132.3, 129.1, 128.6, 128.2, 128.04, 127.96, 127.5, 126.4, 124.3, 110.9, 55.0, 48.5, 46.8, 26.5, 24.0, 21.5, 20.0, 19.6; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{30}H_{31}N_3NaO_5S$ 568.1877; Found 568.1879.

Optical Rotation: $[\alpha]^{20}_D$ = +32.3 (c = 0.25, CH_2Cl_2). The absolute configuration of **3ka** was assigned by analogy to **3ma** and **3ah**. 91% ee (HPLC condition: Chiralpak IA column, *n*-hexane/*i*-PrOH = 70:30, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 10.9 min for minor isomer, t_R = 15.9 min for major isomer).



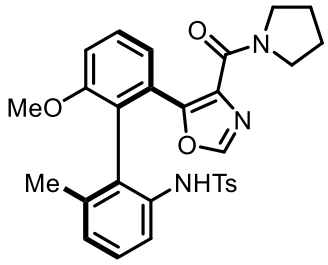
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.860	MM m	10.024	12.003	0.42	149.09	5.24	4.54
15.874	BB	14.913	17.997	3.08	3136.94	82.29	95.46

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
10.460	BB	9.844	13.532	3.69	4320.08	164.62	50.28
15.540	BB	14.594	17.629	3.04	4272.30	112.51	49.72

(*S*)-*N*-(2'-methoxy-6-methyl-6'-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)-[1,1'-biphenyl]-2-yl)-4-methylbenzenesulfonamide (**3la**)

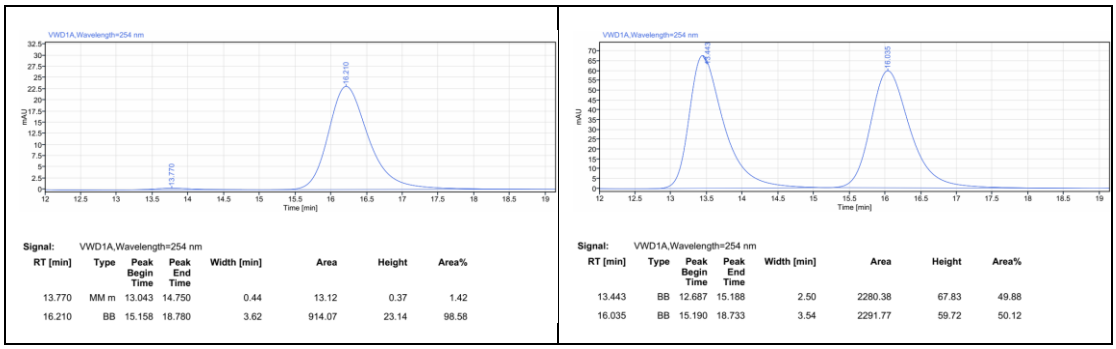


3la

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 1:1). White solid, 51.0 mg, 96% yield. **MP**: 120-121 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.64-7.54 (m, 3H), 7.49 (s, 1H), 7.43 (dd, *J* = 8.3, 7.7 Hz, 1H), 7.29-7.22 (m, 1H), 7.17 (dd, *J* = 7.7, 1.0 Hz, 1H), 7.16-7.13 (m, 2H), 7.06 (t, *J* = 7.9 Hz, 1H), 6.93 (dd, *J* = 8.4, 1.1 Hz, 1H), 6.88 (dt, *J* = 7.5, 1.1 Hz, 1H), 3.64-3.56 (m, 2H), 3.53-3.44 (m, 5H), 2.36 (s, 3H), 1.98-1.63 (m, 7H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.9, 156.9, 152.4, 148.7, 142.6, 138.6, 138.5, 135.4, 132.4, 129.74, 129.66, 129.3, 128.3, 128.0, 127.2, 125.9, 125.4, 123.2, 119.2, 112.6, 55.7, 48.2, 46.6, 26.3, 23.9, 21.6, 20.2; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{29}H_{29}N_3NaO_5S$ 554.1720; Found 554.1720.

Optical Rotation: $[\alpha]^{20}_D$ = +55.2 (c = 0.125, CH_2Cl_2). The absolute configuration of **3la** was assigned by analogy to **3ma** and **3ah**. 97% ee (HPLC condition: Chiralpak IA

column, *n*-hexane/*i*-PrOH = 70:30, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 13.8 min for minor isomer, t_R = 16.2 min for major isomer).



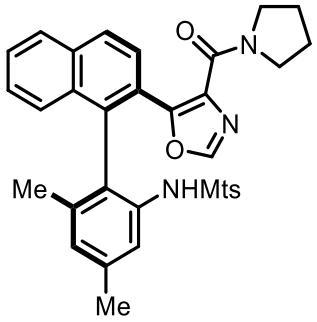
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
13.770	MM m	13.043	14.750	0.44	13.12	0.37	1.42
16.210	BB	15.158	18.780	3.62	914.07	23.14	98.58

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
13.443	BB	12.687	15.188	2.50	2280.38	67.83	49.88
16.035	BB	15.190	18.733	3.54	2291.77	59.72	50.12

(*R*)-*N*-(3,5-dimethyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-2,4,6-trimethylbenzenesulfonamide (3ma)

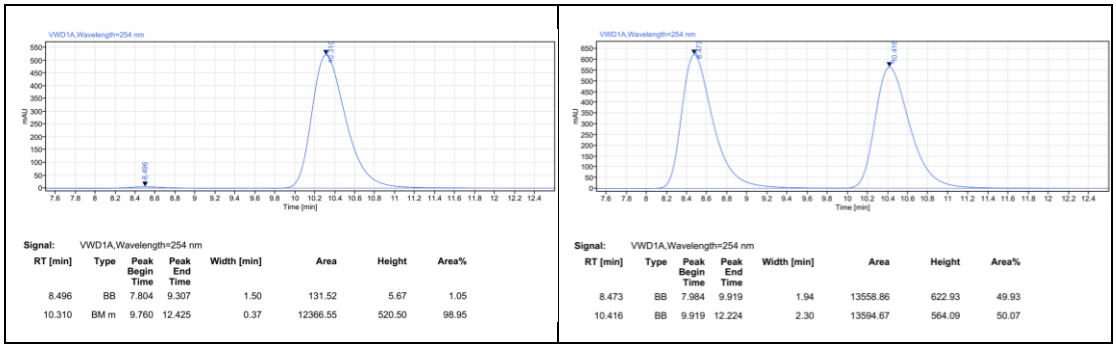


3ma

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 58.8 mg, 99% yield. **MP**: 183-185 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.94 (dd, *J* = 8.6, 0.8 Hz, 1H), 7.84 (dt, *J* = 8.3, 0.8 Hz, 1H), 7.76 (s, 1H), 7.67-7.53 (m, 2H), 7.47-7.37 (m, 2H), 6.91 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.85-6.78 (m, 1H), 6.70 (dd, *J* = 8.5, 1.1 Hz, 1H), 6.38 (s, 2H), 3.86-3.77 (m, 1H), 3.77-3.65 (m, 2H), 3.61-3.47 (m, 1H), 2.31 (s, 3H), 2.13 (s, 3H), 2.00 (s, 6H), 1.98-1.94 (m, 1H), 1.91-1.81 (m, 3H), 1.77 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.9, 153.7, 148.9, 141.1, 138.8, 138.4, 138.1, 135.5, 135.2, 135.0, 134.0, 132.7, 131.9, 131.5, 128.5, 127.9, 127.5, 127.5, 127.4, 126.8, 126.6, 126.5, 125.5, 122.1, 48.5, 46.9, 26.5, 23.9, 22.7, 21.4, 20.9, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{35}H_{35}N_3NaO_4S$ 616.2240; Found 616.2237.

Optical Rotation: $[\alpha]^{20}_D$ = +298.7 (c = 0.125, CH_2Cl_2). The absolute configuration of

3ma was unambiguously assigned by single crystal X-ray analysis. 98% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 8.5 min for minor isomer, t_R = 10.3 min for major isomer).



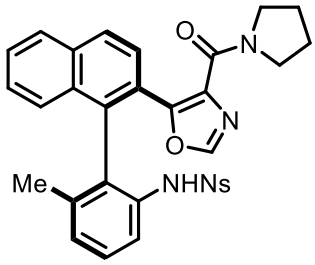
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.496	BB	7.804	9.307	1.50	131.52	5.67	1.05
10.310	BM m	9.760	12.425	0.37	12366.55	520.50	98.95

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.473	BB	7.984	9.919	1.94	13558.86	622.93	49.93
10.416	BB	9.919	12.224	2.30	13594.67	564.09	50.07

(*R*)-*N*-(3-methyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-4-nitrobenzenesulfonamide (3na)

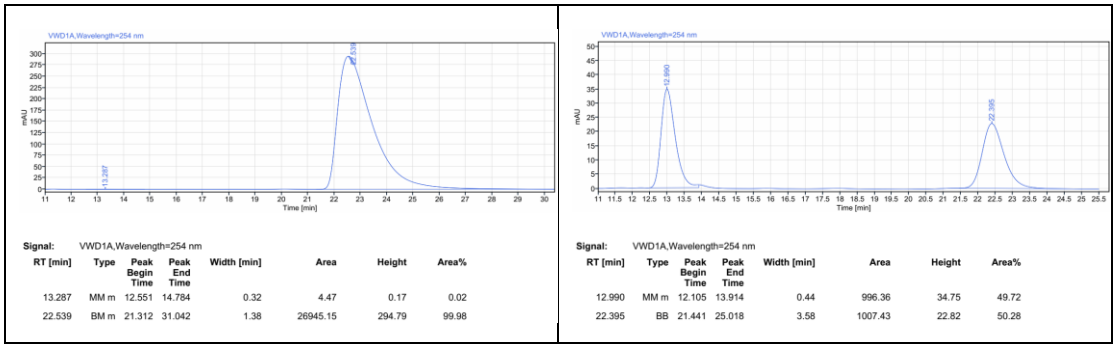


3na

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 1:1). White solid, 57.1 mg, 98% yield. **MP**: 200-202 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.09 (s, 1H), 7.90 (dd, *J* = 8.7, 0.9 Hz, 1H), 7.74 (dt, *J* = 8.1, 0.8 Hz, 1H), 7.71 (d, *J* = 8.5 Hz, 1H), 7.66 (dd, *J* = 7.7, 1.6 Hz, 1H), 7.62 (dt, *J* = 8.3, 0.9 Hz, 1H), 7.58 (s, 1H), 7.42-7.27 (m, 4H), 7.21 (dd, *J* = 7.7, 1.6 Hz, 1H), 7.08 (dt, *J* = 7.6, 1.0 Hz, 1H), 6.80 (ddd, *J* = 8.2, 6.8, 1.3 Hz, 1H), 6.72-6.58 (m, 1H), 3.80-3.47 (m, 4H), 1.96-1.83 (m, 4H), 1.81 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.9, 152.2, 149.1, 146.8, 139.0, 134.8, 134.3, 134.0, 133.9, 133.2, 133.0, 132.2, 131.8, 130.9, 130.3, 128.9, 128.7, 128.1, 127.6, 127.4, 126.8, 126.7, 126.1, 125.0, 124.9, 122.2, 48.3, 46.7, 26.4, 24.0, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{31}H_{26}N_4NaO_6S$ 605.1465; Found 605.1465.

Optical Rotation: $[\alpha]^{20}_D$ = +84.7 (c = 0.25, CH_2Cl_2). The absolute configuration of **3na**

was assigned by analogy to **3ma** and **3ah**. >99% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 13.3 min for minor isomer, t_R = 22.5 min for major isomer).



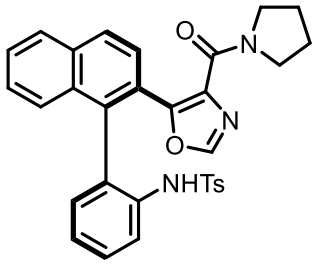
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
13.287	MM m	12.551	14.784	0.32	4.47	0.17	0.02
22.539	BM m	21.312	31.042	1.38	26945.15	294.79	99.98

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
12.990	MM m	12.105	13.914	0.44	996.36	34.75	49.72
22.395	BB	21.441	25.018	3.58	1007.43	22.82	50.28

(*R*)-4-methyl-*N*-(2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)benzenesulfonamide (3oa)

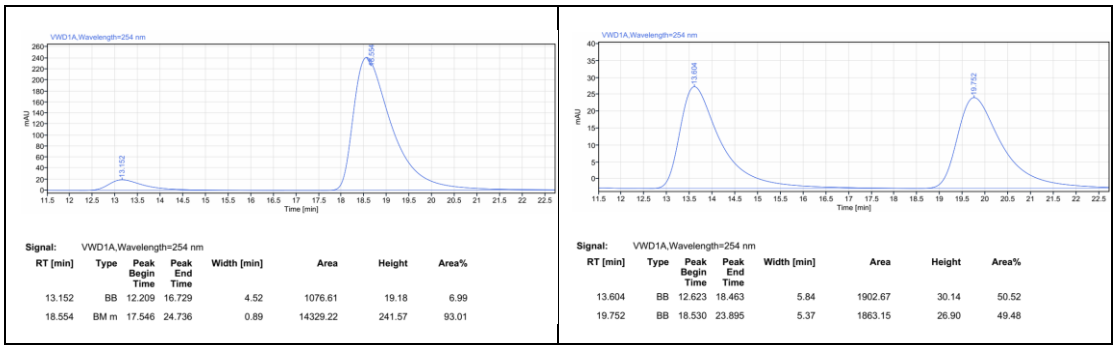


3oa

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 22.0 mg, 41% yield. **MP**: 190-192 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.94 (d, *J* = 8.5 Hz, 1H), 7.90-7.79 (m, 2H), 7.65 (d, *J* = 8.2 Hz, 1H), 7.58-7.53 (m, 2H), 7.50-7.43 (m, 1H), 7.35-7.22 (m, 3H), 7.15-7.02 (m, 3H), 6.88 (d, *J* = 8.5 Hz, 1H), 6.81 (d, *J* = 8.0 Hz, 2H), 3.85-3.75 (m, 1H), 3.73-3.58 (m, 2H), 3.57-3.43 (m, 1H), 2.26 (s, 3H), 2.00-1.80 (m, 4H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.9, 153.6, 149.0, 142.8, 137.5, 135.8, 135.5, 134.0, 132.9, 132.2, 131.9, 130.2, 129.2, 128.9, 128.0, 127.0, 126.9, 126.8, 126.4, 126.3, 124.3, 123.0, 48.4, 46.9, 26.5, 23.9, 21.6; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{31}H_{27}N_3NaO_4S$ 560.1614; Found 560.1615.

Optical Rotation: $[\alpha]^{20}_D$ = +165.0 (c = 0.3, CH_2Cl_2). The absolute configuration of **3oa** was assigned by analogy to **3ma** and **3ah**. 86% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R =

13.2 min for minor isomer, t_R = 18.6 min for major isomer).



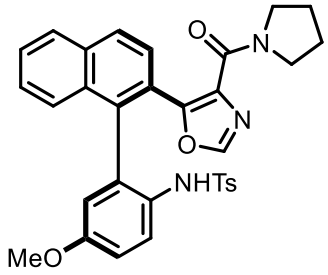
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
13.152	BB	12.209	16.729	4.52	1076.61	19.18	6.99
18.554	BM m	17.546	24.736	0.89	14329.22	241.57	93.01

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
13.604	BB	12.623	18.463	5.84	1902.67	30.14	50.52
19.752	BB	18.530	23.895	5.37	1863.15	26.90	49.48

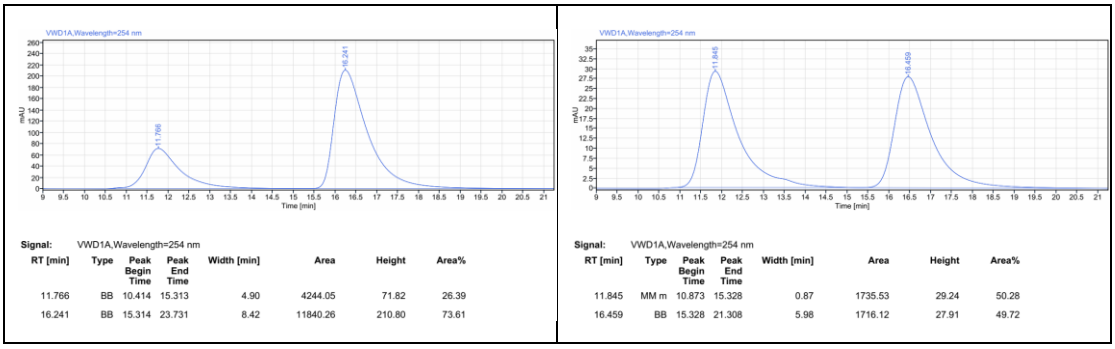
(*R*)-*N*-(4-methoxy-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-4-methylbenzenesulfonamide (3pa)



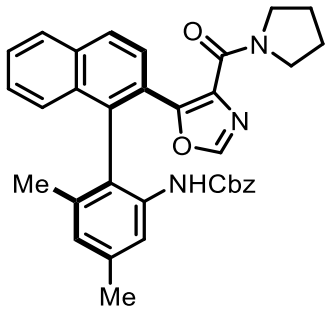
3pa

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 2:3). White solid, 25.5 mg, 45% yield. **MP**: 188-189 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.93-7.88 (m, 1H), 7.83-7.78 (m, 1H), 7.60 (s, 1H), 7.56 (d, *J* = 9.0 Hz, 1H), 7.50 (d, *J* = 8.5 Hz, 1H), 7.47-7.41 (m, 1H), 7.18-7.13 (m, 2H), 7.07-7.00 (m, 1H), 6.92 (dd, *J* = 8.5, 1.1 Hz, 1H), 6.87 (dd, *J* = 9.0, 3.0 Hz, 1H), 6.71-6.64 (m, 3H), 3.96-3.86 (m, 1H), 3.73 (s, 3H), 3.71-3.62 (m, 2H), 3.61-3.51 (m, 1H), 2.20 (s, 3H), 2.06-1.84 (m, 4H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 160.9, 156.5, 153.8, 149.2, 142.4, 137.5, 136.0, 133.9, 132.9, 132.7, 132.1, 129.0, 128.8, 128.3, 127.8, 126.9, 126.8, 126.7, 126.62, 126.59, 126.5, 126.0, 116.9, 114.3, 55.6, 48.5, 46.9, 26.5, 23.9, 21.6; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{32}H_{29}N_3NaO_5S$ 590.1720; Found 590.1721.

Optical Rotation: $[\alpha]^{20}_D$ = +118.2 (c = 0.5, CH_2Cl_2). The absolute configuration of **3pa** was assigned by analogy to **3ma** and **3ah**. 47% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 70:30, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 11.8 min for minor isomer, t_R = 16.2 min for major isomer).



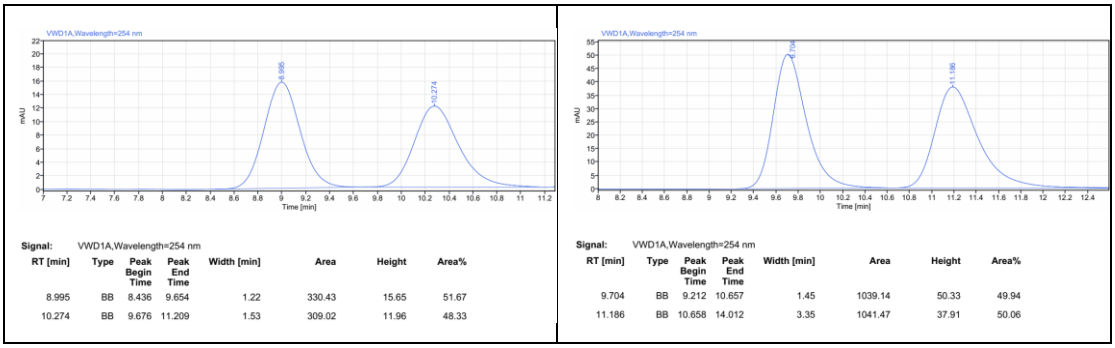
Benzyl (*R*)-(3,5-dimethyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)carbamate (3ta)



3ta

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 1:1). White solid, 3.3 mg, 6% yield. **MP**: 118-120 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.98 (d, *J* = 8.5 Hz, 1H), 7.91 (dd, *J* = 8.2, 1.1 Hz, 1H), 7.67-7.63 (m, 2H), 7.59-7.48 (m, 2H), 7.41-7.33 (m, 2H), 7.27-7.20 (m, 3H), 7.18-7.12 (m, 2H), 6.98 (s, 1H), 6.80 (dt, *J* = 1.7, 0.8 Hz, 1H), 4.99 (q, *J* = 12.6 Hz, 2H), 3.75-3.53 (m, 1H), 3.46-3.34 (m, 2H), 3.28-3.20 (m, 1H), 2.35 (s, 3H), 1.89-1.76 (m, 4H), 1.75 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.0, 154.3, 152.9, 148.8, 138.1, 137.7, 136.8, 136.7, 135.4, 134.3, 132.5, 131.8, 128.8, 128.33, 128.29, 127.8, 127.7, 127.4, 127.3, 126.9, 126.7, 126.4, 126.2, 120.6, 66.2, 48.1, 46.3, 26.2, 24.0, 21.5, 20.2; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{34}H_{31}N_3NaO_4$ 568.2207; Found 568.2205.

<5% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 9.0 min for major isomer, t_R = 10.3 min for minor isomer).



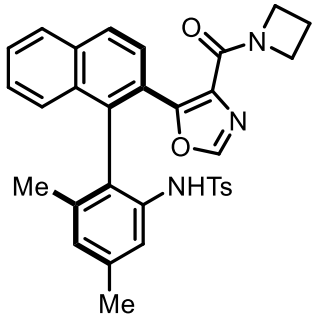
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.995	BB	8.436	9.654	1.22	330.43	15.65	51.67
10.274	BB	9.676	11.209	1.53	309.02	11.96	48.33

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
9.704	BB	9.212	10.657	1.45	1039.14	50.33	49.94
11.186	BB	10.658	14.012	3.35	1041.47	37.91	50.06

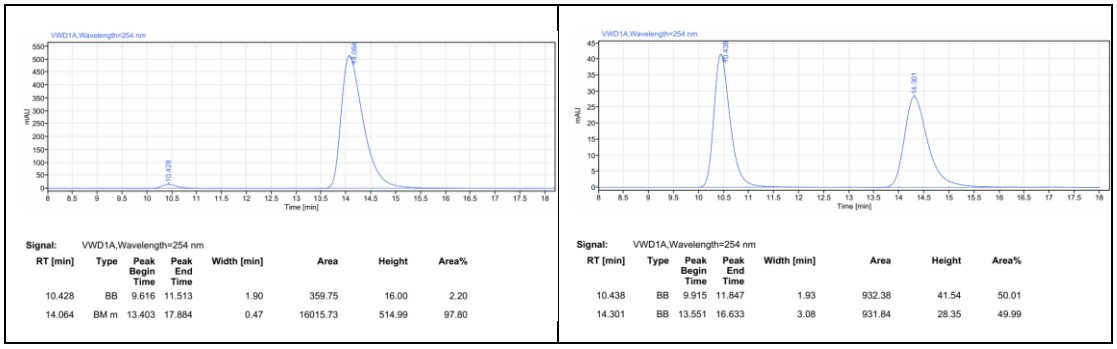
(*R*)-*N*-(2-(2-(4-(azetidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)-3,5-dimethylphenyl)-4-methylbenzenesulfonamide (3ab)



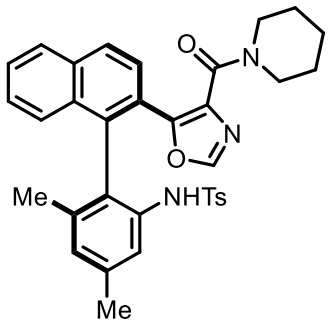
3ab

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 54.6 mg, 99% yield. **MP**: 128-129 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.91 (dd, *J* = 8.7, 0.8 Hz, 1H), 7.86-7.79 (m, 1H), 7.60-7.50 (m, 3H), 7.44 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H), 7.34 (dt, *J* = 1.6, 0.8 Hz, 1H), 7.25-7.19 (m, 2H), 7.01 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.87-6.73 (m, 4H), 4.71-4.56 (m, 1H), 4.55-4.42 (m, 1H), 4.30-4.20 (m, 1H), 4.19-4.10 (m, 1H), 2.36-2.28 (m, 5H), 2.27 (s, 3H), 1.77 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.2, 154.0, 149.3, 142.6, 138.4, 138.3, 137.6, 135.4, 135.3, 134.1, 131.7, 131.1, 129.1, 128.5, 128.0, 127.8, 127.1, 126.9, 126.8, 126.7, 126.5, 126.3, 125.7, 120.8, 53.4, 48.8, 21.6, 21.5, 20.2, 16.5; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{32}H_{29}N_3NaO_4S$ 574.1771; Found 574.1770.

Optical Rotation: $[\alpha]^{20}_D$ = +181.2 (c = 0.15, CH_2Cl_2). The absolute configuration of **3ab** was assigned by analogy to **3ma** and **3ah**. 96% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 10.4 min for minor isomer, t_R = 14.1 min for major isomer).



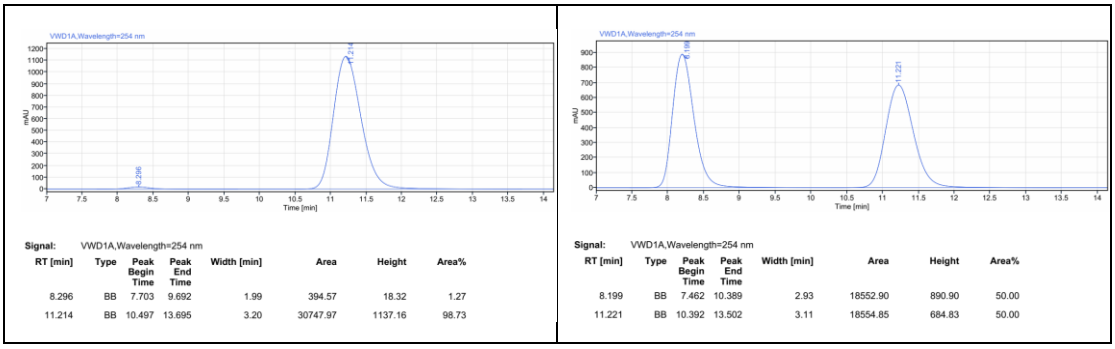
(*R*)-*N*-(3,5-dimethyl-2-(2-(4-(piperidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)p-henyl)-4-methylbenzenesulfonamide (**3ac**)



3ac

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 56.8 mg, 98% yield. **MP**: 168-169 ºC; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.90 (dd, *J* = 8.7, 0.8 Hz, 1H), 7.85-7.80 (m, 1H), 7.76 (s, 1H), 7.58-7.49 (m, 2H), 7.45 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H), 7.34-7.30 (m, 1H), 7.24-7.18 (m, 2H), 7.05 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.88-6.74 (m, 4H), 3.84-3.39 (m, 4H), 2.33 (s, 3H), 2.26 (s, 3H), 1.77 (s, 3H), 1.72-1.51 (m, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.5, 153.3, 149.0, 142.5, 138.38, 138.35, 137.7, 135.1, 135.0, 134.0, 132.4, 131.9, 129.1, 128.8, 128.1, 127.3, 127.1, 127.0, 126.9, 126.8, 126.7, 125.83, 125.78, 121.3, 48.0, 43.7, 26.7, 25.7, 24.7, 21.6, 21.5, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{34}H_{33}N_3NaO_4S$ 602.2084; Found 602.2085.

Optical Rotation: $[\alpha]^{20}_D$ = +182.2 (c = 0.25, CH_2Cl_2). The absolute configuration of **3ac** was assigned by analogy to **3ma** and **3ah**. 97% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 8.3 min for minor isomer, t_R = 11.2 min for major isomer).



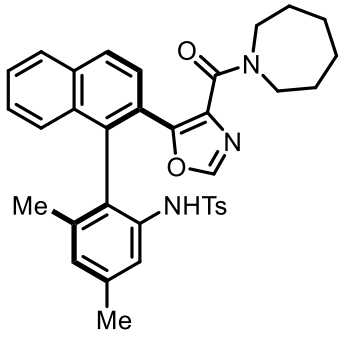
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.296	BB	7.703	9.692	1.99	394.57	18.32	1.27
11.214	BB	10.497	13.695	3.20	30747.97	1137.16	98.73

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.199	BB	7.462	10.389	2.93	18552.90	890.90	50.00
11.221	BB	10.392	13.502	3.11	18554.85	684.83	50.00

(*R*)-*N*-(2-(2-(4-(azepane-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)-3,5-dimethylph -enyl)-4-methylbenzenesulfonamide (3ad)

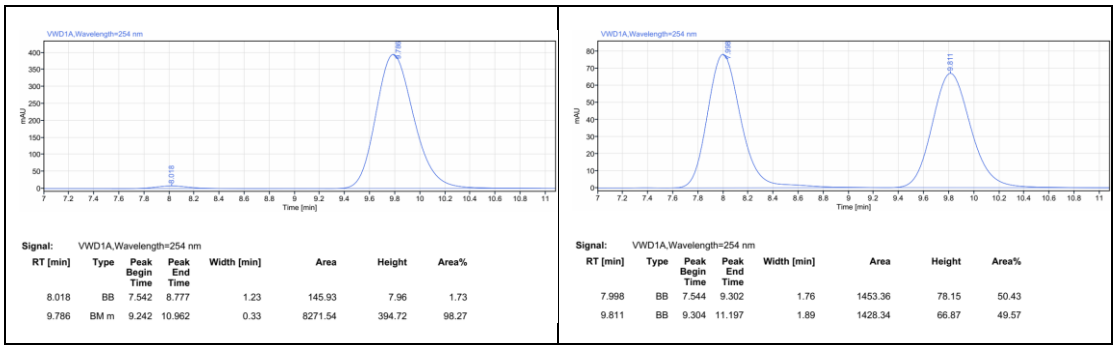


3ad

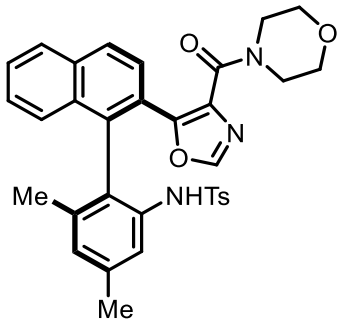
The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 58.2 mg, 98% yield. **MP**: 106-107 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.89 (dd, *J* = 8.6, 0.8 Hz, 1H), 7.85-7.76 (m, 2H), 7.62-7.50 (m, 2H), 7.44 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H), 7.32 (dd, *J* = 1.6, 0.8 Hz, 1H), 7.25-7.17 (m, 2H), 7.05 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.85-6.81 (m, 2H), 6.81-6.75 (m, 2H), 3.75-3.53 (m, 4H), 2.32 (s, 3H), 2.26 (s, 3H), 1.88-1.72 (m, 7H), 1.71-1.55 (m, 4H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 162.9, 153.1, 149.0, 142.4, 138.4, 138.3, 137.7, 135.1, 134.9, 134.0, 132.8, 131.9, 129.0, 128.7, 128.0, 127.3, 127.02, 126.97, 126.9, 126.8, 126.7, 125.9, 125.8, 121.3, 49.0, 47.0, 29.8, 27.5, 27.0, 26.9, 21.6, 21.5, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{35}H_{35}N_3NaO_4S$ 616.2240; Found 616.2237.

Optical Rotation: $[\alpha]^{20}_D$ = +208.9 (c = 0.125, CH_2Cl_2). The absolute configuration of **3ad** was assigned by analogy to **3ma** and **3ah**. 97% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R

= 8.0 min for minor isomer, t_R = 9.8 min for major isomer).



(*R*)-*N*-(3,5-dimethyl-2-(2-(4-(morpholine-4-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-4-methylbenzenesulfonamide (3ae)

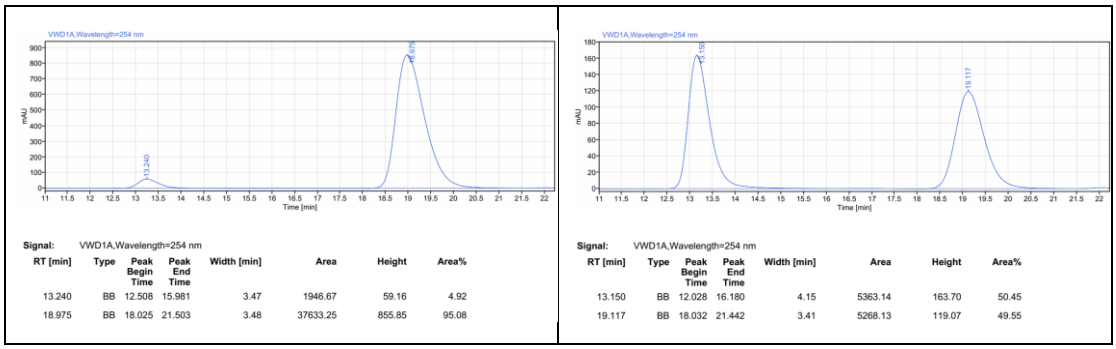


3ae

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 1:1). White solid, 57.6 mg, 99% yield. **MP**: 188-190 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.92 (d, *J* = 8.5 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.58 (s, 2H), 7.54 (d, *J* = 8.5 Hz, 1H), 7.45 (ddd, *J* = 8.0, 6.8, 1.2 Hz, 1H), 7.33 (d, *J* = 1.7 Hz, 1H), 7.23-7.17 (m, 2H), 7.03 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.87-6.73 (m, 4H), 4.05-3.93 (m, 1H), 3.82-3.61 (m, 7H), 2.33 (s, 3H), 2.27 (s, 3H), 1.77 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.5, 154.5, 149.0, 142.6, 138.5, 138.4, 137.5, 135.10, 135.05, 134.0, 131.8, 131.6, 129.1, 128.8, 128.1, 127.3, 127.1, 127.0, 126.9, 126.7, 126.5, 125.8, 120.9, 67.1, 66.9, 47.3, 43.0, 21.6, 21.5, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{33}H_{31}N_3NaO_5S$ 604.1877; Found 604.1876.

Optical Rotation: $[\alpha]^{20}_D$ = +160.8 (c = 0.125, CH_2Cl_2). The absolute configuration of **3ae** was assigned by analogy to **3ma** and **3ah**. 90% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R

= 13.2 min for minor isomer, t_R = 19.0 min for major isomer).



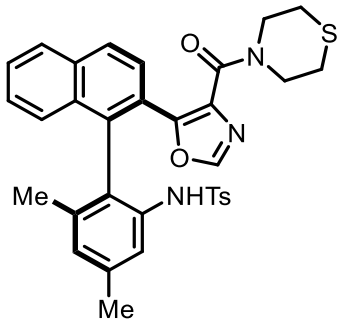
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
13.240	BB	12.508	15.981	3.47	1946.67	59.16	4.92
18.975	BB	18.025	21.503	3.48	37633.25	855.85	95.08

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
13.150	BB	12.028	16.180	4.15	5363.14	163.70	50.45
19.117	BB	18.032	21.442	3.41	5268.13	119.07	49.55

(*R*)-*N*-(3,5-dimethyl-2-(2-(4-(thiomorpholine-4-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-4-methylbenzenesulfonamide (3af)

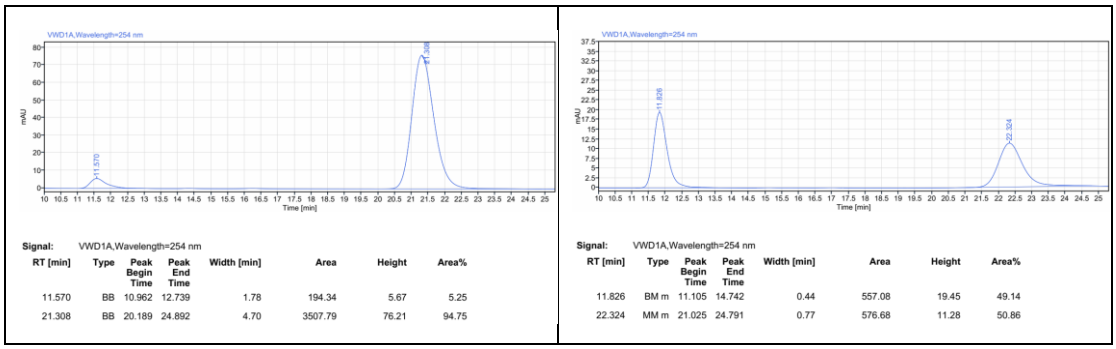


3af

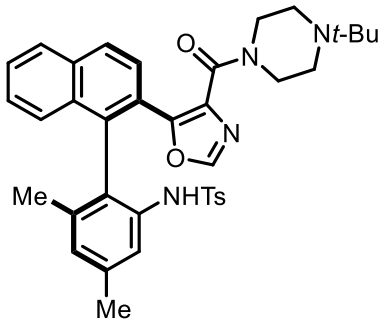
The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 1:1). White solid, 56.2 mg, 94% yield. **MP**: 212-214 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.92 (dd, *J* = 8.6, 0.8 Hz, 1H), 7.87-7.79 (m, 1H), 7.58 (s, 1H), 7.53 (d, *J* = 8.5 Hz, 1H), 7.50 (s, 1H), 7.48-7.43 (m, 1H), 7.36-7.30 (m, 1H), 7.24-7.15 (m, 2H), 7.10-7.00 (m, 1H), 6.87-6.71 (m, 4H), 4.10-4.00 (m, 2H), 3.93-3.78 (m, 2H), 2.90-2.60 (m, 4H), 2.33 (s, 3H), 2.27 (s, 3H), 1.76 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.7, 154.1, 149.1, 142.7, 138.48, 138.46, 137.5, 135.03, 134.96, 134.1, 131.9, 131.8, 129.1, 128.9, 128.1, 127.3, 127.1, 127.0, 126.7, 126.4, 125.8, 125.7, 120.8, 49.7, 45.1, 28.3, 27.5, 21.6, 21.5, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{33}H_{31}N_3NaO_4S_2$ 620.1648; Found 620.1647.

Optical Rotation: $[\alpha]^{20}_D$ = +170.2 (c = 0.125, CH_2Cl_2). The absolute configuration of **3af** was assigned by analogy to **3ma** and **3ah**. 90% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R

= 11.6 min for minor isomer, t_R = 21.3 min for major isomer).



(*R*)-*N*-(2-(2-(4-(4-(*tert*-butyl)piperazine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)-3,5-dimethylphenyl)-4-methylbenzenesulfonamide (**3ag**)

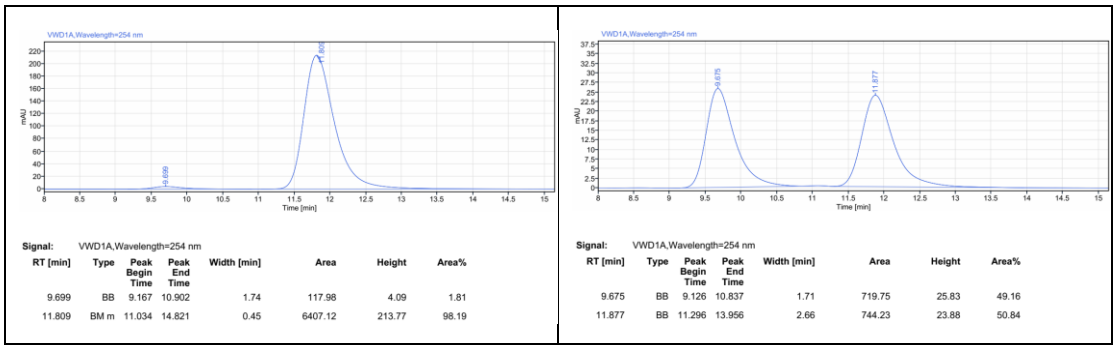


3ag

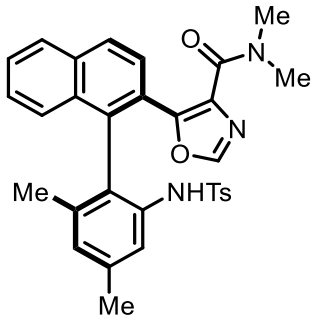
The crude reaction mixture was purified by flash column chromatography (EtOAc). White solid, 62.4 mg, 98% yield. **MP**: 130-132 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.90 (dd, *J* = 8.6, 0.8 Hz, 1H), 7.84-7.76 (m, 2H), 7.54 (s, 1H), 7.52 (d, *J* = 8.5 Hz, 1H), 7.44 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H), 7.35-7.31 (m, 1H), 7.23-7.17 (m, 2H), 7.02 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.85-6.73 (m, 4H), 4.08-3.94 (m, 1H), 3.88-3.78 (m, 1H), 3.72-3.56 (m, 2H), 2.70-2.56 (m, 4H), 2.32 (s, 3H), 2.26 (s, 3H), 1.77 (s, 3H), 1.08 (s, 9H); **^{13}C NMR** (126 MHz, $CDCl_3$): δ 161.2, 154.1, 149.0, 142.5, 138.36, 138.35, 137.7, 135.11, 135.06, 134.0, 132.0, 131.9, 129.0, 128.8, 128.0, 127.3, 127.0, 126.9, 126.8, 126.7, 125.79, 125.77, 121.3, 54.1, 47.4, 46.5, 45.8, 43.3, 26.0, 21.6, 21.5, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{37}H_{40}N_4NaO_4S$ 659.2662; Found 659.2665.

Optical Rotation: $[\alpha]^{20}_D$ = +195.8 (c = 0.125, CH_2Cl_2). The absolute configuration of **3ag** was assigned by analogy to **3ma** and **3ah**. 96% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R

= 9.7 min for minor isomer, t_R = 11.8 min for major isomer).



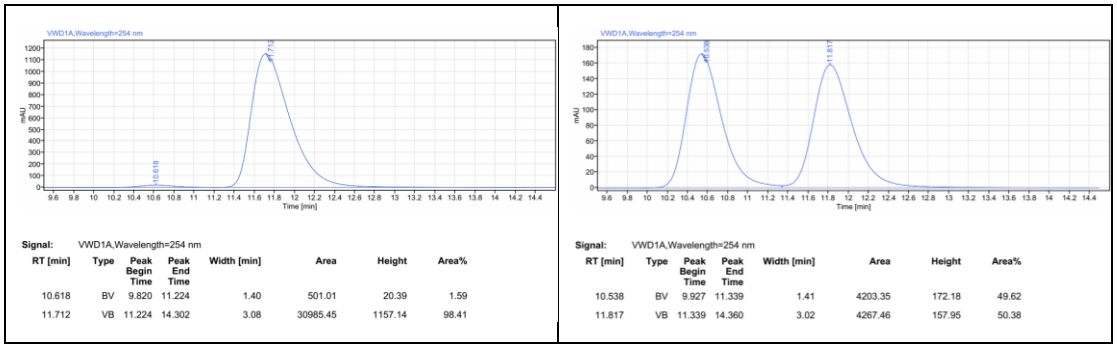
(*R*)-5-(1-(2,4-dimethyl-6-((4-methylphenyl)sulfonamido)phenyl)naphthalen-2-yl)-N,N-dimethyloxazole-4-carboxamide (**3ah**)



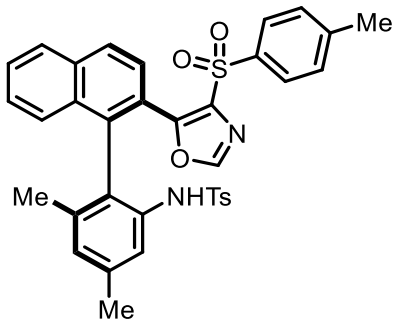
3ah

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 53.4 mg, 99% yield. **MP**: 150-152 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.91 (dd, *J* = 8.7, 0.9 Hz, 1H), 7.85-7.80 (m, 1H), 7.69-7.53 (m, 3H), 7.45 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H), 7.32 (dt, *J* = 1.5, 0.7 Hz, 1H), 7.24-7.17 (m, 2H), 7.04 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.87-6.67 (m, 4H), 3.17 (s, 3H), 3.04 (s, 3H), 2.32 (s, 3H), 2.26 (s, 3H), 1.76 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 163.0, 153.3, 149.0, 142.6, 138.5, 138.4, 137.5, 135.1, 135.0, 134.0, 132.3, 131.8, 129.1, 128.8, 128.1, 127.2, 127.1, 127.0, 126.9, 126.7, 126.6, 125.9, 125.8, 120.9, 38.6, 36.0, 21.6, 21.5, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{31}H_{29}N_3NaO_4S$ 562.1771; Found 562.1769.

Optical Rotation: $[\alpha]^{20}_D$ = +192.7 (c = 0.25, CH_2Cl_2). The absolute configuration of **3ah** was unambiguously assigned by single crystal X-ray analysis. 97% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 10.6 min for minor isomer, t_R = 11.7 min for major isomer).



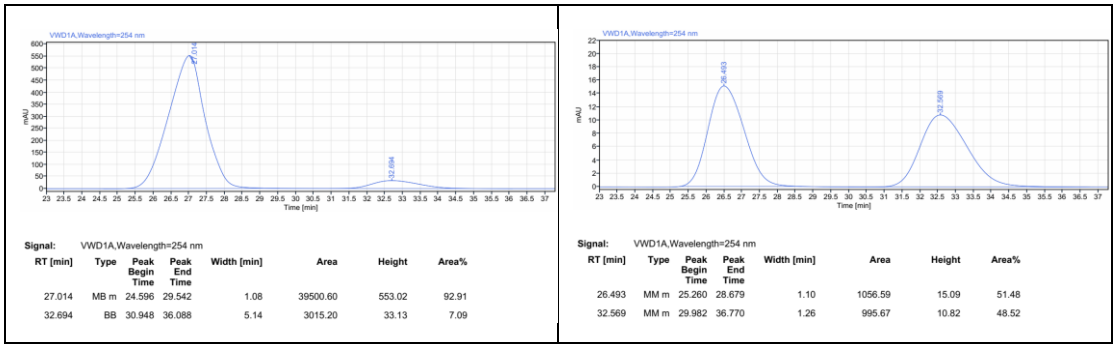
(*R*)-*N*-(3,5-dimethyl-2-(2-(4-tosyloxazol-5-yl)naphthalen-1-yl)phenyl)-4-methylbe -nzenesulfonamide (3ai)



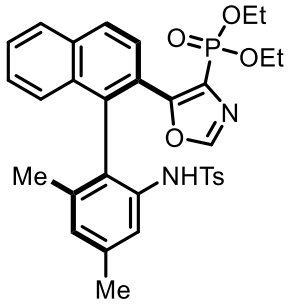
3ai

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 5:1). Pale yellow solid, 39.2 mg, 63% yield. **MP**: 233-235 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.08-8.02 (m, 3H), 7.93 (d, *J* = 8.2 Hz, 1H), 7.77 (d, *J* = 8.5 Hz, 1H), 7.55 (ddd, *J* = 8.1, 6.8, 1.2 Hz, 1H), 7.45 (s, 1H), 7.42-7.38 (m, 2H), 7.36-7.31 (m, 3H), 7.11 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 7.03-6.92 (m, 2H), 6.83 (dd, *J* = 8.4, 1.1 Hz, 1H), 6.76 (d, *J* = 1.8 Hz, 1H), 6.49 (s, 1H), 2.45 (s, 3H), 2.34 (s, 3H), 2.31 (s, 3H), 1.75 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 152.5, 150.4, 145.5, 143.4, 139.0, 138.4, 137.8, 136.9, 136.3, 135.1, 134.7, 131.7, 130.1, 129.4, 129.0, 128.9, 128.6, 128.4, 127.7, 127.6, 127.2, 126.9, 125.7, 124.5, 124.2, 118.3, 21.9, 21.7, 21.6, 20.2; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{35}H_{30}N_2NaO_5S_2$ 645.1488; Found 645.1485.

Optical Rotation: $[\alpha]^{20}_D$ = -40.8 (c = 0.8, CH_2Cl_2). The absolute configuration of **3ai** was assigned by analogy to **3ma** and **3ah**. 86% ee (HPLC condition: Chiralpak IA column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 27.0 min for major isomer, t_R = 32.7 min for minor isomer).



Diethyl (*R*)-(5-(1-(2,4-dimethyl-6-((4-methylphenyl)sulfonamido)phenyl)naphthal-en-2-yl)oxazol-4-yl)phosphonate (3aj)

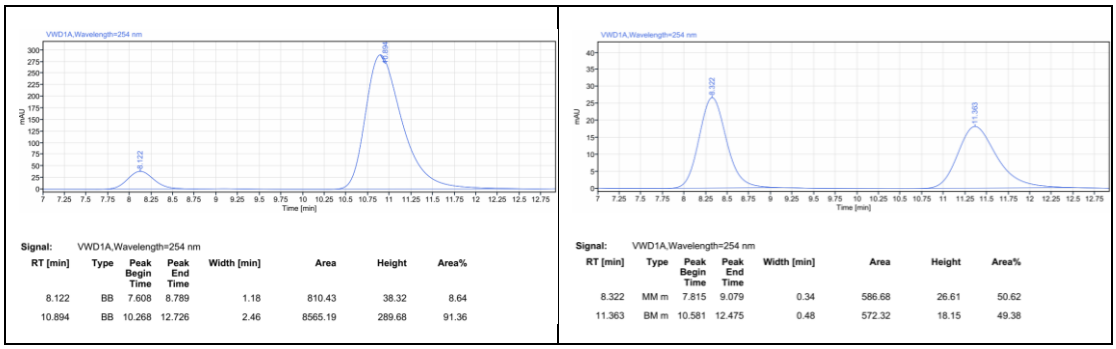


3aj

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 1:1). White solid, 35.1 mg, 58% yield. **MP**: 113-114 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.96 (d, *J* = 8.5 Hz, 1H), 7.87 (d, *J* = 8.2 Hz, 1H), 7.69 (d, *J* = 8.5 Hz, 1H), 7.61 (d, *J* = 1.2 Hz, 1H), 7.48 (ddd, *J* = 8.0, 6.7, 1.2 Hz, 1H), 7.37 (d, *J* = 1.6 Hz, 1H), 7.24 (d, *J* = 8.3 Hz, 2H), 7.09 (s, 1H), 7.03 (ddd, *J* = 8.2, 6.8, 1.2 Hz, 1H), 6.88 (d, *J* = 8.0 Hz, 2H), 6.84-6.73 (m, 2H), 4.44-3.89 (m, 4H), 2.32 (s, 3H), 2.31 (s, 3H), 1.76 (s, 3H), 1.35-1.29 (m, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$): δ 158.6 (d, *J* = 37.5 Hz), 151.0 (d, *J* = 22.3 Hz), 143.0, 138.7, 138.4, 137.2, 135.2, 135.0, 134.3, 131.8, 129.3, 128.6, 128.3, 128.2, 127.2 (d, *J* = 9.2 Hz), 127.04, 126.99, 126.7 (d, *J* = 242.1 Hz), 125.7, 125.3, 119.6, 63.5 (d, *J* = 5.5 Hz), 63.2 (d, *J* = 6.2 Hz), 21.64, 21.58, 20.2, 16.38 (d, *J* = 10.6 Hz), 16.37 (d, *J* = 2.4 Hz); **^{31}P NMR** (202 MHz, $CDCl_3$): δ 8.1; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{32}H_{33}N_2NaO_6PS$ 627.1689; Found 627.1689.

Optical Rotation: $[\alpha]^{20}_D$ = +99.5 (c = 0.7, CH_2Cl_2). The absolute configuration of **3aj** was assigned by analogy to **3ma** and **3ah**. 83% ee (HPLC condition: Chiralpak IB N-5

column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 8.1 min for minor isomer, t_R = 10.9 min for major isomer).



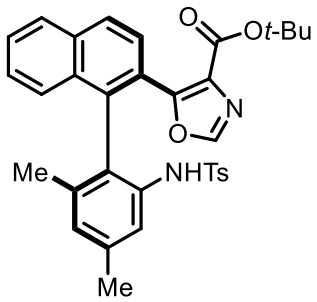
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.122	BB	7.608	8.789	1.18	810.43	38.32	8.64
10.894	BB	10.268	12.726	2.46	8565.19	289.68	91.36

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.322	MM m	7.815	9.079	0.34	586.68	26.61	50.62
11.363	BM m	10.581	12.475	0.48	572.32	18.15	49.38

tert-Butyl (*R*)-5-(1-(2,4-dimethyl-6-((4-methylphenyl)sulfonamido)phenyl)naphth-alen-2-yl)oxazole-4-carboxylate (3ak)

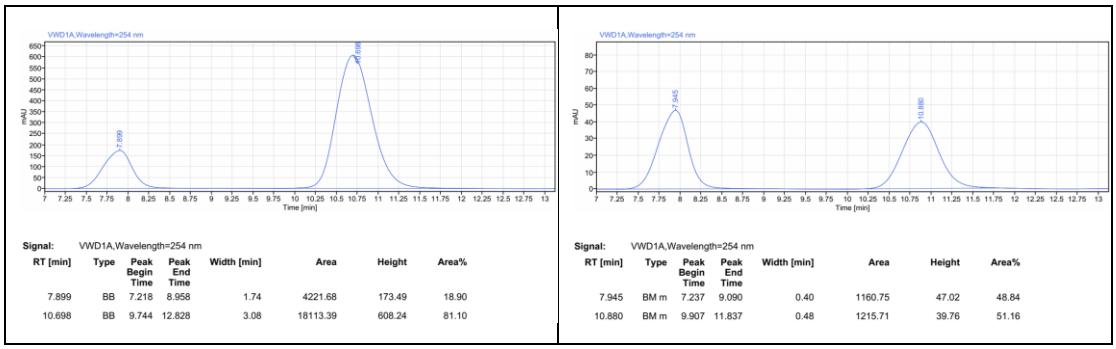


3ak

The crude reaction mixture was purified by flash column chromatography (PE/EtOAc 3:2). White solid, 51.2 mg, 90% yield. **MP**: 114-116 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.02-7.96 (m, 1H), 7.91 (dd, *J* = 8.0, 1.2 Hz, 1H), 7.61 (d, *J* = 8.5 Hz, 1H), 7.52 (ddd, *J* = 8.2, 6.8, 1.2 Hz, 1H), 7.46 (s, 1H), 7.37 (d, *J* = 1.6 Hz, 1H), 7.32 (d, *J* = 8.3 Hz, 2H), 7.09 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 6.99 (d, *J* = 8.2 Hz, 2H), 6.81 (dd, *J* = 8.5, 1.0 Hz, 1H), 6.76-6.66 (m, 1H), 6.32 (s, 1H), 2.35 (s, 3H), 2.31 (s, 3H), 1.70 (s, 3H), 1.48 (s, 9H); **^{13}C NMR** (126 MHz, $CDCl_3$): δ 160.7, 154.7, 150.0, 143.4, 138.8, 138.1, 136.8, 135.1, 134.8, 134.3, 131.7, 129.9, 129.4, 128.6, 128.5, 128.3, 127.42, 127.37, 127.2, 126.7, 126.1, 125.5, 124.4, 117.6, 83.0, 28.1, 21.64, 21.59, 20.0; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{33}H_{32}N_2NaO_5S$ 591.1924; Found 591.1923.

Optical Rotation: $[\alpha]^{20}_D$ = +34.1 (c = 0.175, CH_2Cl_2). The absolute configuration of **3ak** was assigned by analogy to **3ma** and **3ah**. 62% ee (HPLC condition: Chiralpak IB

N-5 column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 7.9 min for minor isomer, t_R = 10.7 min for major isomer).



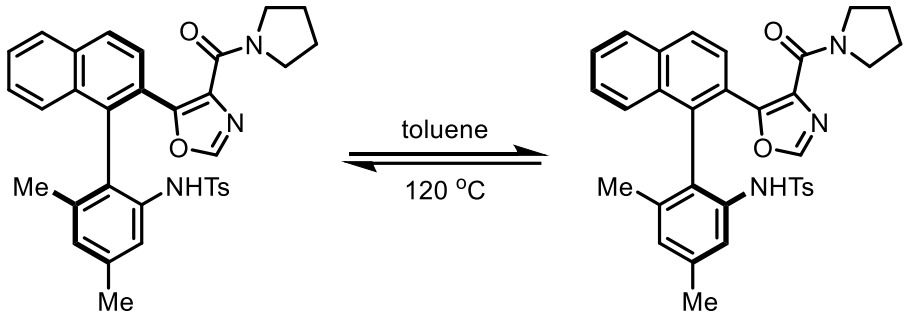
Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
7.899	BB	7.218	8.958	1.74	4221.68	173.49	18.90
10.698	BB	9.744	12.828	3.08	18113.39	608.24	81.10

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
7.945	BM m	7.237	9.090	0.40	1160.75	47.02	48.84
10.880	BM m	9.907	11.837	0.48	1215.71	39.76	51.16

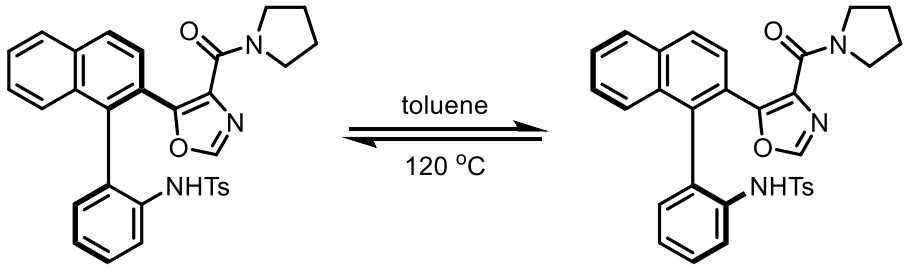
VIII. Evaluation of the stereochemical stability



3aa **(*S*)-3aa**

To an oven-dried tube equipped with a magnetic stir bar was taken the **3aa** (11.3 mg, 0.02 mmol) in toluene (1.0 mL). The reaction solution was allowed to stir at 120 °C in a heating block. After a period of time a small amount of sample of reaction solution was taken out and ee value was determined by HPLC.

time (h)	2	4	6	8	10	12	24	36	48	60	72
ee (%)	98	98	98	98	98	98	98	98	98	98	98



3oa **(*S*)-3oa**

To an oven-dried tube equipped with a magnetic stir bar was taken the **3oa** (10.8 mg,

0.02 mmol) in toluene (1.0 mL). The reaction solution was allowed to stir at 120 °C in a heating block. After a period of time a small amount of sample of reaction solution was taken out and ee value was determined by HPLC.

time (h)	2	4	6	8	10	12	24	36	48	60	72
ee (%)	86	86	86	85	85	84	84	84	84	84	84

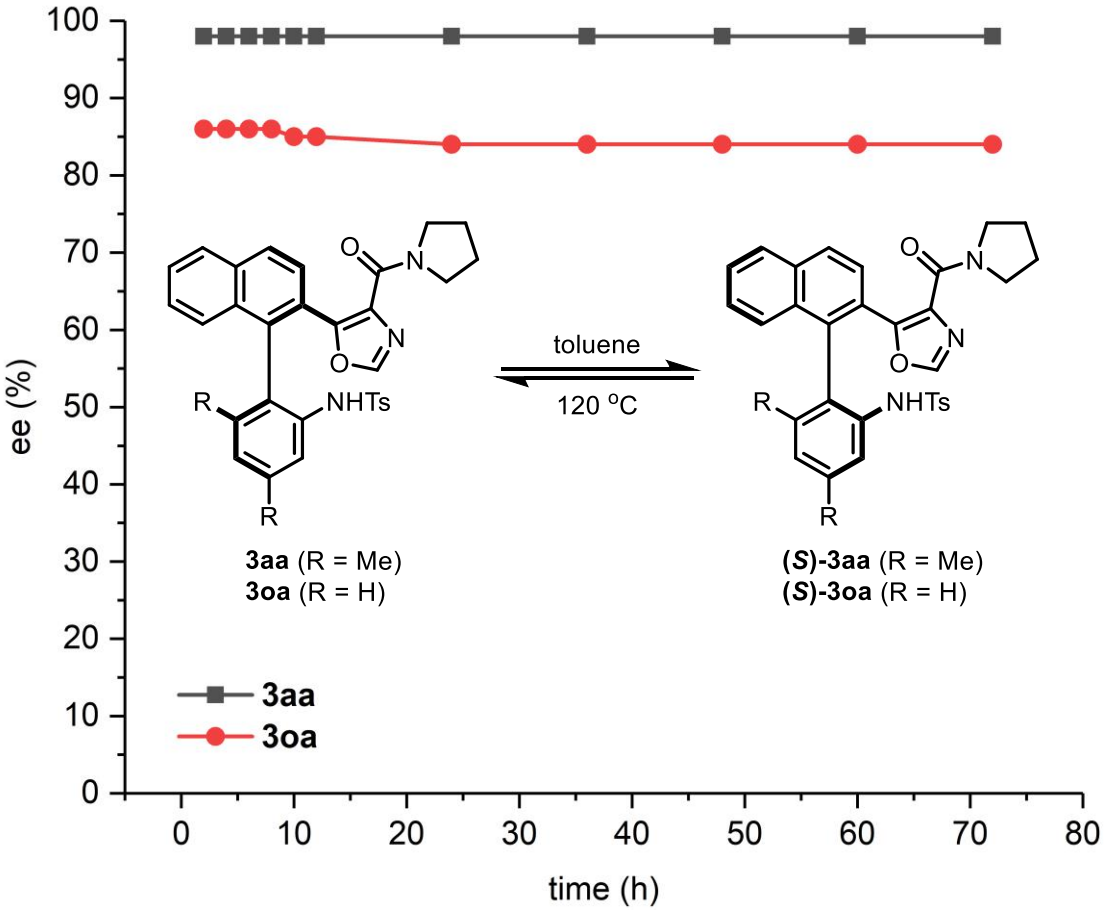
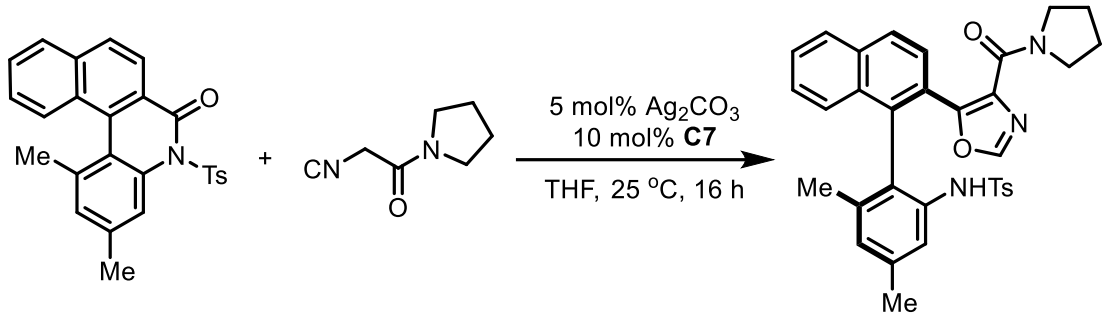


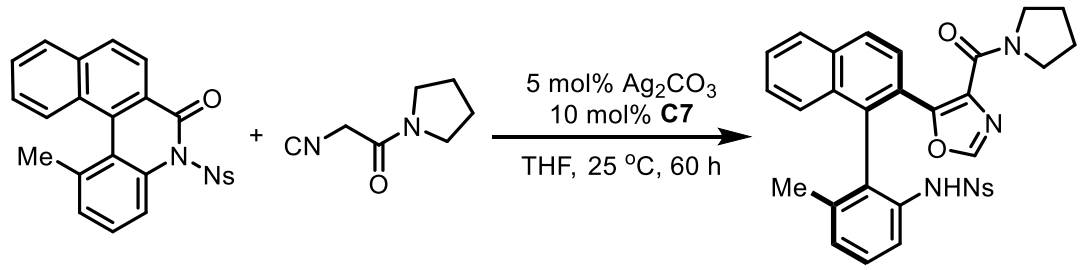
Figure S1. Evaluation of the stereochemical stability

IX. Preparative synthesis of 3aa and 3na



1a: 1 g **2a** (1.2 equiv) **3aa:** 1.19 g, 90%, 98% ee

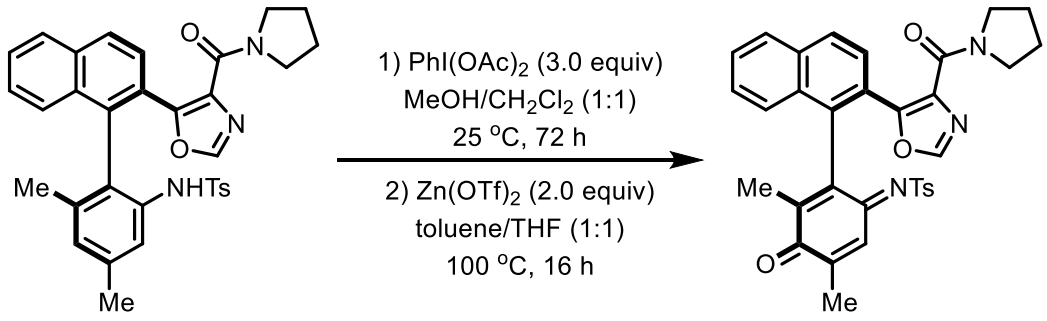
To a 100 mL round-bottom flask charged with **C7** (111.1 mg, 0.234 mmol) and Ag_2CO_3 (32.3 mg, 0.117 mmol) was added anhydrous THF (23.5 mL). Then biaryl lactam **1a** (1.0 g, 2.34 mmol) and α-isocyanoacetamide **2a** (387.8 mg, 2.81 mmol) were added successively. The reaction mixture was stirred at 25 °C for 16 hours, filtered, then the filtrate was concentrated and purified by flash chromatography (PE/EtOAc 3:2) to afford 1.19 g of **3aa**.



1n: 267 mg **2a** (1.2 equiv) **3na:** 349 mg, >99%, >99% ee

To a 25 mL round-bottom flask charged with **C7** (28.5 mg, 0.06 mmol) and Ag_2CO_3 (8.3 mg, 0.03 mmol) was added anhydrous THF (6.0 mL). Then biaryl lactam **1n** (267.0 mg, 0.6 mmol) and α-isocyanoacetamide **2a** (99.5 mg, 0.72 mmol) were added successively. The reaction mixture was stirred at 25 °C for 60 hours, filtered, then the filtrate was concentrated and purified by flash chromatography (PE/EtOAc 3:2) to afford 349 mg of **3na**.

X. Synthetic transformations

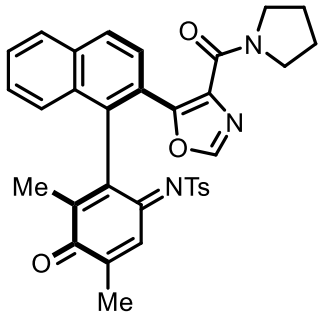


3aa: 98% ee

4: 93%, 98% ee

3aa (452.6 mg, 0.8 mmol, 98% ee) was added to the mixture of $PhI(OAc)_2$ (773.0 mg, 2.4 mmol) in MeOH (10.0 mL) and CH_2Cl_2 (10.0 mL) at 0 °C. The reaction mixture was stirred for 5 min at 0 °C and another 72 hours at 25 °C, then concentrated and purified by flash chromatography (PE/EtOAc 1:1) to afford 475.6 mg of pale yellow solid. $Zn(OTf)_2$ (581.6 mg, 1.6 mmol) was added to the mixture of the above solid in toluene (10.0 mL) and THF (10.0 mL) at 25 °C. The reaction mixture was stirred at 100 °C for 16 h, then concentrated and purified by flash chromatography (EtOAc) to afford 431.8 mg of **4**.

(*E*)-*N*-(3,5-dimethyl-4-oxo-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthale -n-1-yl)cyclohexa-2,5-dien-1-ylidene)-4-methylbenzenesulfonamide (4)

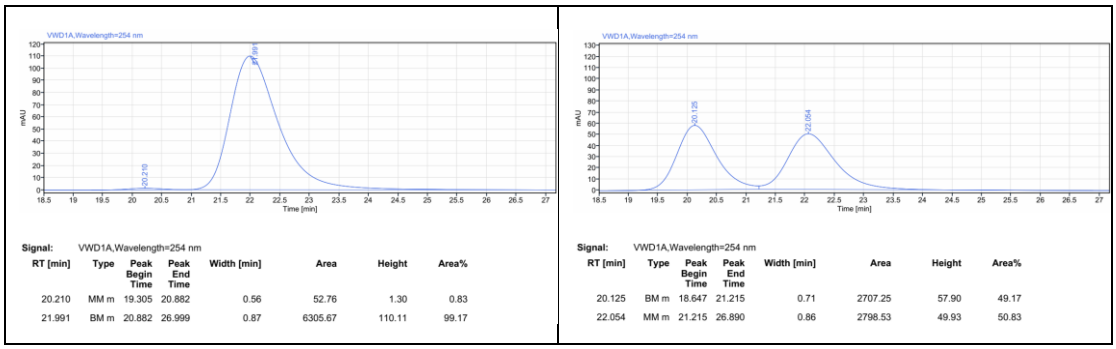


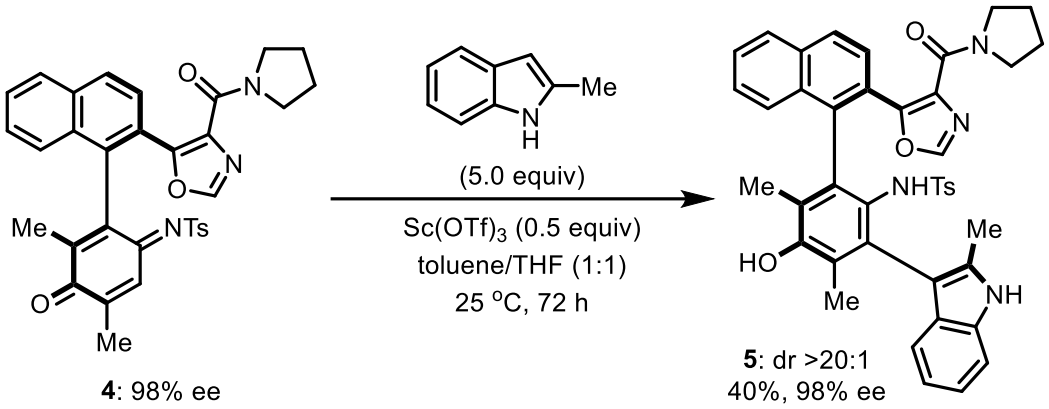
4

Reddish brown solid, 93% yield. **MP**: 205-206 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.01 (q, *J* = 1.5 Hz, 1H), 7.94-7.78 (m, 3H), 7.73 (s, 1H), 7.54-7.45 (m, 2H), 7.40 (ddd, *J* = 8.0, 6.7, 1.3 Hz, 1H), 7.24-7.17 (m, 2H), 7.04-6.92 (m, 2H), 3.70-3.57 (m, 1H), 3.55-3.35 (m, 3H), 2.26 (s, 3H), 2.20 (d, *J* = 1.6 Hz, 3H), 1.83-1.75 (m, 4H), 1.73 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 186.2, 164.5, 160.8, 151.2, 149.2, 145.0, 144.8, 144.1, 143.6, 137.7, 133.6, 132.7, 131.7, 130.8, 129.2, 128.8, 128.5, 127.5, 127.3, 127.1, 126.9,

126.6, 125.5, 125.0, 48.3, 46.4, 26.3, 24.0, 21.5, 16.9, 14.5; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{33}H_{29}N_3NaO_5S$ 602.1720; Found 602.1717.

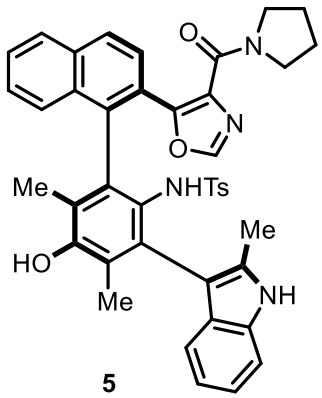
Optical Rotation: $[\alpha]^{20}_D$ = -37.6 (c = 0.15, CH_2Cl_2). The absolute configuration of **4** was assigned by analogy to **3ma** and **3ah**. 98% ee (HPLC condition: Chiralpak IA column, *n*-hexane/*i*-PrOH = 80:20, flow rate = 0.8 ml/min, wavelength = 254 nm, t_R = 20.2 min for minor isomer, t_R = 22.0 min for major isomer).





A solution of **4** (115.9 mg, 0.2 mmol, 98% ee), 2-methylindole (131.2 mg, 1.0 mmol) and $Sc(OTf)_3$ (49.2 mg, 0.1 mmol) in toluene (2.5 mL) and THF (2.5 mL) was stirred at 25 °C for 72 hours. Then the reaction mixture was concentrated and purified by flash chromatography (PE/EtOAc 1:2) to afford 56.9 mg of **5**.

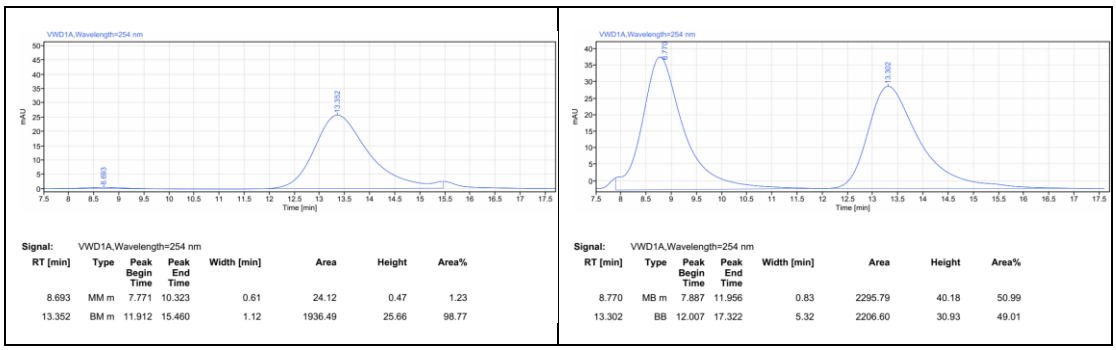
(*R*)-*N*-(4-hydroxy-3,5-dimethyl-2-(2-methyl-1*H*-indol-3-yl)-6-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)-4-methylbenzenesulfonamide (5)

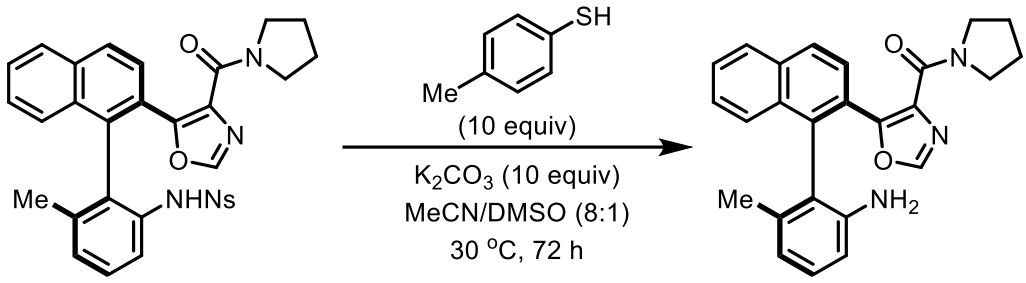


5

White solid, 40% yield. **MP**: 304-307 °C; **^{1}H NMR** (400 MHz, DMSO-d_6): δ 10.24 (s, 1H), 8.34 (s, 1H), 8.33 (s, 1H), 8.26 (s, 1H), 7.94-7.84 (m, 2H), 7.56-7.42 (m, 4H), 7.08-6.99 (m, 2H), 6.95-6.85 (m, 2H), 6.56-6.43 (m, 4H), 4.01-3.91 (m, 1H), 3.68-3.42 (m, 3H), 2.18 (s, 3H), 2.02-1.87 (m, 4H), 1.84 (s, 3H), 1.83 (s, 3H), 1.55 (s, 3H); **^{13}C NMR** (101 MHz, DMSO-d_6): δ 161.1, 153.2, 151.4, 150.7, 140.0, 139.6, 137.9, 135.3, 134.5, 133.6, 133.2, 132.1, 131.9, 131.7, 128.6, 127.8, 127.6, 127.2, 127.1, 127.0, 126.9, 126.4, 125.6, 124.9, 123.4, 123.2, 119.2, 118.0, 110.3, 109.9, 107.0, 105.8, 48.1, 46.5, 25.9, 23.5, 21.0, 14.9, 14.5, 11.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{42}H_{38}N_4NaO_5S$ 733.2455; Found 733.2457.

Optical Rotation: $[\alpha]^{20}_D$ = +7.2 (c = 0.125, CH_2Cl_2). 98% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 70:30, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 8.7 min for minor isomer, t_R = 13.4 min for major isomer).



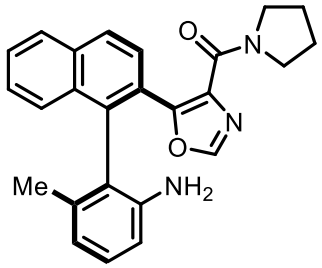


3na: >99% ee

6: 95%, 96% ee

To a mixture of **3na** (291.3 mg, 0.5 mmol, >99% ee), K_2CO_3 (691.0 mg, 5.0 mmol) and *p*-toluenethiol (621.0 mg, 5.0 mmol) in acetonitrile (8 mL) was added DMSO (1 mL) at 25 °C under N_2 atmosphere. Then the reaction mixture was stirred at 30 °C for 72 hours. Upon completion, the reaction was quenched with water, and extracted with dichloromethane. The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4, concentrated and purified by flash chromatography (PE/CH_2Cl_2 3:1) to afford 188.8 mg of **6**.

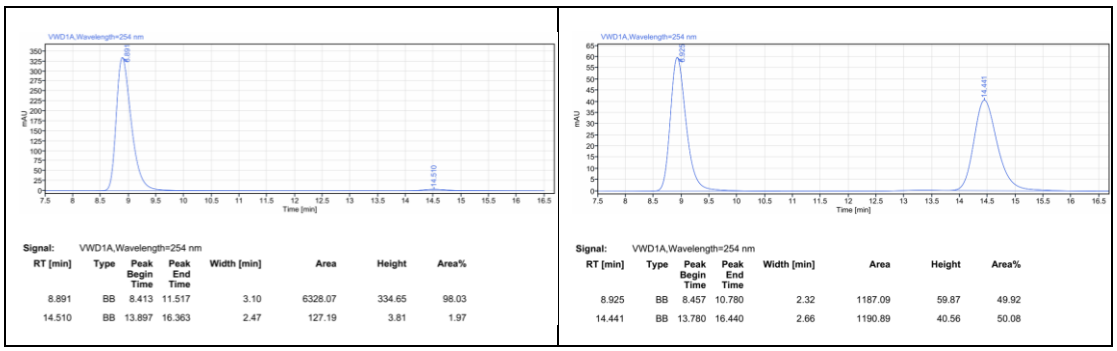
(*R*)-(5-(1-(2-amino-6-methylphenyl)naphthalen-2-yl)oxazol-4-yl)(pyrrolidin-1-yl)methanone (6)



6

White solid, 95% yield. **MP**: 171-172 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.95 (d, *J* = 8.5 Hz, 1H), 7.91 (d, *J* = 8.1 Hz, 1H), 7.77-7.63 (m, 2H), 7.54 (ddd, *J* = 8.1, 6.6, 1.5 Hz, 1H), 7.49-7.36 (m, 2H), 7.05 (t, *J* = 7.7 Hz, 1H), 6.64 (d, *J* = 7.5 Hz, 1H), 6.55 (d, *J* = 8.0 Hz, 1H), 3.66-3.42 (m, 4H), 1.92-1.84 (m, 4H), 1.82 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.2, 152.9, 148.8, 145.2, 138.3, 136.5, 134.5, 132.4, 131.8, 128.5, 128.4, 128.2, 127.7, 127.4, 127.1, 126.3, 125.9, 123.2, 119.8, 113.2, 48.2, 46.4, 26.3, 24.1, 20.3; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{25}H_{23}N_3NaO_2$ 420.1682; Found 420.1685.

Optical Rotation: $[\alpha]^{20}_D$ = +36.3 (c = 0.125, CH_2Cl_2). The absolute configuration of **6** was assigned by analogy to **3ma** and **3ah**. 96% ee (HPLC condition: Chiralpak IB N-5 column, *n*-hexane/*i*-PrOH = 70:30, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 8.9 min for major isomer, t_R = 14.5 min for minor isomer).

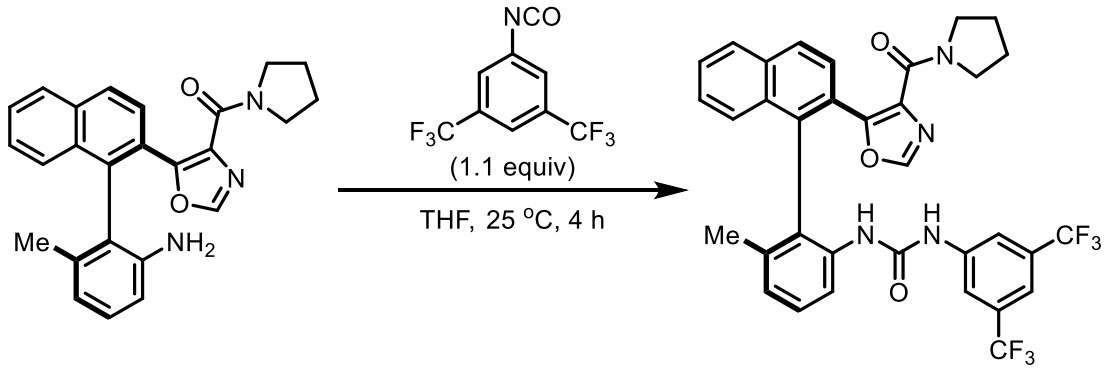


Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.891	BB	8.413	11.517	3.10	6328.07	334.65	98.03
14.510	BB	13.897	16.363	2.47	127.19	3.81	1.97

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
8.925	BB	8.457	10.780	2.32	1187.09	59.87	49.92
14.441	BB	13.780	16.440	2.66	1190.89	40.56	50.08

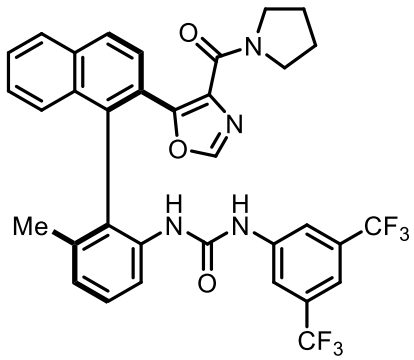


6: 96% ee

7: 90%, 96% ee

In a flame-dried Schlenk tube, 3,5-bis(trifluoromethyl)phenyl isocyanate (14.0 mg, 0.055 mmol) and **6** (19.9 mg, 0.05 mmol, 96% ee) were dissolved in dry THF (1 mL). The mixture was stirred at 25 °C for 4 hours, concentrated and purified by flash chromatography (PE/EtOAc 5:1) to afford 29.4 mg of **7**.

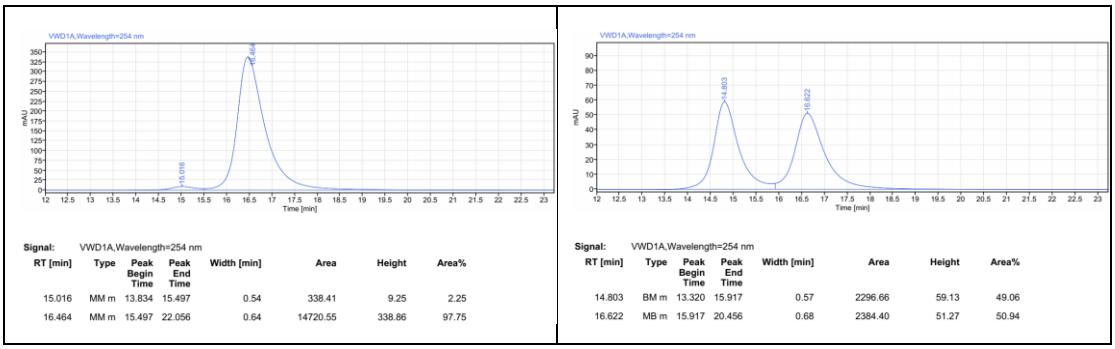
(*R*)-1-(3,5-bis(trifluoromethyl)phenyl)-3-(3-methyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)urea (7)

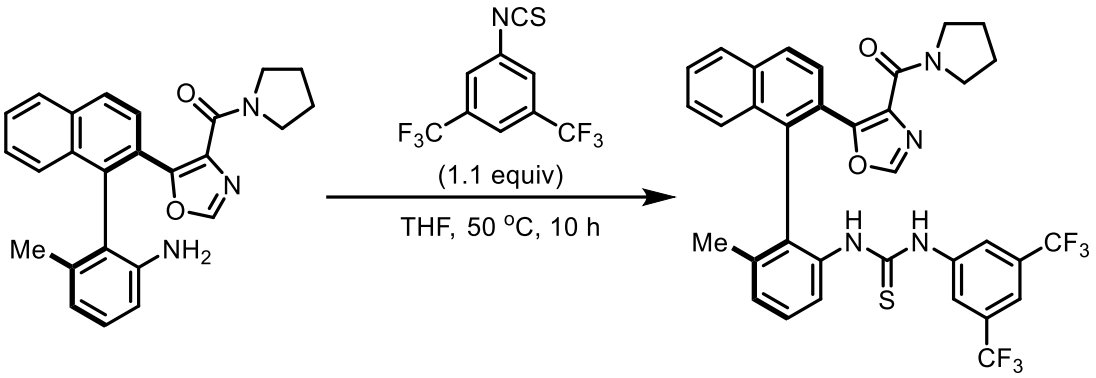


7

White solid, 90% yield. **MP**: 153-155 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.37 (s, 1H), 8.02 (d, *J* = 8.4 Hz, 1H), 7.96-7.88 (m, 2H), 7.87-7.83 (m, 2H), 7.65 (s, 1H), 7.63 (s, 1H), 7.60-7.55 (m, 1H), 7.49 (d, *J* = 8.5 Hz, 1H), 7.46-7.33 (m, 3H), 7.31-7.25 (m, 1H), 7.05-6.99 (m, 1H), 4.28-4.17 (m, 1H), 3.88-3.76 (m, 2H), 3.53-3.43 (m, 1H), 2.12-1.86 (m, 7H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 161.9, 155.2, 152.3, 149.3, 141.3, 138.6, 136.5, 136.3, 134.6, 132.2, 132.0, 131.9 (q, *J* = 33.0 Hz), 129.2, 128.8, 128.4, 128.0, 127.8, 127.1, 126.5, 126.3, 125.3, 124.3, 123.5 (q, *J* = 272.6 Hz), 117.8, 117.6 (m), 114.8 (m), 49.2, 47.3, 26.6, 23.8, 20.6; **^{19}F NMR** (376 MHz, $CDCl_3$): δ -63.0; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{34}H_{26}F_6N_4NaO_3$ 675.1801; Found 675.1803.

Optical Rotation: $[\alpha]^{20}_D$ = -63.8 (c = 0.25, CH_2Cl_2). The absolute configuration of **7** was assigned by analogy to **3ma** and **3ah**. 96% ee (HPLC condition: Chiralpak IA column, *n*-hexane/*i*-PrOH = 99:1, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 15.0 min for minor isomer, t_R = 16.5 min for major isomer).



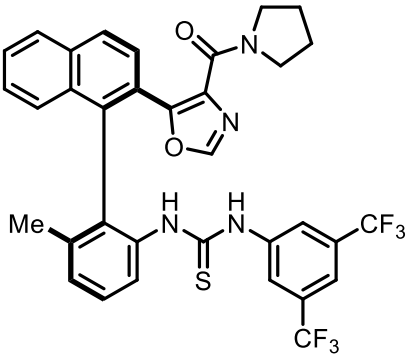


6: 96% ee

8: 98%, 97% ee

In a flame-dried Schlenk tube, 1-isothiocyanato-3,5-bis(trifluoromethyl)benzene (14.9 mg, 0.055 mmol) and **6** (19.9 mg, 0.05 mmol, 96% ee) were dissolved in dry THF (1 mL). The mixture was stirred at 50 °C for 10 hours, concentrated and purified by flash chromatography (PE/EtOAc 5:1) to afford 32.8 mg of **8**.

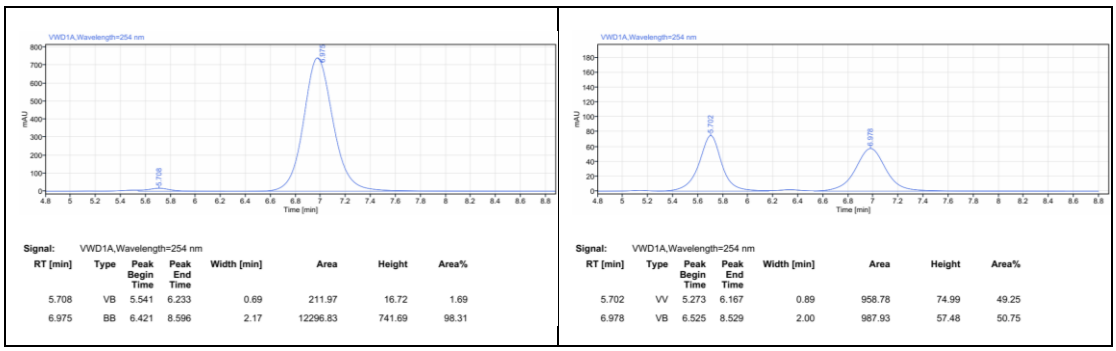
(*R*)-1-(3,5-bis(trifluoromethyl)phenyl)-3-(3-methyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)thiourea (8)



8

White solid, 98% yield. **MP**: 139-140 °C; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 9.22 (s, 1H), 9.09 (s, 1H), 8.11 (d, *J* = 1.7 Hz, 2H), 8.02-7.84 (m, 3H), 7.66 (s, 1H), 7.61-7.50 (m, 2H), 7.49-7.40 (m, 3H), 7.32 (t, *J* = 7.9 Hz, 1H), 7.15 (d, *J* = 7.6 Hz, 1H), 4.20-4.05 (m, 1H), 3.90-3.76 (m, 1H), 3.75-3.61 (m, 1H), 3.56-3.40 (m, 1H), 2.17-1.90 (m, 7H); **^{13}C NMR** (101 MHz, $CDCl_3$): δ 179.2, 161.8, 155.0, 149.4, 141.1, 138.8, 136.9, 136.7, 134.5, 132.3, 131.9, 131.4 (q, *J* = 33.3 Hz), 131.2, 129.1, 128.2, 128.1, 128.0, 127.9, 126.8, 126.7, 126.6, 123.9, 123.4 (q, *J* = 270.1 Hz), 122.0 (m), 117.1 (m), 49.1, 47.2, 26.5, 23.9, 20.4; **^{19}F NMR** (376 MHz, $CDCl_3$): δ -62.9; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{34}H_{26}F_6N_4NaO_2S$ 691.1573; Found 691.1576.

Optical Rotation: $[\alpha]^{20}_D$ = -97.3 (c = 0.4, CH_2Cl_2). The absolute configuration of **8** was assigned by analogy to **3ma** and **3ah**. 97% ee (HPLC condition: Chiralpak IA column, *n*-hexane/*i*-PrOH = 90:10, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 5.7 min for minor isomer, t_R = 7.0 min for major isomer).

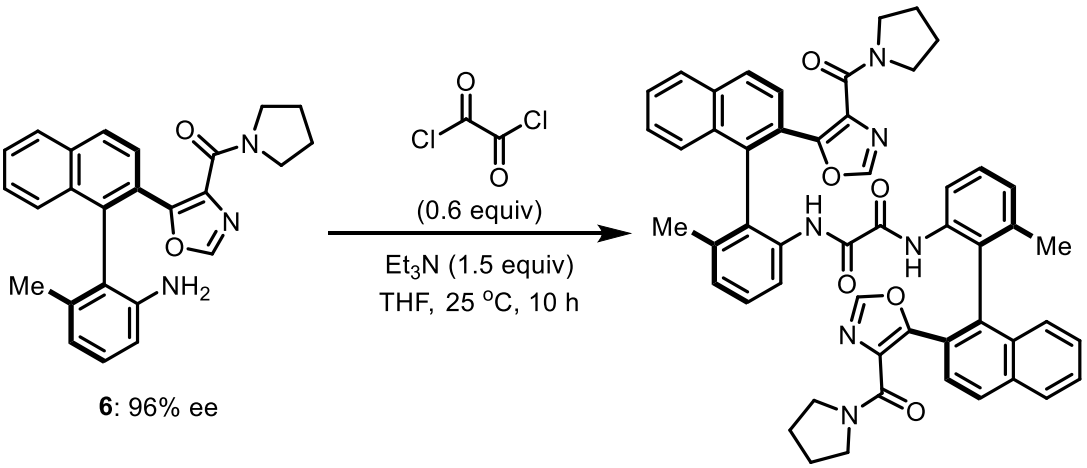


Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
5.708	VB	5.541	6.233	0.69	211.97	16.72	1.69
6.975	BB	6.421	8.596	2.17	12296.83	741.69	98.31

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
5.702	VV	5.273	6.167	0.89	958.78	74.99	49.25
6.978	VB	6.525	8.529	2.00	987.93	57.48	50.75

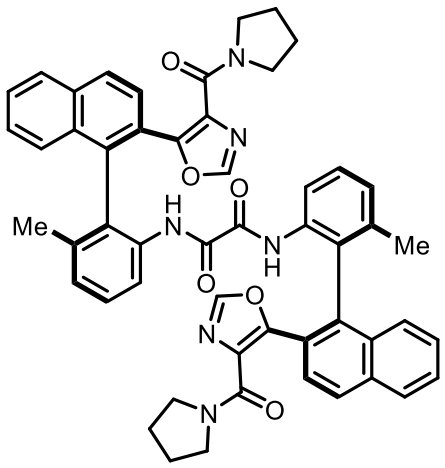


6: 96% ee

9: dr >20:1
60%, 98% ee

In a flame-dried Schlenk tube, **6** (39.7 mg, 0.10 mmol) was dissolved in dry THF (1 mL) under N_2 atmosphere, then Et_3N (15.2 mg, 0.15 mmol), and oxalyl chloride (7.6 mg, 0.06 mmol) were added at 0 °C. The reaction mixture was stirred at 25 °C for 10 hours, concentrated and purified by flash chromatography (PE/EtOAc 1:2) to afford 25.5 mg of **9**.

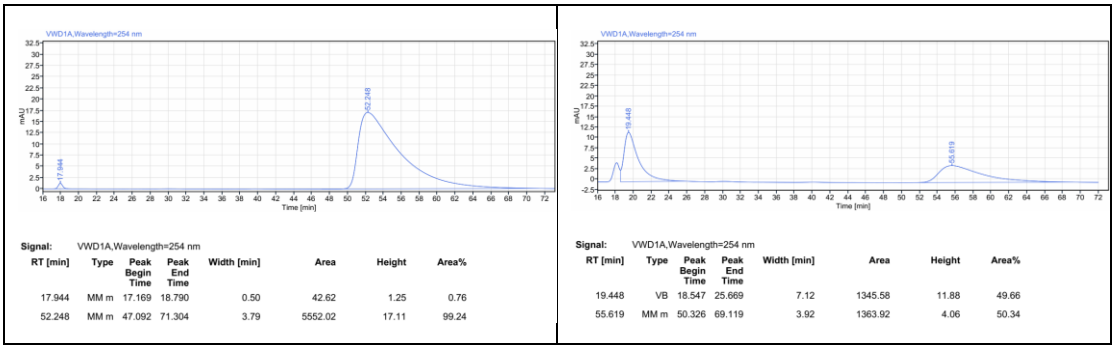
N^1-(3-methyl-2-((*R*)-2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)ph-enyl)-N^2-((*R*)-3-methyl-2-(2-(4-(pyrrolidine-1-carbonyl)oxazol-5-yl)naphthalen-1-yl)phenyl)oxalamide (9)



9

White wax, 60% yield. **^{1}H NMR** (400 MHz, DMSO-d_6): δ 8.73 (s, 2H), 8.41 (s, 2H), 8.19 (d, *J* = 8.6 Hz, 2H), 8.09 (d, *J* = 8.2 Hz, 2H), 7.79 (d, *J* = 8.6 Hz, 2H), 7.73-7.54 (m, 4H), 7.30 (t, *J* = 7.9 Hz, 2H), 7.22-7.16 (m, 2H), 7.09 (d, *J* = 7.6 Hz, 2H), 6.92 (d, *J* = 8.5 Hz, 2H), 3.33-3.25 (m, 2H), 3.23-3.15 (m, 4H), 2.86-2.76 (m, 2H), 1.75-1.60 (m, 14H); **^{13}C NMR** (101 MHz, DMSO-d_6): δ 160.2, 156.5, 150.8, 149.9, 137.4, 134.8, 133.5, 132.9, 132.2, 130.6, 129.1, 128.8, 128.5, 128.4, 127.5, 127.4, 127.2, 126.8, 126.1, 124.9, 119.2, 47.3, 45.6, 25.3, 23.5, 19.5; **HRMS** (ESI-TOF) m/z: $[M+Na]^+$ Calcd for $C_{52}H_{44}N_6NaO_6$ 871.3215; Found 871.3217.

Optical Rotation: $[\alpha]^{20}_D$ = -102.5 (c = 0.4, CH_2Cl_2). The absolute configuration of **9** was assigned by analogy to **3ma** and **3ah**. 98% ee (HPLC condition: Chiralpak IA column, *n*-hexane/*i*-PrOH = 70:30, flow rate = 1 ml/min, wavelength = 254 nm, t_R = 17.9 min for minor isomer, t_R = 52.2 min for major isomer).



Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
17.944	MM m	17.169	18.790	0.50	42.62	1.25	0.76
52.248	MM m	47.092	71.304	3.79	5552.02	17.11	99.24

Signal: VWD1A,Wavelength=254 nm

RT [min]	Type	Peak Begin Time	Peak End Time	Width [min]	Area	Height	Area%
19.448	VB	18.547	25.669	7.12	1345.58	11.88	49.66
55.619	MM m	50.326	69.119	3.92	1363.92	4.06	50.34

XI. Proposed activation mode

Based on our experimental results, a plausible activation mode is proposed (Figure S2). The squaramide moiety of **C7** serves as hydrogen-bond donors to activate the amide carbonyl, making it more electrophilic. Meanwhile, the coordination of silver to the isocyanide facilitates the deprotonation of its α-C-H by the quinuclidine nitrogen of **C7**, generating the nucleophilic enolate. The additional coordination of silver to the amide carbonyl as well as the hydrogen-bonding interaction between **C7** and the sulfonamide moiety are crucial, which helps to further define the stereochemical environment of the transition structure.

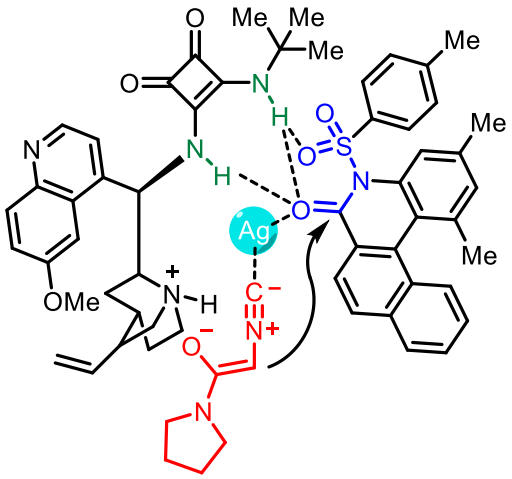


Figure S2. Proposed activation mode

XII. Crystal structure data of 3ma, 3ah and 5

The absolute configuration of **3ma** (***R***) was assigned by X-ray crystallographic analysis of a single crystal of **3ma** (Figure S3). The crystal was prepared from the solution of **3ma** in hexanes/MTBE/THF (10:1:1) at 4 °C.

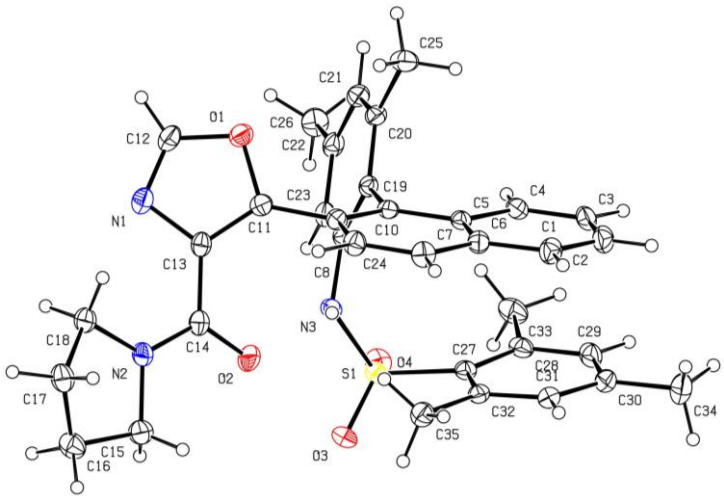


Figure S3. X-ray structure of **3ma** (ellipsoid contour at 30% probability)

Table S3. Crystal data and structure refinement for mo_210616_WT_MTS_PRO_0m

Identification code	mo_210616_WT_MTS_PRO_0m
Empirical formula	$C_{35}H_{35}N_3O_4S$
Formula weight	593.72
Temperature/K	170.0
Crystal system	orthorhombic
Space group	$P2_12_12_1$
a/Å	9.723(5)
b/Å	17.085(16)
c/Å	18.323(11)
α/°	90
β/°	90
γ/°	90
Volume/Å^3	3044(4)
Z	4
ρ_{calc}g/cm^3	1.296
μ/mm^{-1}	0.150
F(000)	1256.0
Crystal size/mm^3	0.32 × 0.23 × 0.2
Radiation	MoKα (λ = 0.71073)

2θ range for data collection/°	4.446 to 54.526
Index ranges	-12 ≤ h ≤ 12, -21 ≤ k ≤ 21, -22 ≤ l ≤ 23
Reflections collected	33500
Independent reflections	6635 [R_{int} = 0.0703, R_{sigma} = 0.0544]
Data/restraints/parameters	6635/0/393
Goodness-of-fit on F^2	1.028
Final R indexes [I>=2σ (I)]	R_1 = 0.0434, wR_2 = 0.1000
Final R indexes [all data]	R_1 = 0.0517, wR_2 = 0.1058
Largest diff. peak/hole / e $Å^{-3}$	0.29/-0.31
Flack parameter	0.09(4)

The absolute configuration of **3ah** (***R***) was assigned by X-ray crystallographic analysis of a single crystal of **3ah** (Figure S4). The crystal was prepared from the solution of **3ah** in hexanes at ambient temperature.

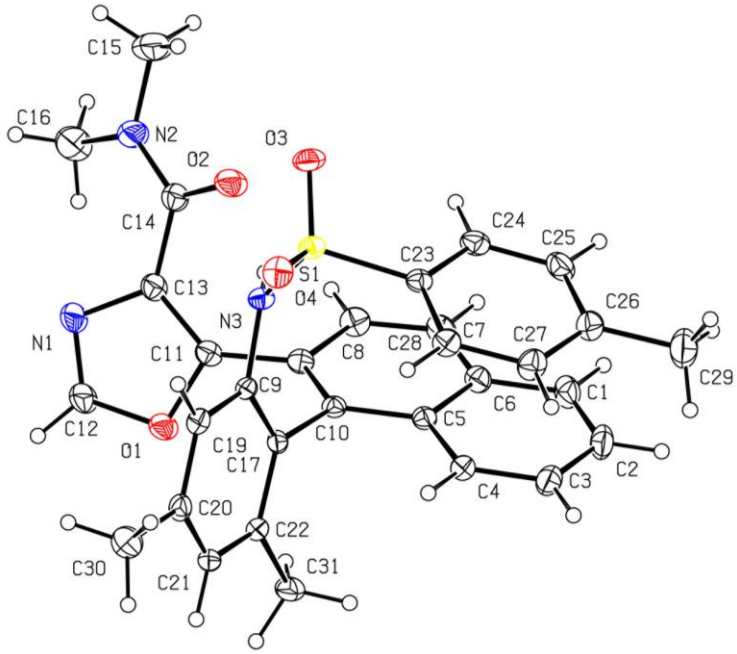


Figure S4. X-ray structure of **3ah** (ellipsoid contour at 30% probability)

Table S4. Crystal data and structure refinement for 210824_TLF_1

Identification code	210824_TLF_1
Empirical formula	$C_{31}H_{29}N_3O_4S$
Formula weight	539.63

Temperature/K	170.0
Crystal system	orthorhombic
Space group	$P2_12_12$
a/Å	9.5543(5)
b/Å	30.4522(16)
c/Å	9.4819(4)
α/°	90
β/°	90
γ/°	90
Volume/Å^3	2758.8(2)
Z	4
ρ_{calc}g/cm^3	1.299
μ/mm^{-1}	0.159
F(000)	1136.0
Crystal size/mm^3	0.49 × 0.32 × 0.09
Radiation	MoKα (λ = 0.71073)
2θ range for data collection/°	4.296 to 54.29
Index ranges	$-12 \leq h \leq 12$, $-39 \leq k \leq 39$, $-10 \leq l \leq 12$
Reflections collected	42157
Independent reflections	6095 [R_{int} = 0.0550, R_{sigma} = 0.0330]
Data/restraints/parameters	6095/1/360
Goodness-of-fit on F^2	1.069
Final R indexes [I>=2σ (I)]	R_1 = 0.0335, wR_2 = 0.0775
Final R indexes [all data]	R_1 = 0.0381, wR_2 = 0.0802
Largest diff. peak/hole / e Å^{-3}	0.19/-0.27
Flack parameter	0.02(3)

The absolute configuration of **5** (***S*** for the newly formed C-C axis) was assigned by X-ray crystallographic analysis of a single crystal of **5** (Figure S5). The crystal was prepared from the solution of **5** in EtOAc at ambient temperature.

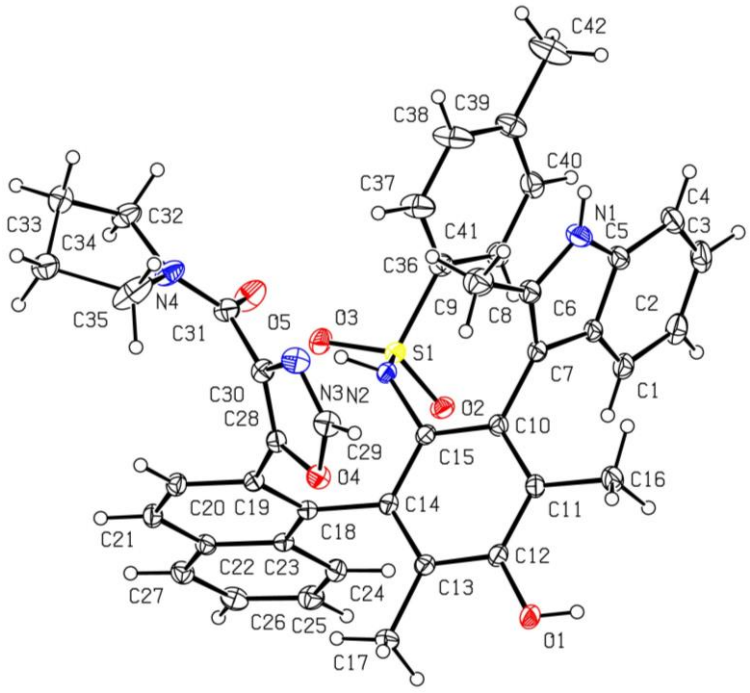


Figure S5. X-ray structure of **5** (ellipsoid contour at 30% probability)

Table S5. Crystal data and structure refinement for mo_220307_WWT_DA_0m

Identification code	mo_220307_WWT_DA_0m
Empirical formula	$C_{42}H_{38}N_4O_5S$
Formula weight	710.82
Temperature/K	170.0
Crystal system	orthorhombic
Space group	$P2_12_12_1$
a/Å	11.8054(16)
b/Å	17.024(2)
c/Å	17.981(2)
α/°	90
β/°	90
γ/°	90
Volume/Å^3	3613.7(8)
Z	4
ρ_{calc}g/cm^3	1.307
μ/mm^{-1}	0.142

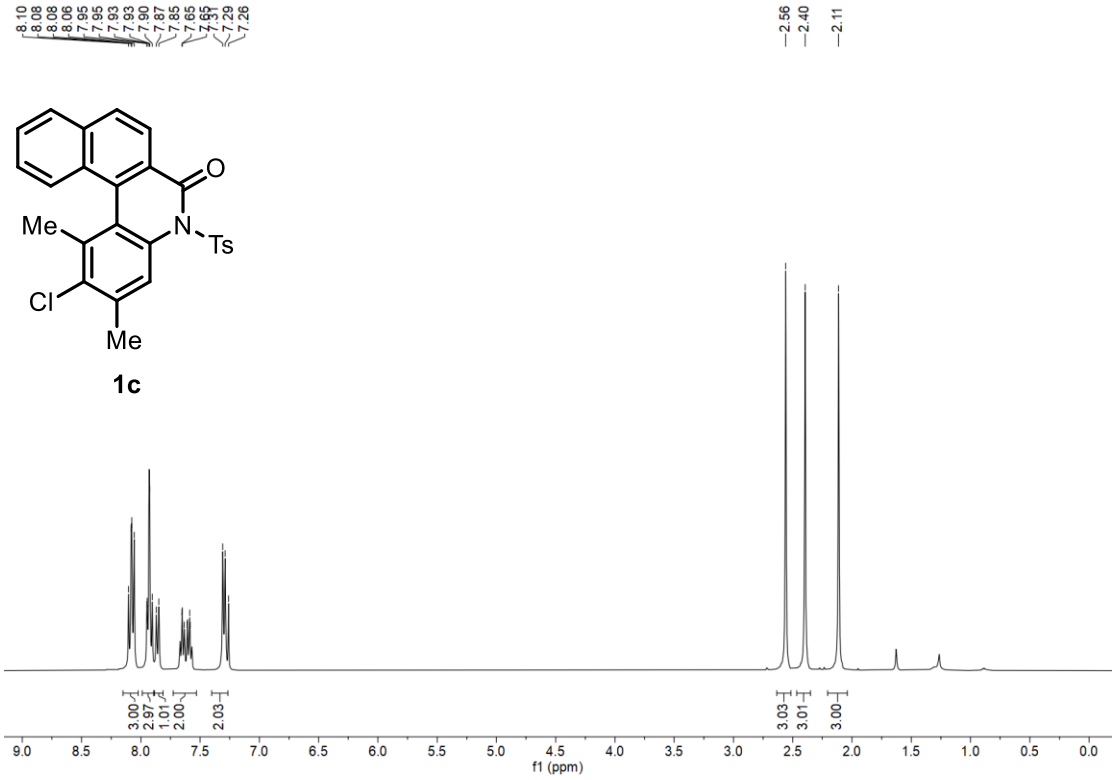
F(000)	1496.0
Crystal size/mm^3	0.42 × 0.2 × 0.16
Radiation	MoKα (λ = 0.71073)
2θ range for data collection/°	4.128 to 54.326
Index ranges	-15 ≤ h ≤ 15, -21 ≤ k ≤ 21, -23 ≤ l ≤ 23
Reflections collected	56636
Independent reflections	7993 [R_{int} = 0.0829, R_{sigma} = 0.0514]
Data/restraints/parameters	7993/1/487
Goodness-of-fit on F^2	1.040
Final R indexes [I>=2σ (I)]	R_1 = 0.0426, wR_2 = 0.1002
Final R indexes [all data]	R_1 = 0.0513, wR_2 = 0.1065
Largest diff. peak/hole / e Å^{-3}	0.26/-0.43
Flack parameter	0.01(3)

XIII. References

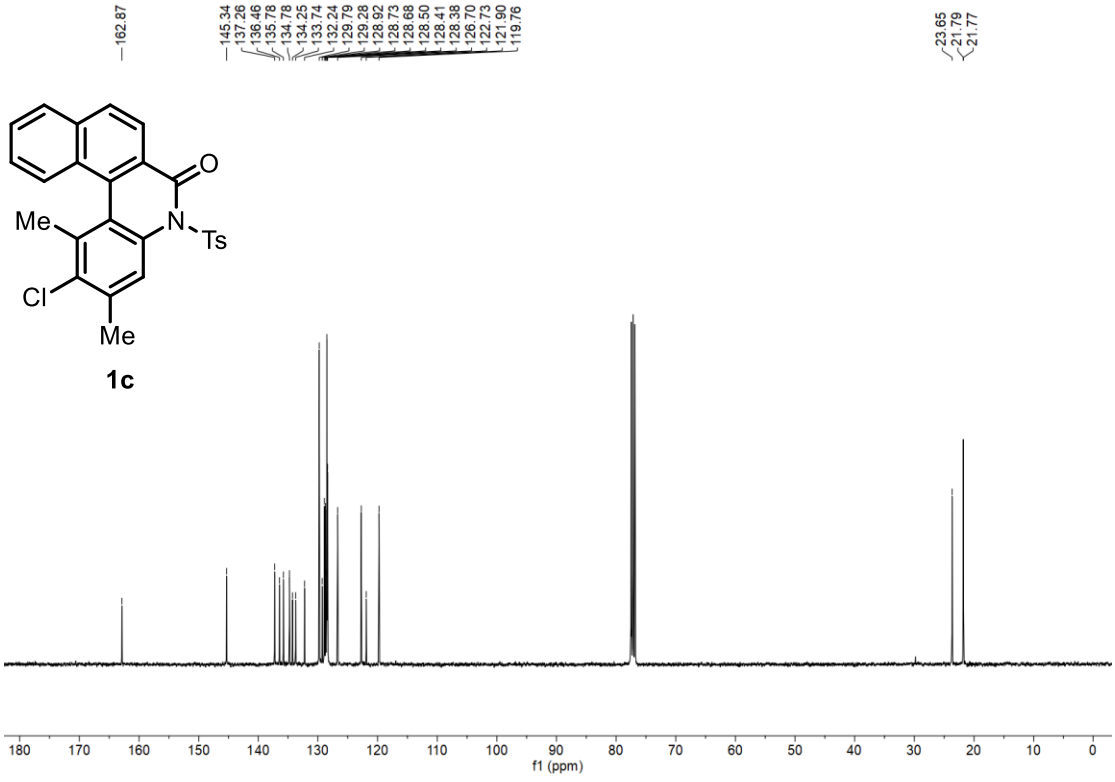
1. (a) Okino, T.; Hoashi, Y.; Furukawa, T.; Xu, X.; Takemoto, Y. *J. Am. Chem. Soc.* **2005**, *127*, 119-125. (b) Greenaway, K.; Dambruoso, P.; Ferrali, A.; Hazelwood, A. J.; Sladojevich, F.; Dixon, D. J. *Synthesis*, **2011**, 1880-1886. (c) Vakulya, B.; Varga, S.; Csámpai, A.; Soós, T. *Org. Lett.* **2005**, *7*, 1967-1969. (d) Yang,W.; Du, D.-M. *Org. Lett.* **2010**, *12*, 5450-5453. (e) Manoni, F.; Connon, S. J. *Angew. Chem. Int. Ed.* **2014**, *53*, 2628-2632.
2. (a) Wang, G.; Shi, Q.; Hu, W.; Chen, T.; Guo, Y.; Hu, Z.; Gong, M.; Guo, J.; Wei, D.; Fu, Z.; Huang, W. *Nat. Commun.* **2020**, *11*, 946. (b) Rajeshkumar, V.; Lee, T.-H.; Chuang, S.-C. *Org. Lett.* **2013**, *15*, 1468-1471.
3. Housseman, C.; Zhu, J. *Synlett* **2006**, 1777-1779.

XIV. NMR spectra of the products

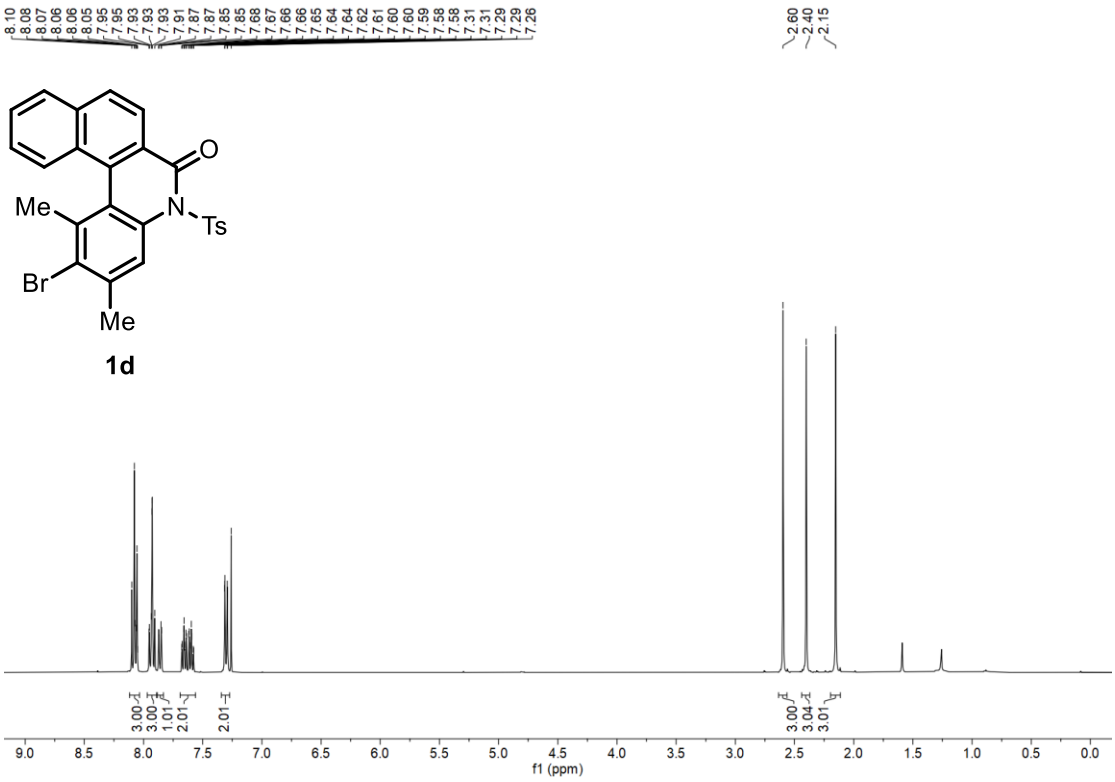
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

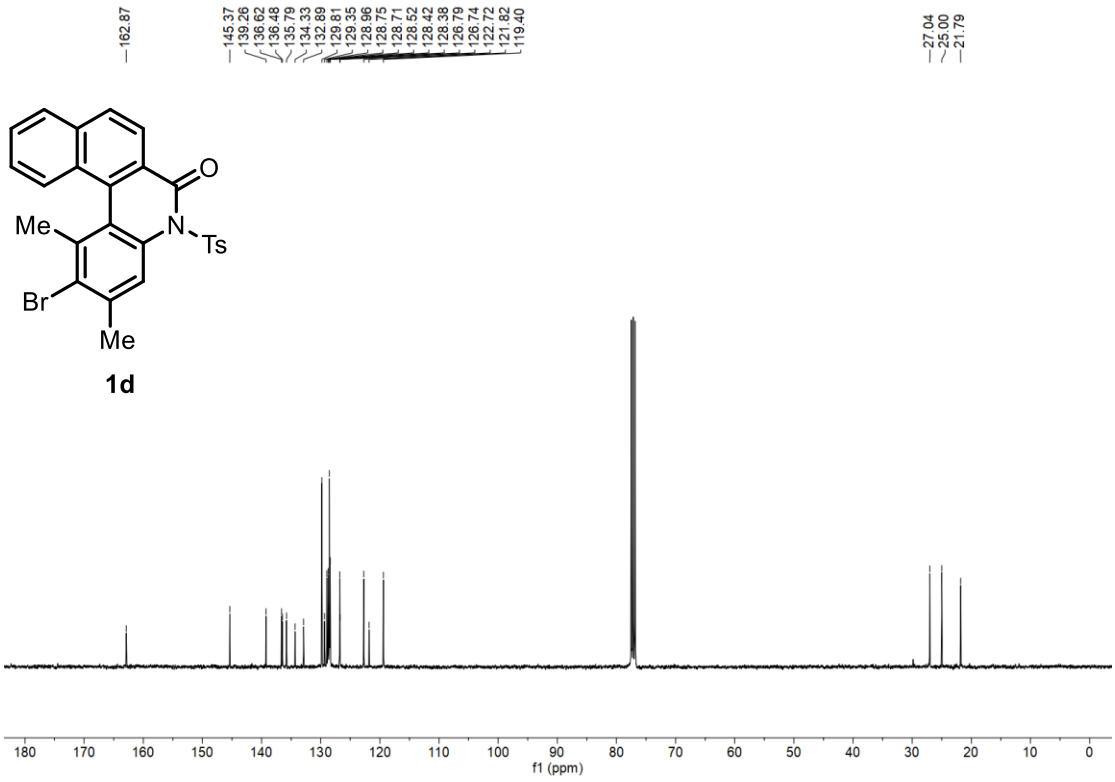


^{1}H NMR (400 MHz, $CDCl_3$)



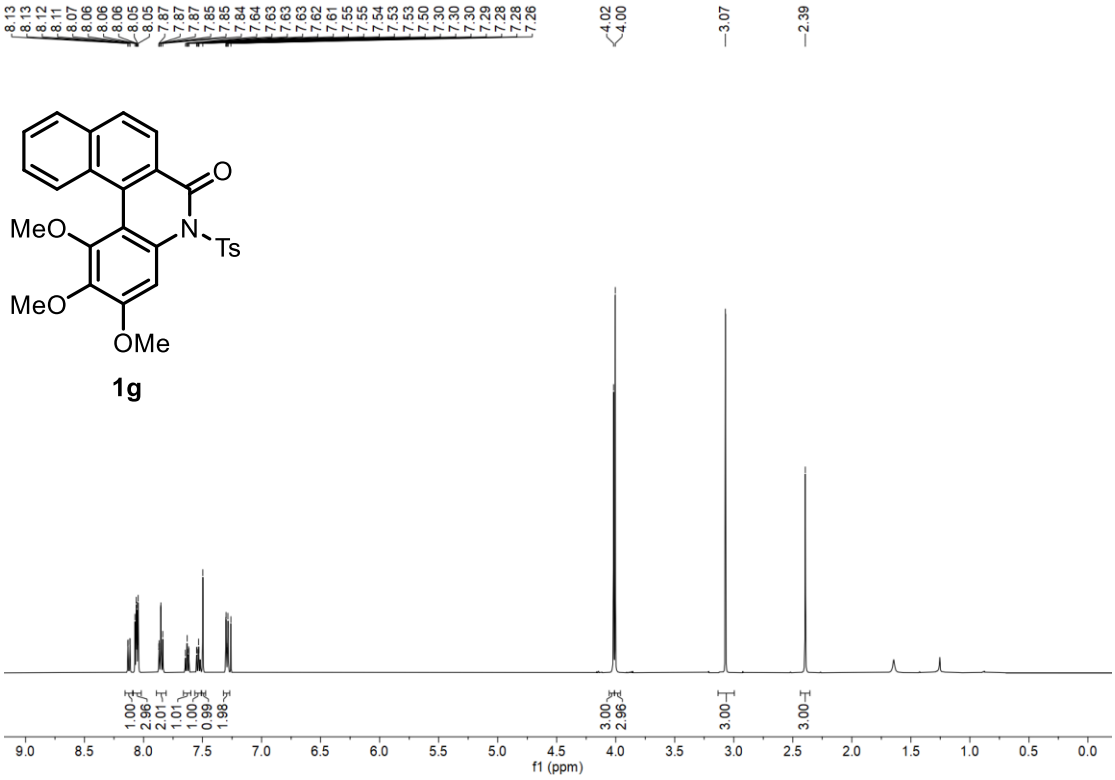
1d

^{13}C NMR (101 MHz, $CDCl_3$)

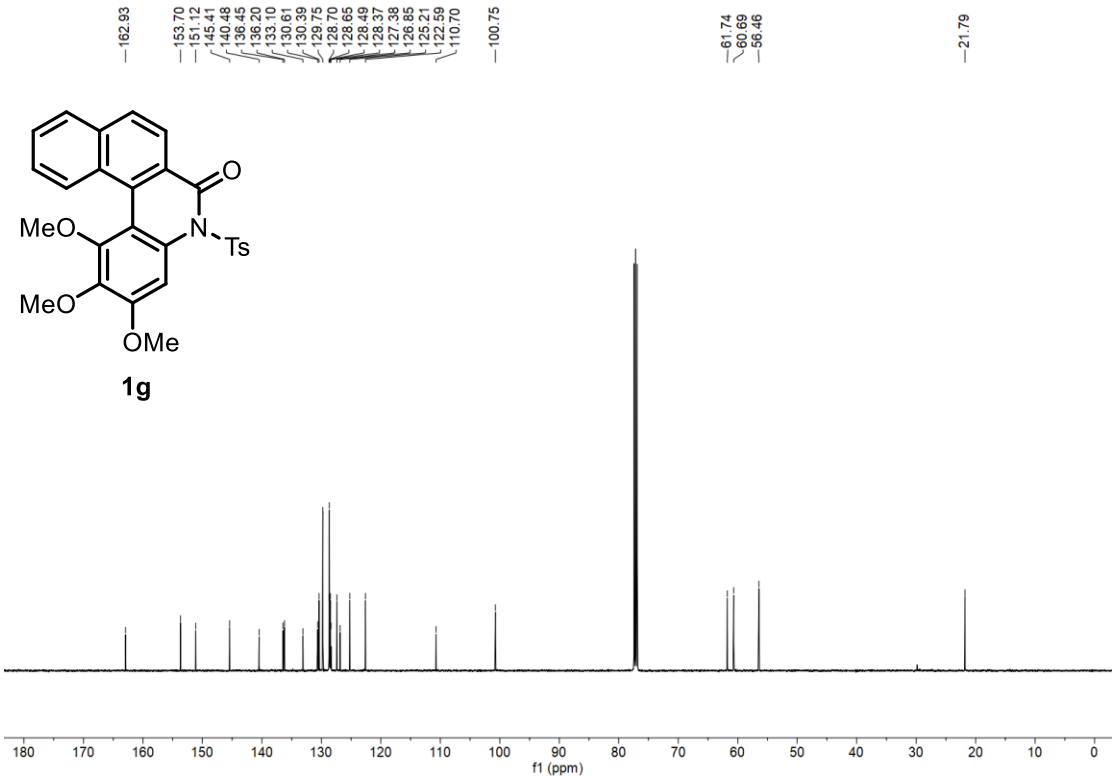


1d

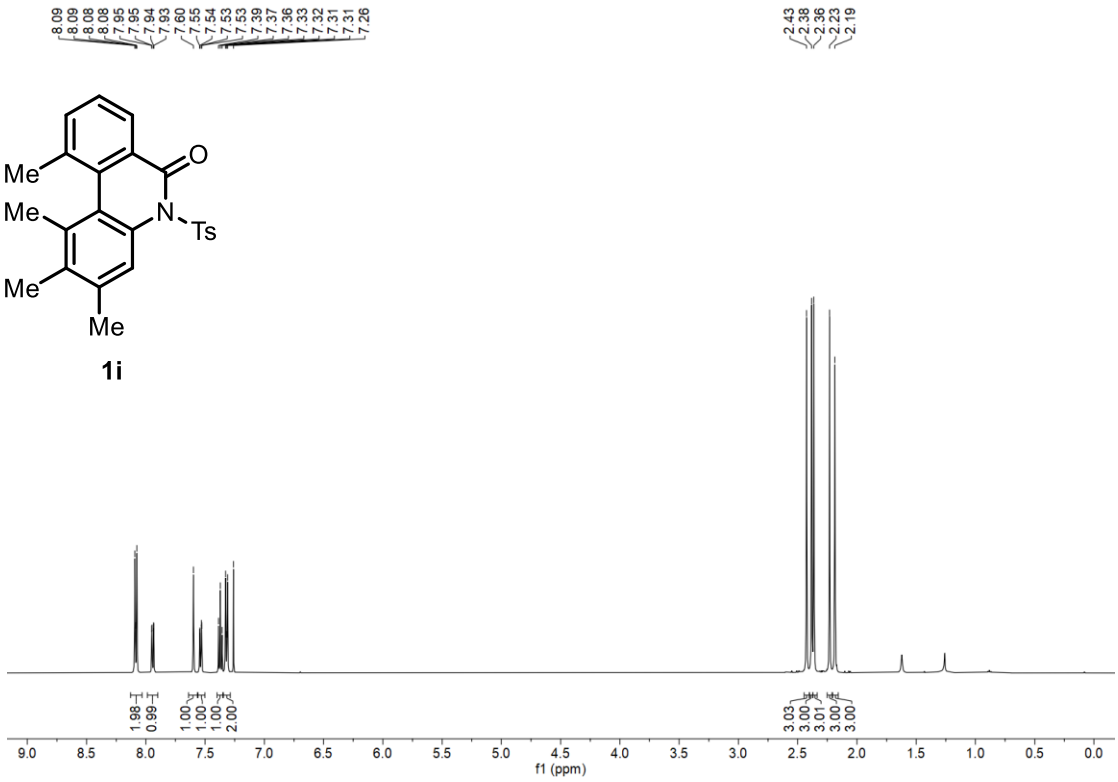
^{1}H NMR (500 MHz, $CDCl_3$)



^{13}C NMR (126 MHz, $CDCl_3$)

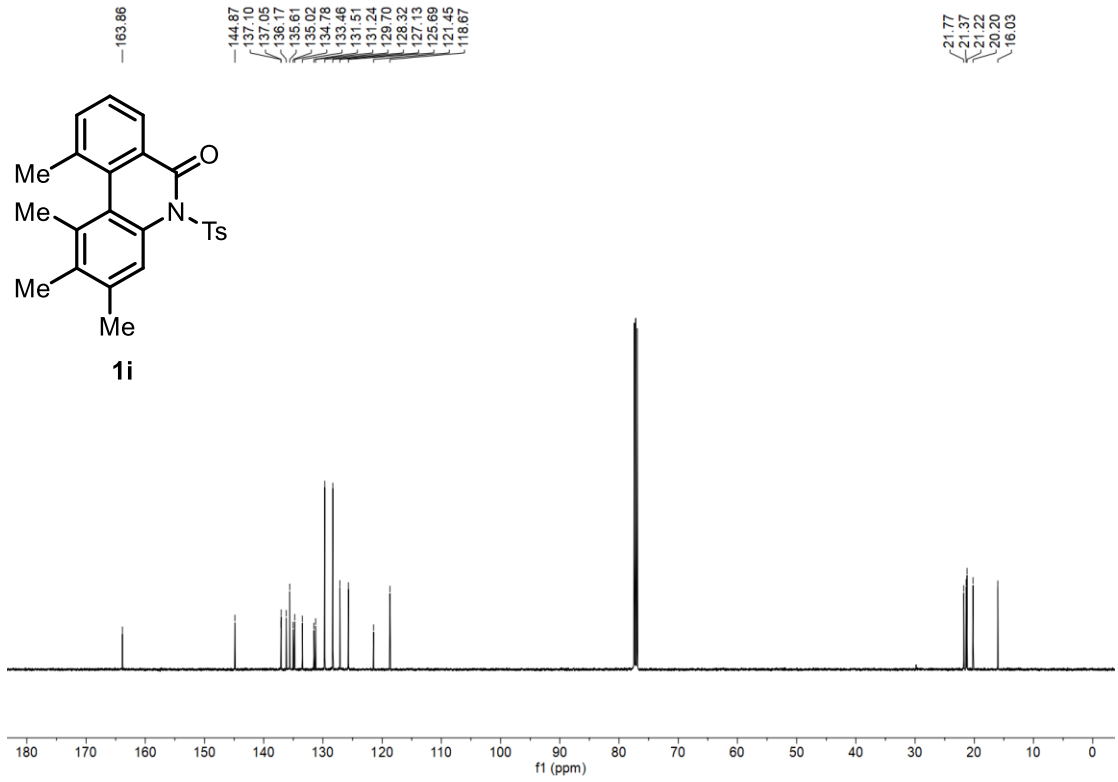


^{1}H NMR (500 MHz, $CDCl_3$)



1i

^{13}C NMR (126 MHz, $CDCl_3$)



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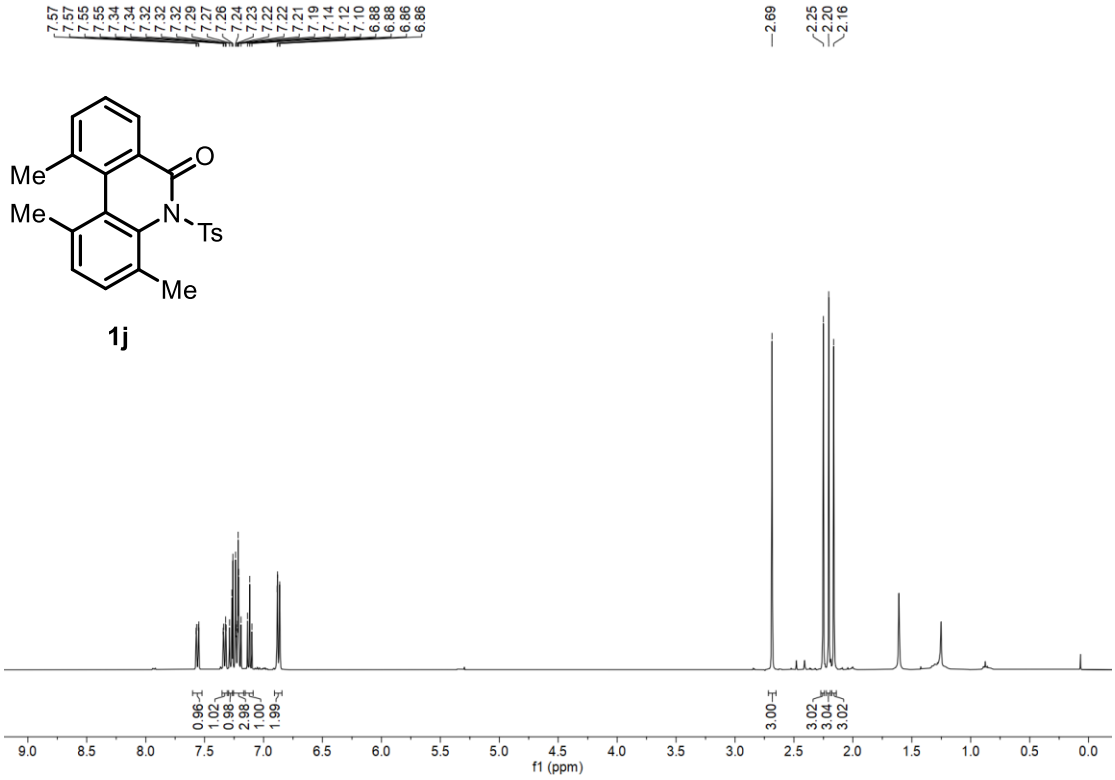
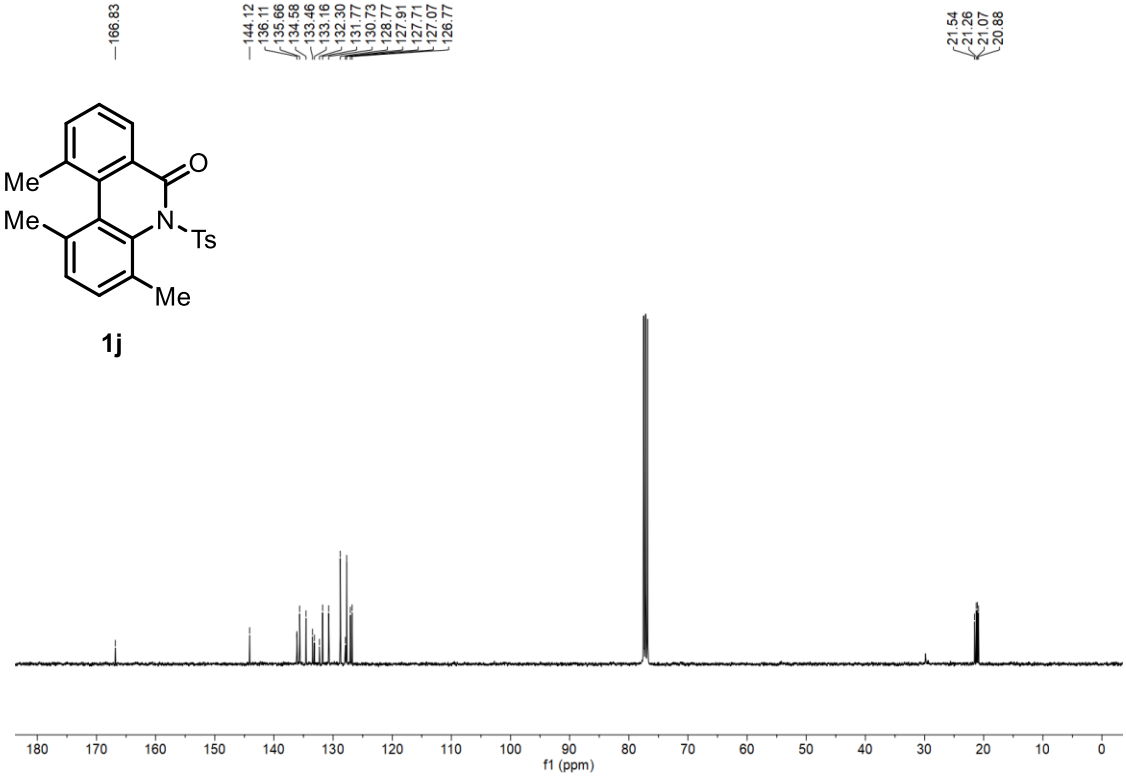
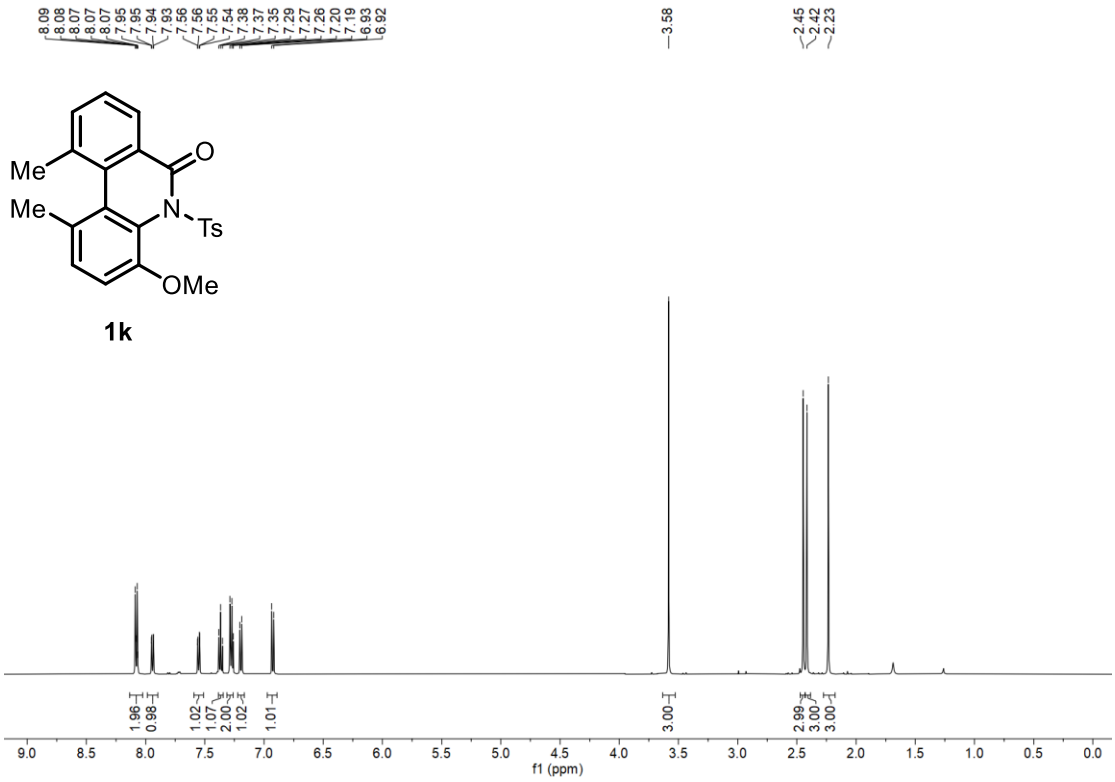
^{1}H NMR (400 MHz, $CDCl_3$)



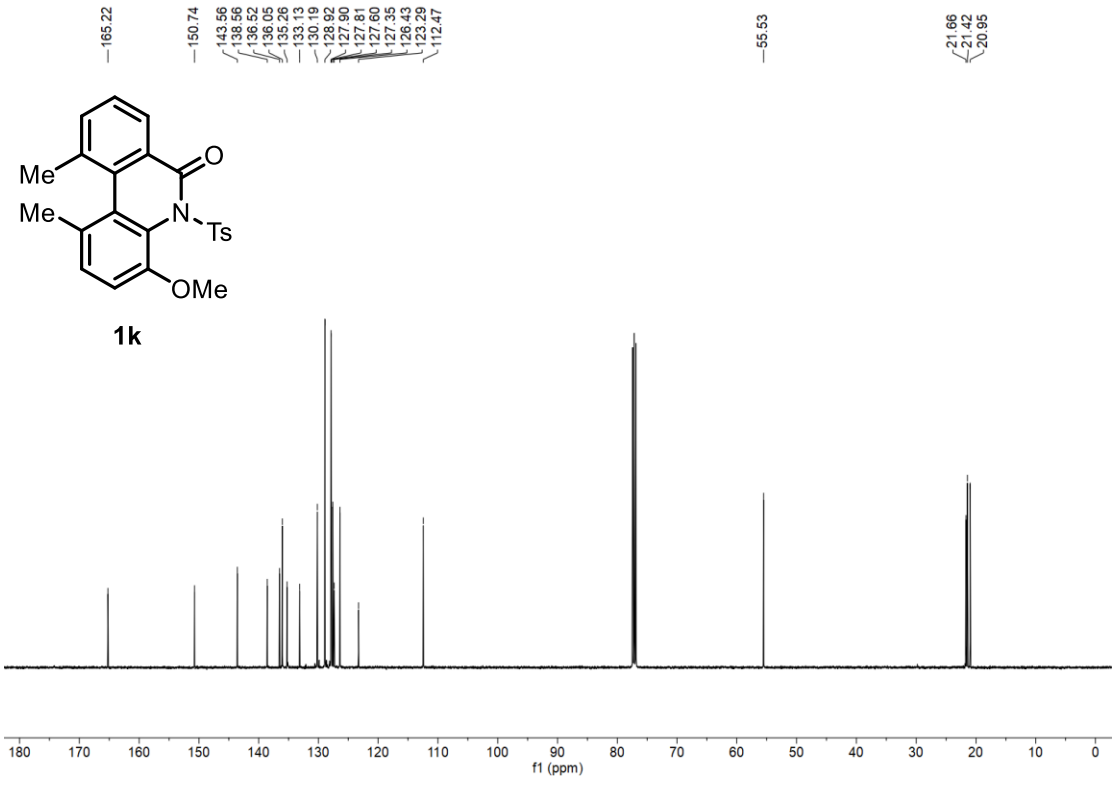
^{13}C NMR (101 MHz, $CDCl_3$)



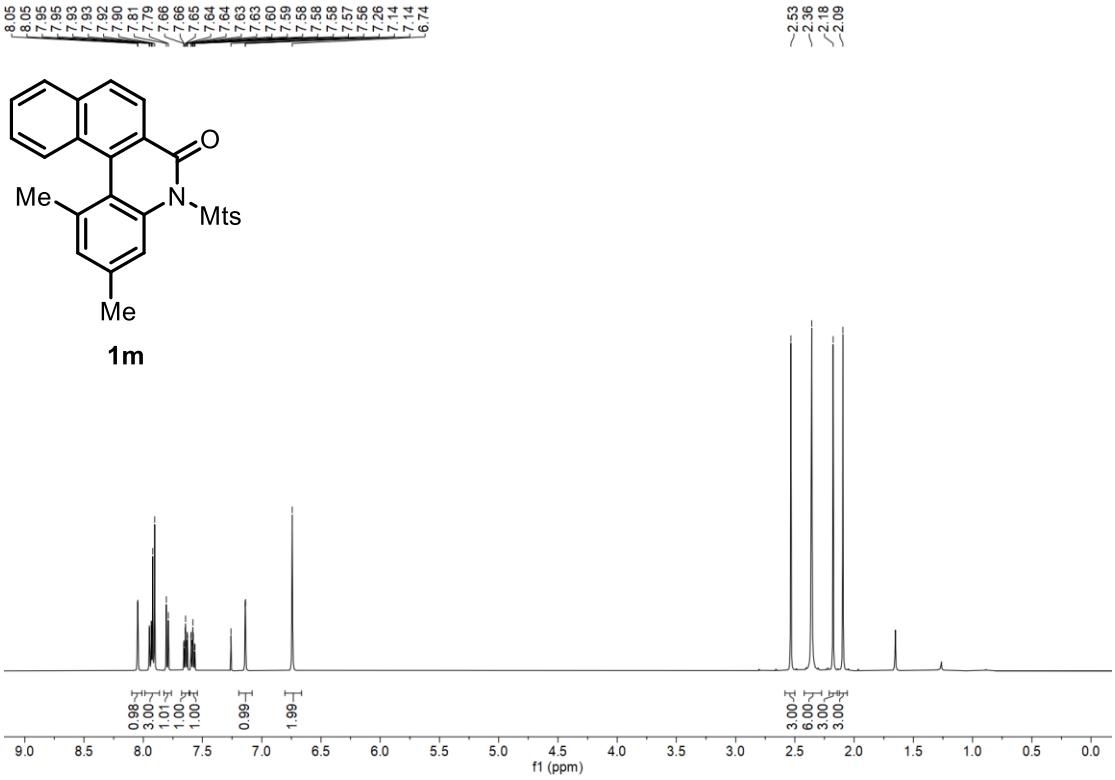
^{1}H NMR (500 MHz, $CDCl_3$)



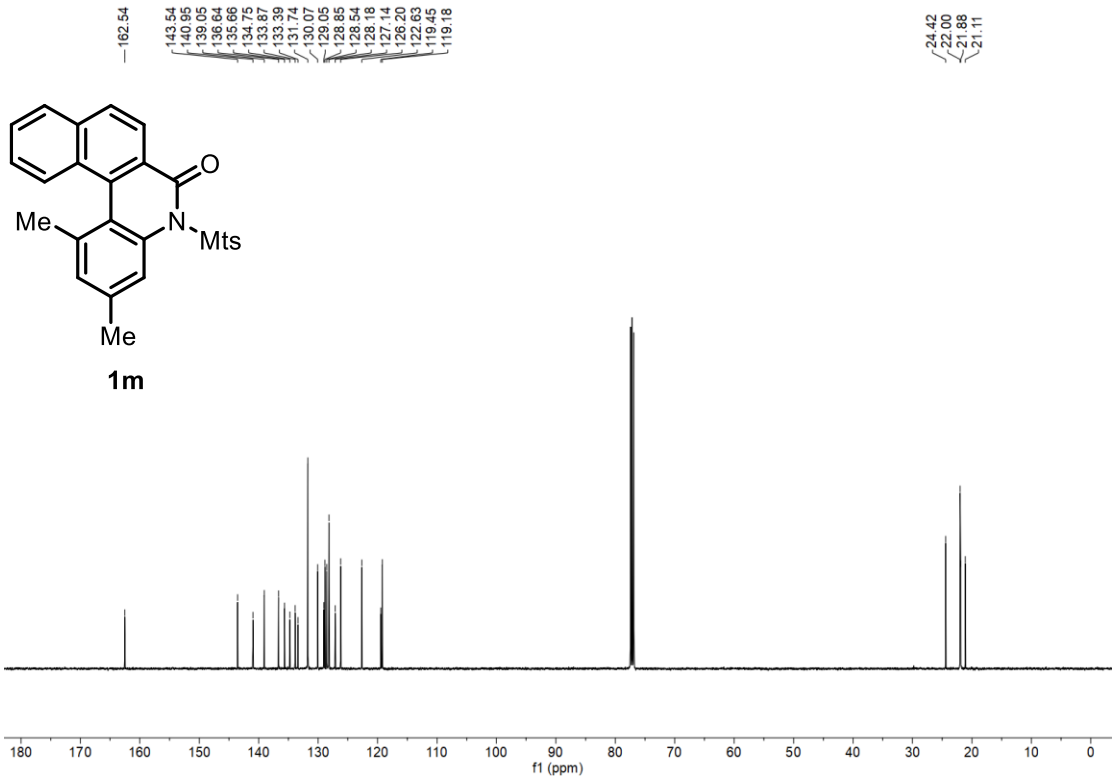
^{13}C NMR (126 MHz, $CDCl_3$)



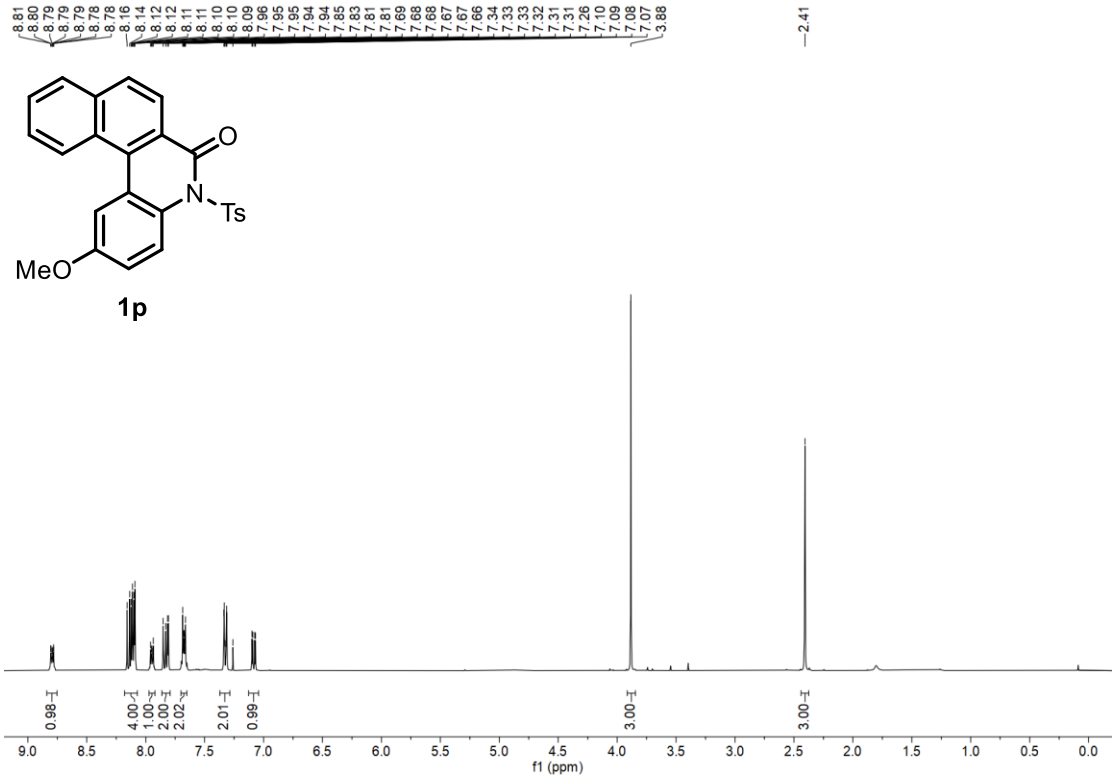
^{1}H NMR (500 MHz, $CDCl_3$)



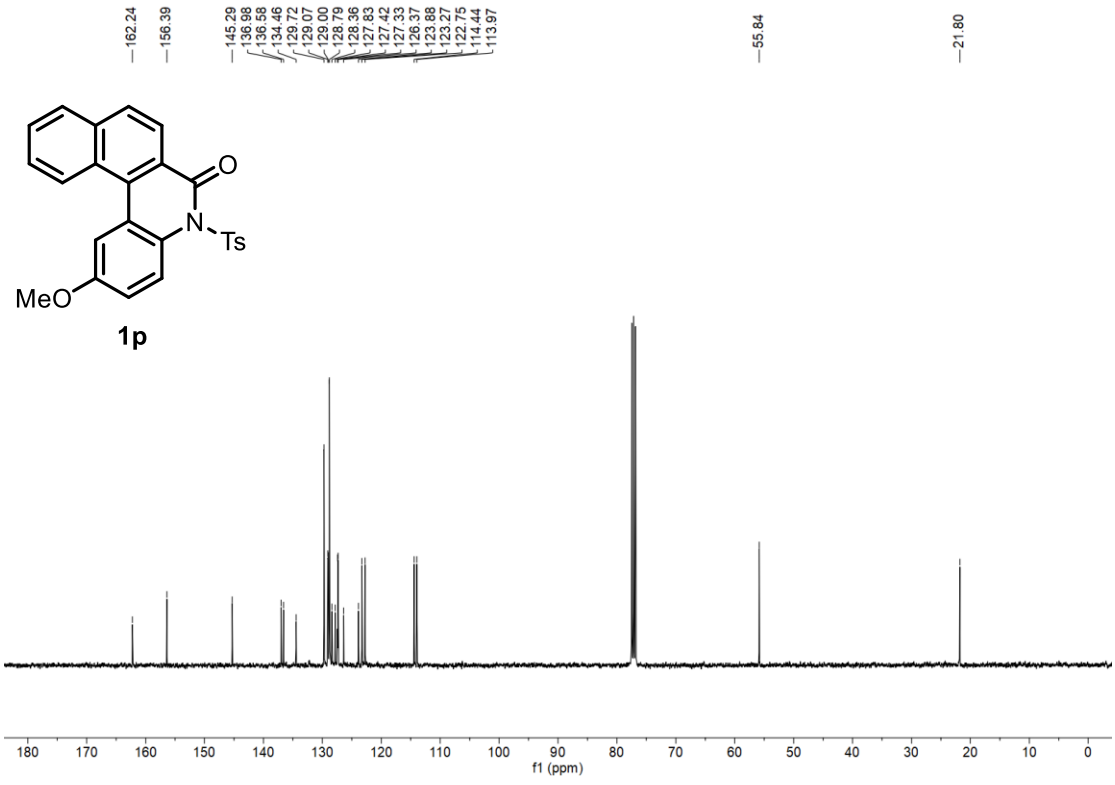
^{13}C NMR (126 MHz, $CDCl_3$)



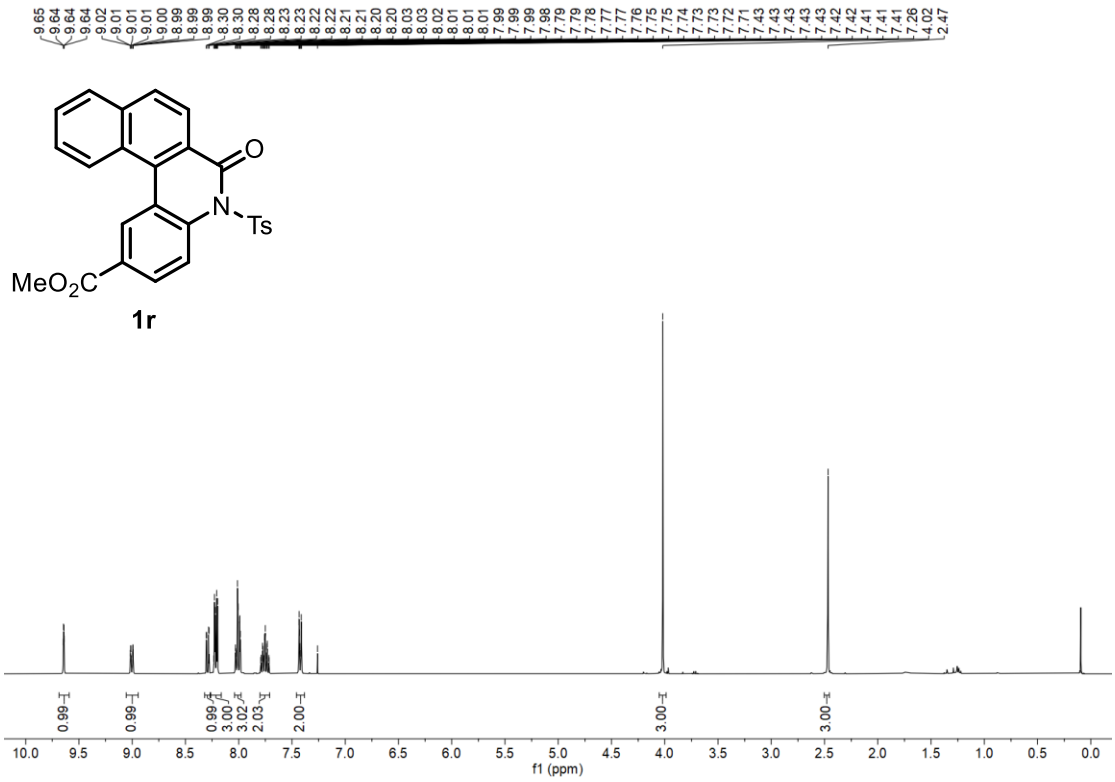
^{1}H NMR (400 MHz, $CDCl_3$)



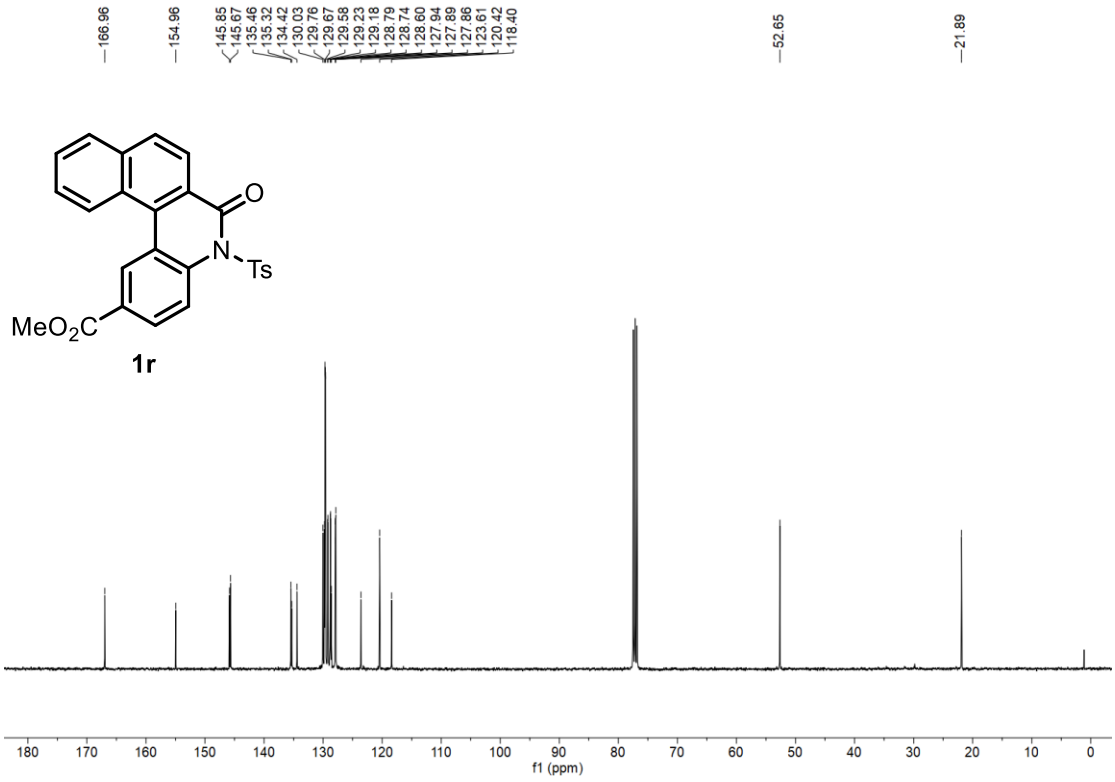
^{13}C NMR (101 MHz, $CDCl_3$)



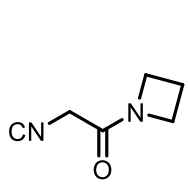
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

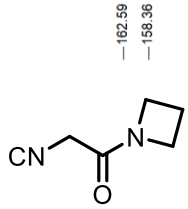


^{1}H NMR (500 MHz, DMSO-d_6)



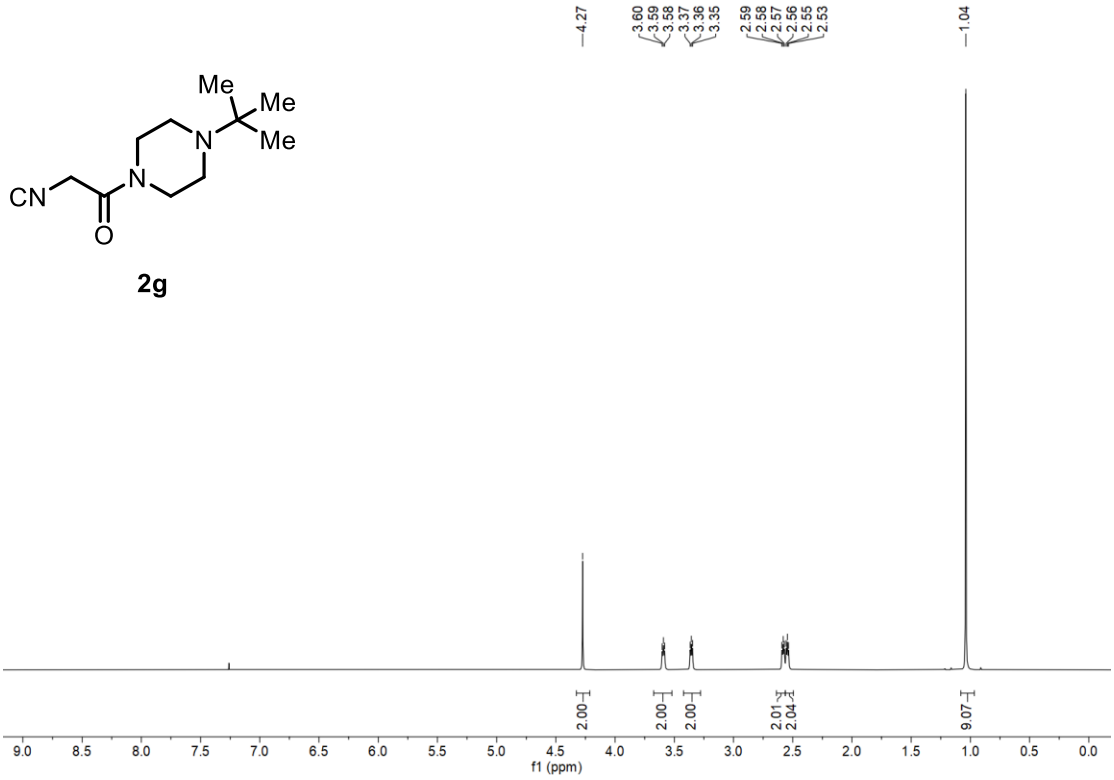
2b

^{13}C NMR (126 MHz, DMSO-d_6)



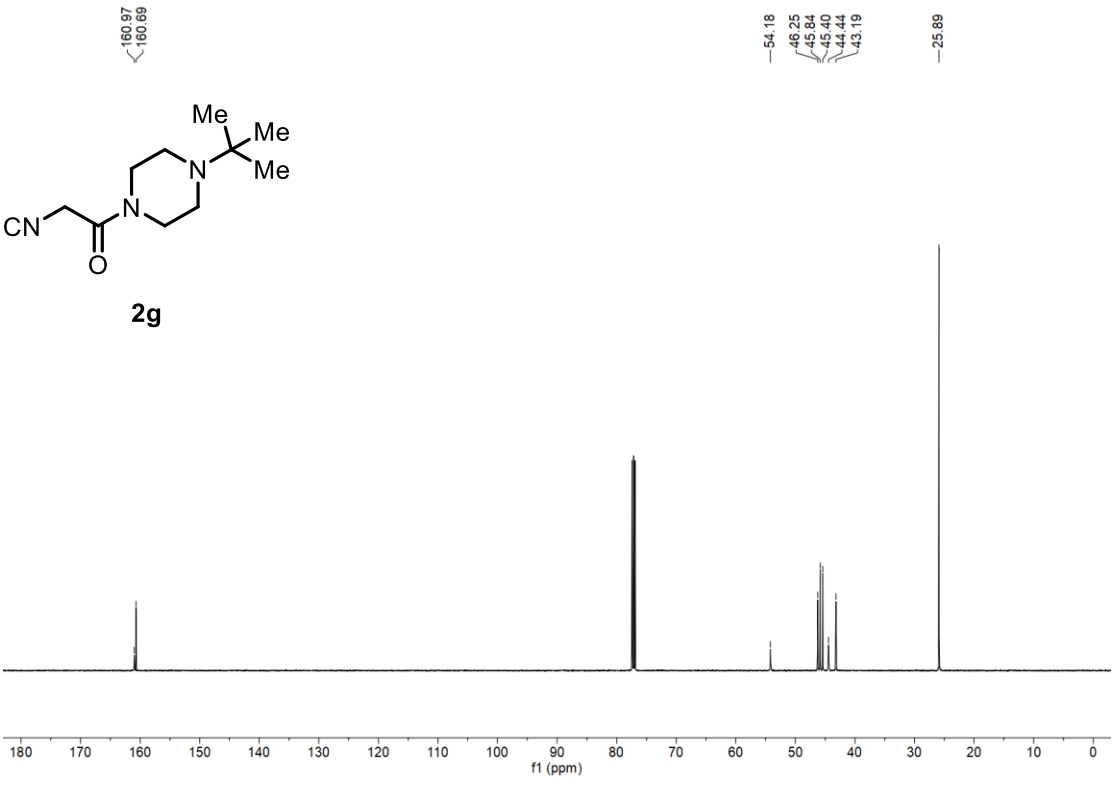
2b

^{1}H NMR (500 MHz, $CDCl_3$)



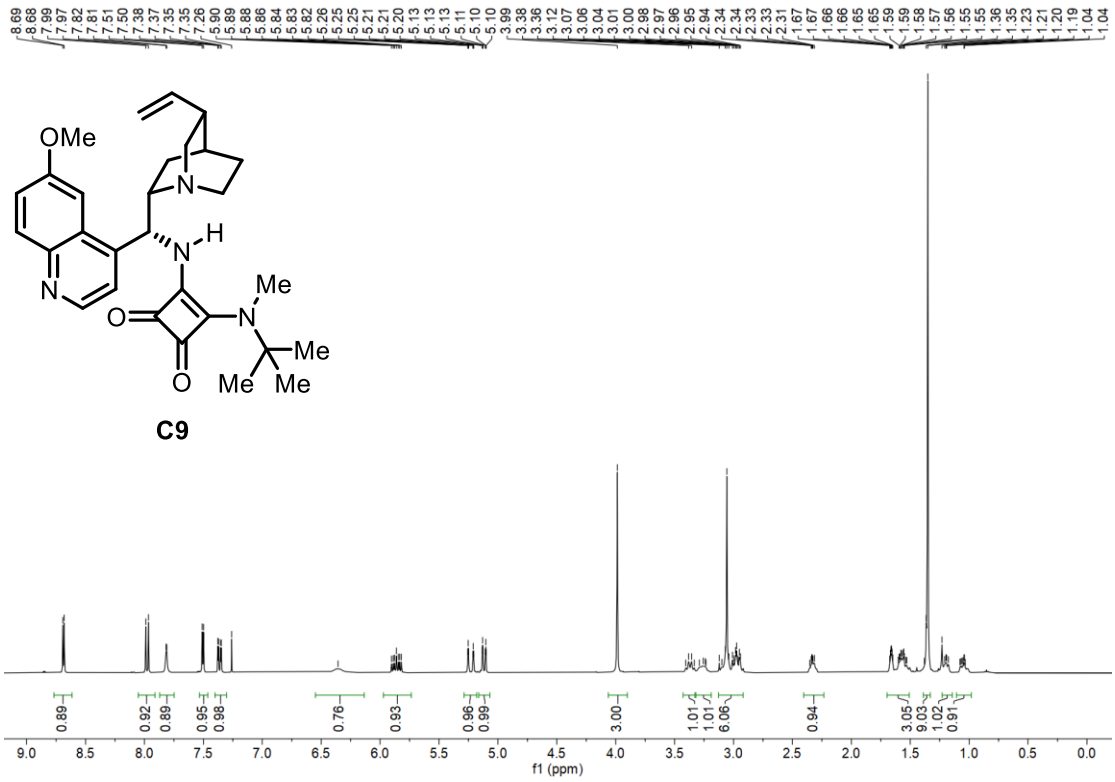
2g

^{13}C NMR (126 MHz, $CDCl_3$)

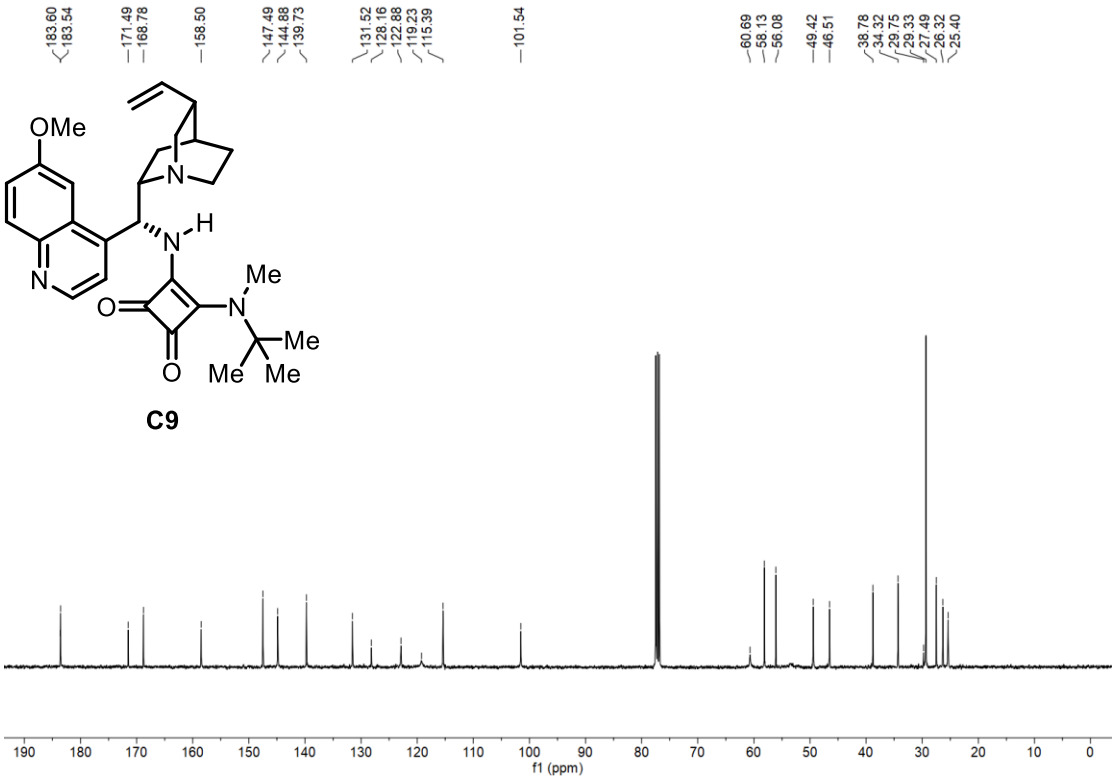


2g

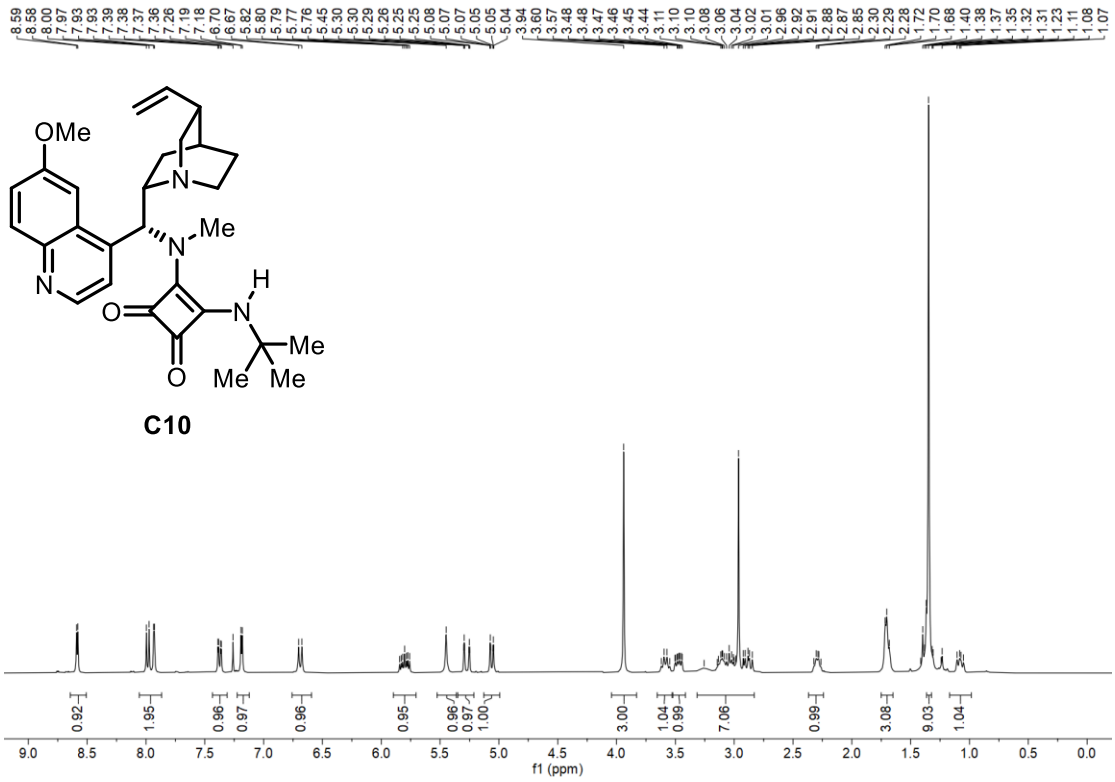
^{1}H NMR (400 MHz, $CDCl_3$)



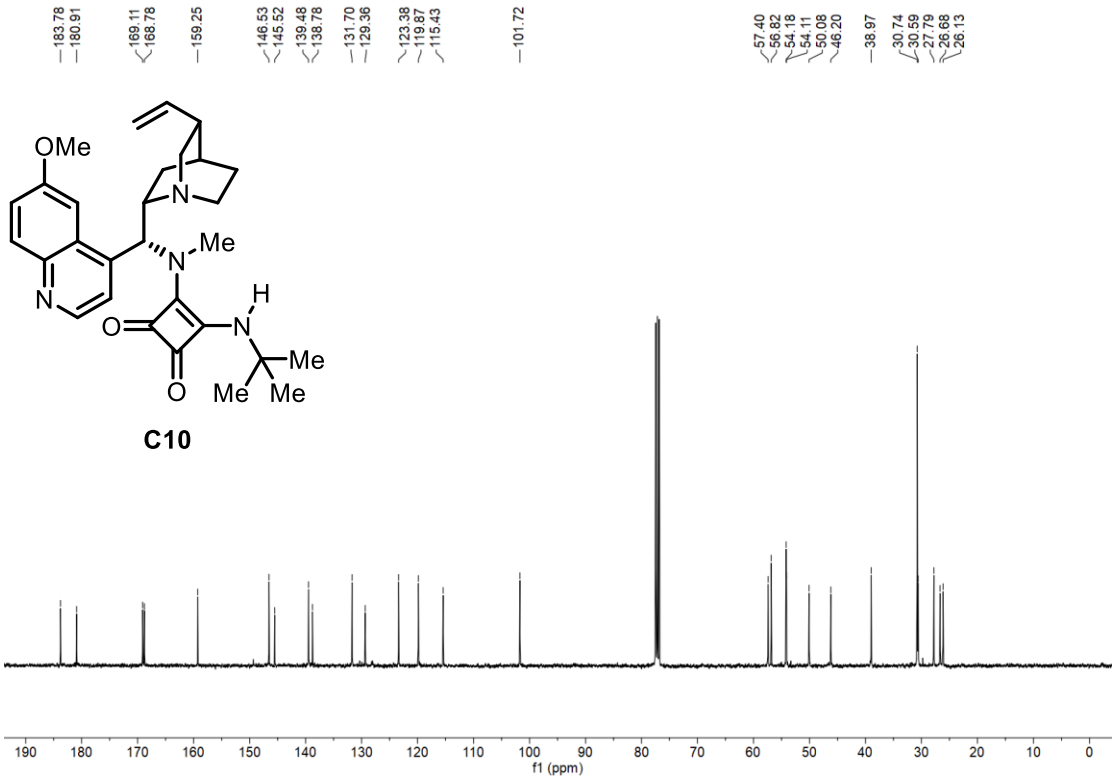
^{13}C NMR (101 MHz, $CDCl_3$)



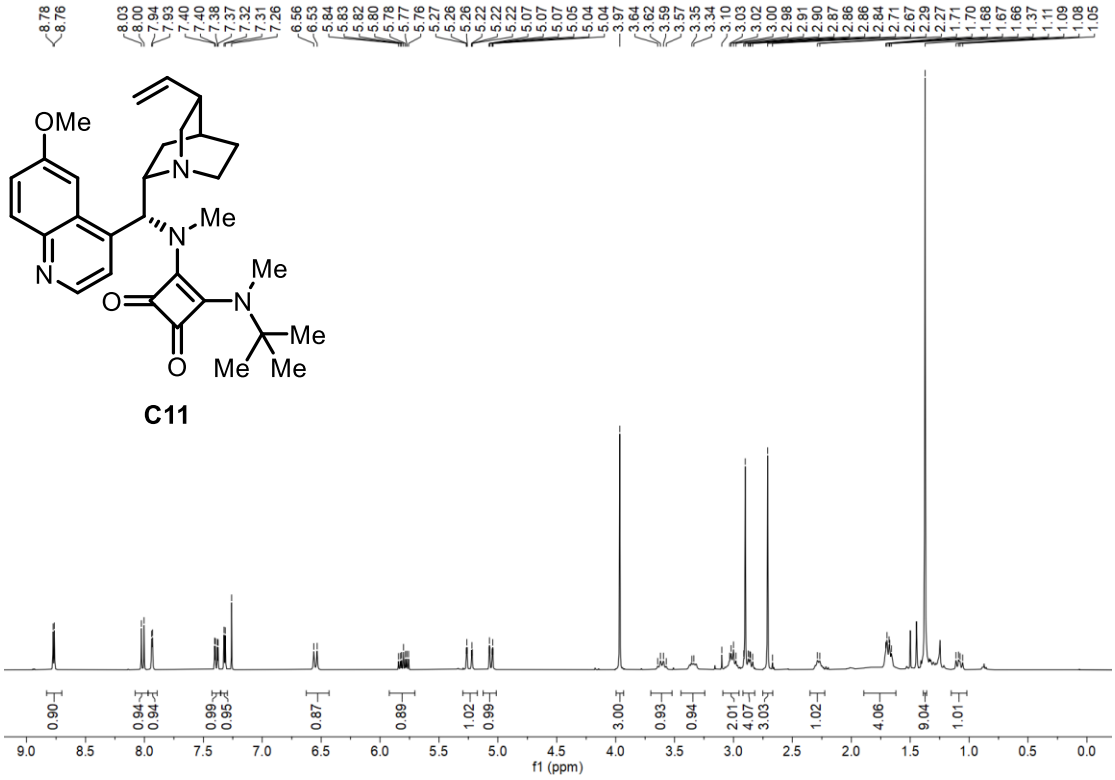
^{1}H NMR (400 MHz, $CDCl_3$)



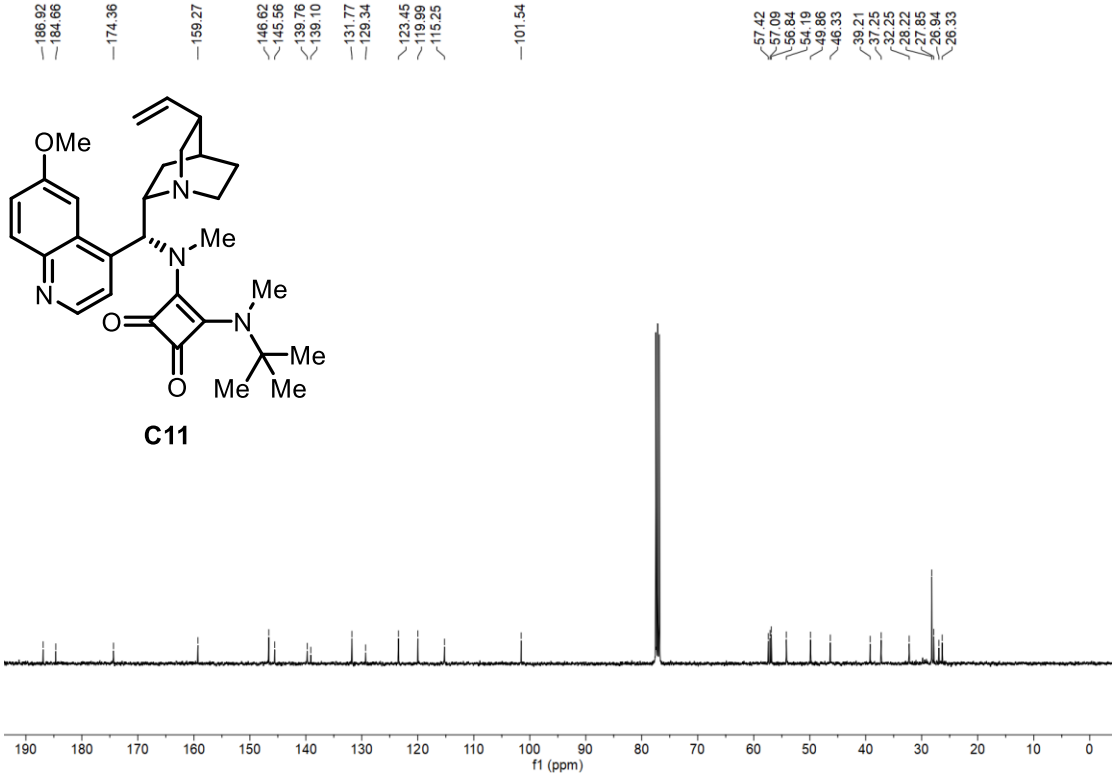
^{13}C NMR (101 MHz, $CDCl_3$)



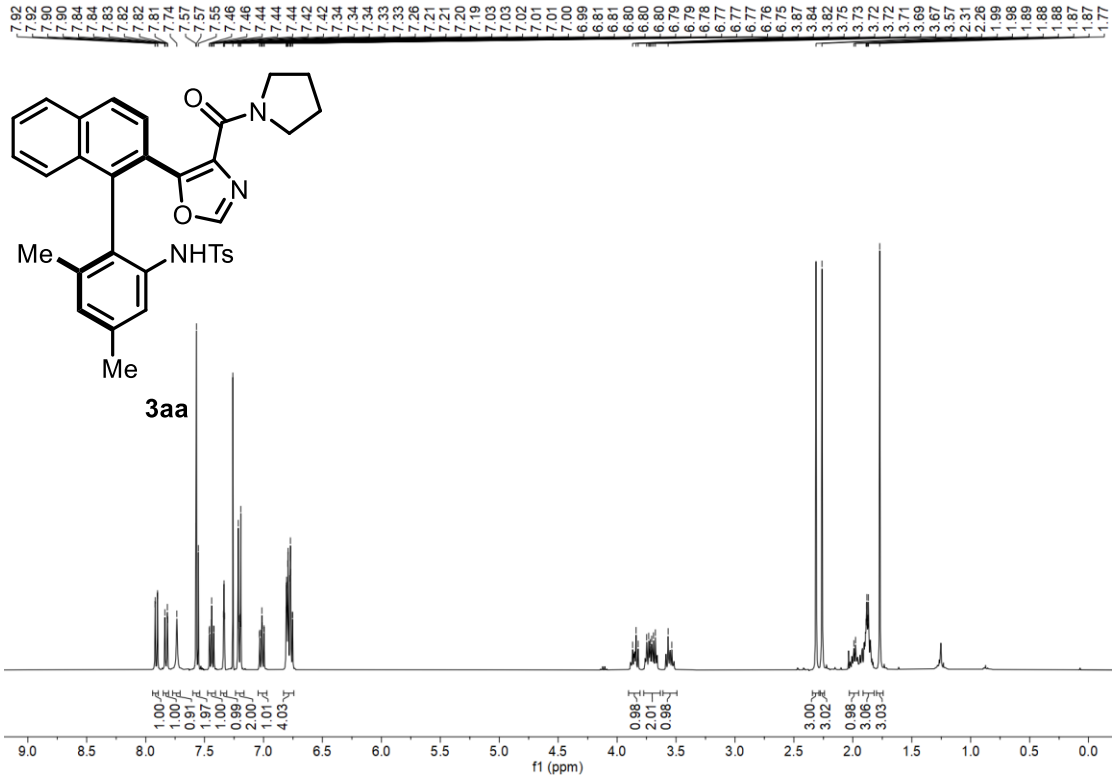
^{1}H NMR (400 MHz, $CDCl_3$)



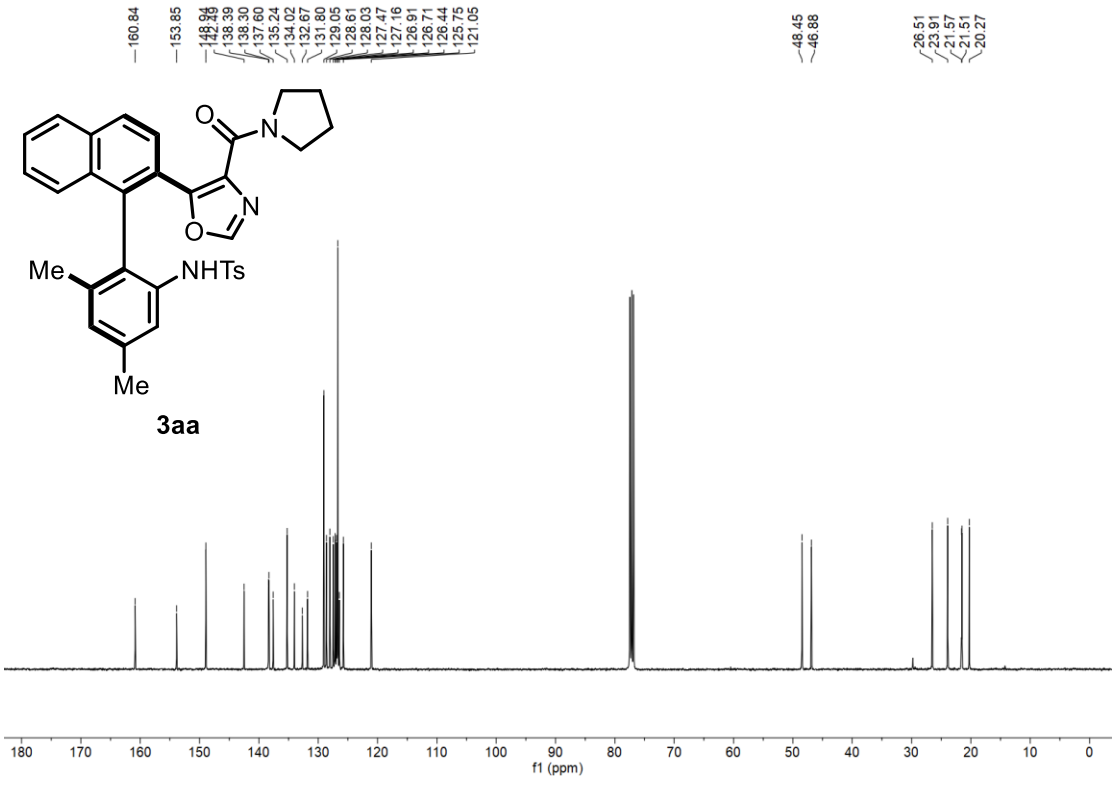
^{13}C NMR (101 MHz, $CDCl_3$)



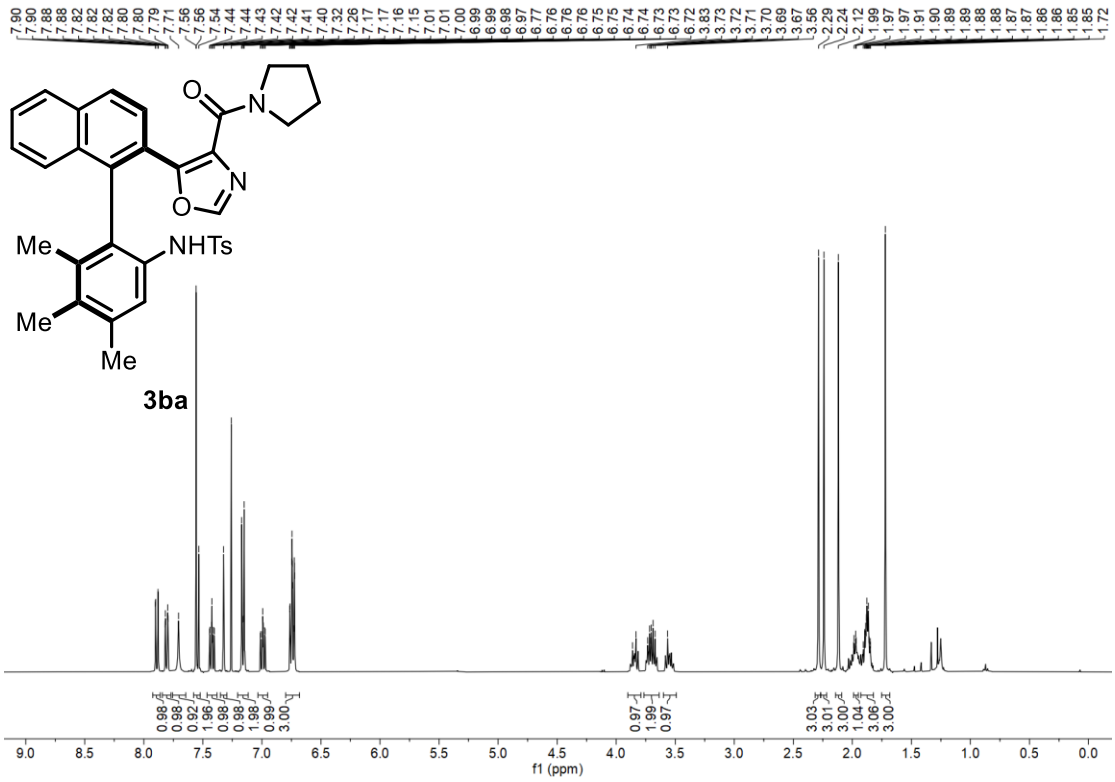
^{1}H NMR (400 MHz, $CDCl_3$)



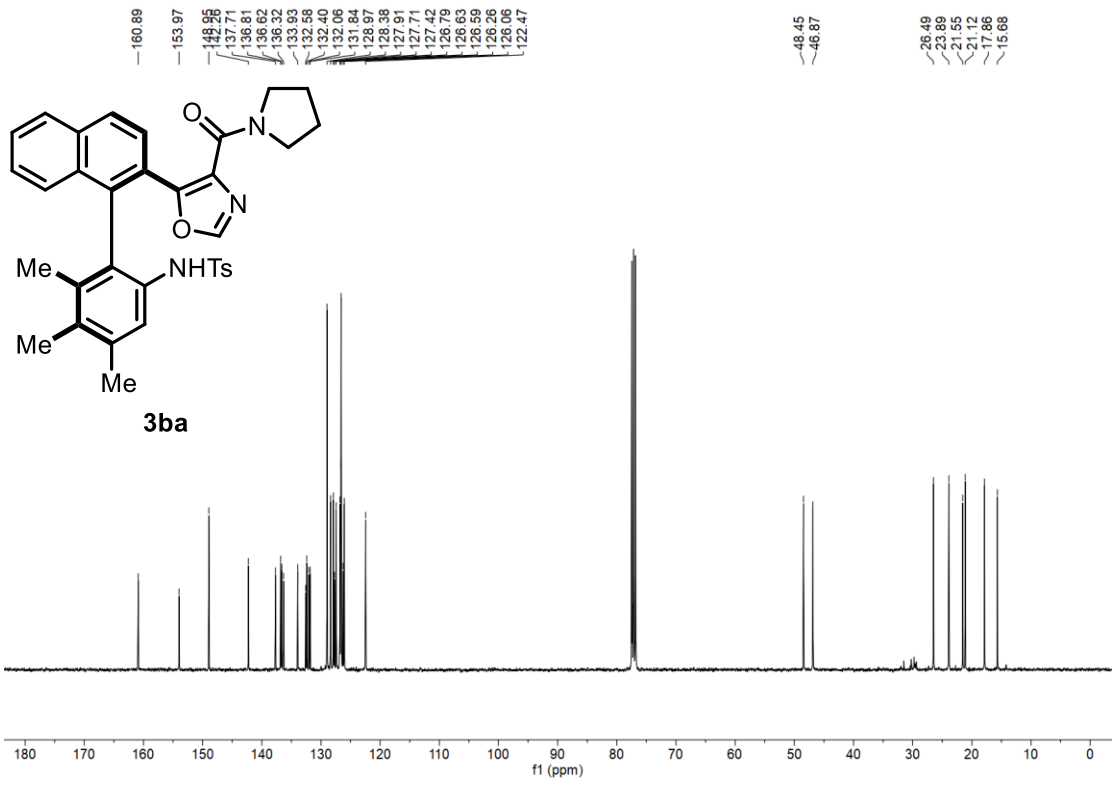
^{13}C NMR (101 MHz, $CDCl_3$)



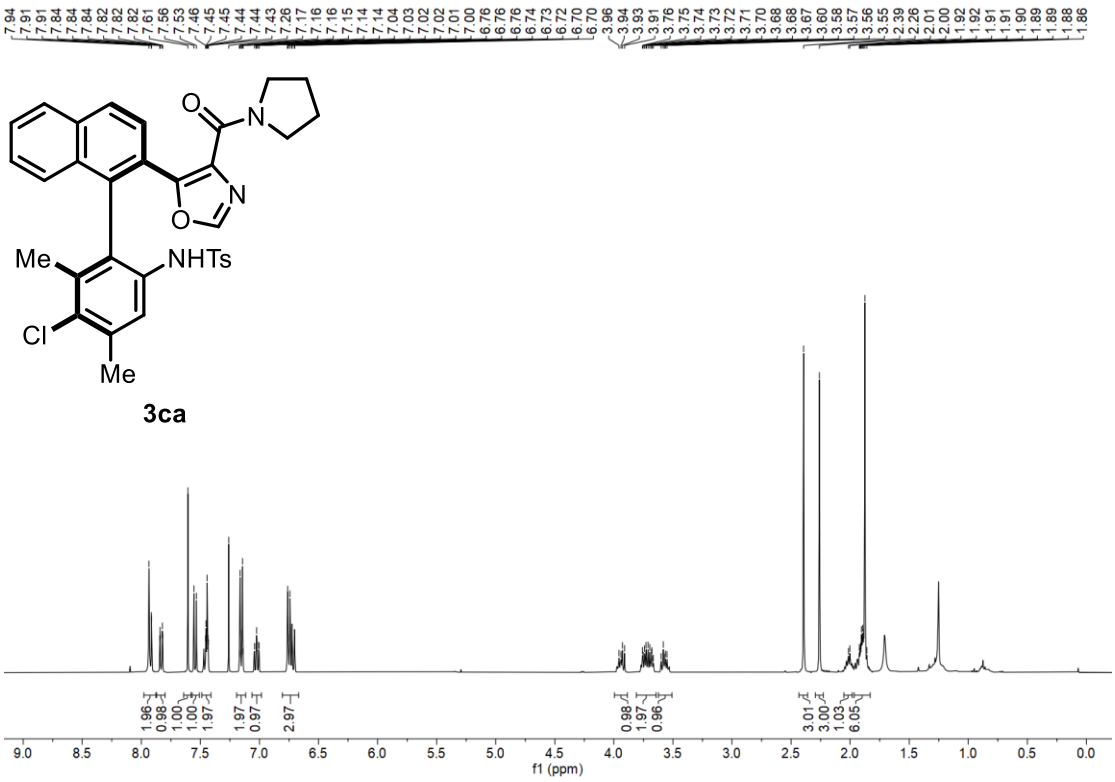
^{1}H NMR (400 MHz, $CDCl_3$)



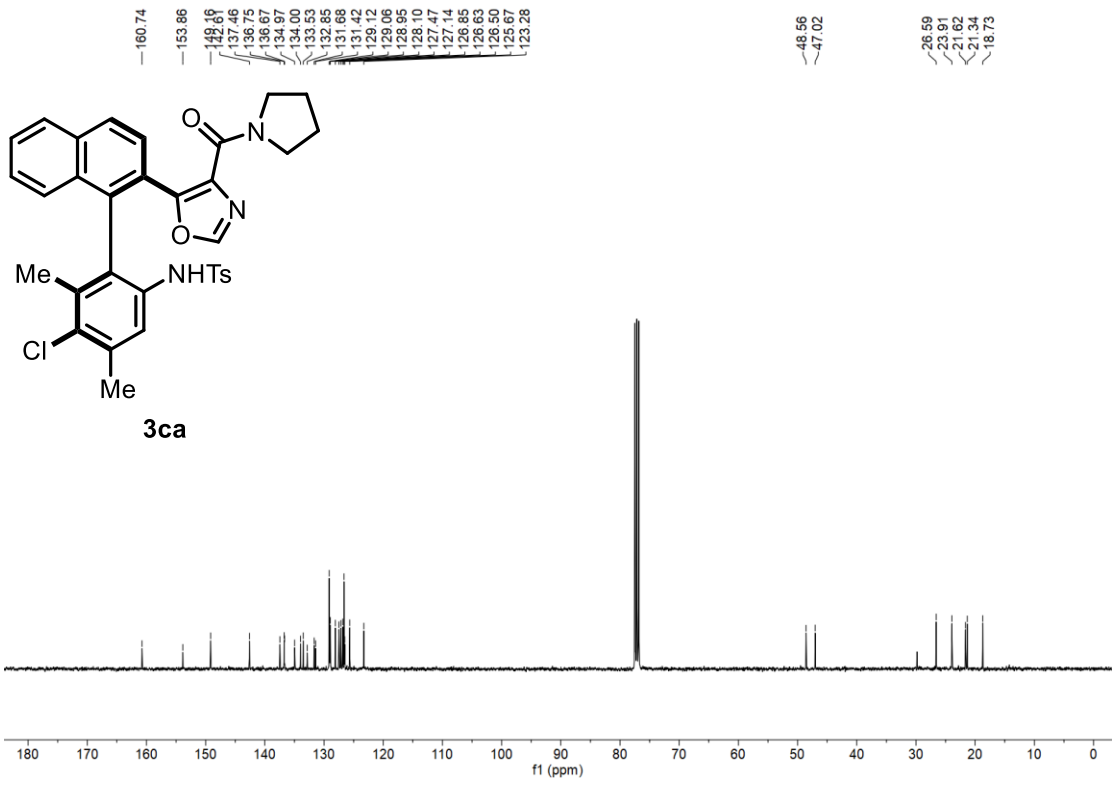
^{13}C NMR (101 MHz, $CDCl_3$)



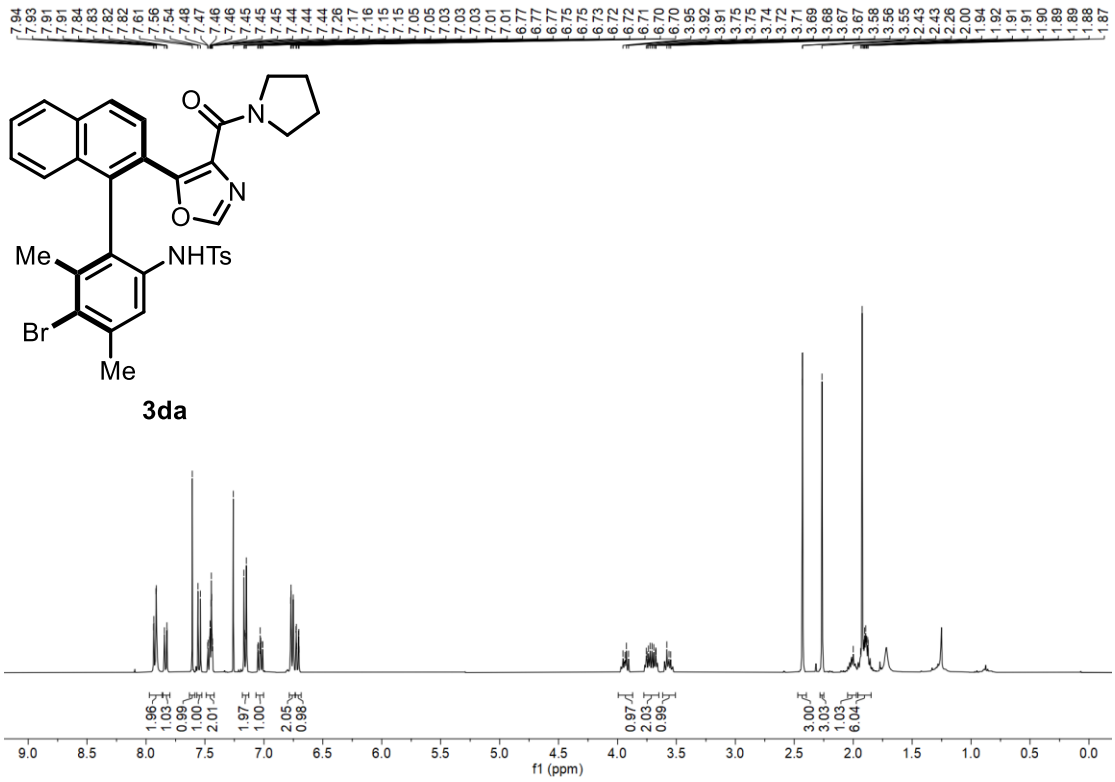
^{1}H NMR (400 MHz, $CDCl_3$)



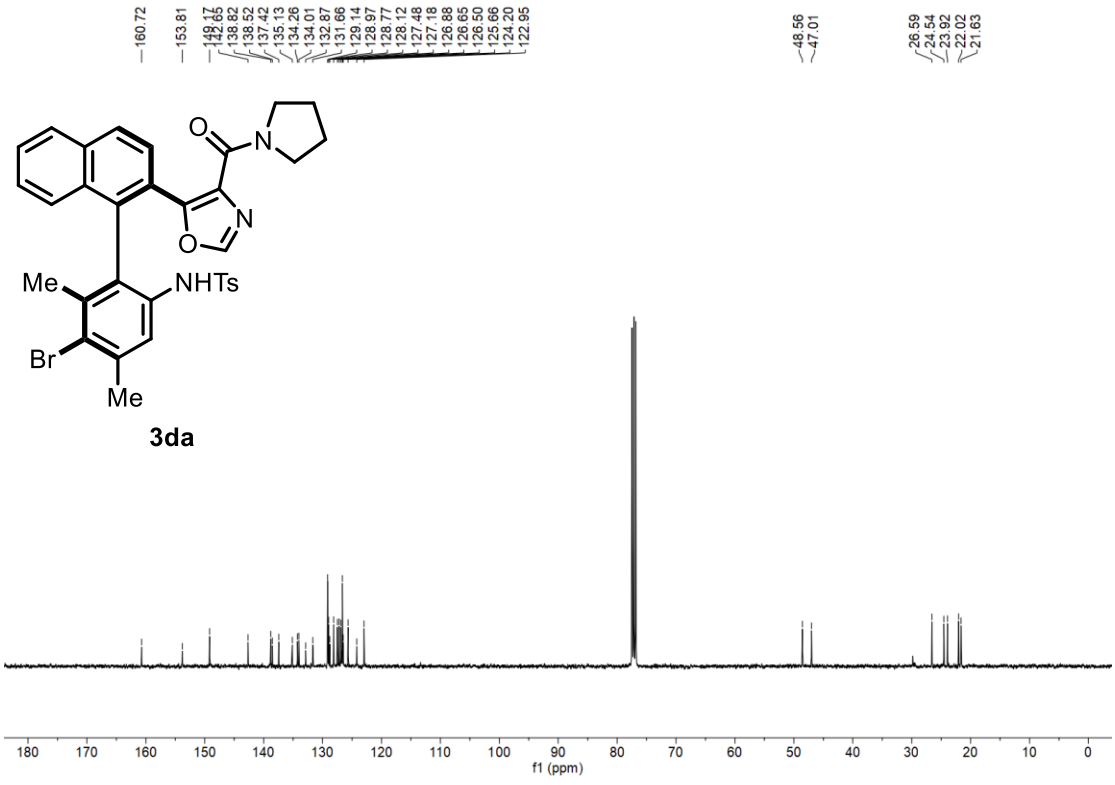
^{13}C NMR (101 MHz, $CDCl_3$)



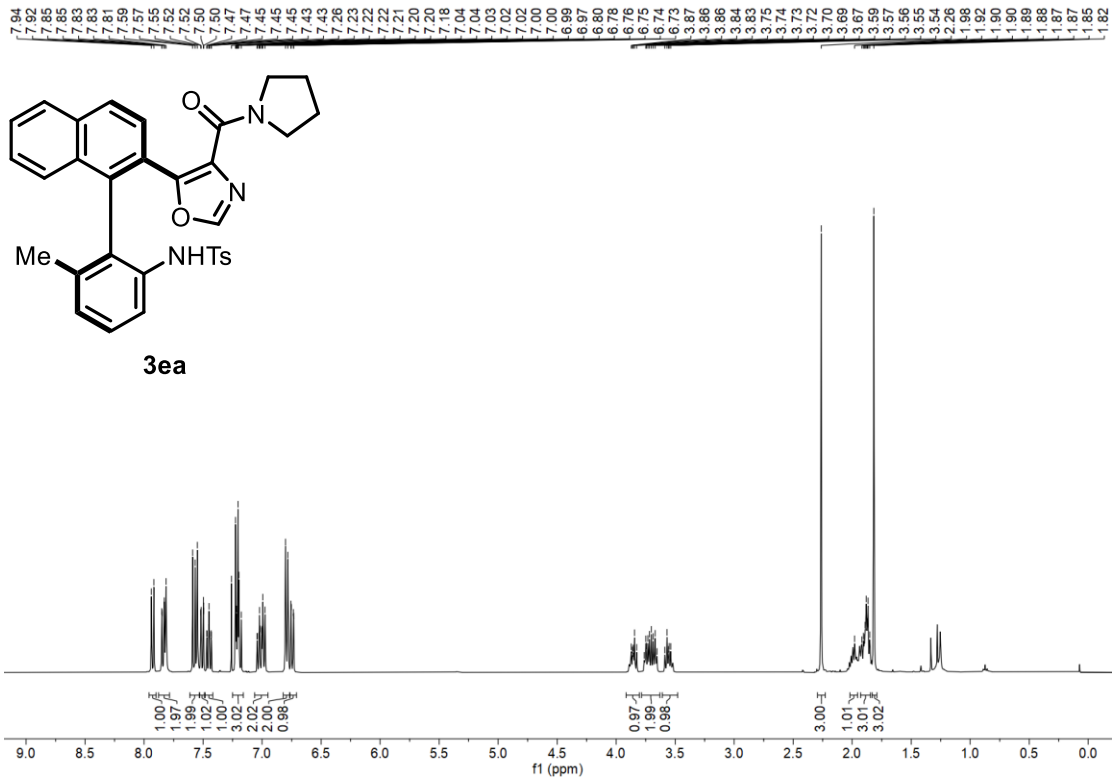
^{1}H NMR (400 MHz, $CDCl_3$)



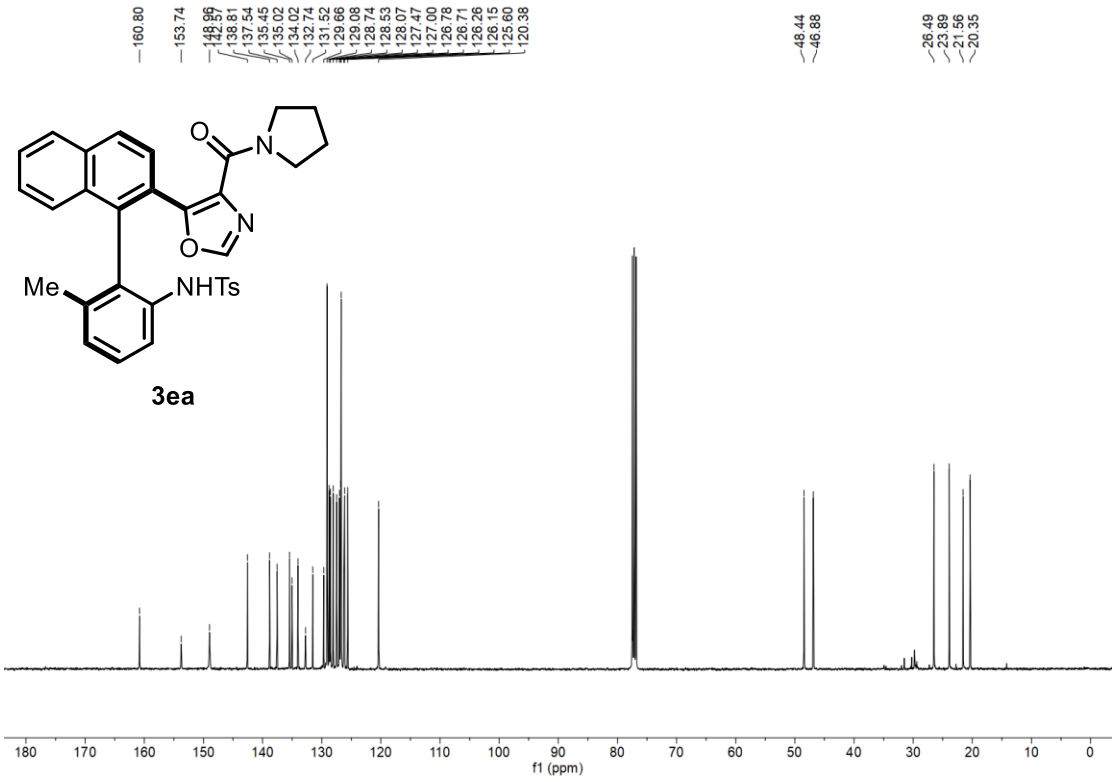
^{13}C NMR (101 MHz, $CDCl_3$)



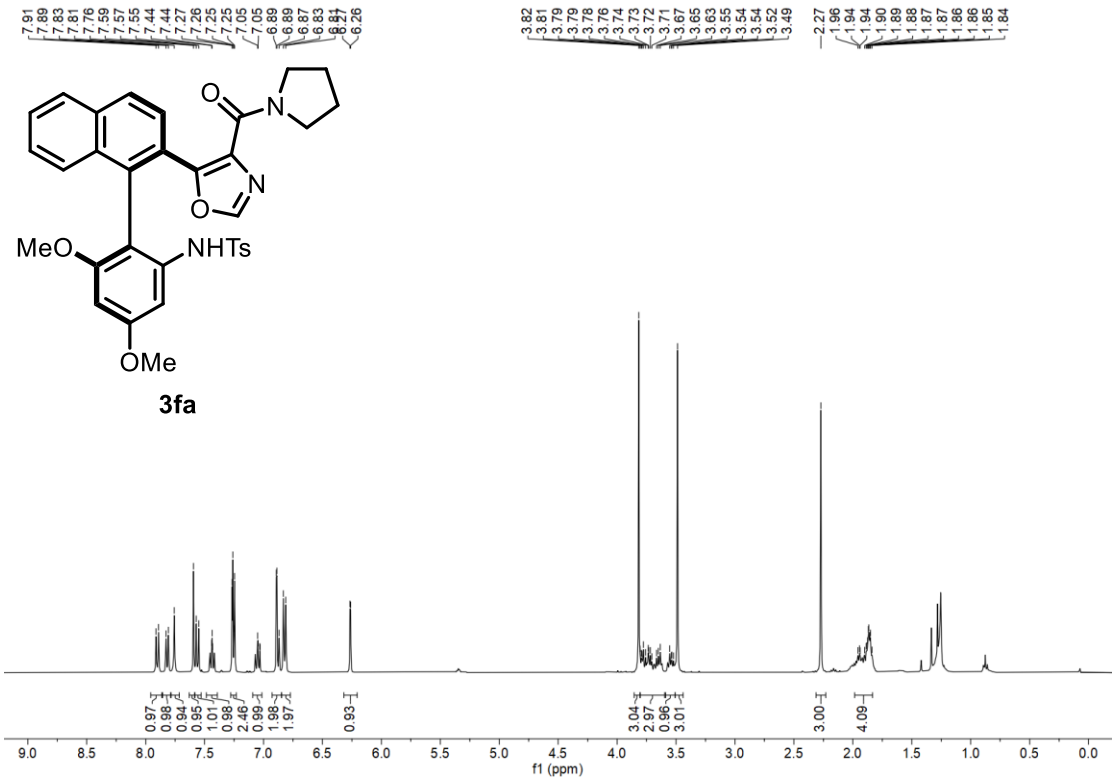
^{1}H NMR (400 MHz, $CDCl_3$)



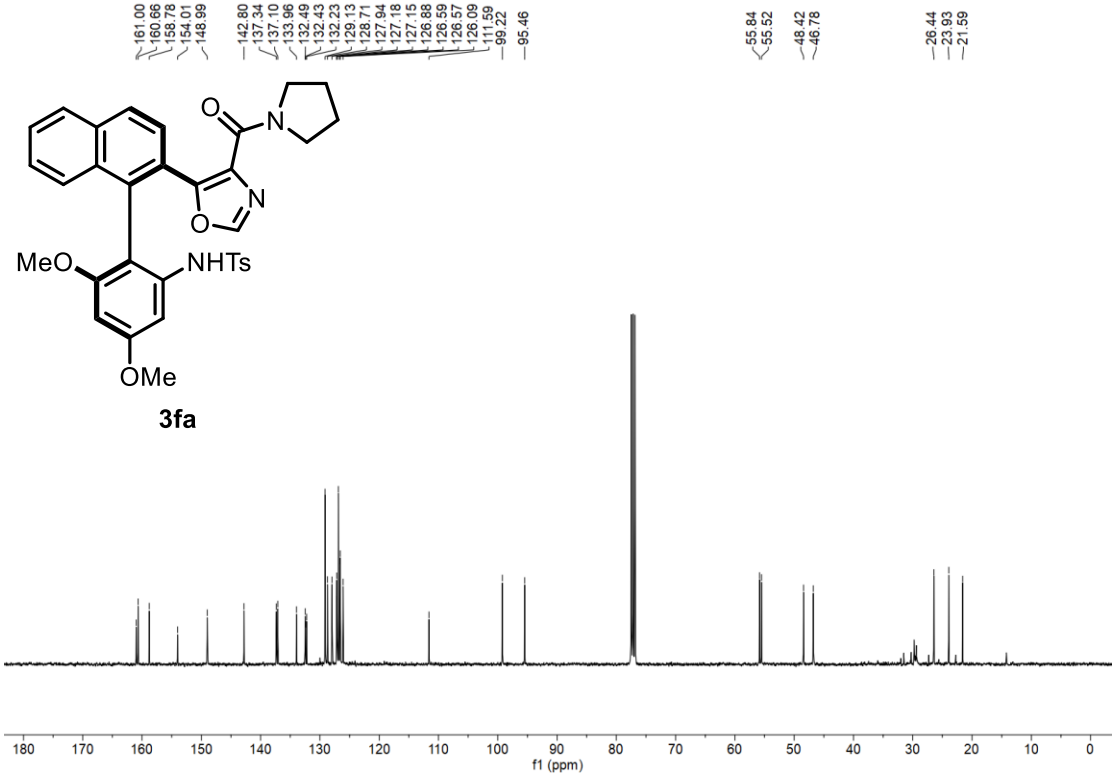
^{13}C NMR (101 MHz, $CDCl_3$)



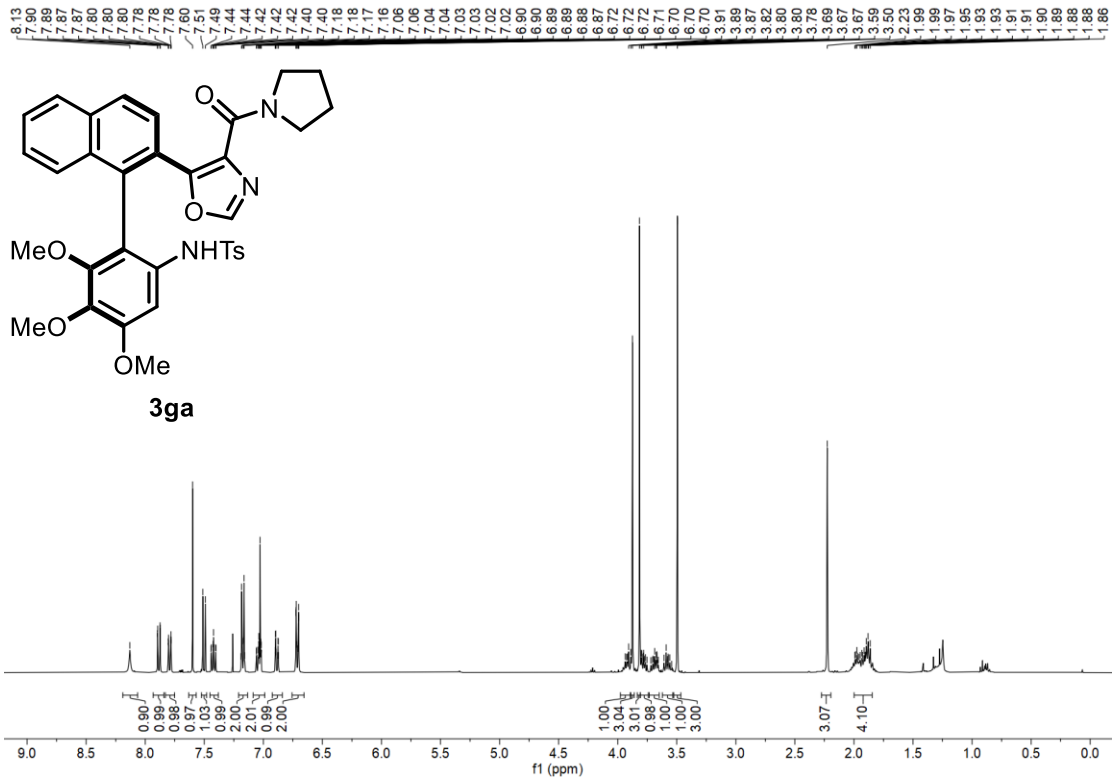
^{1}H NMR (400 MHz, $CDCl_3$)



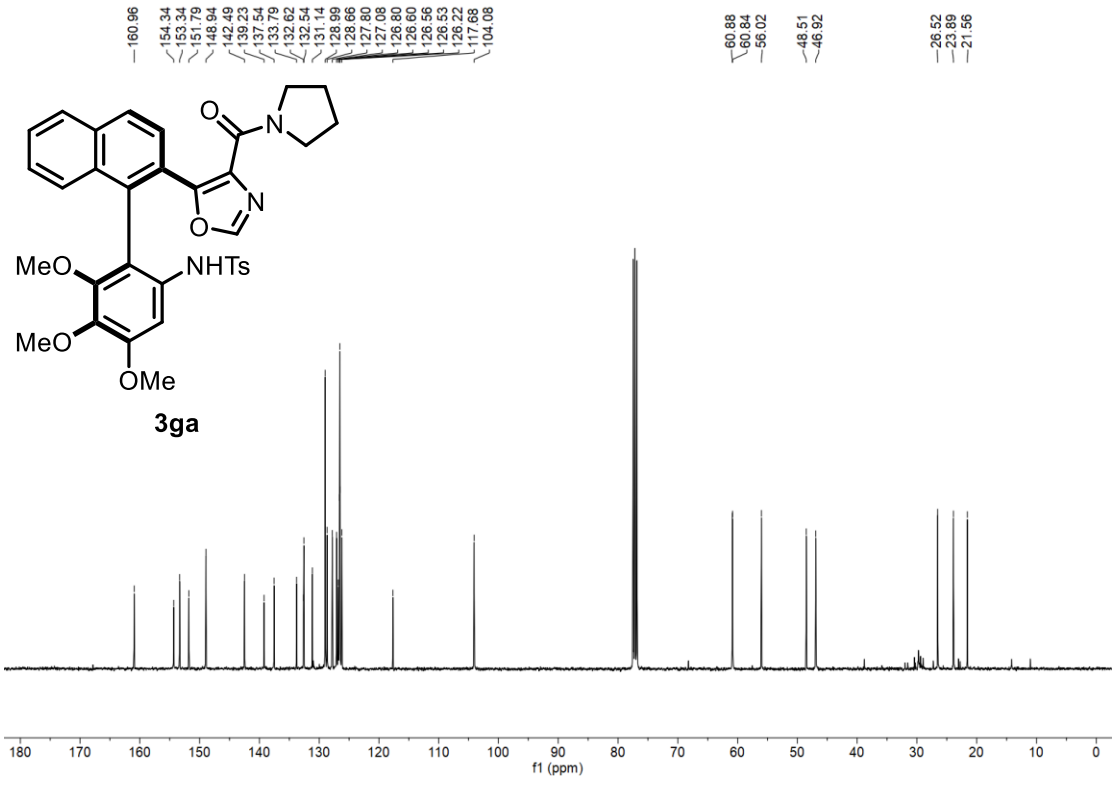
^{13}C NMR (101 MHz, $CDCl_3$)



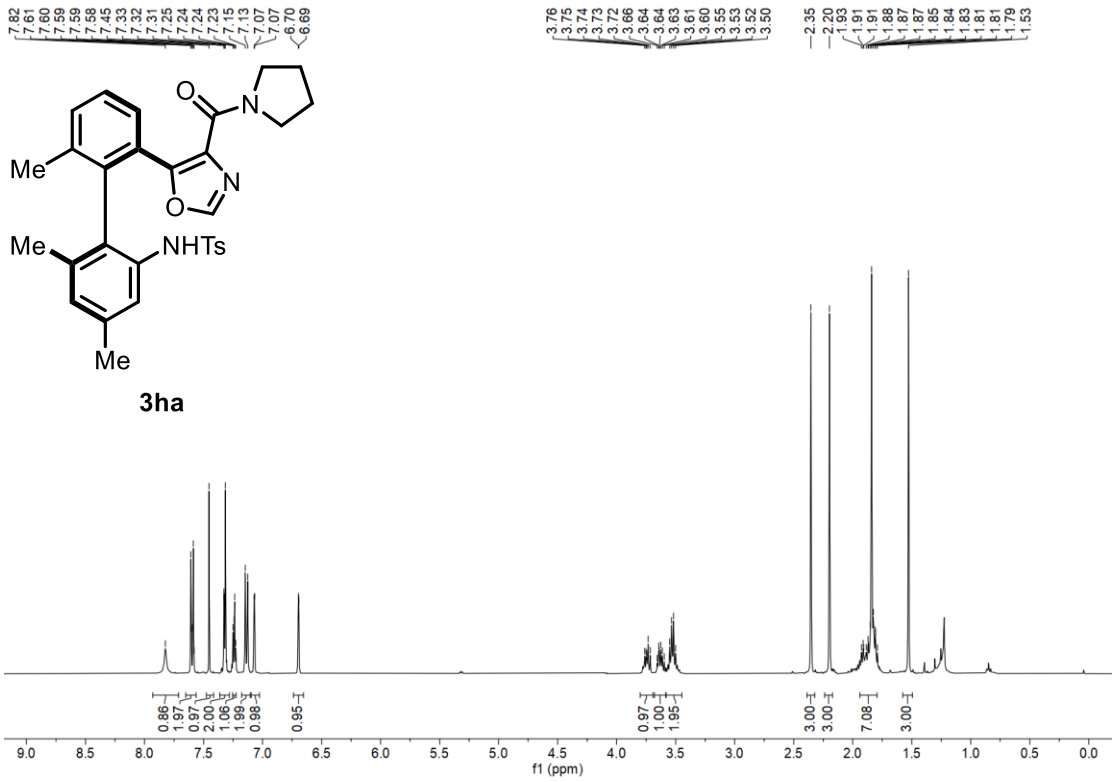
^{1}H NMR (400 MHz, $CDCl_3$)



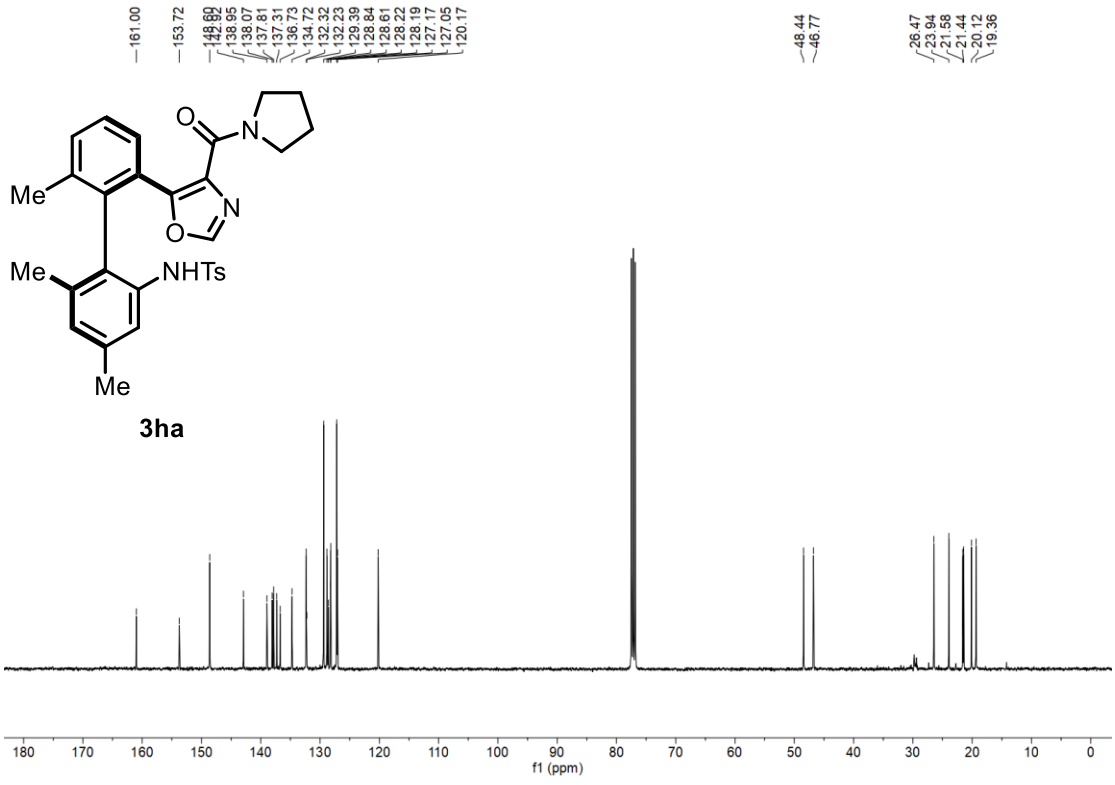
^{13}C NMR (101 MHz, $CDCl_3$)



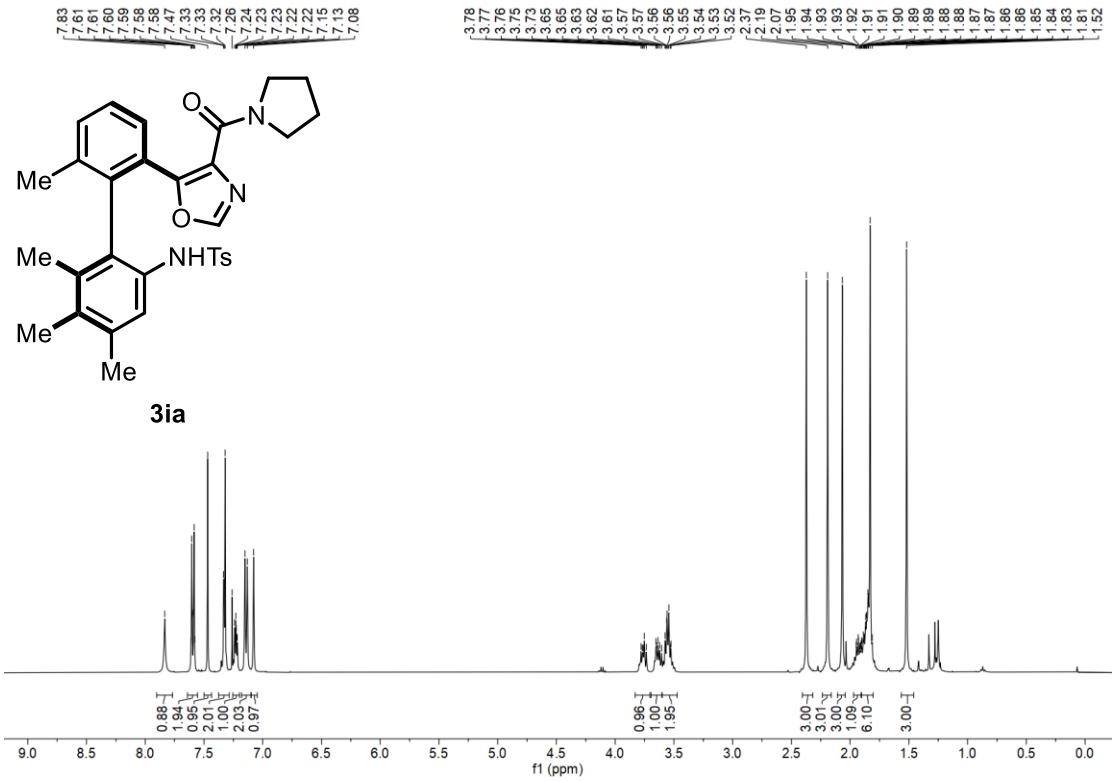
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

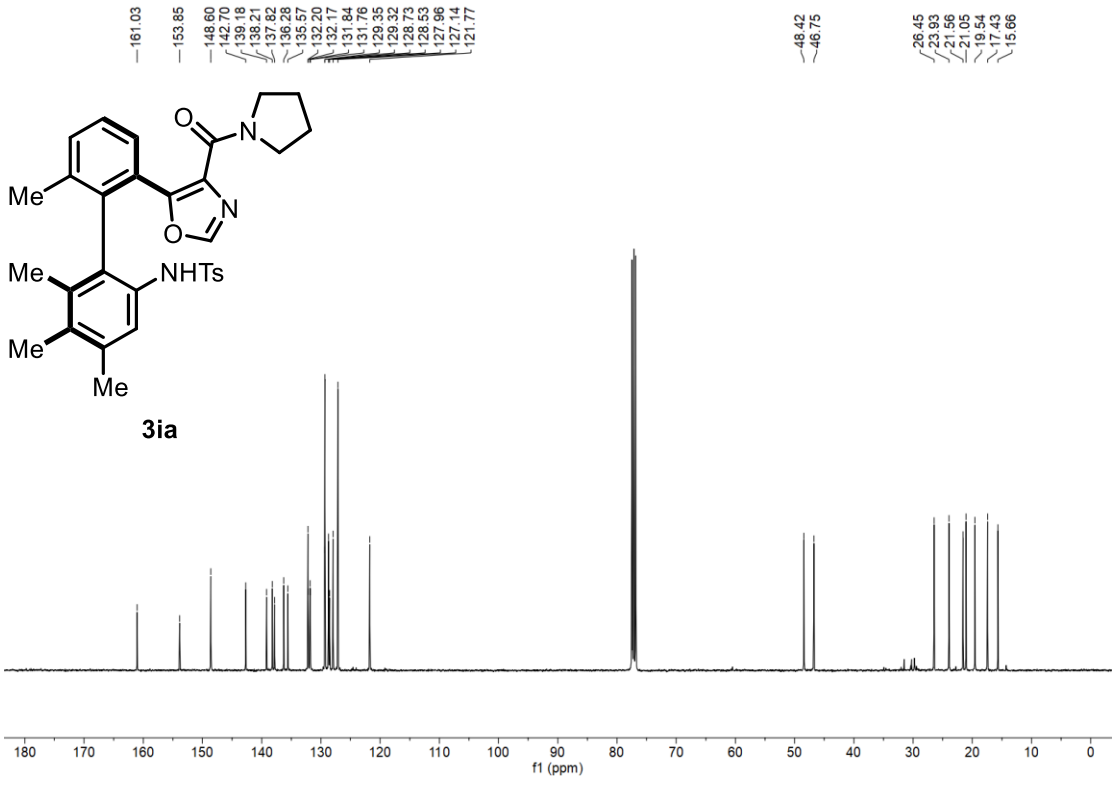


^{1}H NMR (400 MHz, $CDCl_3$)



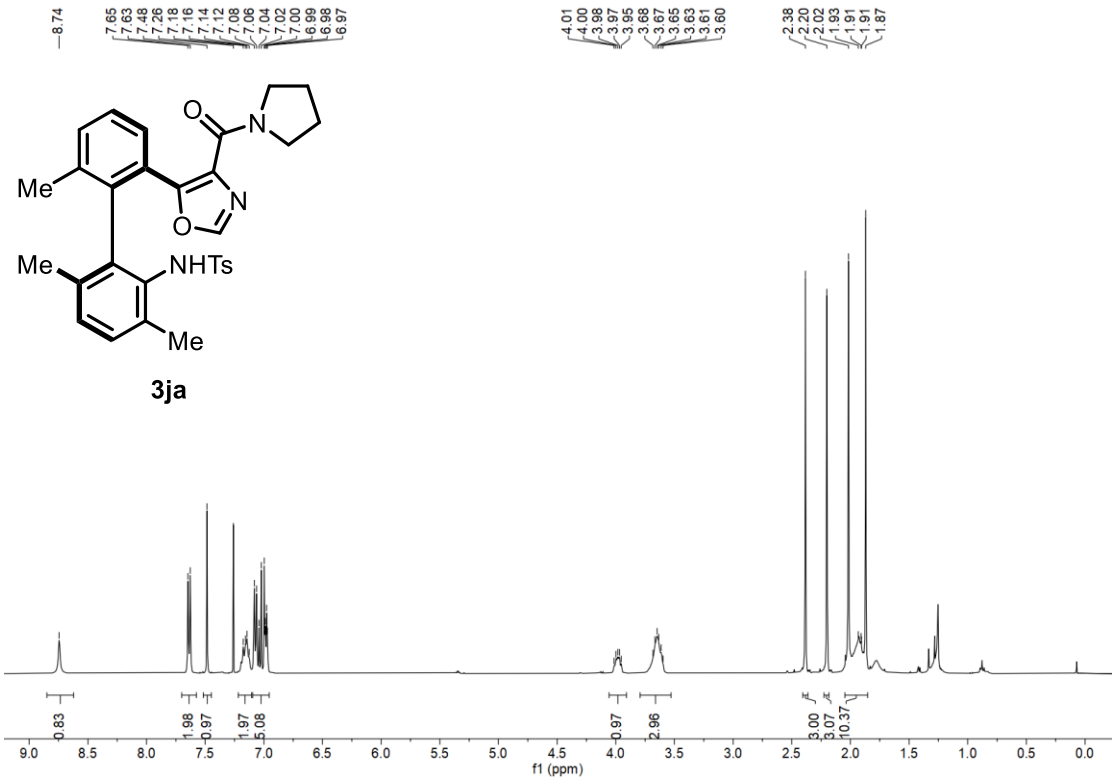
3ia

^{13}C NMR (101 MHz, $CDCl_3$)



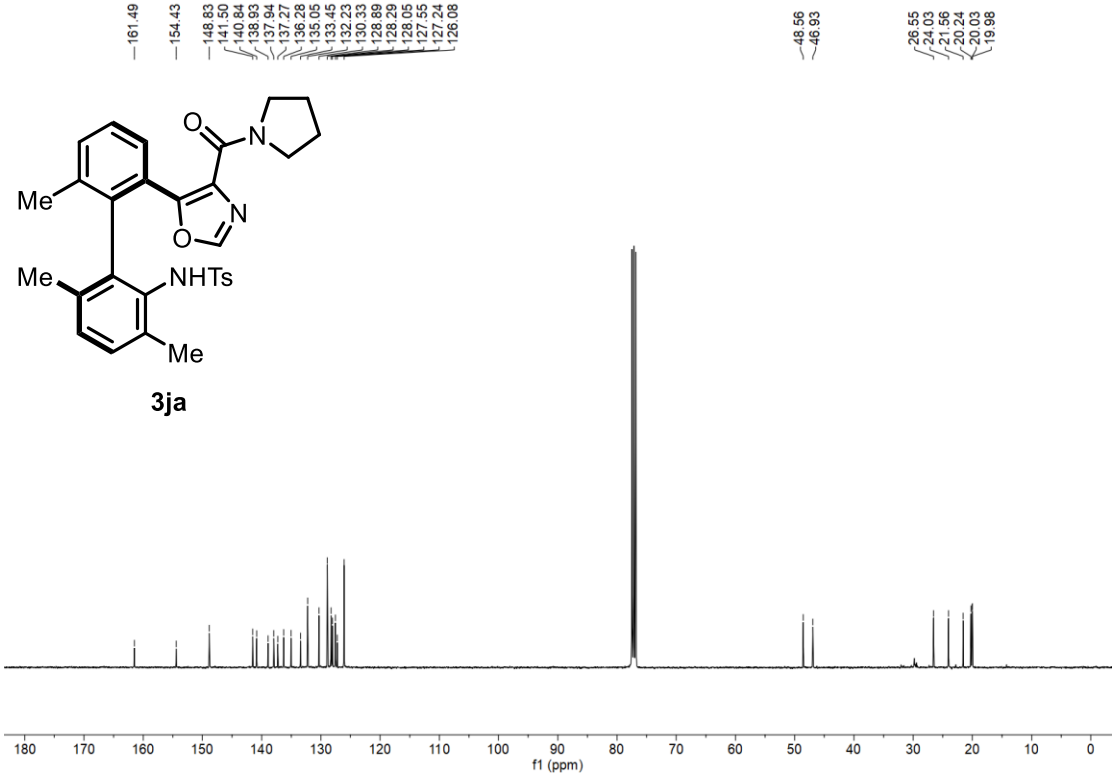
3ia

^{1}H NMR (400 MHz, $CDCl_3$)



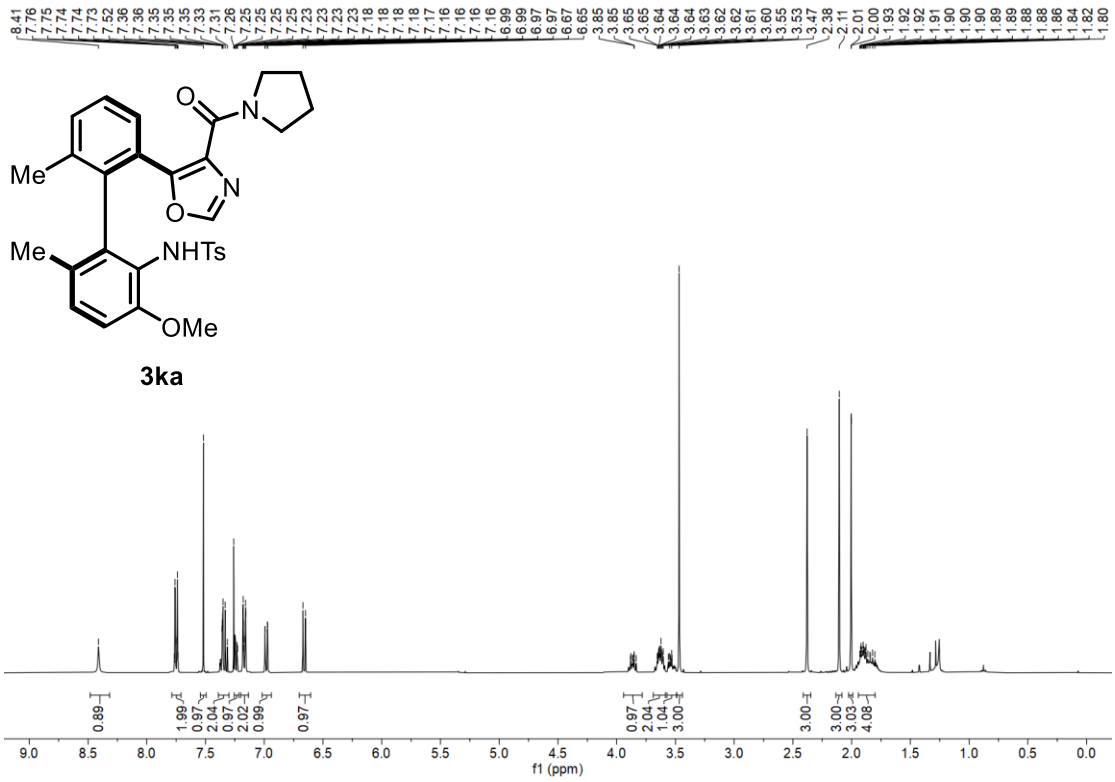
3ja

^{13}C NMR (101 MHz, $CDCl_3$)

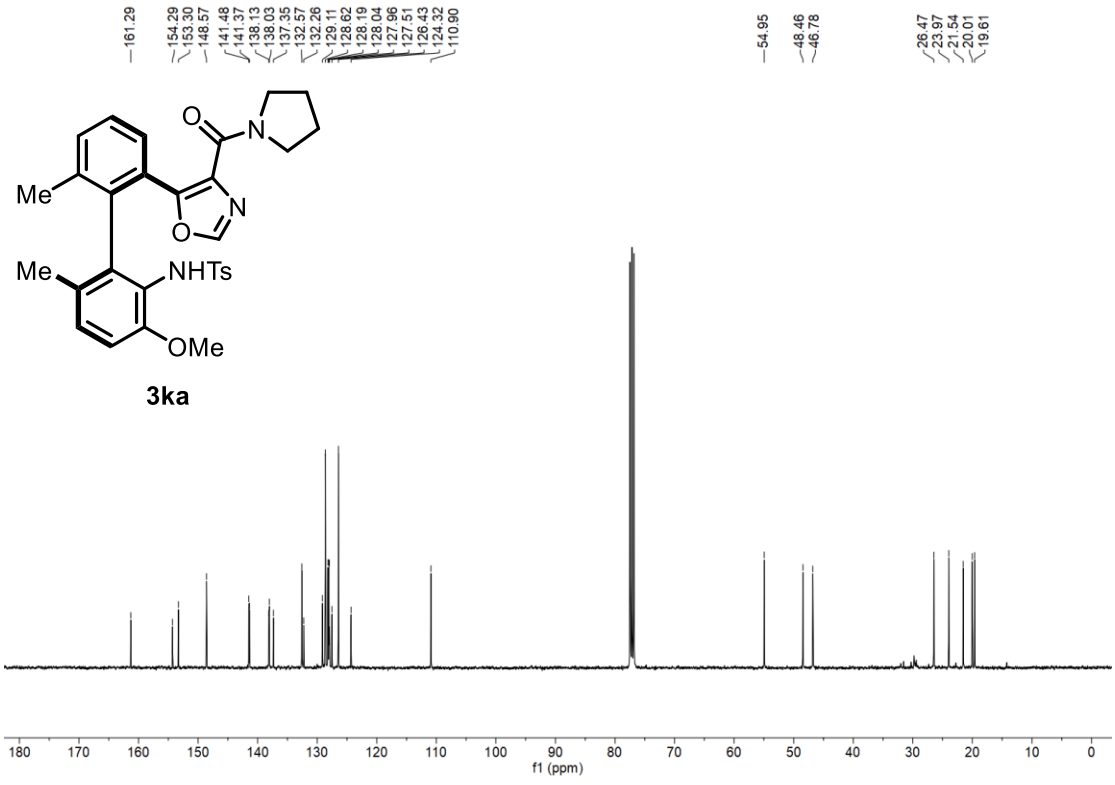


3ja

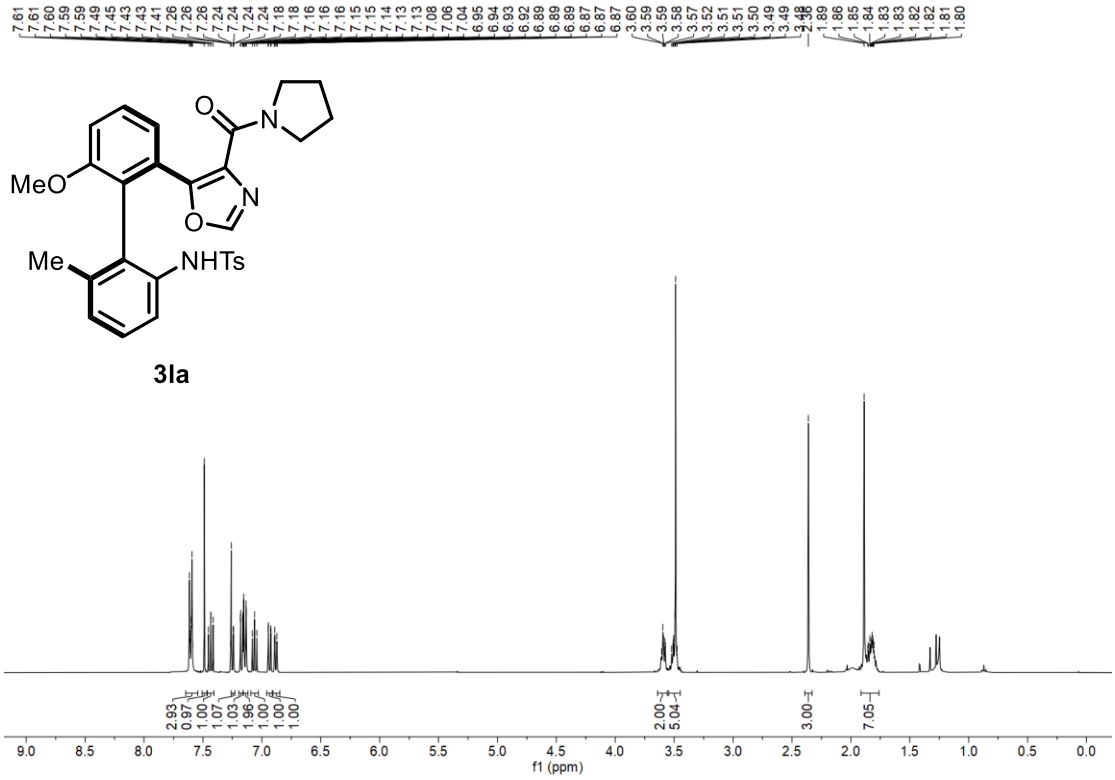
^{1}H NMR (400 MHz, $CDCl_3$)



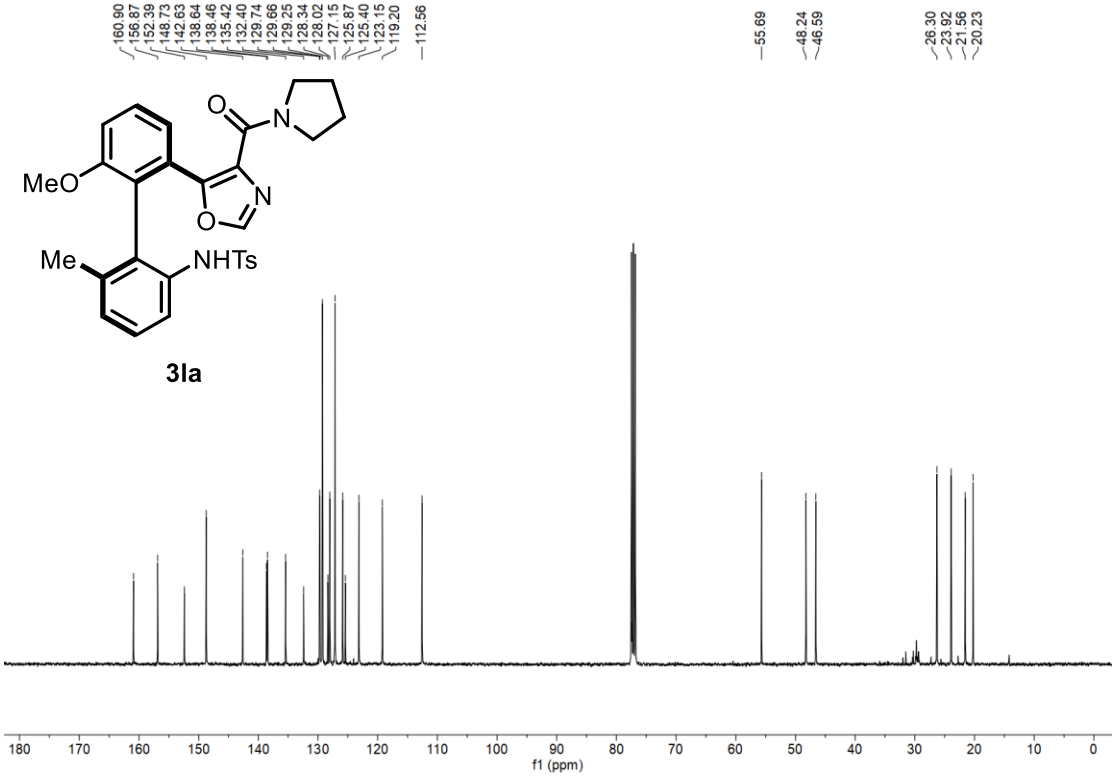
^{13}C NMR (101 MHz, $CDCl_3$)



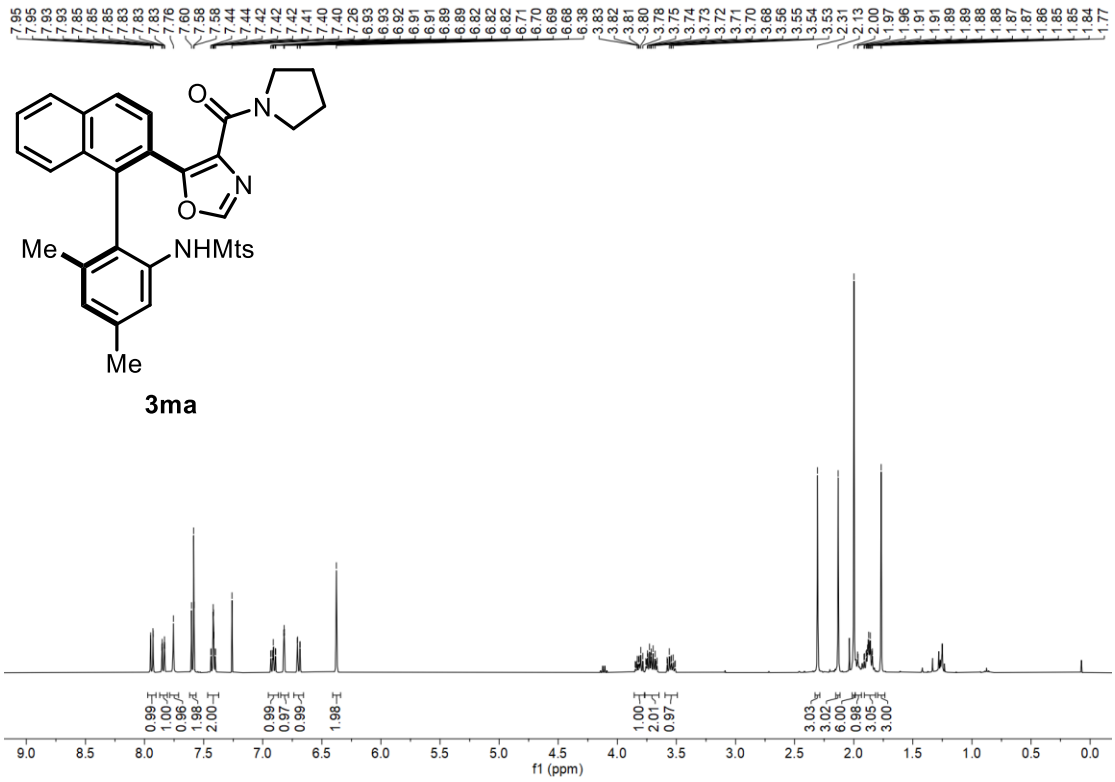
^{1}H NMR (400 MHz, $CDCl_3$)



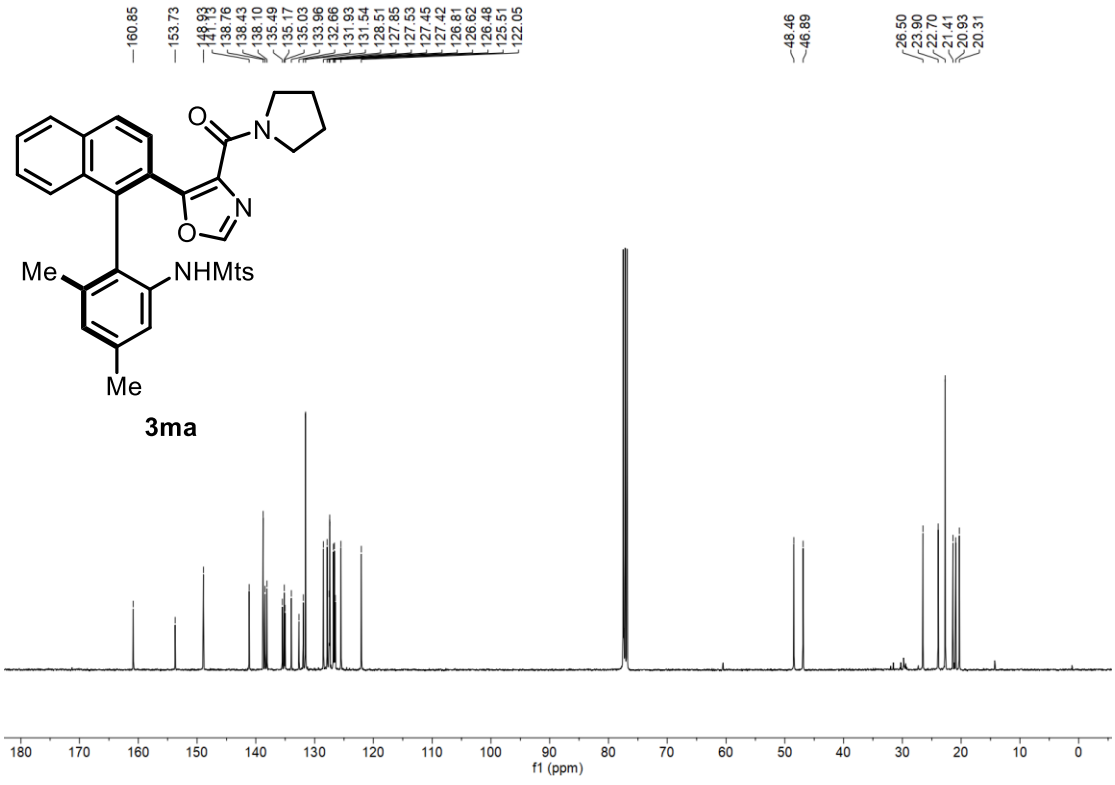
^{13}C NMR (101 MHz, $CDCl_3$)



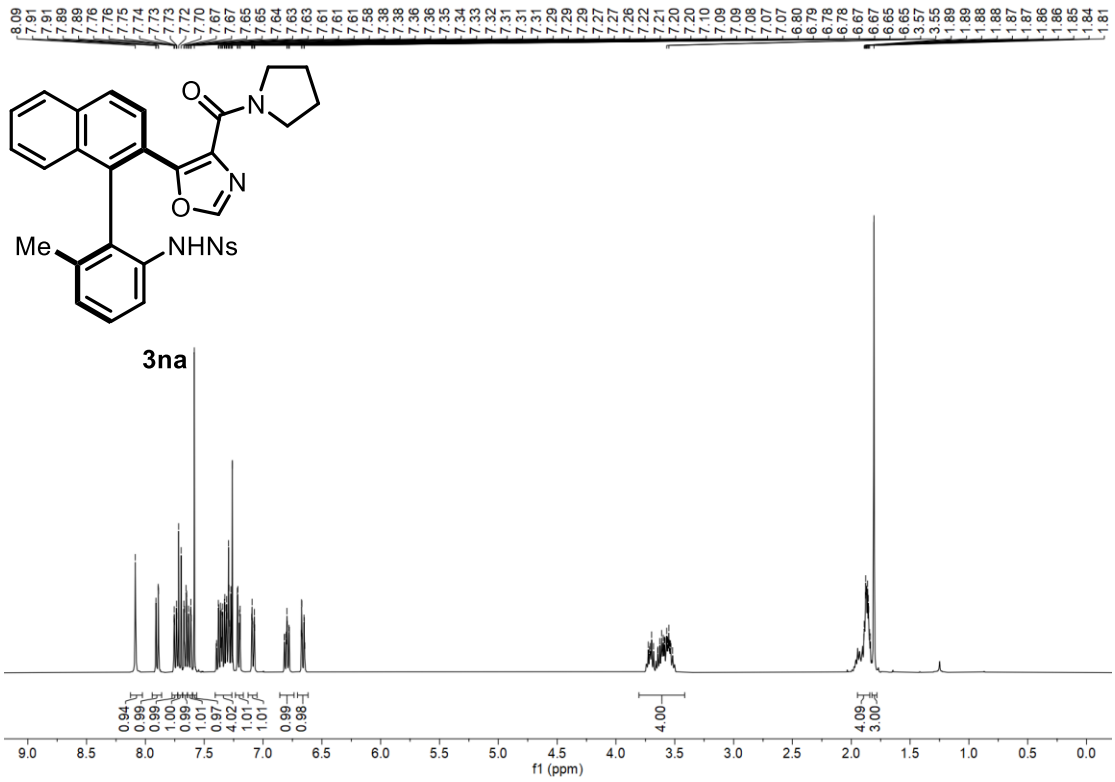
^{1}H NMR (400 MHz, $CDCl_3$)



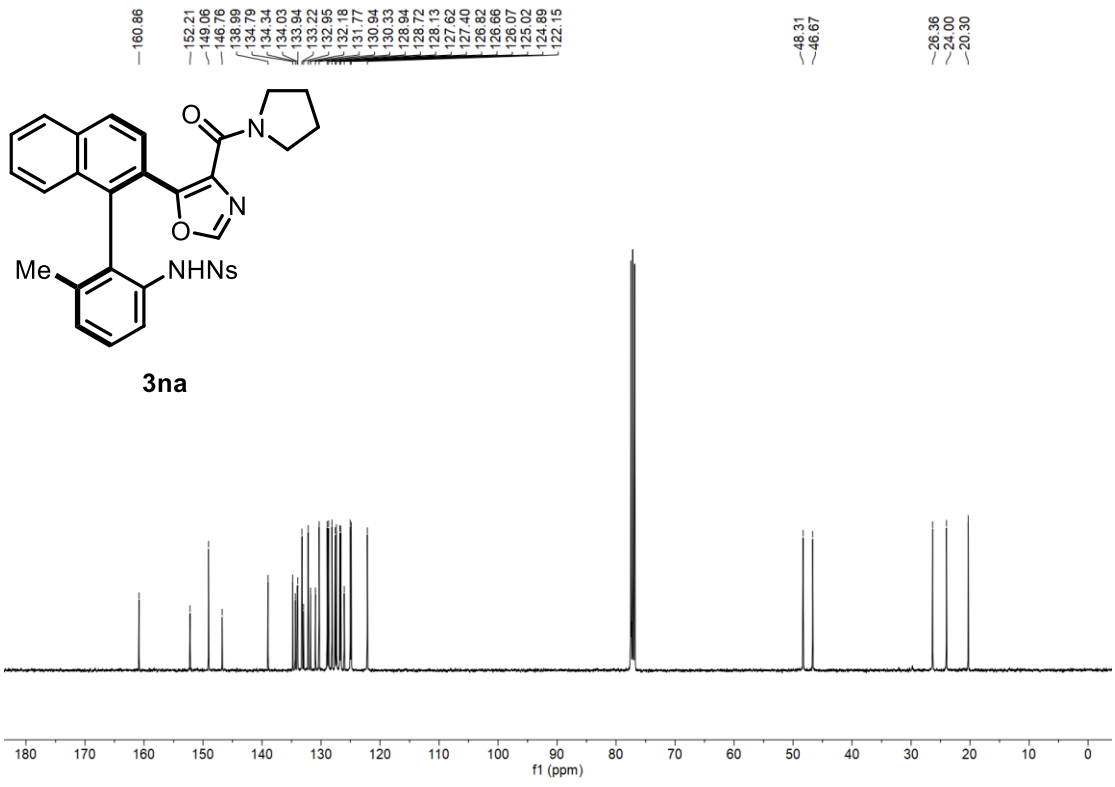
^{13}C NMR (101 MHz, $CDCl_3$)



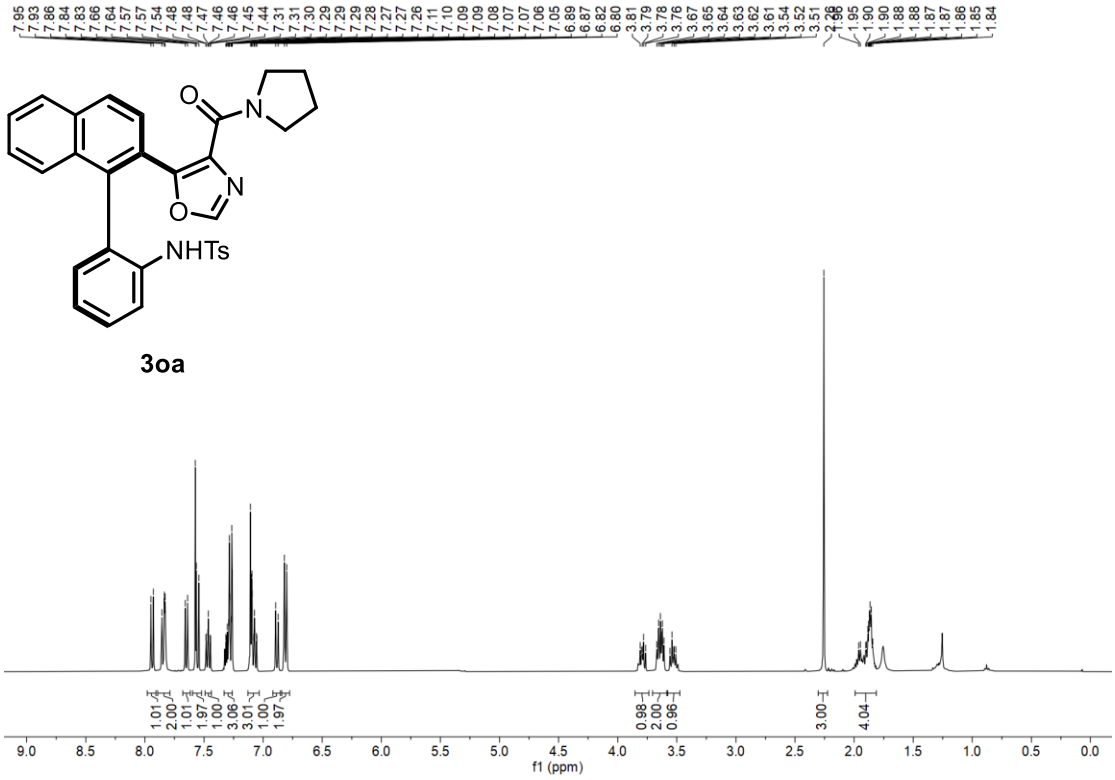
^{1}H NMR (400 MHz, $CDCl_3$)



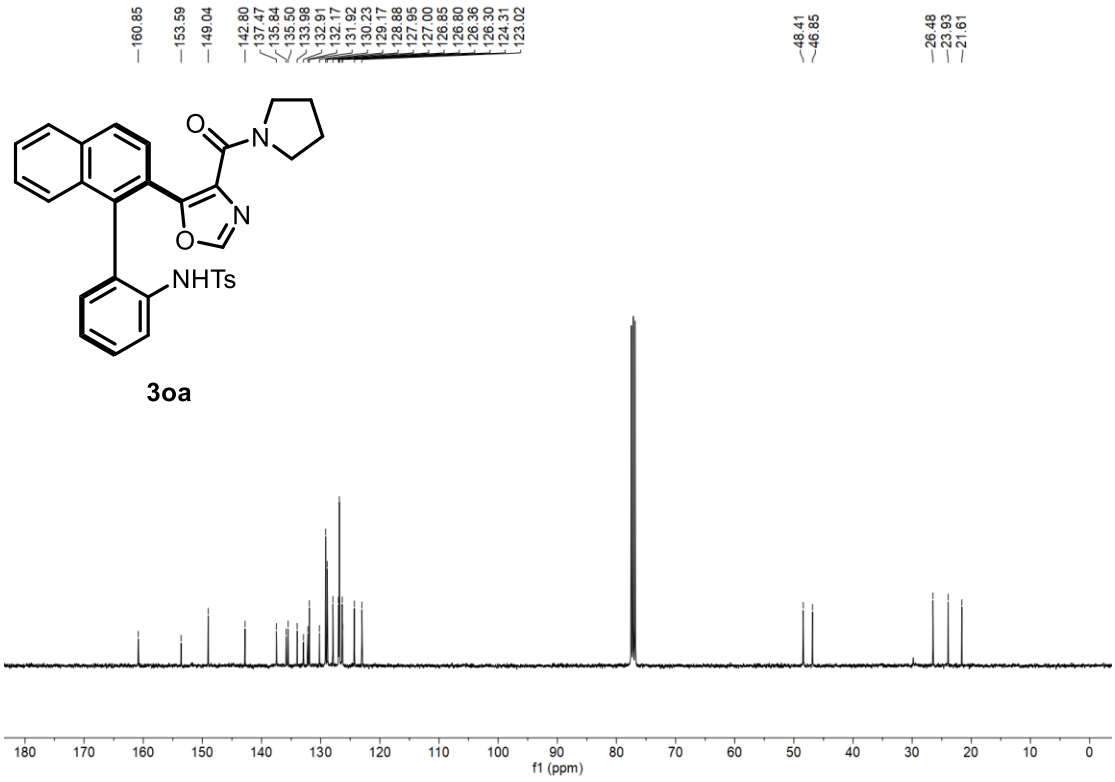
^{13}C NMR (101 MHz, $CDCl_3$)



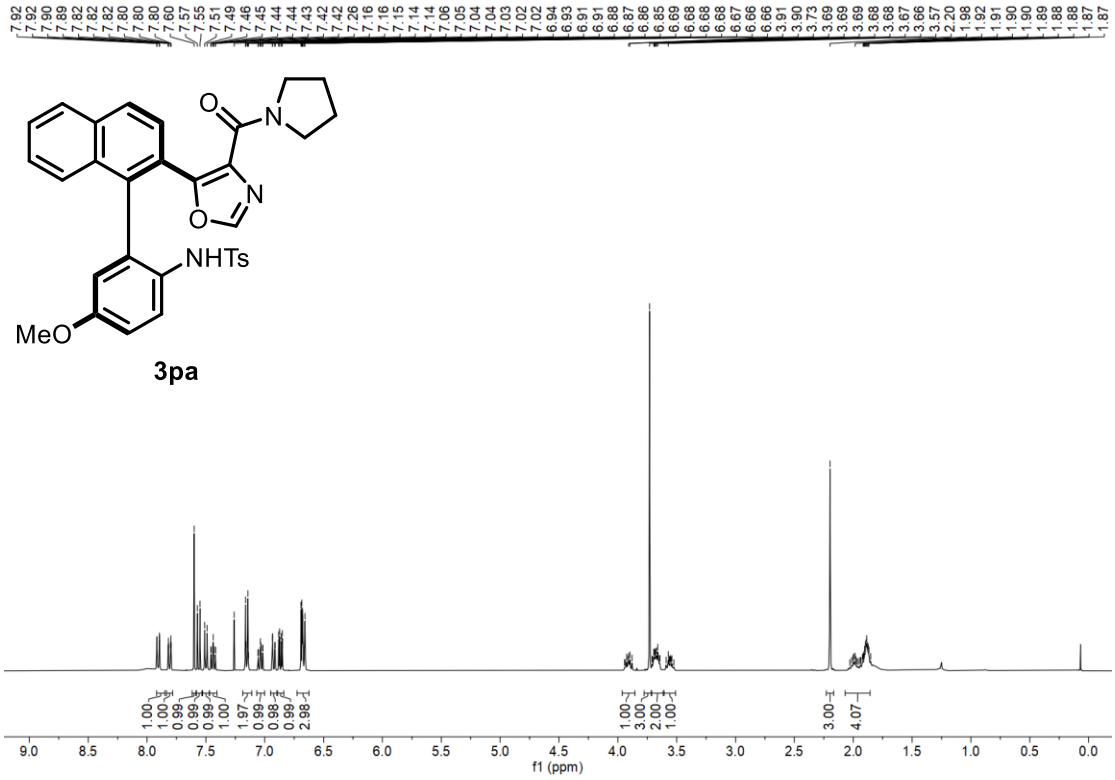
^{1}H NMR (400 MHz, $CDCl_3$)



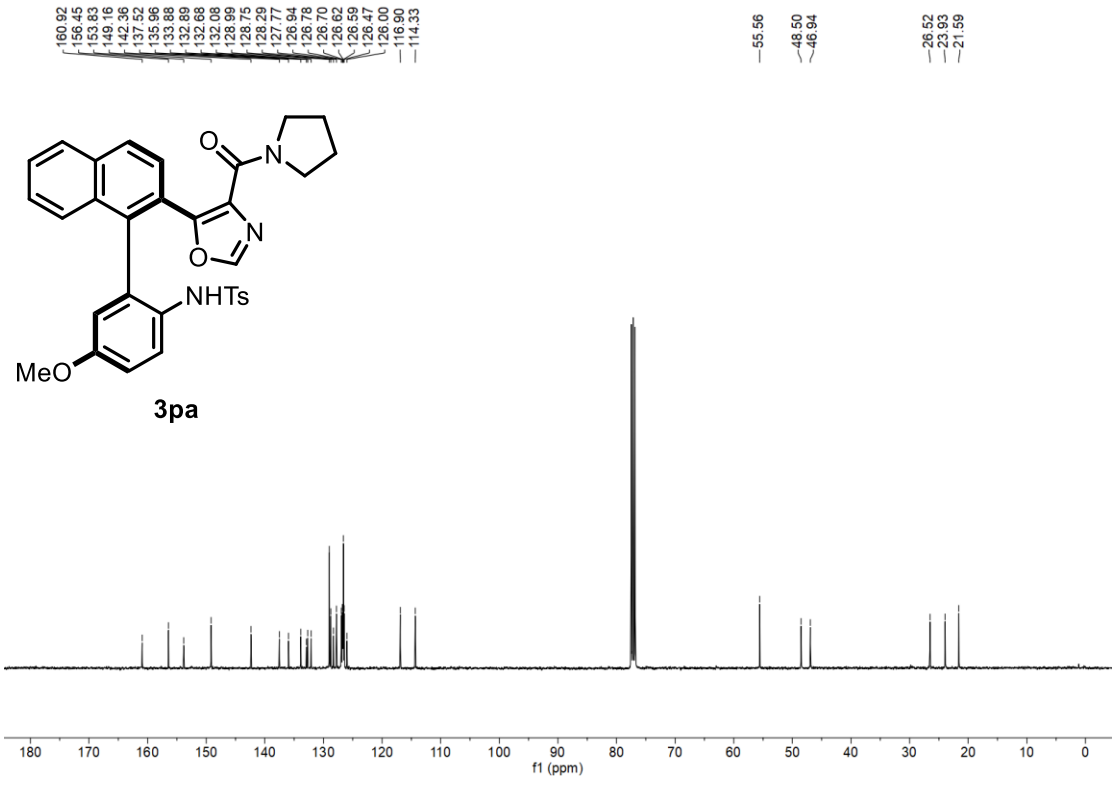
^{13}C NMR (101 MHz, $CDCl_3$)



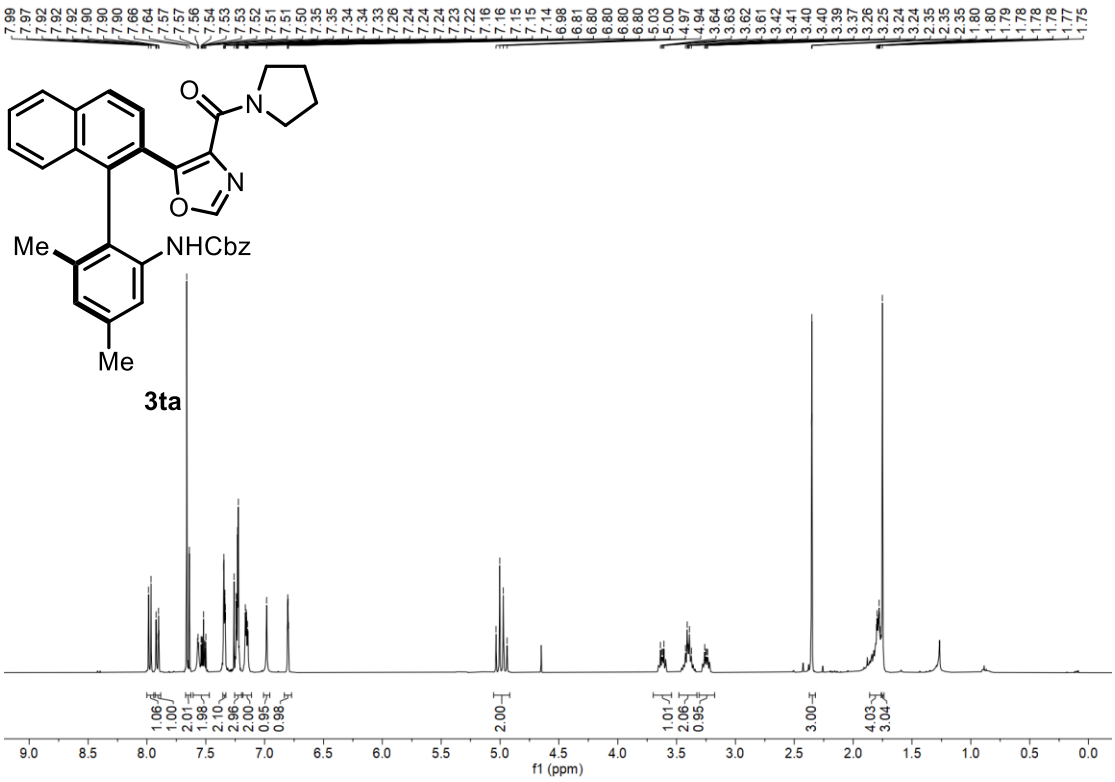
^{1}H NMR (400 MHz, $CDCl_3$)



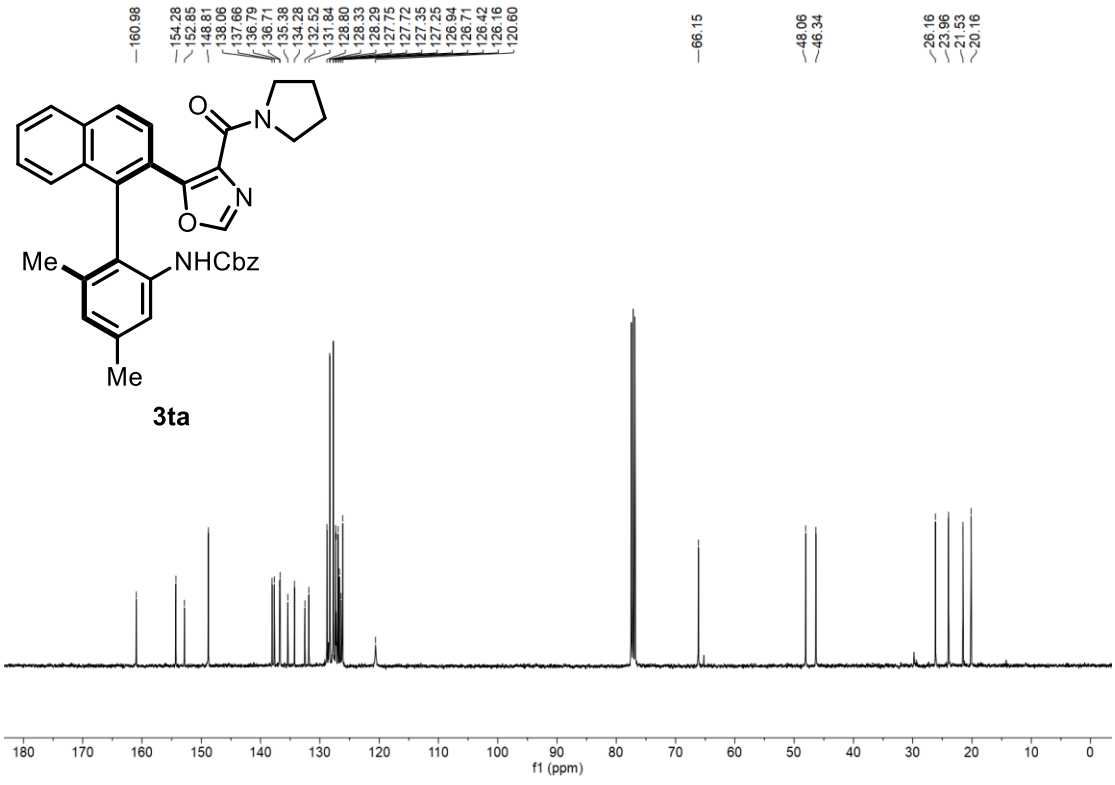
^{13}C NMR (101 MHz, $CDCl_3$)



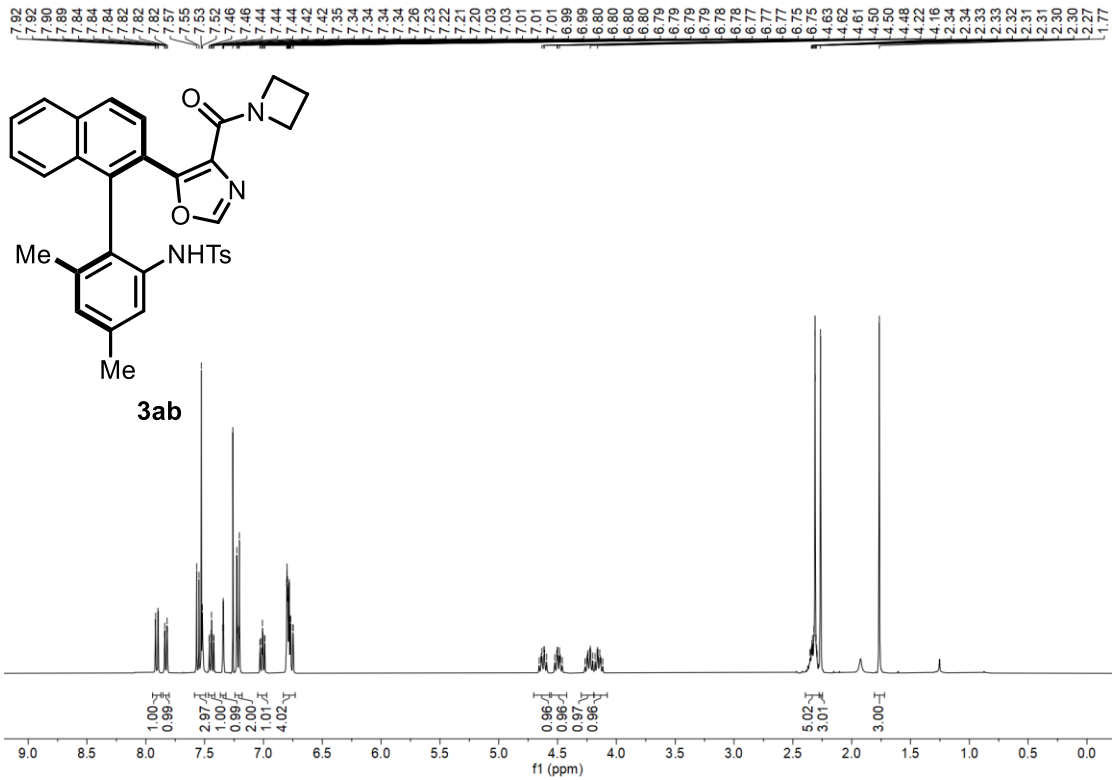
^{1}H NMR (400 MHz, $CDCl_3$)



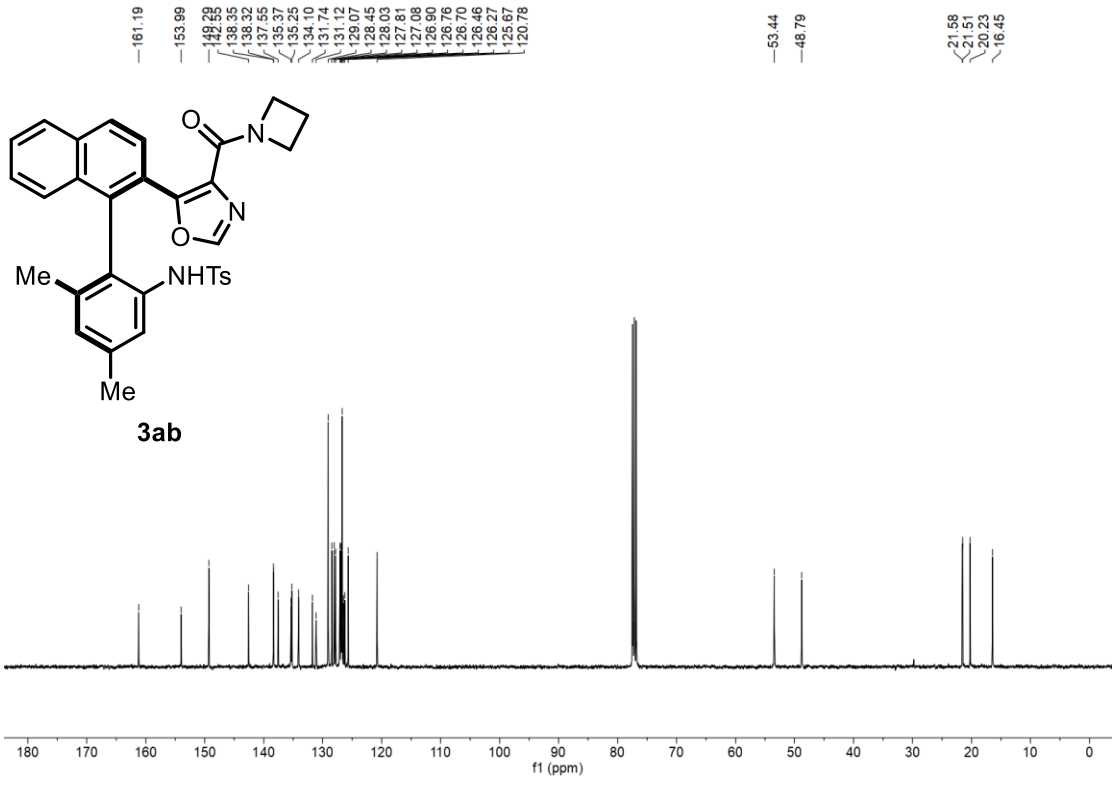
^{13}C NMR (101 MHz, $CDCl_3$)



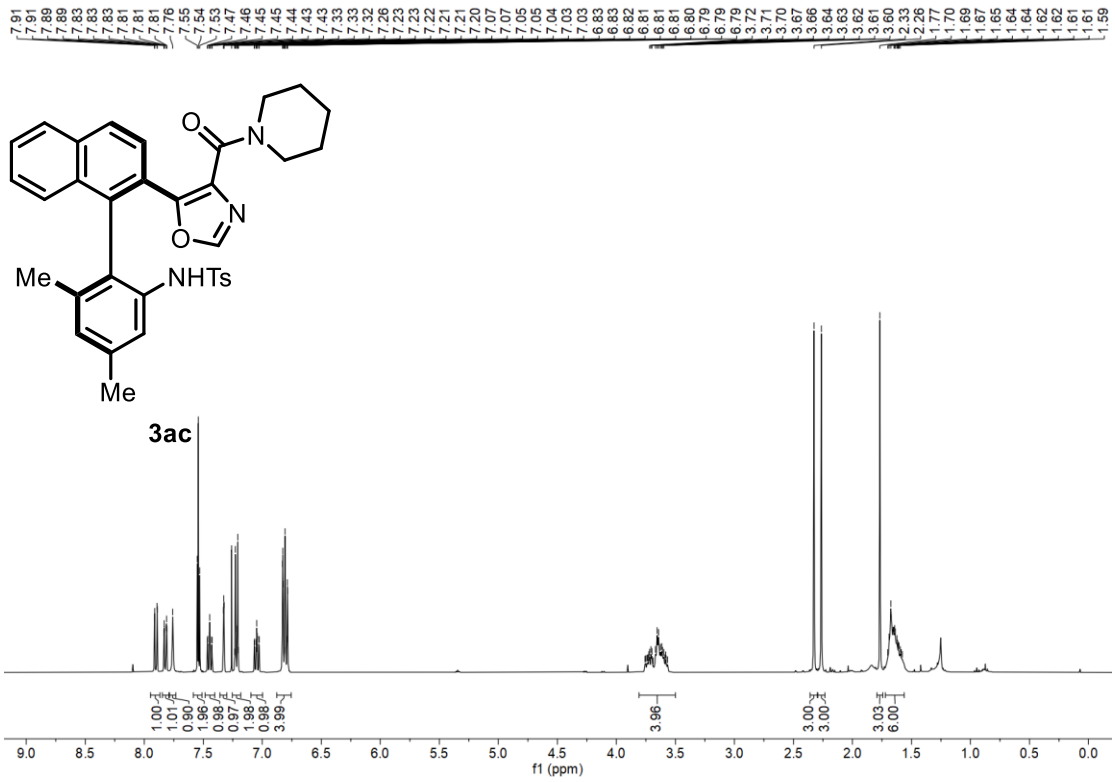
^{1}H NMR (400 MHz, $CDCl_3$)



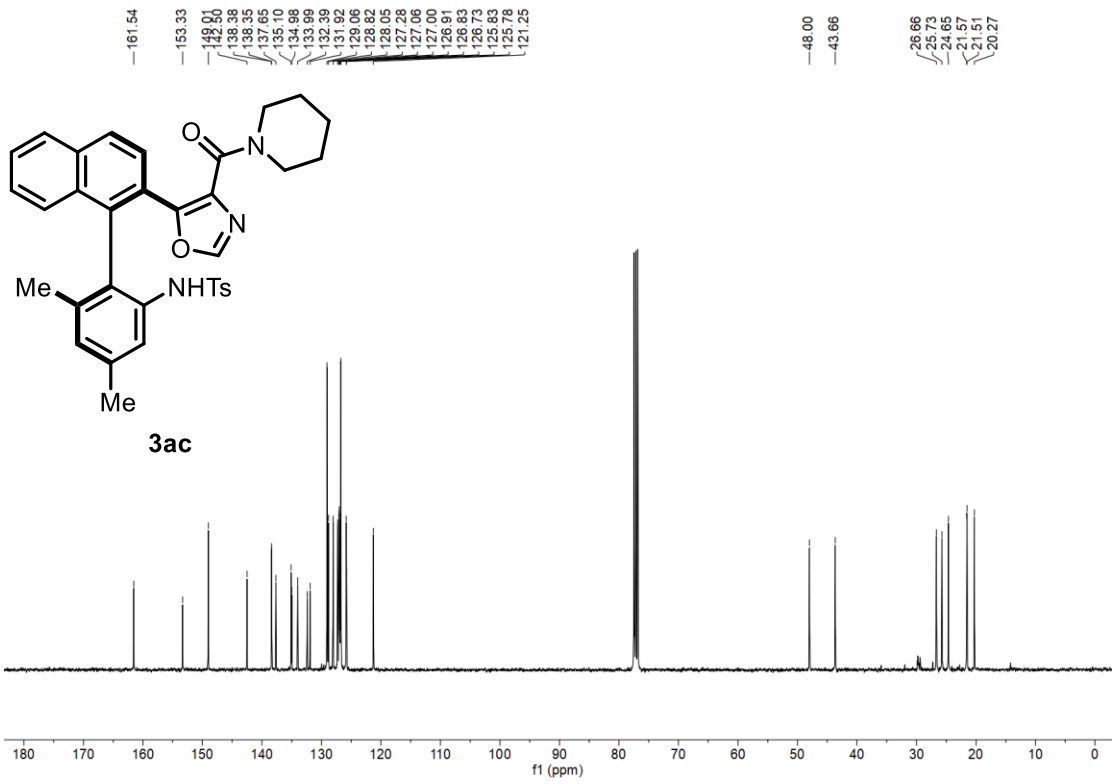
^{13}C NMR (101 MHz, $CDCl_3$)



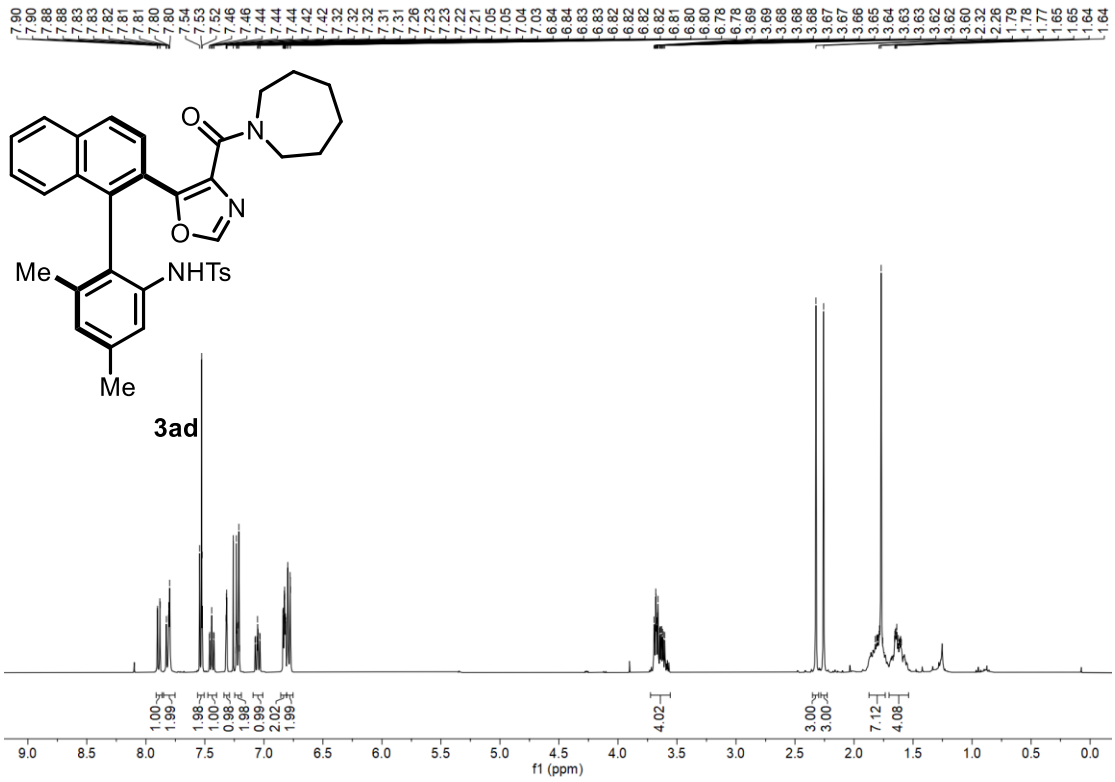
^{1}H NMR (400 MHz, $CDCl_3$)



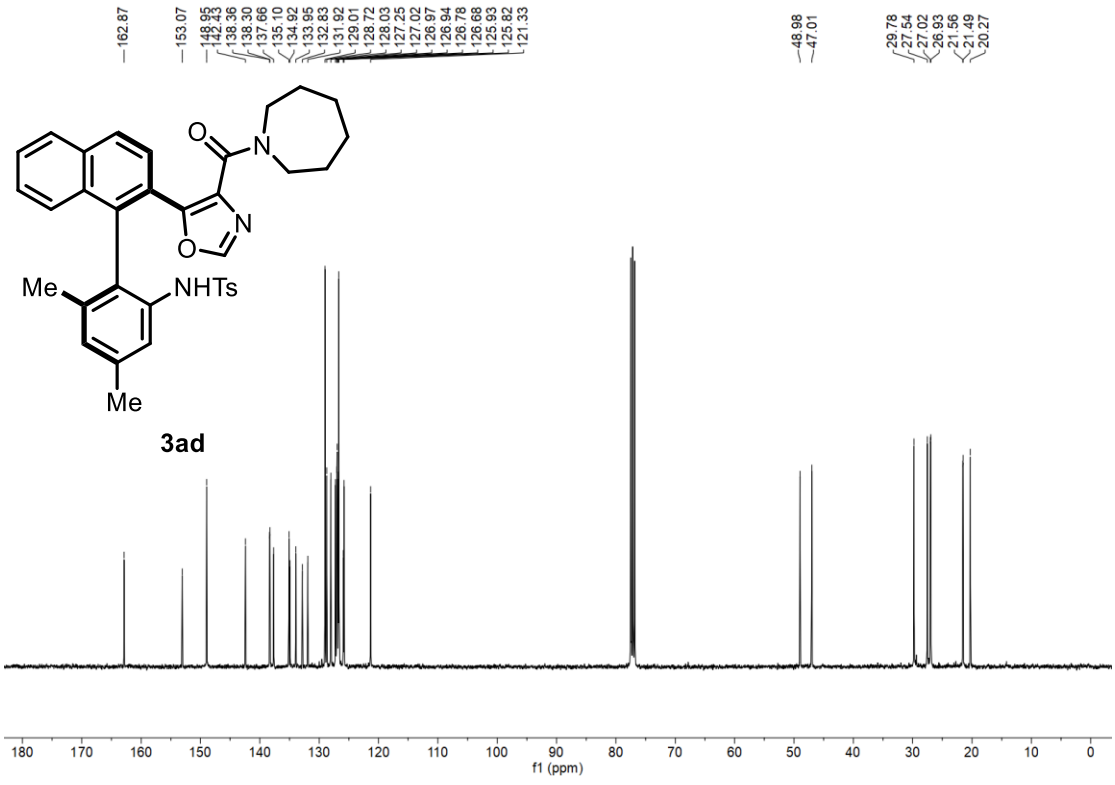
^{13}C NMR (101 MHz, $CDCl_3$)



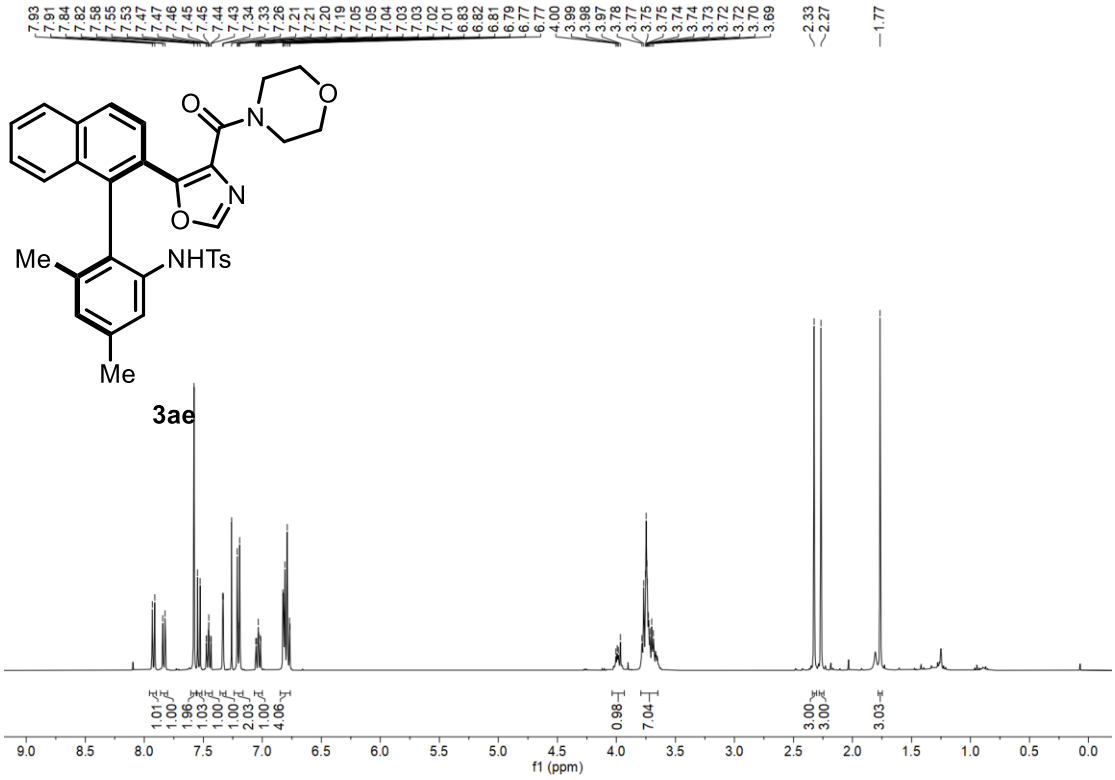
^{1}H NMR (400 MHz, $CDCl_3$)



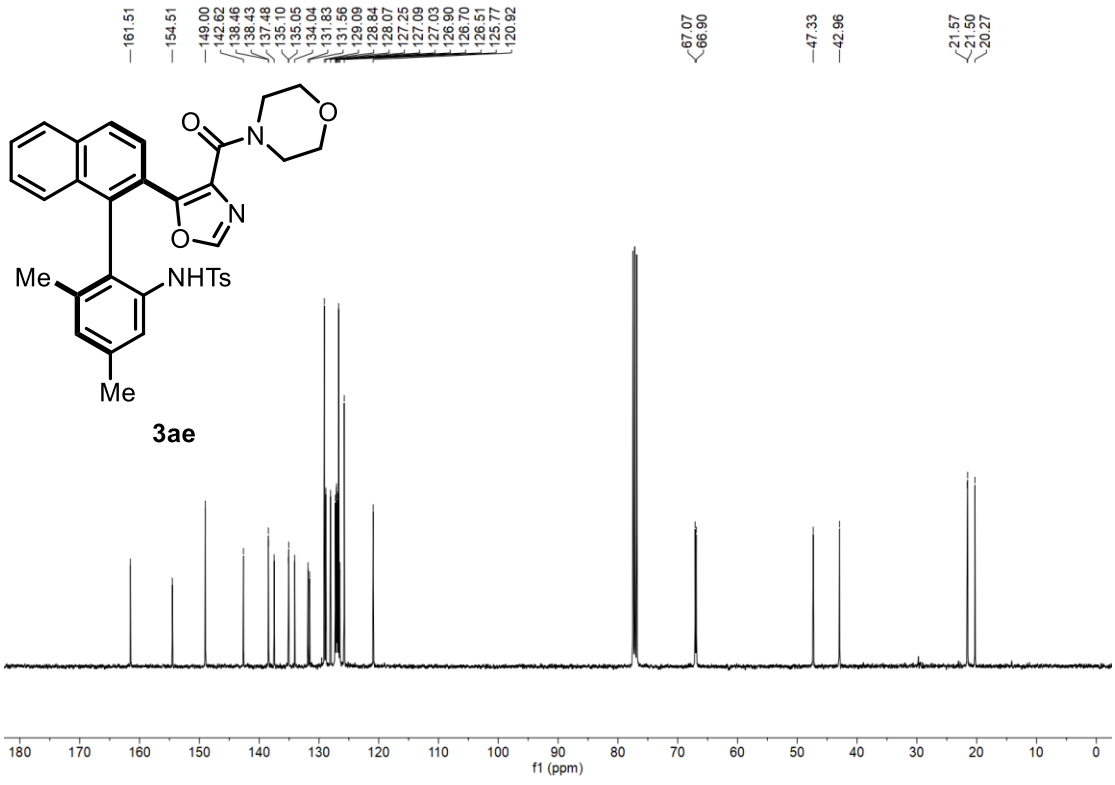
^{13}C NMR (101 MHz, $CDCl_3$)



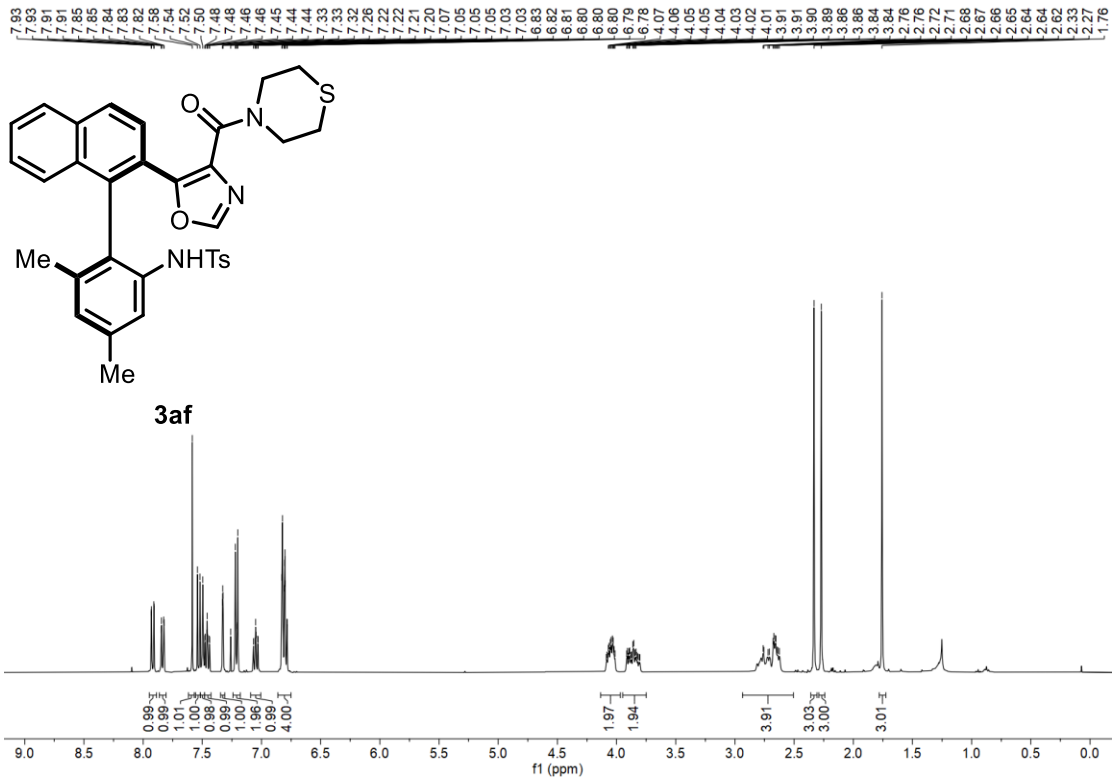
^{1}H NMR (400 MHz, $CDCl_3$)



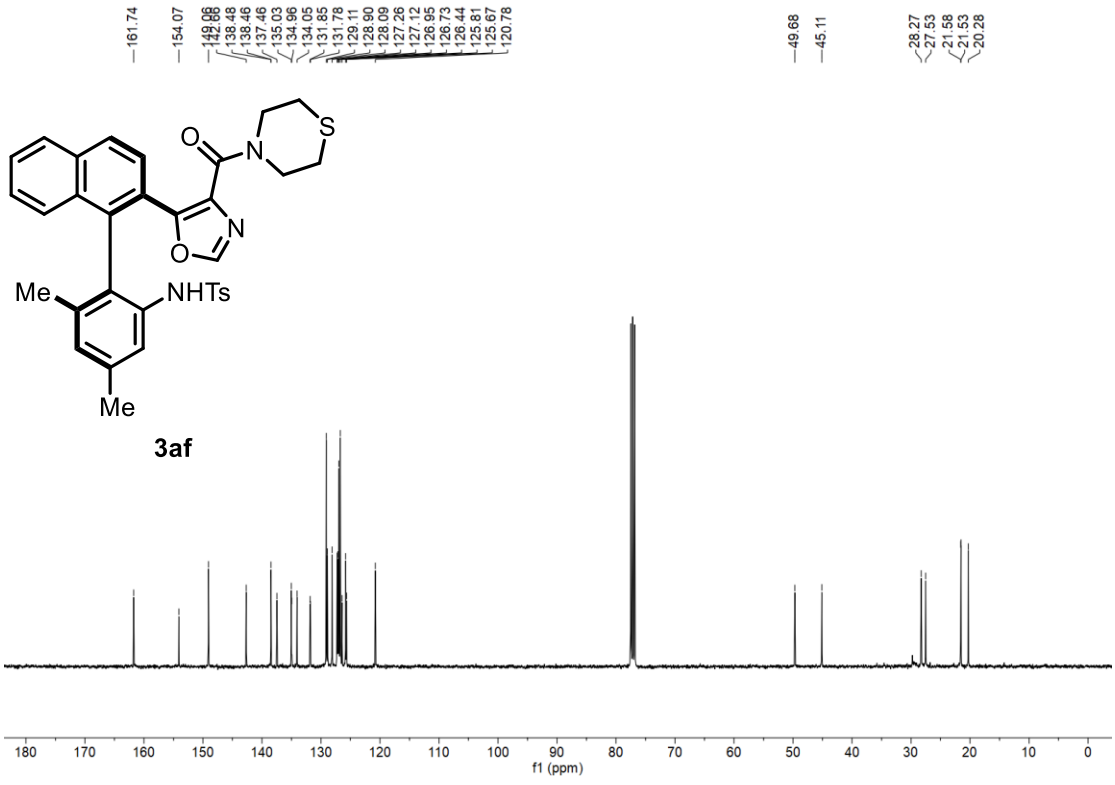
^{13}C NMR (101 MHz, $CDCl_3$)



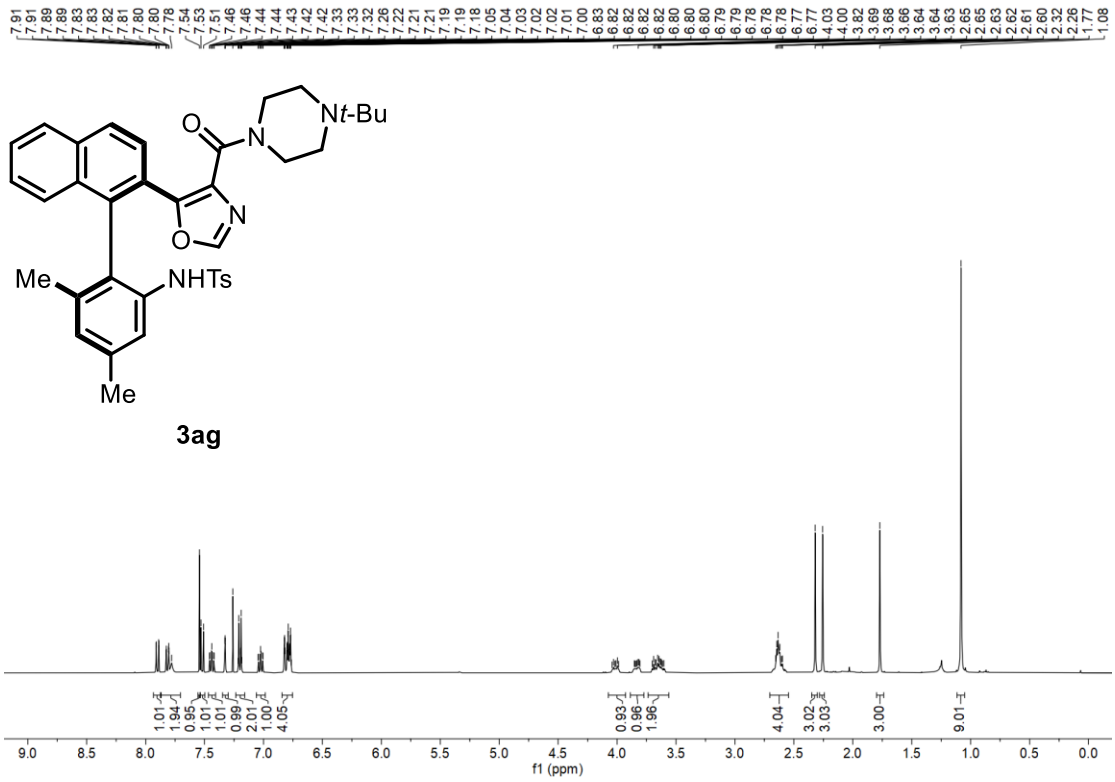
^{1}H NMR (400 MHz, $CDCl_3$)



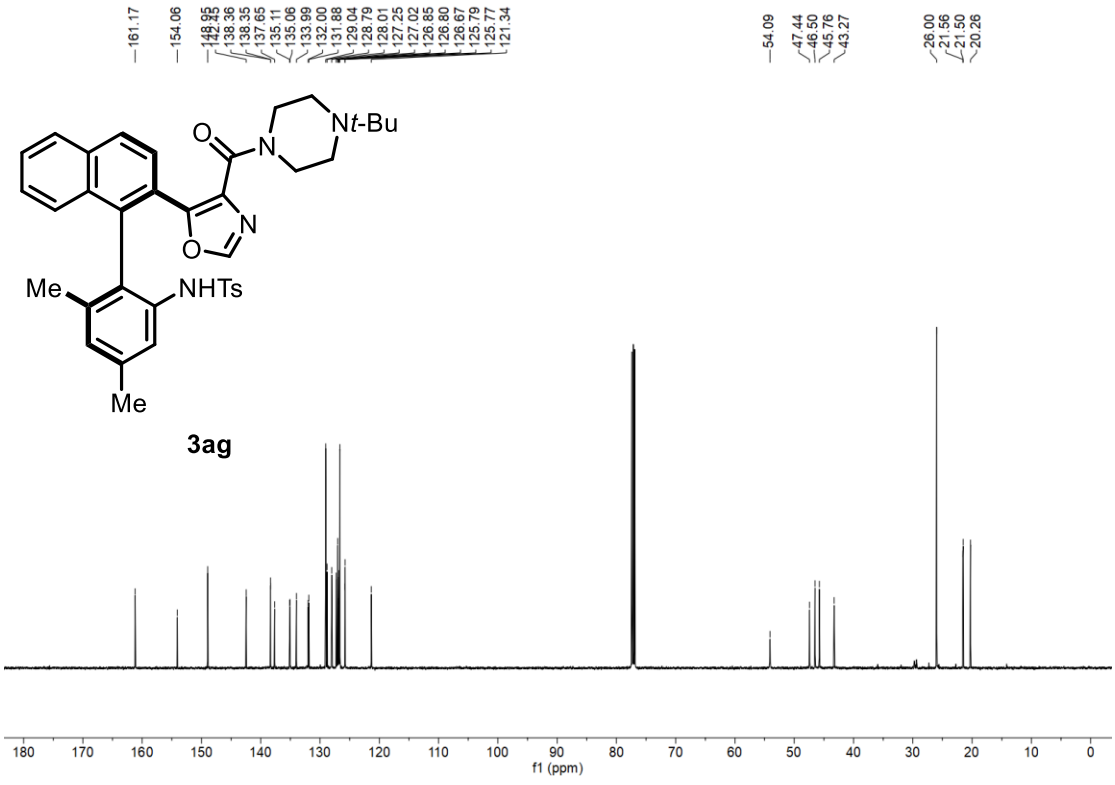
^{13}C NMR (101 MHz, $CDCl_3$)



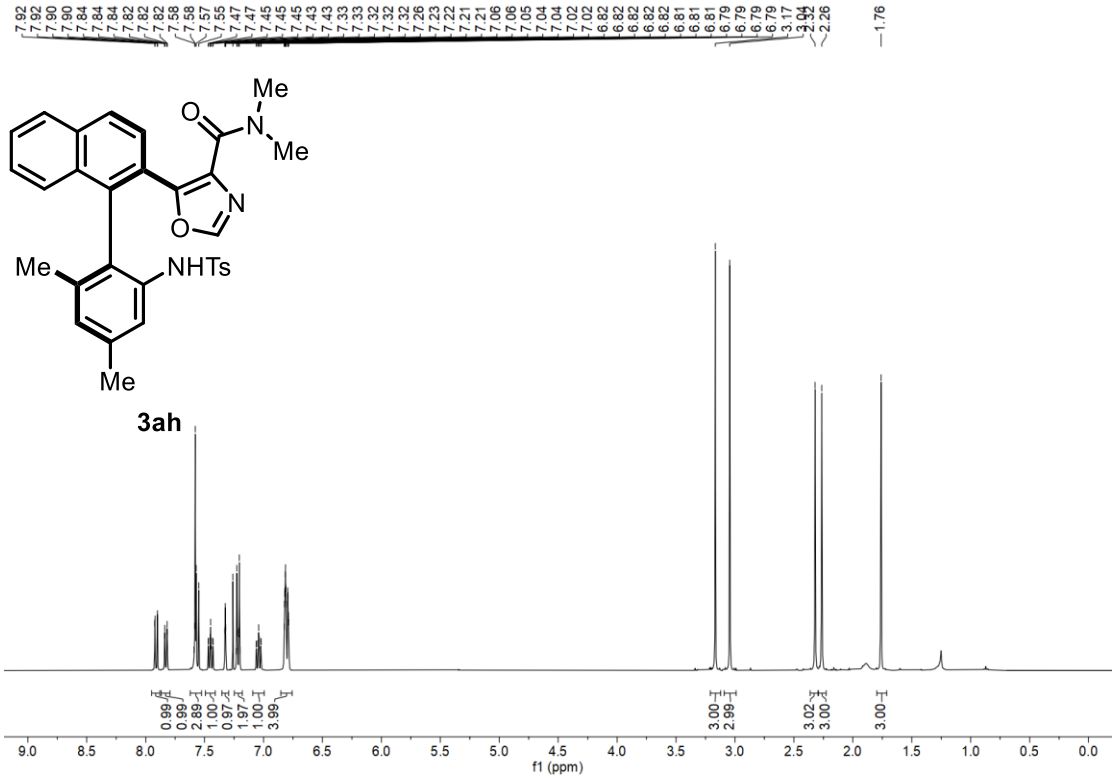
^{1}H NMR (400 MHz, $CDCl_3$)



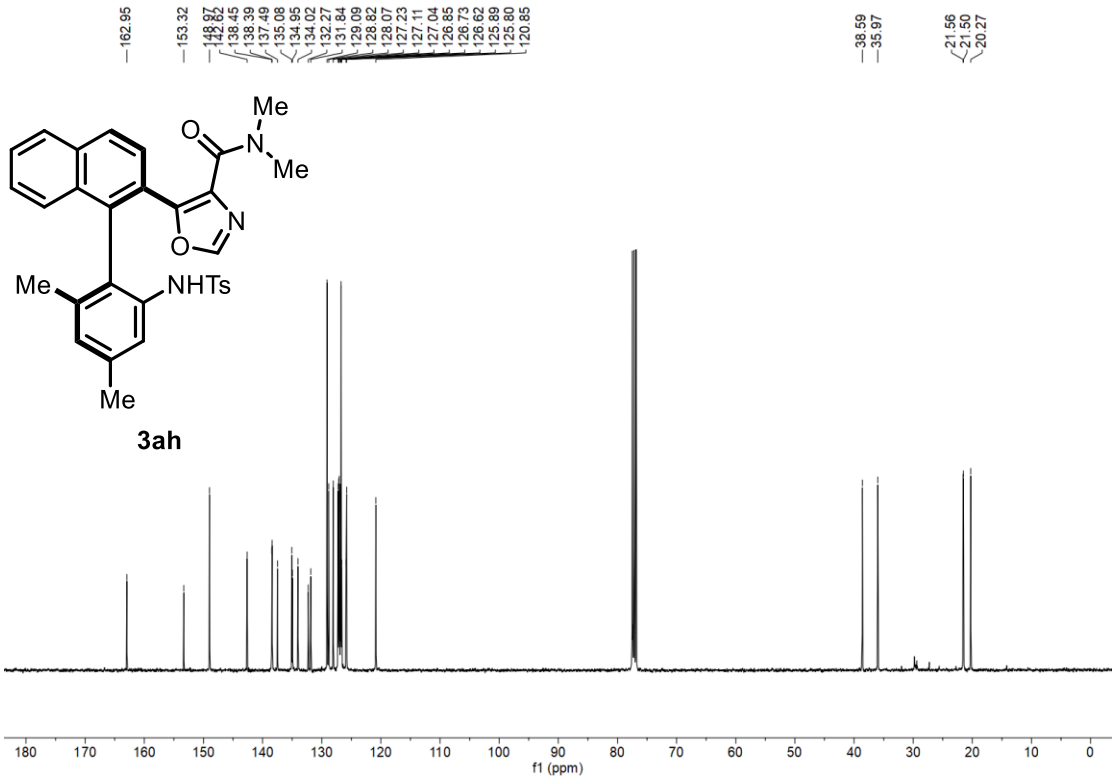
^{13}C NMR (126 MHz, $CDCl_3$)



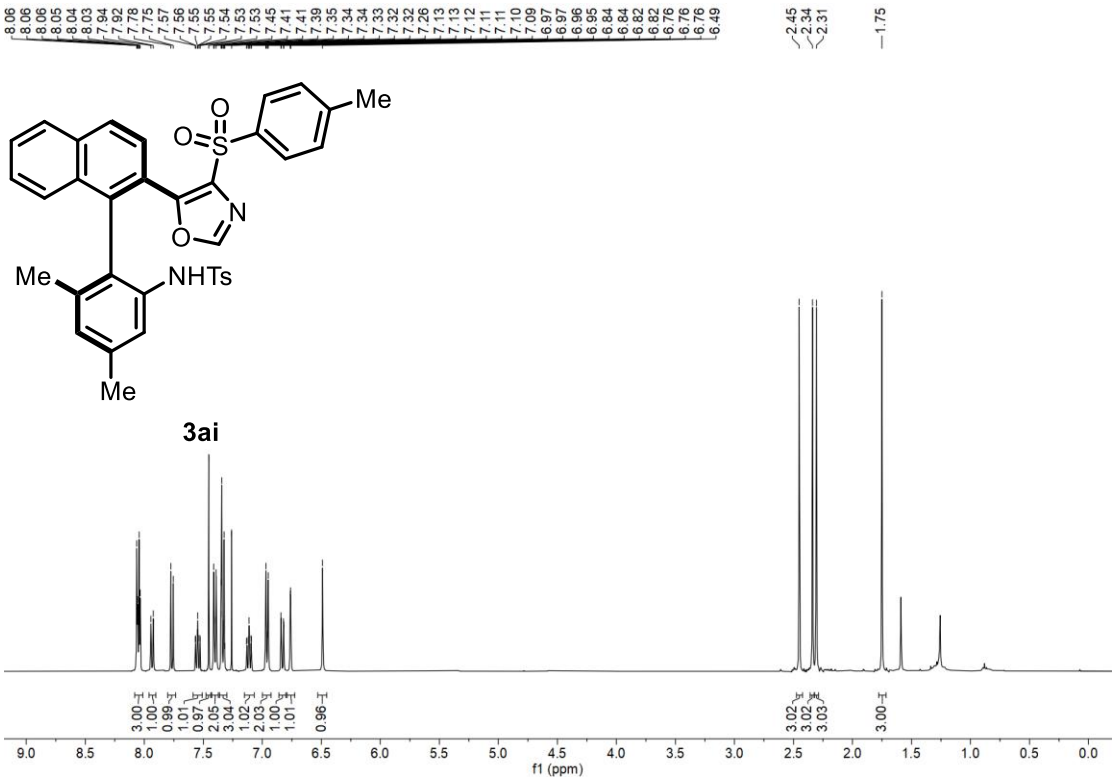
^{1}H NMR (400 MHz, $CDCl_3$)



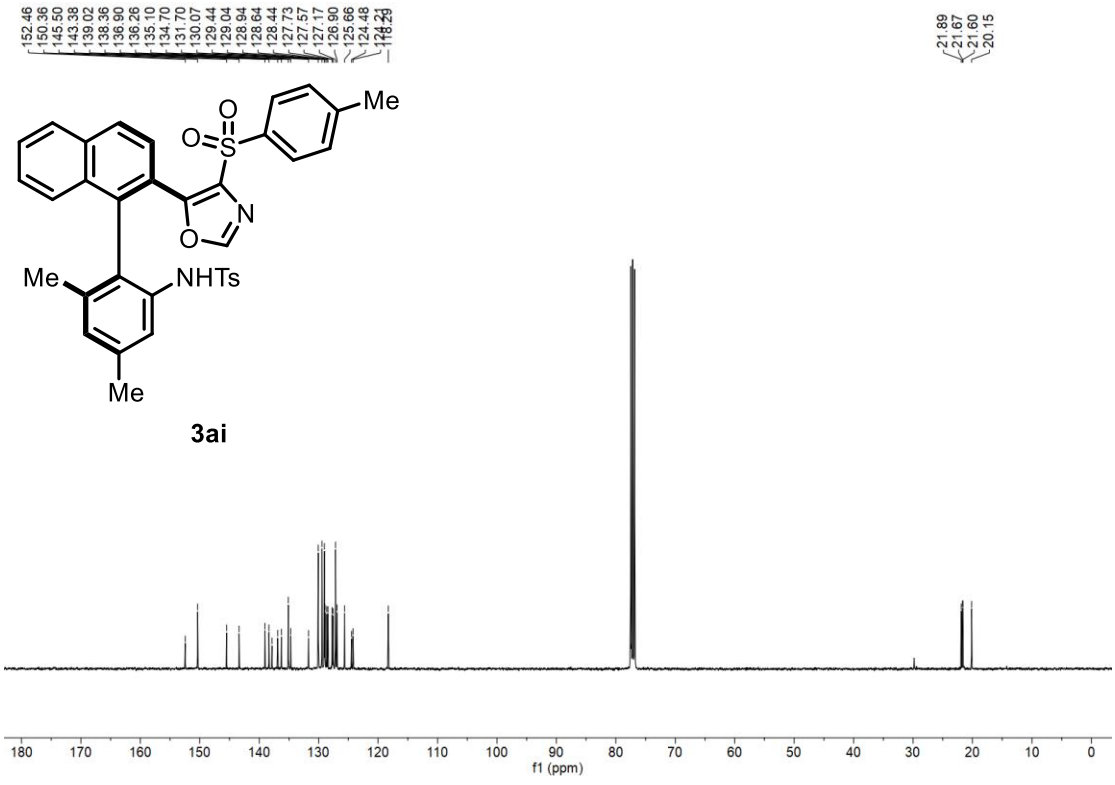
^{13}C NMR (101 MHz, $CDCl_3$)



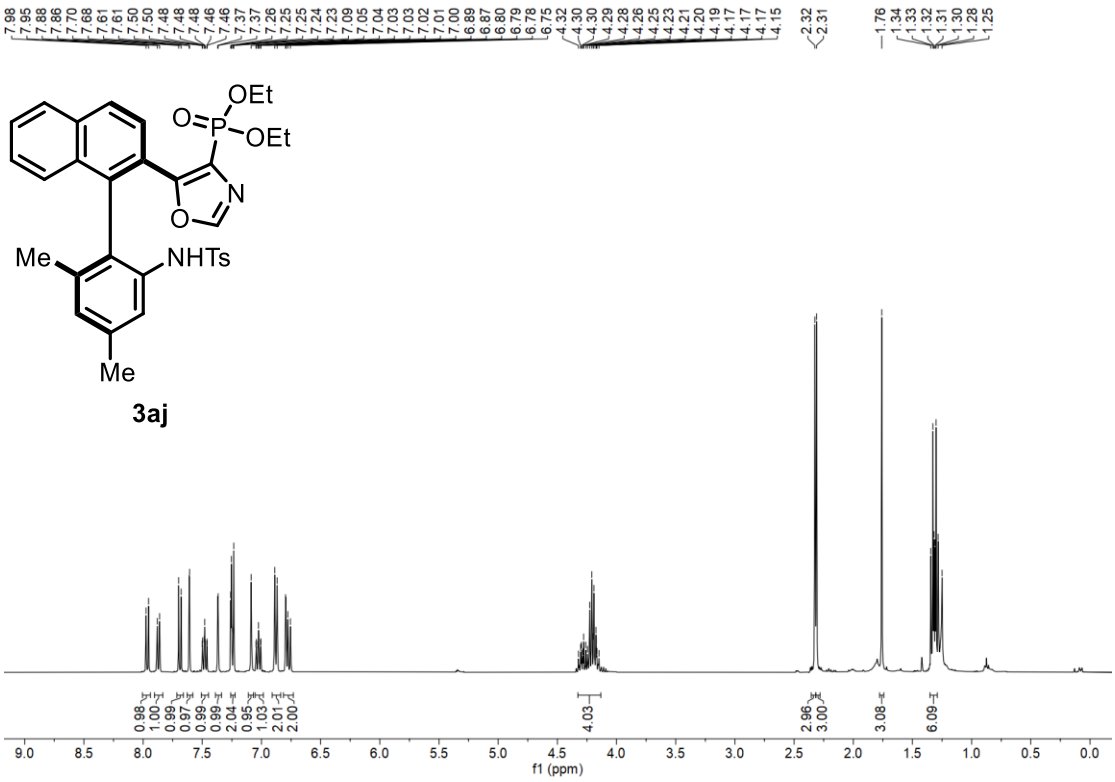
^{1}H NMR (400 MHz, $CDCl_3$)



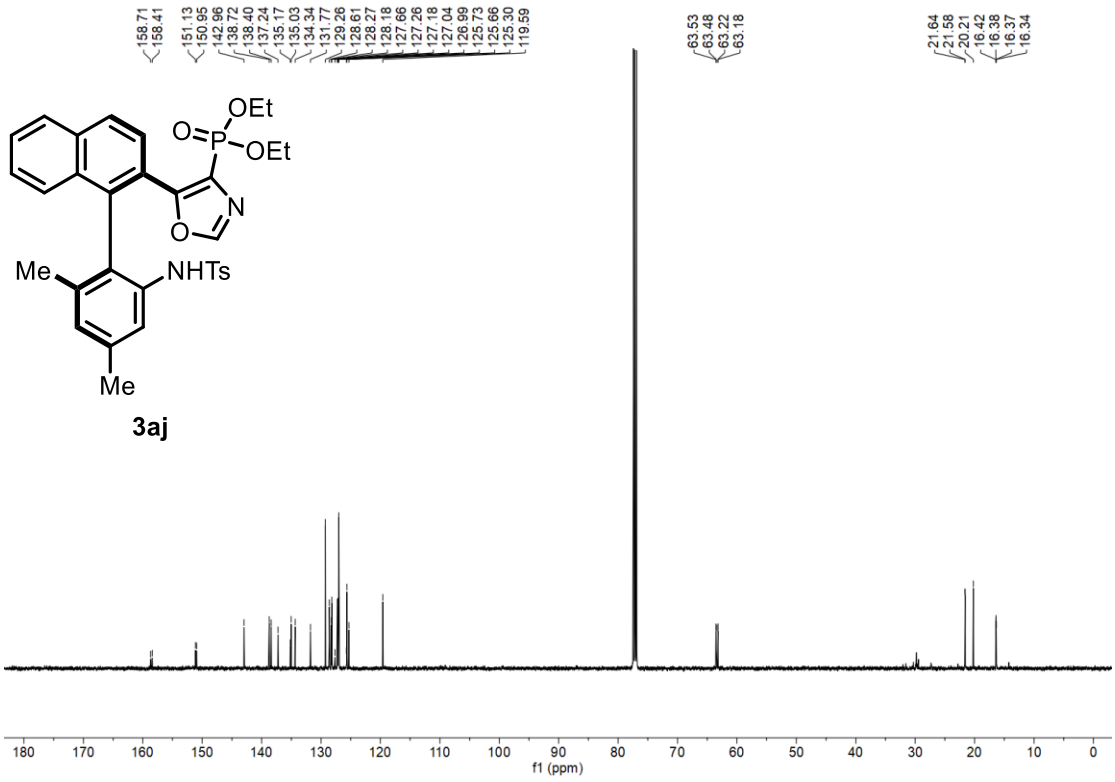
^{13}C NMR (101 MHz, $CDCl_3$)



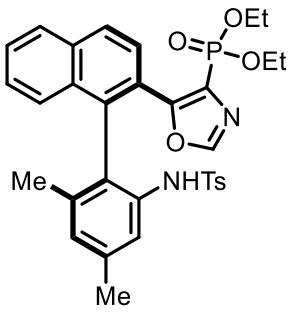
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (126 MHz, $CDCl_3$)

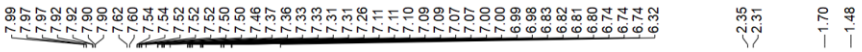


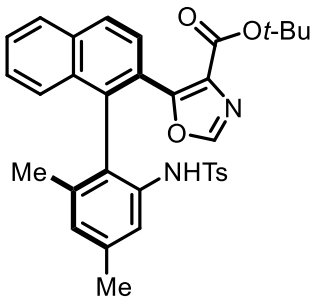
^{31}P NMR (202 MHz, $CDCl_3$)



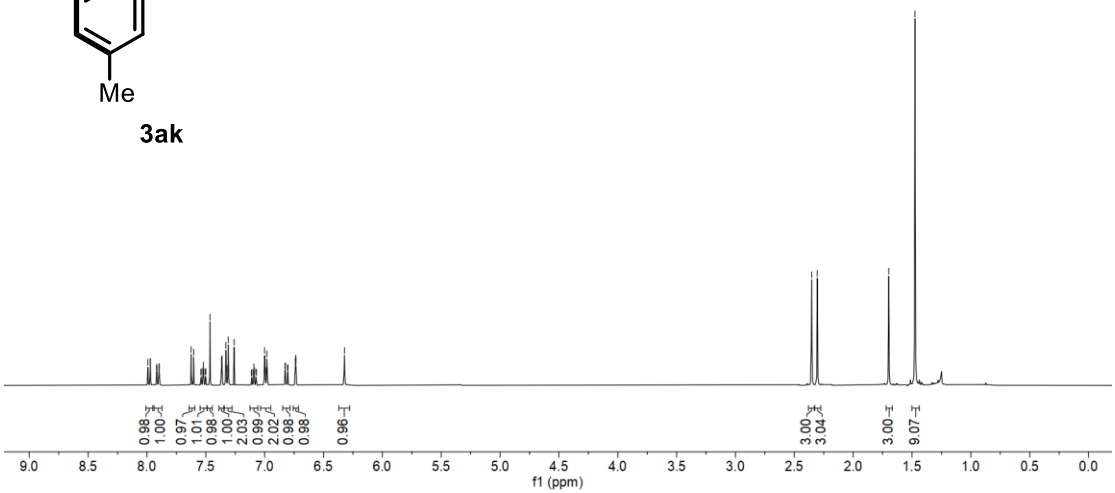
3aj

^{1}H NMR (400 MHz, $CDCl_3$)

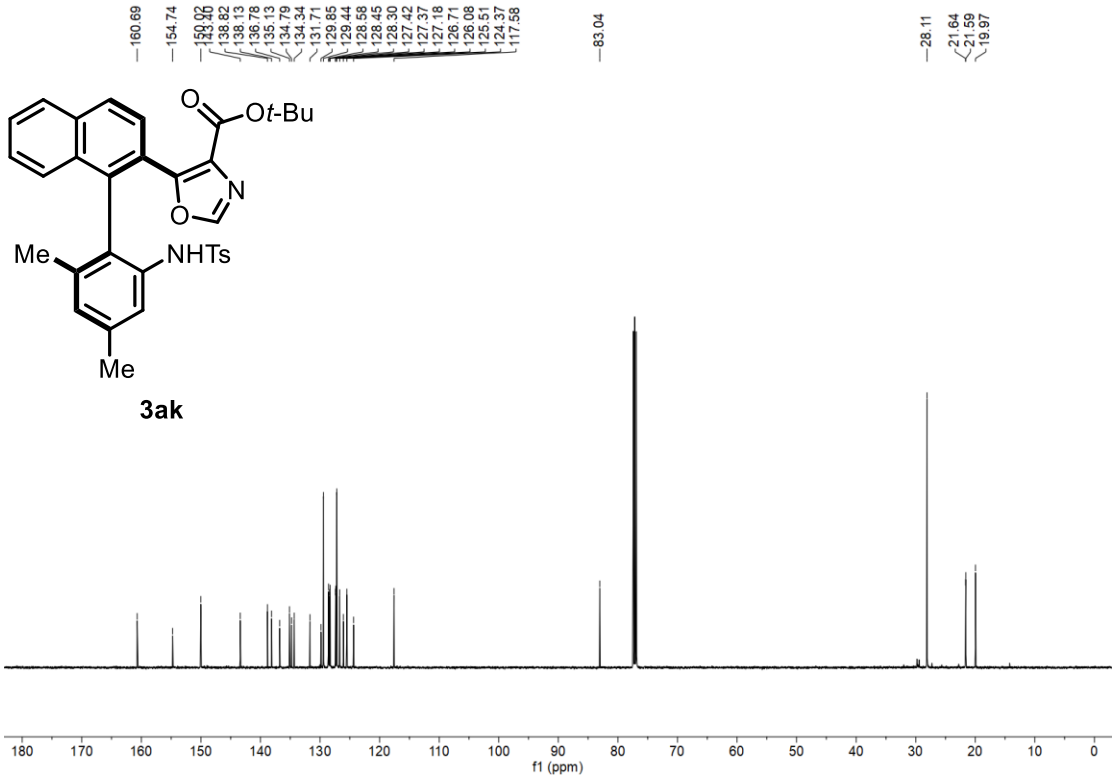




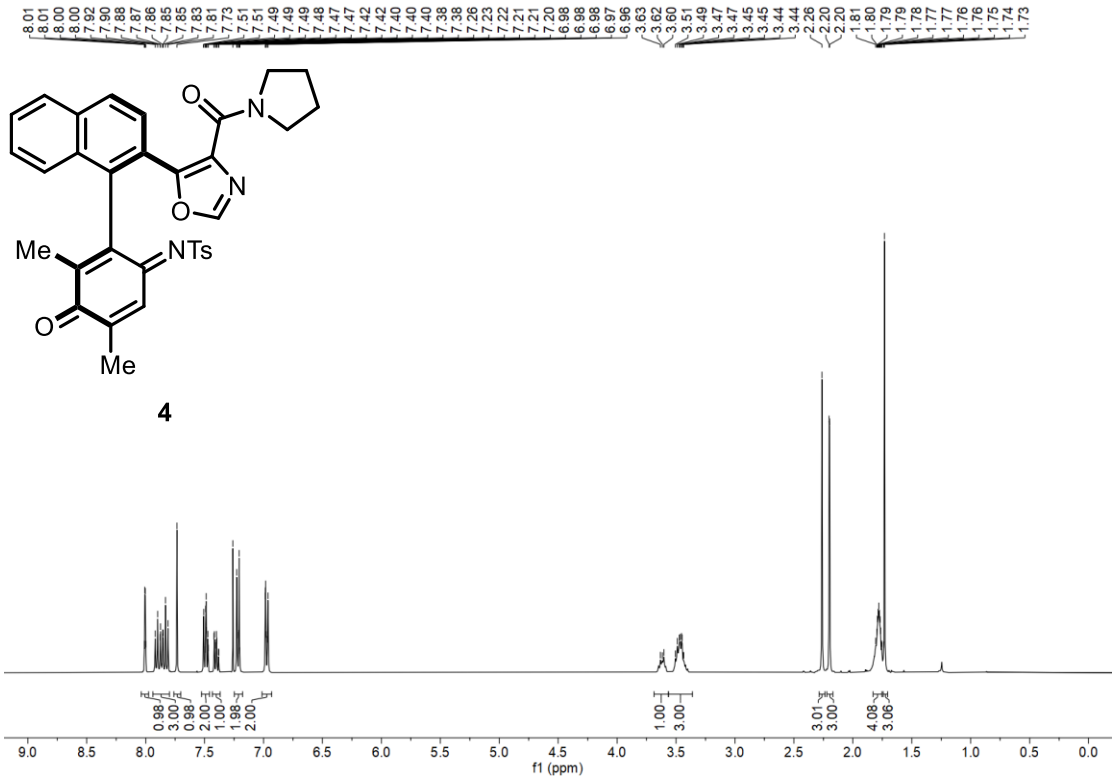
3ak



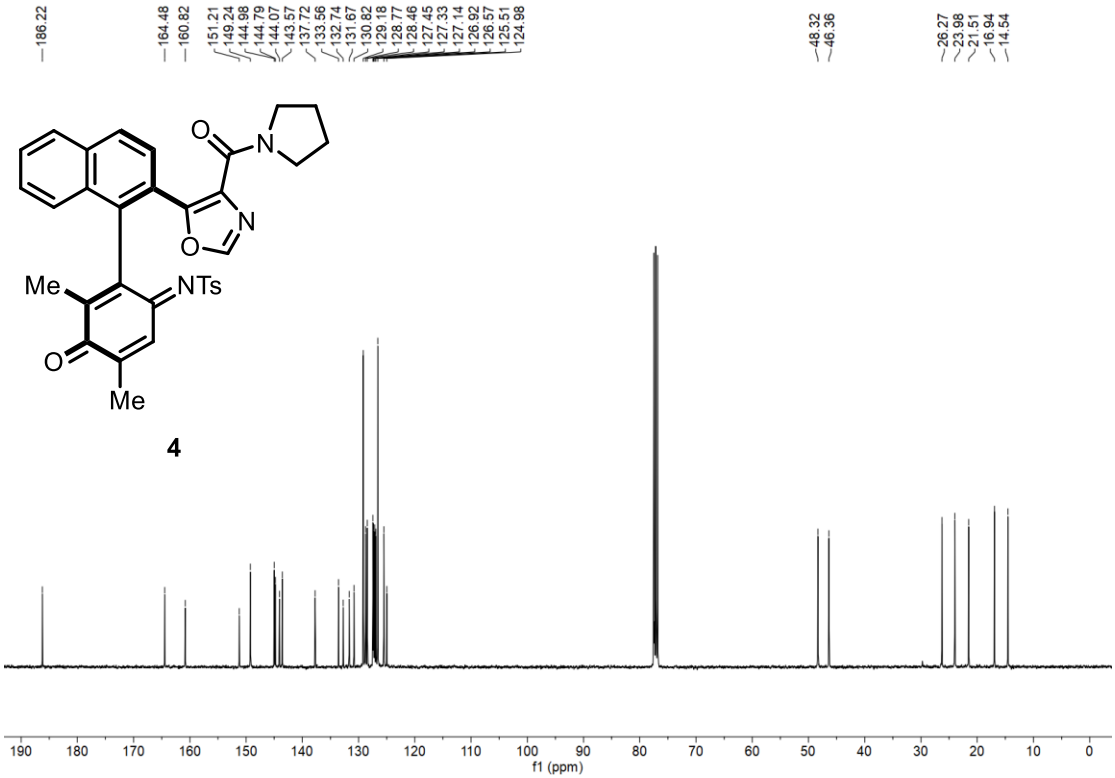
^{13}C NMR (126 MHz, $CDCl_3$)



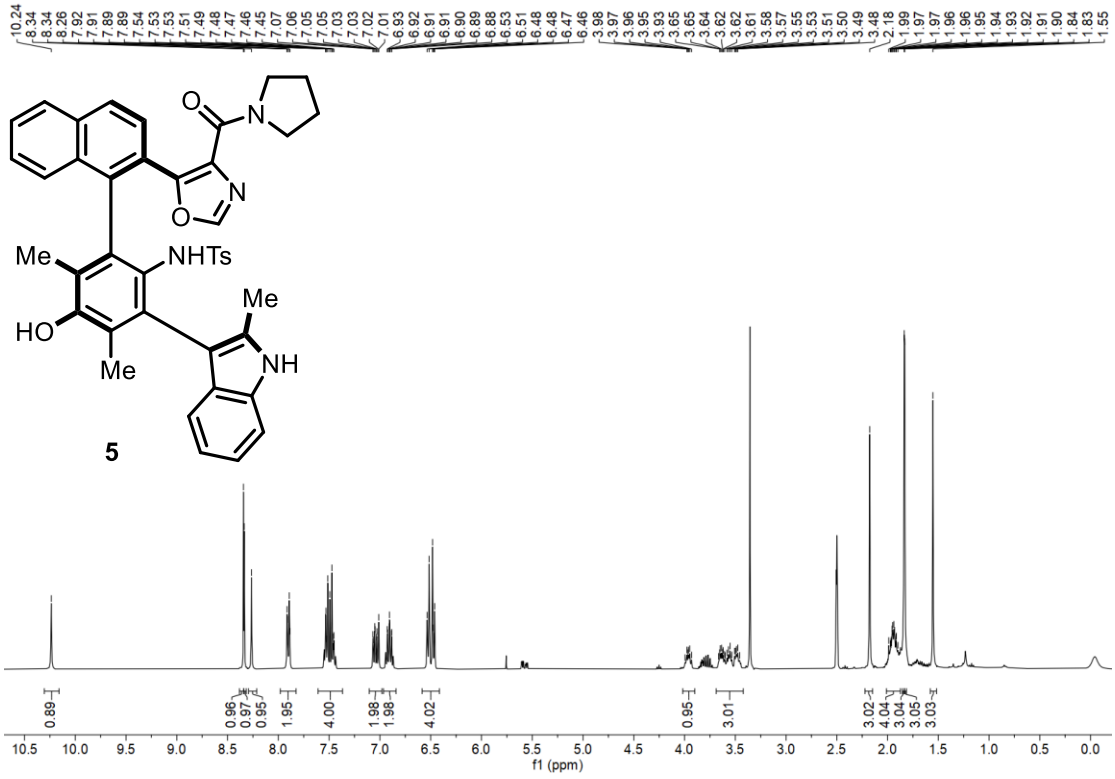
^{1}H NMR (400 MHz, $CDCl_3$)



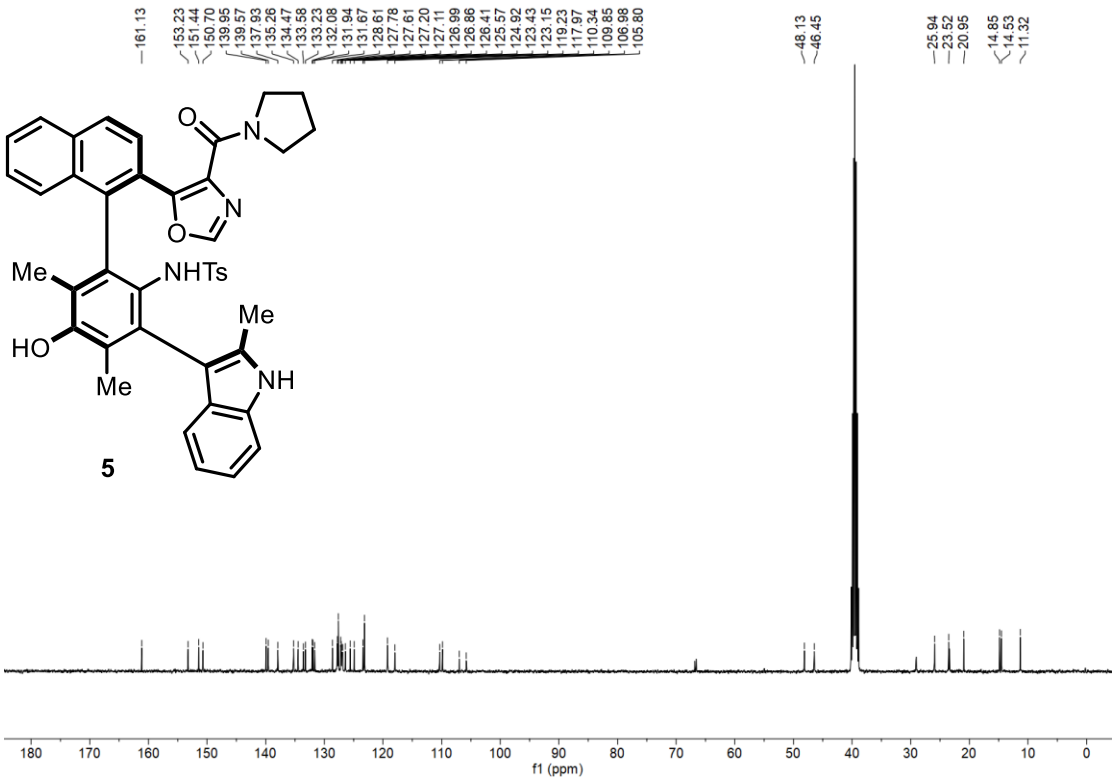
^{13}C NMR (101 MHz, $CDCl_3$)



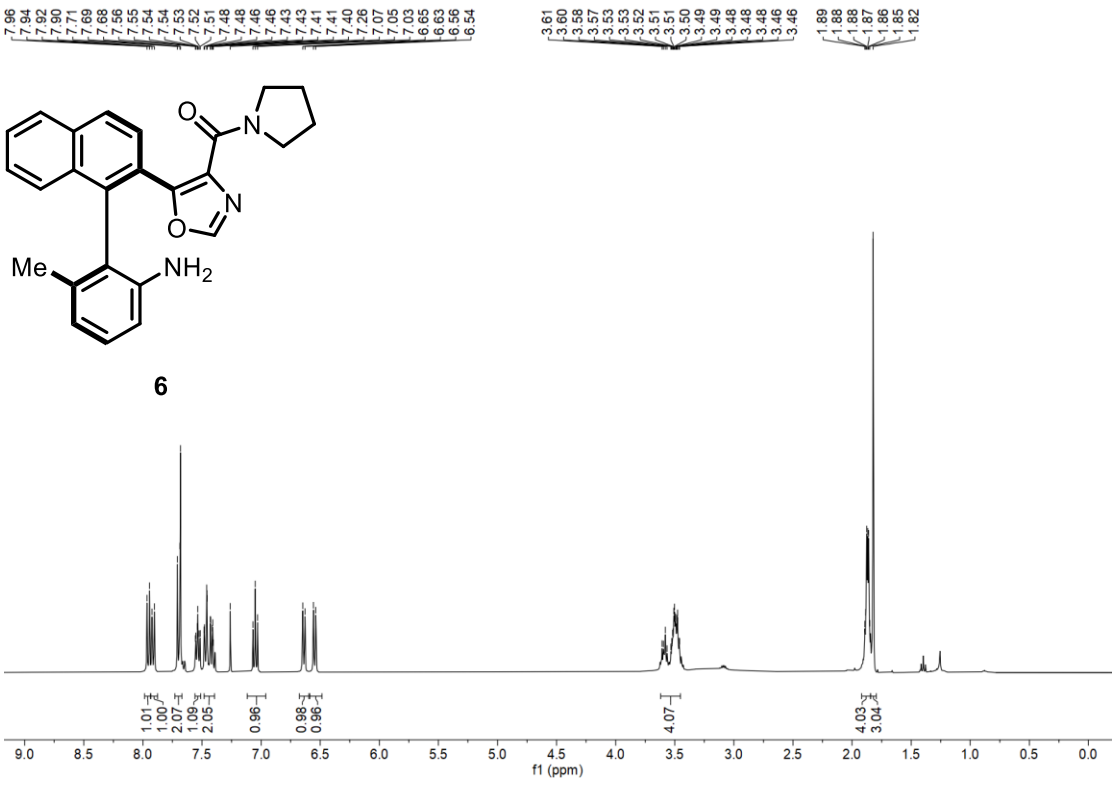
^{1}H NMR (400 MHz, DMSO-d_6)



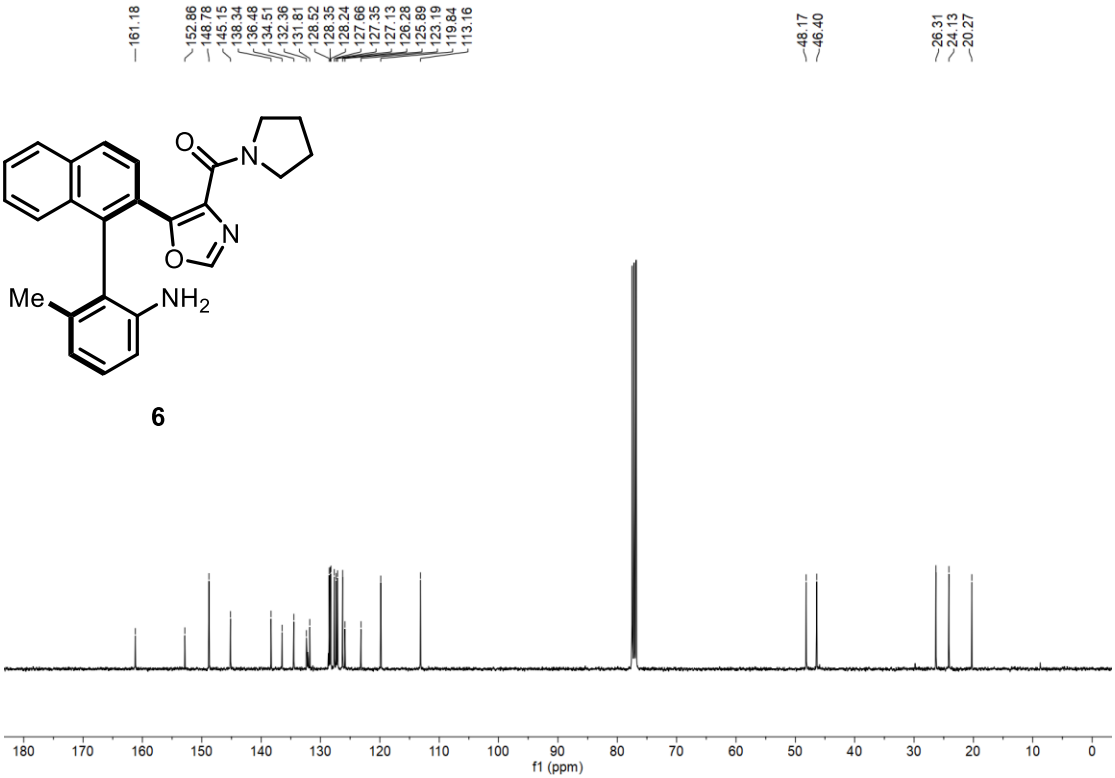
^{13}C NMR (101 MHz, DMSO-d_6)



^{1}H NMR (400 MHz, $CDCl_3$)

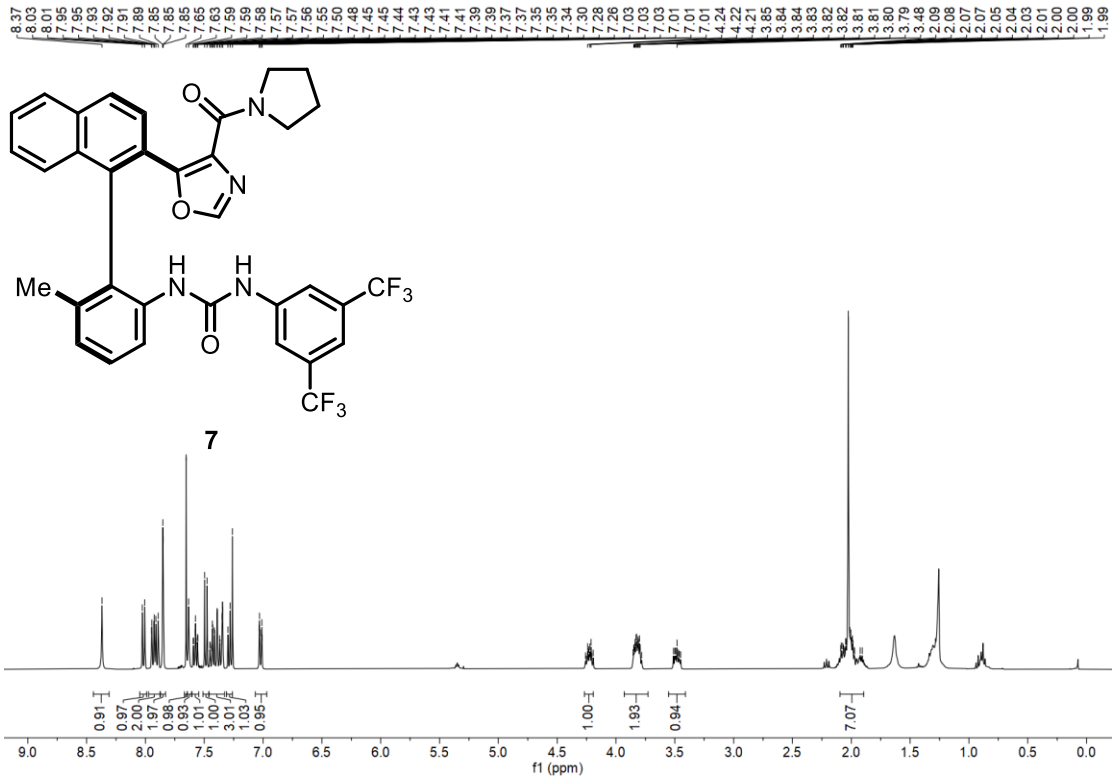


^{13}C NMR (101 MHz, $CDCl_3$)



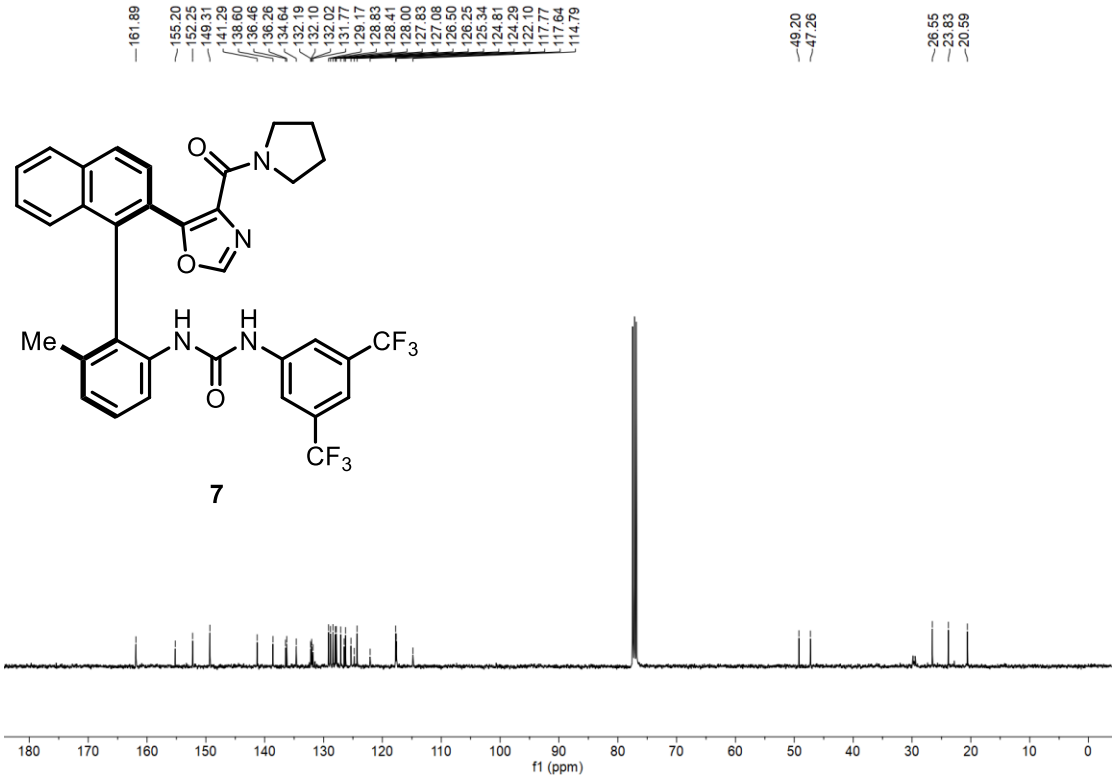
6

^{1}H NMR (400 MHz, $CDCl_3$)

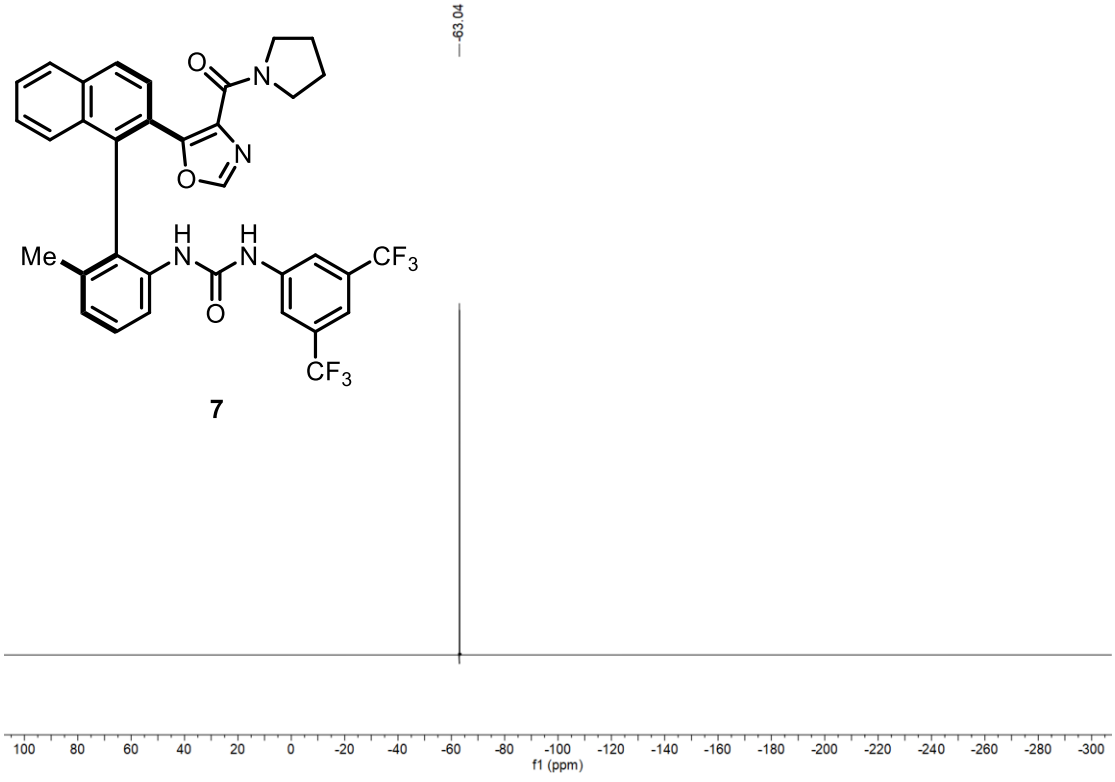


7

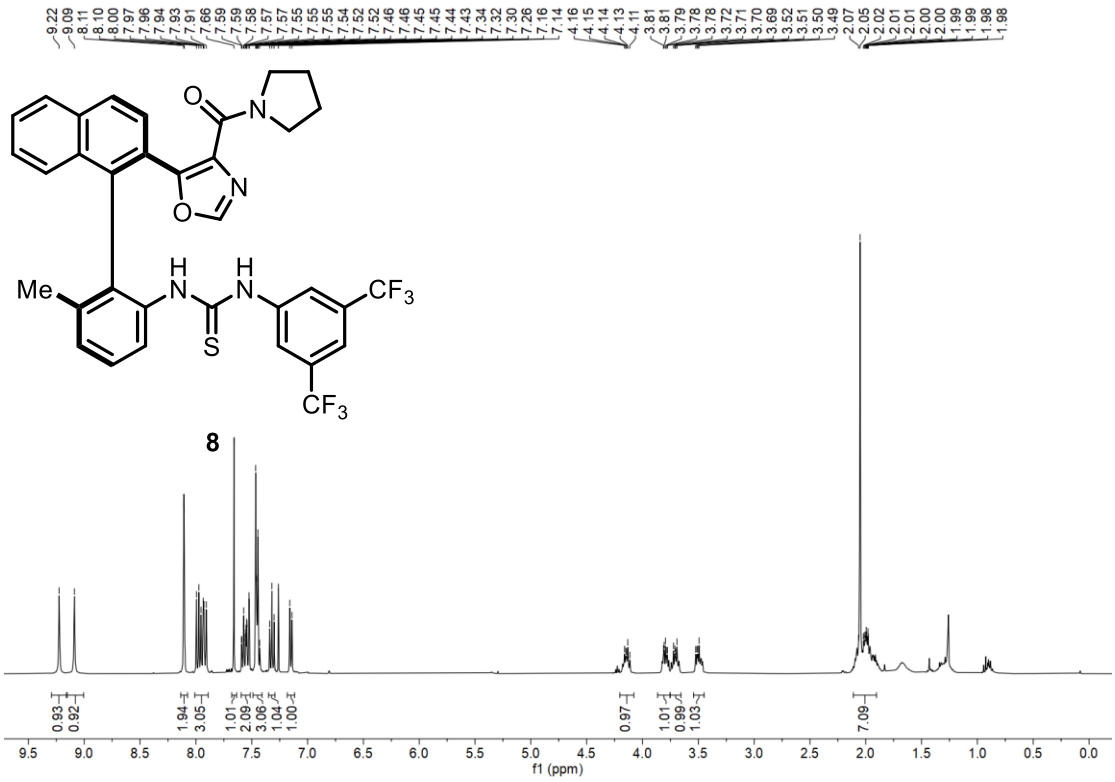
^{13}C NMR (101 MHz, $CDCl_3$)



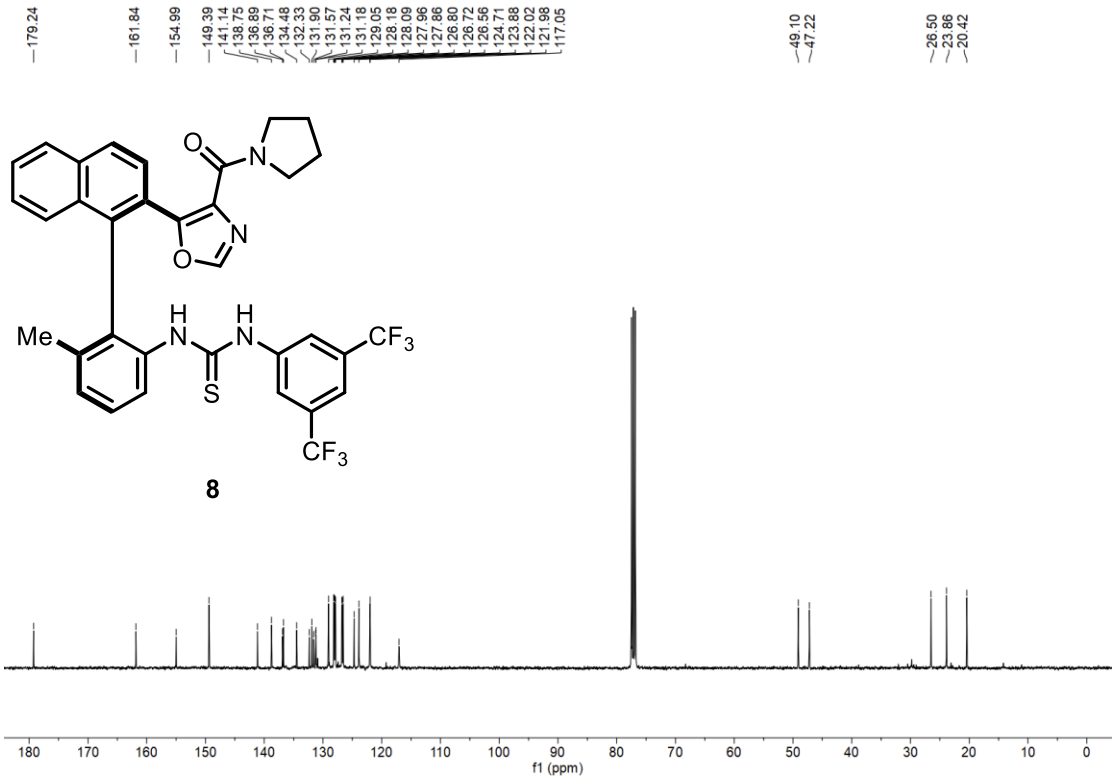
^{19}F NMR (376 MHz, $CDCl_3$)



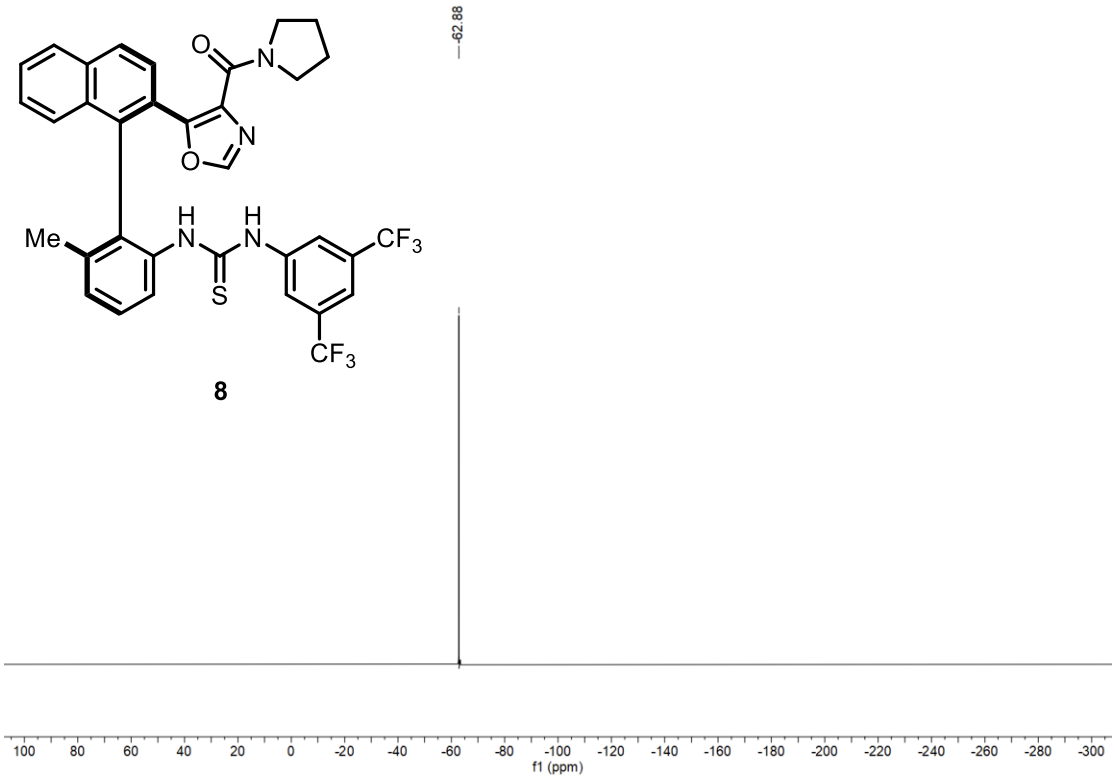
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

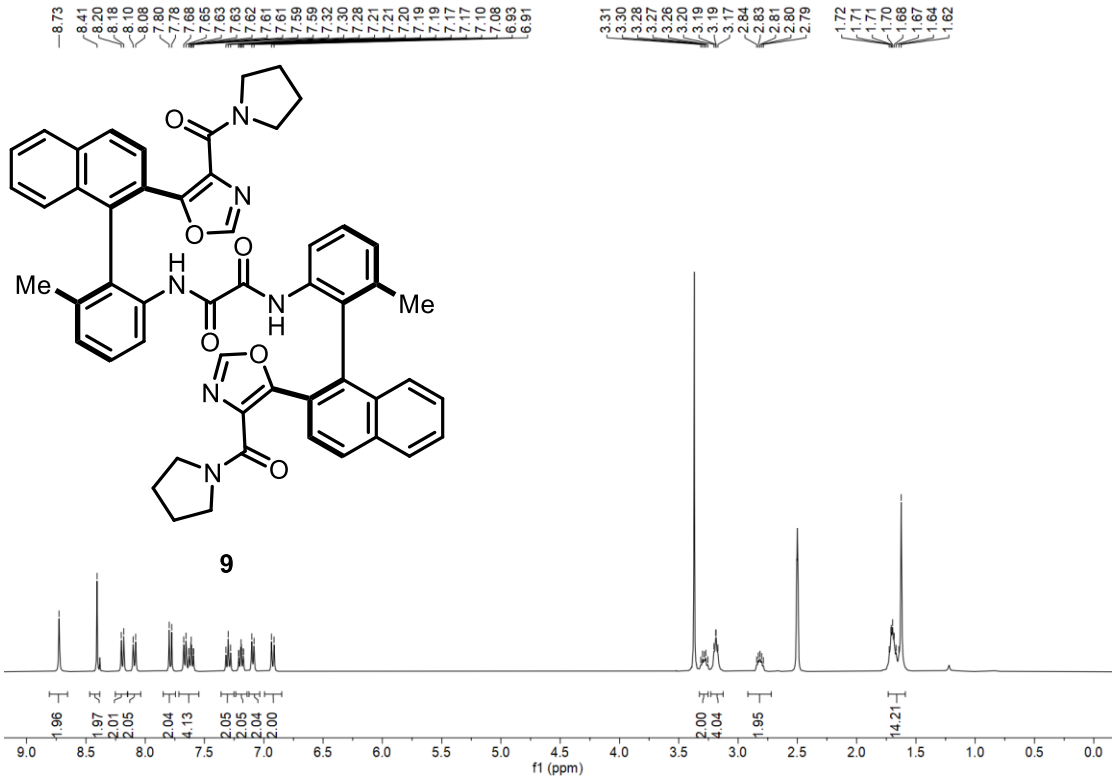


^{19}F NMR (376 MHz, $CDCl_3$)



8

^{1}H NMR (400 MHz, DMSO-d_6)



9

^{13}C NMR (101 MHz, DMSO-d_6)