

Supporting Information

Cu(II)/DM-Segphos catalyzed asymmetric 1,3-dipolar cycloaddition of benzoisothiazole-2,2-dioxide-3-ylidenes and azomethine ylides

*Feifei Li, Guorui Cao, Yanfeng Gao, Dawei Teng **

College of Chemical Engineering, Qingdao University of Science and Technology, 53 Zhengzhou Lu, Qingdao 266042, China

Table of Contents

1. General.....	S2
2. General procedure for the preparation of spiropyrrolidinyl-benzoisothiazolines 3	S2
3. X-ray structure of 3m	S2
4. Characterization data and spectra of compound 3a-t	S3-S32
5. Chiral HPLC chromatograms of compound 3a-t	S33-S72

General

All the reagents were purchased from TCI chemicals and local suppliers and used without purification. The starting materials (**1a-i**) were prepared following our previous paper.¹ All reactions were monitored by TLC. Chromatography refers to open column chromatography on silica gel (100-200 mesh).

¹H NMR spectra were recorded on 500 MHz and ¹³C NMR spectra were recorded on 125 MHz by using a Bruker Avance 500M spectrometer. Chemical shifts were reported in parts per million (δ) relative to tetramethylsilane (TMS). Mass spectra were performed on an Ultima Global spectrometer with an ESI source. The X-ray single-crystal diffraction was performed on Saturn 724+ instrument. Optical rotations were measured on SGW-1 automatic polarimeter and reported as follows: $[\alpha]_D^{25}$ (c g/100 mL, solvent). Chiral HPLC analysis was performed using a Shimadzu LC-20 HPLC.

General procedure for the preparation of spiropyrrolidinyl-benzothiazolines **3**

After a suspension of the DM-Segphos (0.0077 mmol) and Cu(OTf)₂ (0.007 mol) in CH₂Cl₂ (0.2 mL) was stirred for 1h at room temperature, a solution of the imine **2** (0.12 mmol) in CH₂Cl₂ (0.1 mL) was added. After being stirred at -25 °C for 10 mins, DBU (0.12 mmol) and a solution of the dipolarophile **1** (0.1mmol) in CH₂Cl₂ (0.1 mL) was added and the resulting solution was stirred at -25 °C for 2h. After that, saturated aqueous NH₄Cl (0.2 mL) was added and the organic layer was separated and evaporated to remove solvent under reduced pressure. The residue was subjected to column chromatography on silica gel (100-200 mesh) using petroleum/ethyl acetate as eluent to afford spiropyrrolidinyl-benzothiazolines **3**.

(2'*R*,3*R*,4'*S*,5'*R*)-1-methyl-2',4'-diphenyl-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (3m**)** (CCDC 1515086)

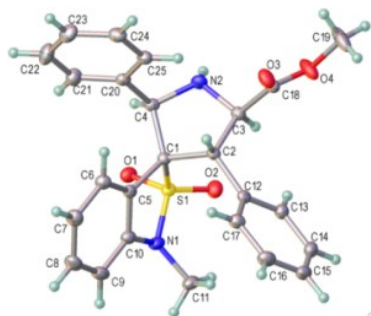
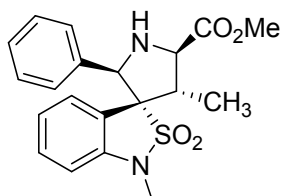


Fig 1. X-ray crystallography of compound **3m**.

¹ G. Cao, F. Long, Y. Zhao, Y. Wang, L. Huang and D. Teng, *Tetrahedron*, 2014, 70, 9359.

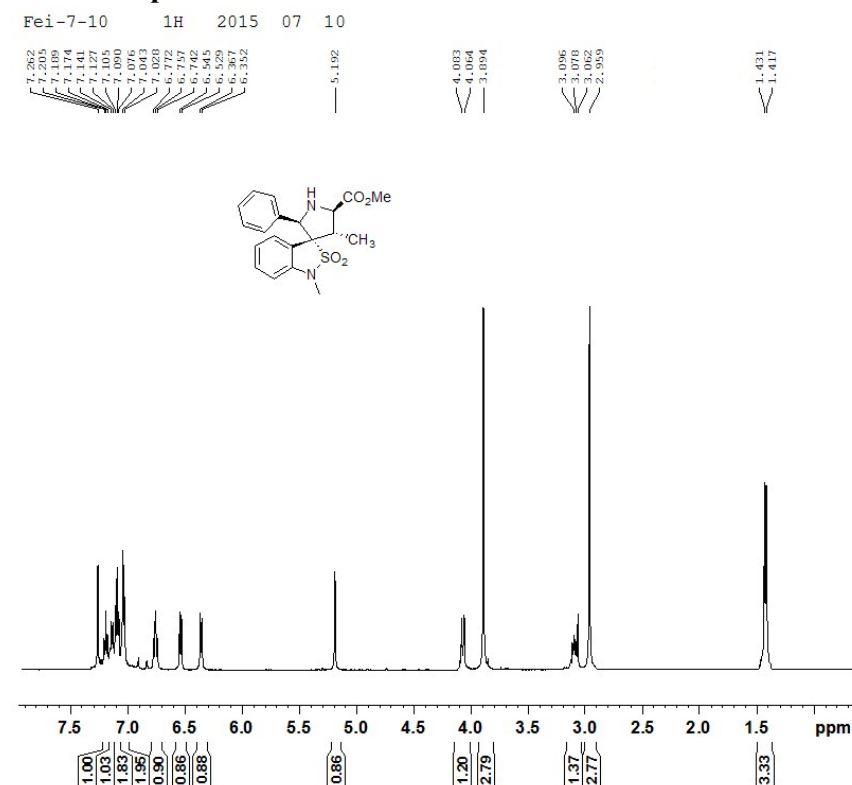
Characterization data and spectra of compound 3a-t



(2'*R*,3*R*,4'*S*,5'*R*)-1,4'-dimethyl-2'-phenyl-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3a**)

¹H NMR (500 MHz, CDCl₃): δ 7.19 (t, 1H, *J* = 7.8 Hz), 7.15-7.03 (m, 5H), 6.77 (t, 1H, *J* = 7.7 Hz), 6.53 (d, 1H, *J* = 7.8 Hz), 6.36 (d, 1H, *J* = 7.6 Hz), 5.19 (s, 1H), 4.07 (d, 1H, *J* = 9.4 Hz), 3.89 (s, 3H), 3.11-3.06 (m, 1H), 2.96 (s, 3H), 1.43 (d, 3H, *J* = 7.1 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 173.4, 140.9, 138.0, 129.2, 127.9, 127.7, 127.4, 125.3, 122.9, 121.6, 108.7, 66.0, 64.5, 52.4, 43.2, 26.1, 12.6.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₀H₂₃N₂O₄S [(*M*+*H*)⁺]: 387.1379. Found: 387.1376. Chiral HPLC (Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min, λ = 254 nm) *t*_R(major) = 9.391 min, *t*_R(minor) = 14.358 min; [α]_D²⁵ = +54.8° (c = 0.27, CH₂Cl₂).

¹H NMR Spectrum of 3a



```

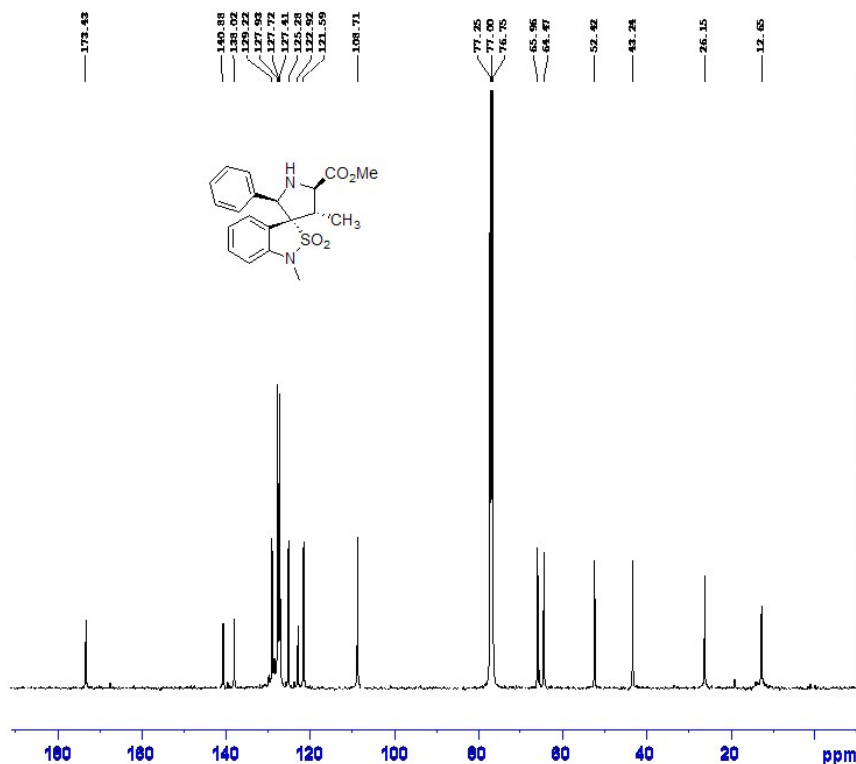
NAME          Fei-7-10
EXPNO         1
PROCNO        1
Date_         20150710
Time          15.48
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            8
DS            1
SWH           10000.000 Hz
FIDRES        0.305176 Hz
AQ            1.6385000 sec
RG            256
DW            50.0000 usec
DE            6.00 usec
TE            673.2 K
D1            1.00000000 sec
TDO           1

===== CHANNEL f1 =====
NUC1          1H
P1            13.00 usec
PL1           2.00 dB
SFO1          500.0335010 MHz
SI            16384
SF            500.0300097 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            4.00
    
```

¹³C NMR Spectrum of 3a

LF-7-31-1-S

13C 2015 07 31



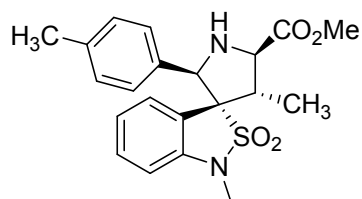
```

NAME      LF7-7-31-1-S
EXPNO     2
PROCNO    1
DATE_     20150731
TIME      12.26
INSTRUM   spect
PROBHD    5 mm F4BBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         4006
DS         2
SWH        32679.736 Hz
FIDRES     0.458653 Hz
AQ         1.0027661 sec
RG         575
DS         15.300 usec
DE         6.00 usec
TE         673.2 K
D1         2.0000000 sec
d11        0.0300000 sec
DELTA      1.8999998 sec
TDC        20

===== CHANNEL f1 =====
NUC1       13C
P1         12.20 usec
PL1        3.00 dB
SFO1       125.7464750 MHz

===== CHANNEL f2 =====
CFDPRG2   waltz16
NUC2       1H
PCPD2     80.00 usec
PL2        2.00 dB
PL12       17.70 dB
PL13       17.70 dB
SFO2       500.0355000 MHz
SI         32768
SF         125.7326463 MHz
WDW        EM
SBB         0
LB         10.00 Hz
GB         0
PC         1.00

```



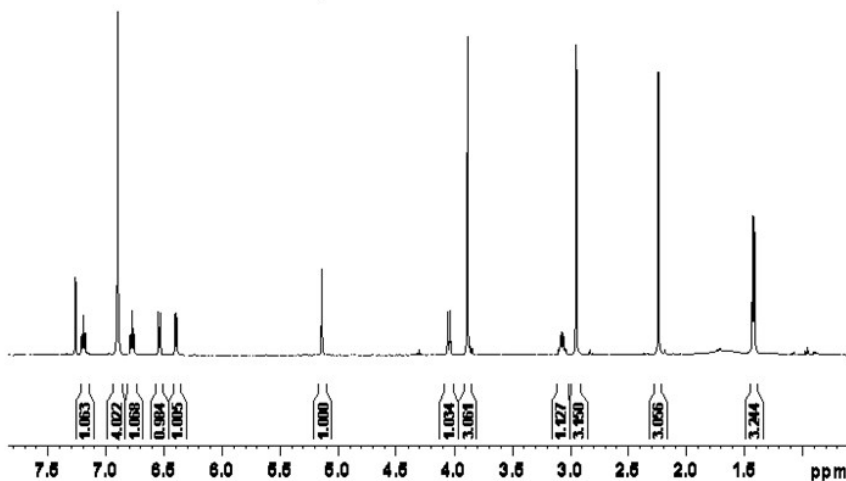
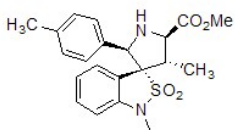
(2'*R*,3*R*,4'*S*,5'*R*)-1,4'-dimethyl-2'-(*p*-tolyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3b**)

^1H NMR (500 MHz, CDCl_3): δ 7.19 (t, 1H, $J = 7.8$ Hz), 6.90 (s, 4H), 6.77 (t, 1H, $J = 7.6$ Hz), 6.53 (d, 1H, $J = 7.9$ Hz), 6.39 (d, 1H, $J = 7.7$ Hz), 5.14 (s, 1H), 4.04 (d, 1H, $J = 9.3$ Hz), 3.88 (s, 3H), 3.09-3.05 (m, 1H), 2.95 (s, 3H), 2.24 (s, 3H), 1.42 (d, 3H, $J = 7.0$ Hz). ^{13}C NMR (125 MHz, CDCl_3): δ 173.5, 140.9, 137.3, 134.9, 129.1, 128.1, 127.8, 125.3, 123.1, 121.5, 108.7, 65.8, 64.4, 52.4, 43.4, 26.2, 21.0, 12.7.; HRMS (ESI-TOF $^+$): m/z Calcd. for $\text{C}_{21}\text{H}_{25}\text{N}_2\text{O}_4\text{S}$ [(M+H) $^+$]: 401.1535. Found: 401.1543. Chiral HPLC (Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min, $\lambda = 254$ nm) t_R (major) = 8.428 min, t_R (minor) = 11.642 min; $[\alpha]_D^{25} = +45.1^\circ$ ($c = 0.37$, CH_2Cl_2).

^1H NMR Spectrum of **3b**

LF-7-16 1H 2015 07 16

7.260
7.207
7.176
6.895
6.786
6.771
6.548
6.527
6.400
6.385
5.140
4.055
4.036
3.885
3.086
3.071
3.068
3.033
2.943
2.240
1.927
1.813
1.254



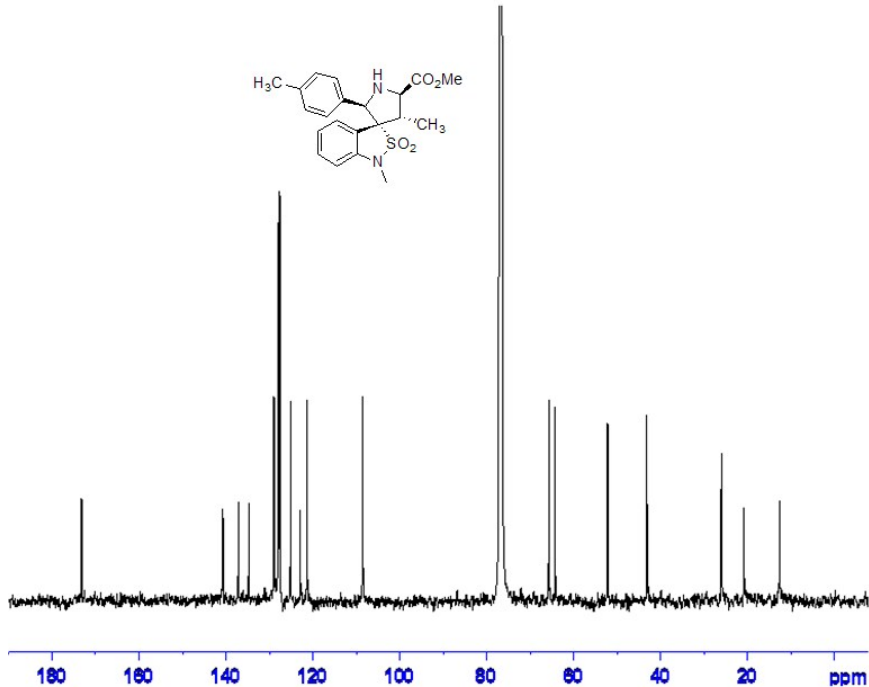
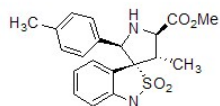
```

NAME LF-7-16-s
EXPNO 1
PROCNO 1
Date_ 20150716
Time 15.42
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 1
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6365000 sec
RG 362
DE 50.000 usec
TE 673.2 K
D1 2.00000000 sec
TDO 1
----- CHANNEL f1 -----
NUC1 1H
P1 13.00 usec
PL1 2.00 dB
SFO1 500.0335010 MHz
SI 16384
SF 500.0300106 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 4.00
  
```

¹³C NMR Spectrum of 3b

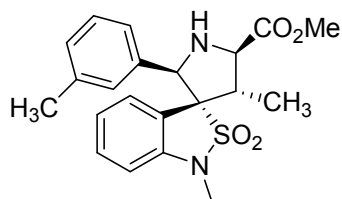
LF-9-2-2S 13C 2015 9 2

173.46
130.97
130.88
134.89
129.38
128.06
127.78
123.46
121.53
108.65
77.18
76.93
76.67
65.79
64.42
52.35
43.35
26.15
20.96
12.72



```

NAME lf-9-2-2s
EXPNO 2
PROCNO 1
Date_ 20150902
Time 21.44
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 5000
DS 2
SWH 32679.738 Hz
FIDRES 0.498653 Hz
AQ 1.0027661 sec
RG 456
DE 15.300 usec
TE 301.1 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TDO 10
----- CHANNEL f1 -----
NUC1 13C
P1 12.20 usec
PL1 3.00 dB
SFO1 125.7464750 MHz
----- CHANNEL f2 -----
CFDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 2.00 dB
PL12 17.70 dB
PL13 17.70 dB
SFO2 500.0355000 MHz
SI 32768
SF 125.7326512 MHz
WDW EM
SSB 0
LB 8.00 Hz
GB 0
PC 1.00
  
```

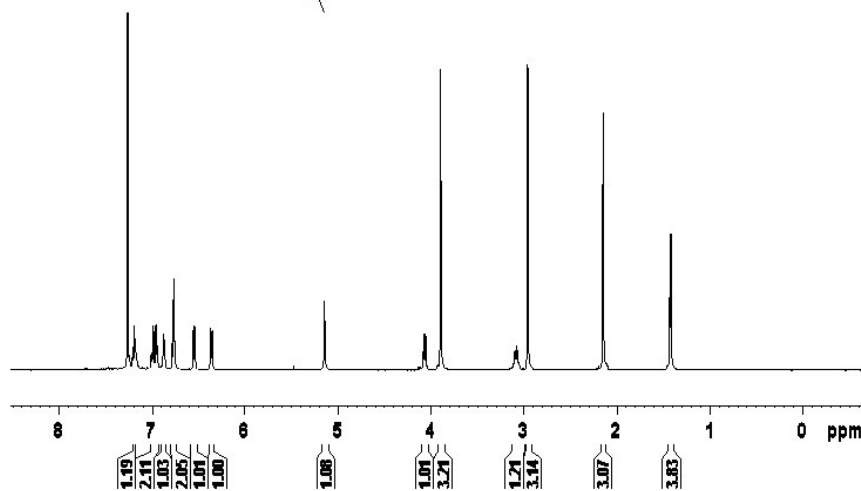
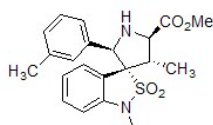


(2'R,3R,4'S,5'R)-1,4-dimethyl-2'-(*m*-tolyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3c**)

¹H NMR (500 MHz, CDCl₃): δ 7.19 (t, 1H, *J* = 7.3 Hz), 6.99-6.94 (m, 2H), 6.87 (d, 1H, *J* = 7.5 Hz), 6.78-6.76 (m, 2H), 6.54 (d, 1H, *J* = 7.9 Hz), 6.36 (d, 1H, *J* = 7.7 Hz), 5.15 (s, 1H), 4.07 (d, 1H, *J* = 9.4 Hz), 3.90 (s, 3H), 3.11-3.05 (m, 1H), 2.96 (s, 3H), 2.14 (s, 3H), 1.42 (d, 3H, *J* = 7.0 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 173.5, 140.9, 137.9, 137.0, 129.2, 128.6, 128.4, 127.3, 125.4, 125.1, 123.0, 121.5, 108.7, 66.0, 64.5, 52.5, 43.2, 26.2, 21.2, 12.7.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₁H₂₅N₂O₄S [(M+H)⁺]: 401.1535. Found: 401.1544. Chiral HPLC (Daicel Chiralpak AD-H, 10% IPA/hexanes, 1 mL/min, λ = 254 nm) *t*_R(major) = 15.676 min, *t*_R(minor) = 48.439 min; [α]_D²⁵ = +30.4° (c = 0.28, CH₂Cl₂).

¹H NMR Spectrum of **3c**

LF-7-31-3-S 1H 2015 07 31

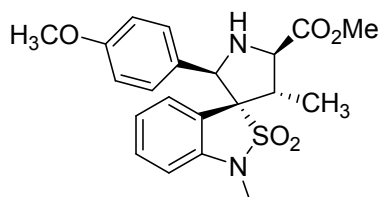
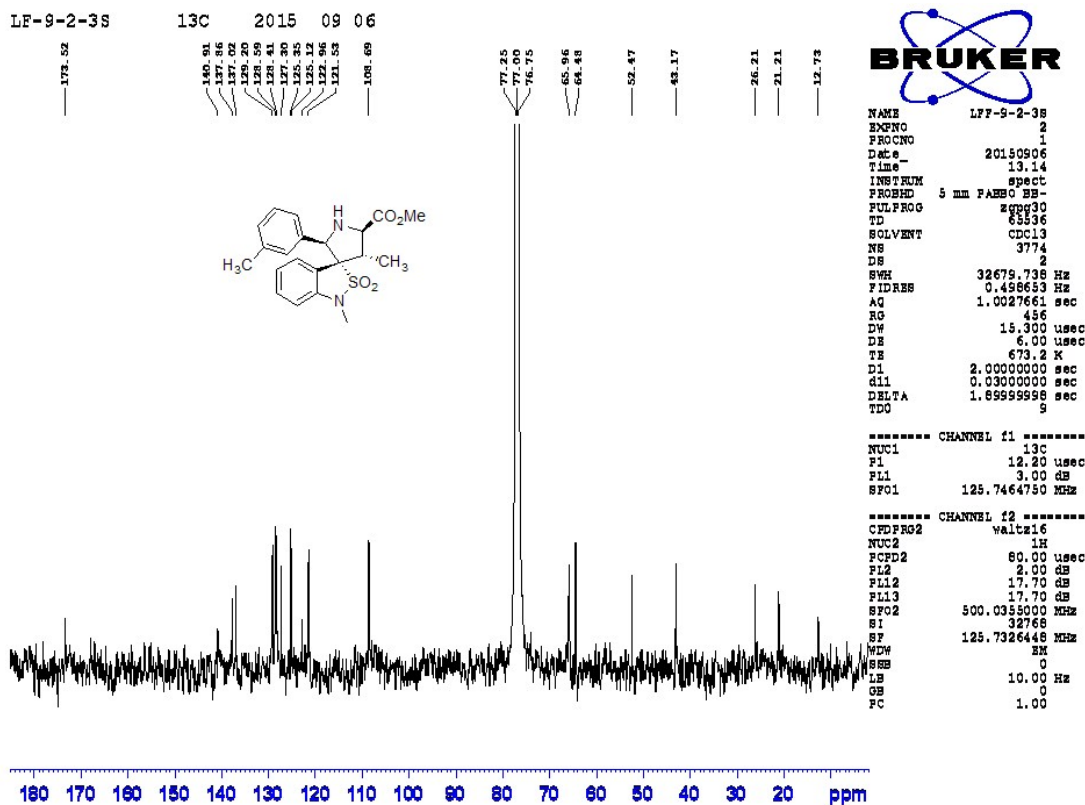


```

NAME LF-7-31-3-S
EXPNO 1
PROCNO 1
Date_ 20150731
Time 10.12
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 1
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6385000 sec
RG 724
DW 50.000 usec
DE 6.00 usec
TE 673.2 K
D1 1.00000000 sec
TDO 1
----- CHANNEL f1 -----
NUC1 1H
P1 13.00 usec
PL1 2.00 dB
SFO1 500.0335010 MHz
SI 16384
SF 500.0300399 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 4.00

```

¹³C NMR Spectrum of **3c**



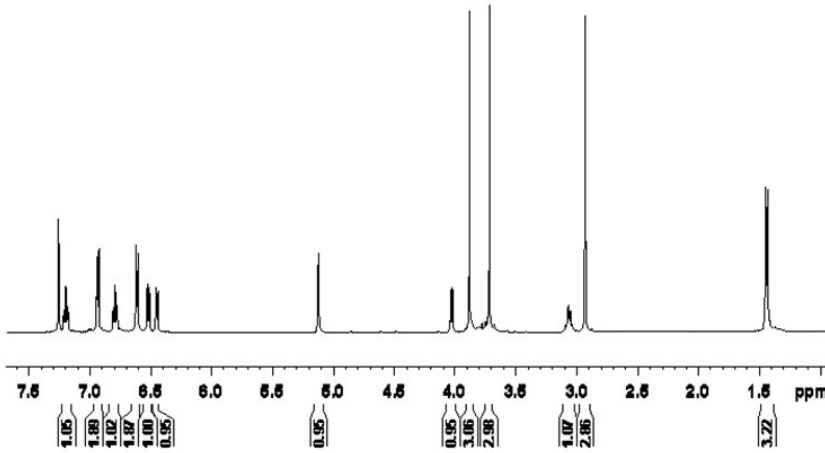
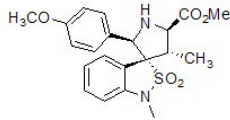
(2'*R*,3*R*,4'*S*,5'*R*)-1,4'-dimethyl-2'-(4-methoxyphenyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3d**)

¹H NMR (500 MHz, CDCl₃): δ 7.20 (t, 1H, *J* = 7.9 Hz), 6.94 (d, 2H, *J* = 8.5 Hz), 6.80 (t, 1H, *J* = 7.7 Hz), 6.62 (d, 2H, *J* = 8.5 Hz), 6.53 (d, 1H, *J* = 7.9 Hz), 6.45 (d, 1H, *J* = 7.6 Hz), 5.13 (s, 1H), 4.04 (d, 1H, *J* = 9.2 Hz), 3.89 (s, 3H), 3.73 (s, 3H), 3.09-3.06 (m, 1H), 2.94 (s, 3H), 1.44 (d, 3H, *J* = 7.1 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 173.5, 159.2, 140.9, 129.8, 129.2, 129.1, 125.3, 123.2, 121.7, 112.8, 108.7, 65.7, 64.5, 55.2, 52.5, 43.3, 26.2, 13.1.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₁H₂₅N₂O₅S [(*M*+*H*)⁺]: 417.1484. Found: 417.1492. Chiral HPLC (Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min, λ = 254 nm) *t*_R(major) = 19.215 min, *t*_R(minor) = 28.847 min; [α]_D²⁵ = +32.2° (c = 0.36, CH₂Cl₂).

¹H NMR Spectrum of **3d**

LF-7-31-5-8

1H 2015 07 31



```

NAME LF7-7-31-5-8
EXPNO 1
PROCNO 1
Date_ 20150731
Time 10.38
INSTRUM spect
PROBHD 5 mm F4000 BB-
PULPROG zgpg30
TD 32768
SOLVENT cdcl3
NS 16
DS 1
SWH 10000.000 Hz
FIDRES 0.303176 Hz
AQ 1.633500 sec
RG 312
DW 30.000 usec
DE 6.00 usec
TE 673.2 K
D1 1.0000000 sec
D11 1.0000000 sec
TDO 1
  
```

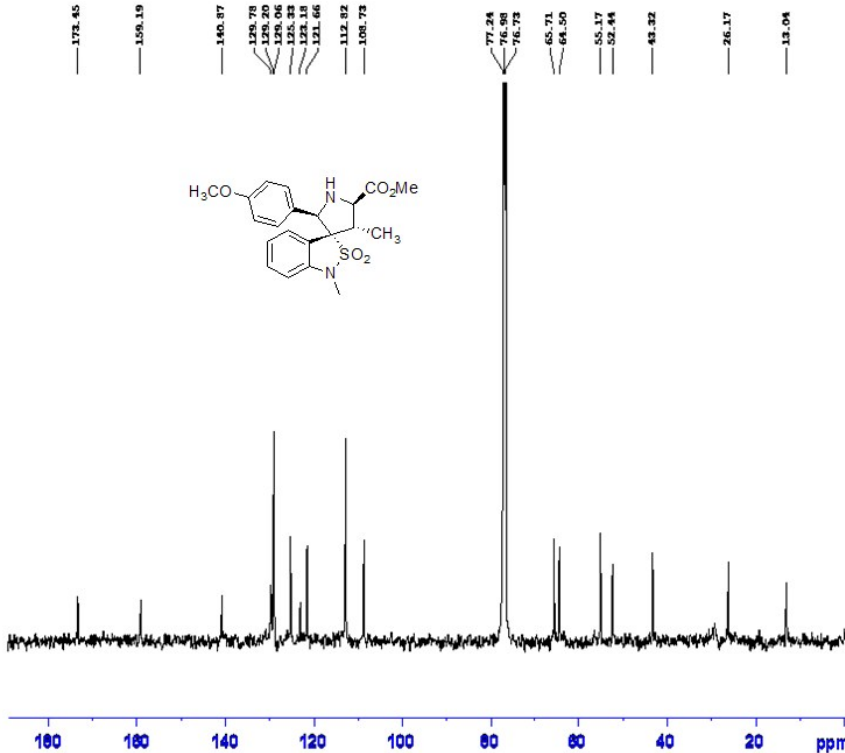
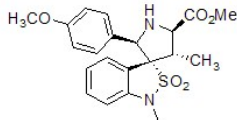
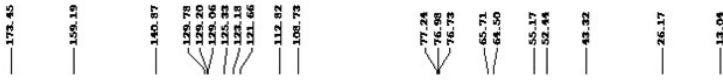
```

===== CHANNEL f1 =====
NUC1 1H
P1 13.00 usec
PL1 2.00 dB
SFO1 500.0335010 MHz
SI 16384
SF 500.0300098 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 4.00
  
```

¹³C NMR Spectrum of 3d

LF-9-2-5-8

13C 2015 09 06



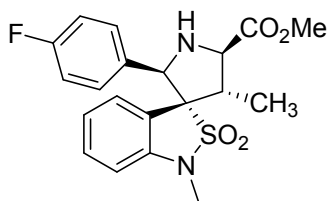
```

NAME LF7-9-2-5-8
EXPNO 2
PROCNO 1
Date_ 20150907
Time 7.39
INSTRUM spect
PROBHD 5 mm F4000 BB-
PULPROG zgpg30
TD 65536
SOLVENT cdcl3
NS 1414
DS 2
SWH 32679.738 Hz
FIDRES 0.498653 Hz
AQ 1.0027661 sec
RG 1820
DW 15.300 usec
DE 6.00 usec
TE 673.2 K
D1 2.0000000 sec
d11 0.0300000 sec
DELTA 1.6999999 sec
TDO 10
  
```

```

===== CHANNEL f1 =====
NUC1 13C
P1 12.20 usec
PL1 3.00 dB
SFO1 125.7464750 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 2.00 dB
PL12 17.70 dB
PL13 17.70 dB
SFO2 500.0355000 MHz
SI 32768
SF 125.7326452 MHz
WDW EM
SSB 0
LB 10.00 Hz
GB 0
PC 1.00
  
```

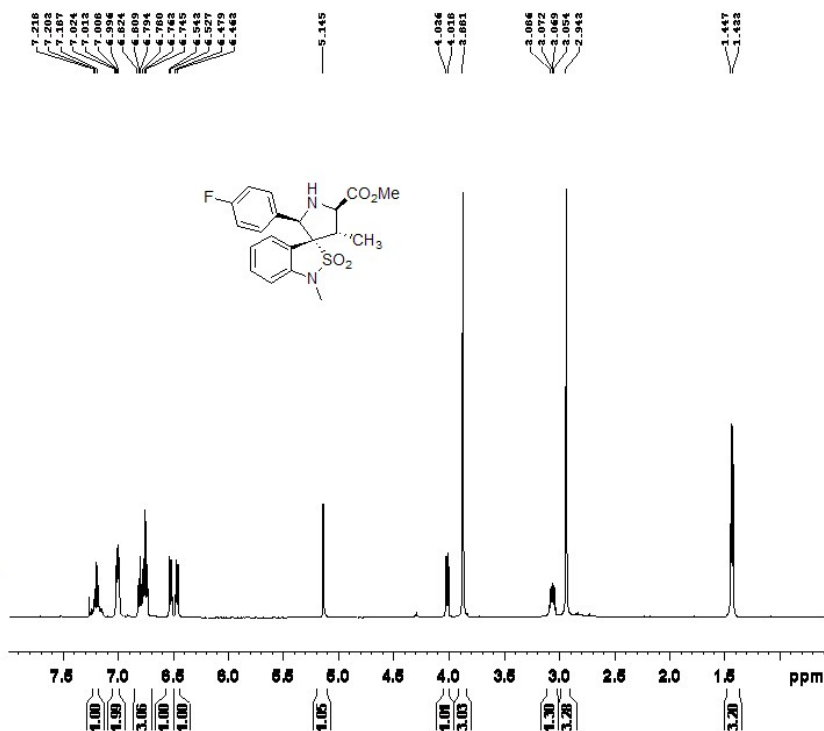


(2'*R*,3*R*,4'*S*,5'*R*)-1,4'-dimethyl-2'-(4-fluorophenyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3e**)

¹H NMR (500 MHz, CDCl₃): δ 7.20 (t, 1H, *J* = 7.7 Hz), 7.02-7.00 (m, 2H), 6.82-6.76 (m, 3H), 6.54 (d, 1H, *J* = 8.0 Hz), 6.47 (d, 1H, *J* = 7.4 Hz), 5.14 (s, 1H), 4.03 (d, 1H, *J* = 9.2 Hz), 3.88 (s, 3H), 3.09-3.05 (m, 1H), 2.94 (s, 3H), 1.44 (d, 3H, *J* = 7.1 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 173.4, 140.7, 133.6, 129.6, 129.5, 129.3, 125.2, 122.9, 121.7, 114.2, 114.0, 108.7, 76.2, 65.4, 64.5, 52.4, 42.9, 26.0, 12.9.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₀H₂₂FN₂O₄S [(*M*+*H*)⁺]: 405.1284. Found: 405.1280. Chiral HPLC (Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min, λ = 254 nm) *t*_R(major) = 7.982 min, *t*_R(minor) = 10.172 min; [α]_D²⁵ = +28.7° (c = 0.24, CH₂Cl₂).

¹H NMR Spectrum of **3e**

LF-7-31-4-S 1H 2015 07 31



```

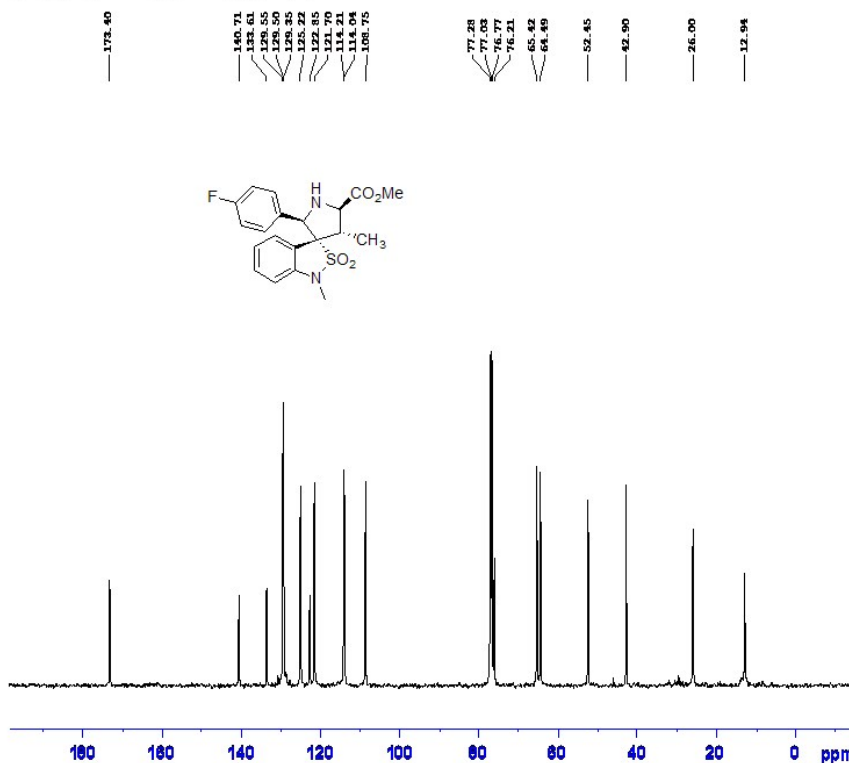
NAME LF-7-31-4-S
EXPNO 1
PROCNO 1
DATE_ 20150731
Time 10.28
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 8
DS 1
SWH 10000.000 MHz
FIDRES 0.303176 MHz
AQ 1.6385000 sec
RG 724
DH 50.000 usec
DE 6.000 usec
TE 673.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 13.00 usec
PL1 2.00 dB
SFO1 300.0335010 MHz
SI 16384
SF 300.0300064 MHz
WDW EM
SSB 0
LB 0.30 MHz
GB 0
PC 4.00

```

¹³C NMR Spectrum of **3e**

LF-9-2-4s 13C 2015 9 8



```

NAME LF-9-2-4s
EXPNO 2
PROCNO 1
Date_ 20150908
Time 8.44
INSTRUM spect
PROBHD 5 mm F4BBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 744
DS 2
SWH 32679.738 Hz
FIDRES 0.488653 Hz
AQ 1.0027661 sec
RG 456
DW 19.300 usec
DE 6.00 usec
TE 673.2 K
D1 2.0000000 sec
d11 0.0300000 sec
DELTA 1.89999998 sec
TDC 10

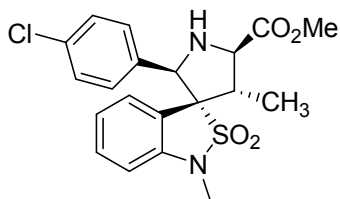
```

```

===== CHANNEL f1 =====
NUC1 13C
P1 12.20 usec
PL1 3.00 dB
SFO1 125.7464750 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 60.00 usec
PL2 2.00 dB
PL12 17.70 dB
PL13 17.70 dB
SFO2 500.0355000 MHz
SI 32768
SF 125.7326512 MHz
WDW EM
SFB 0
LB 10.00 Hz
GB 0
PC 1.00

```



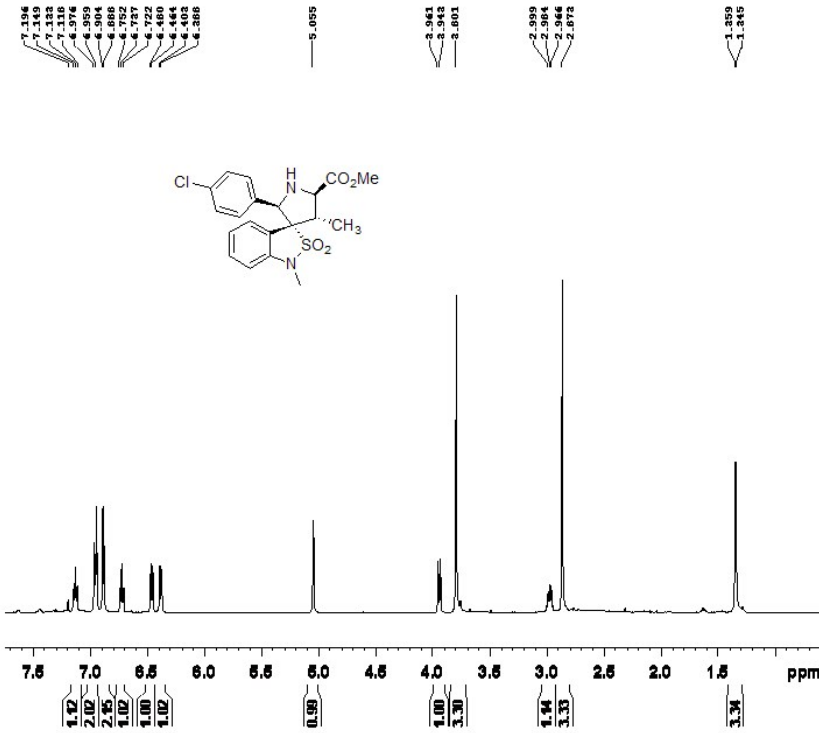
(2'*R*,3*R*,4'*S*,5'*R*)-1,4'-dimethyl-2'-(4-chlorophenyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3f**)

¹H NMR (500 MHz, CDCl₃): δ 7.13 (t, 1H, *J* = 7.7 Hz), 6.98-6.89 (m, 4H), 6.74 (t, 1H, *J* = 7.6 Hz), 6.47 (d, 1H, *J* = 7.9 Hz), 6.40 (d, 1H, *J* = 7.6 Hz), 5.05 (s, 1H), 3.95 (d, 1H, *J* = 9.3 Hz), 3.80 (s, 3H), 3.00-2.97 (m, 1H), 2.87 (s, 3H), 1.35 (d, 3H, *J* = 7.0 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 173.4, 140.8, 136.5, 133.5, 129.5, 129.3, 127.5, 125.3, 122.7, 121.8, 108.9, 76.3, 65.5, 64.5, 52.5, 43.0, 26.1, 12.9.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₀H₂₂ClN₂O₄S [(M+H)⁺]: 421.0989. Found: 421.0983. Chiral HPLC (Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min, λ = 254 nm) *t*_R(major) = 8.180 min, *t*_R(minor) = 10.133 min; [α]_D²⁵ = +40.3° (c = 0.29, CH₂Cl₂).

¹H NMR Spectrum of 3f

LF-7-31-6-S

1H 2015 07 31

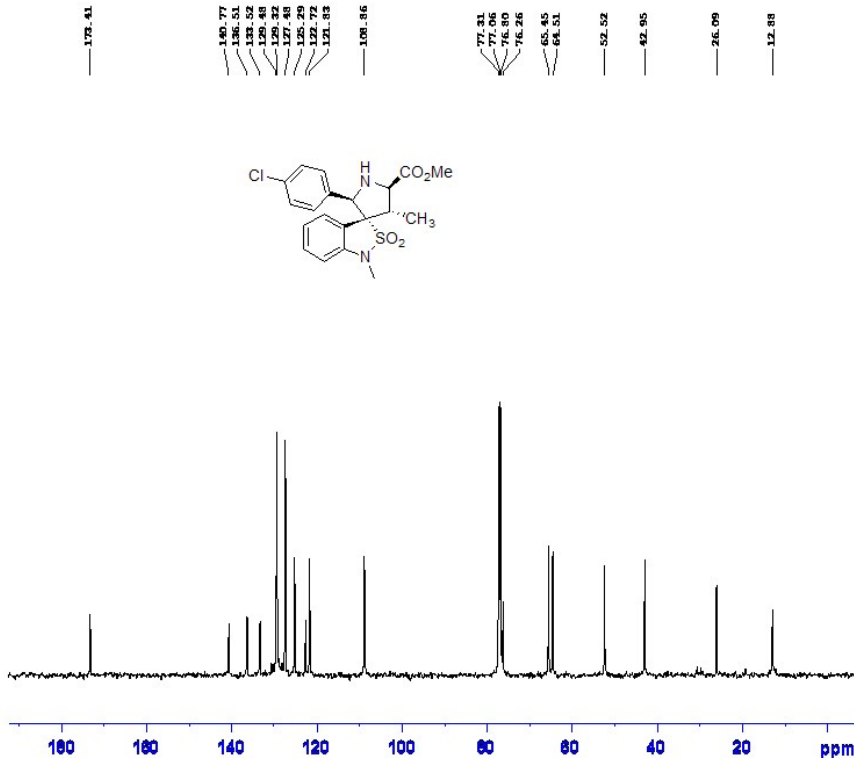


```

NAME LF7-7-31-6-S
EXPNO 1
PROCNO 1
DATE_ 20150731
Time 11.03
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 32768
SOLVENT CDCl3
NS 9
DS 1
SWH 10000.000 Kh
FIDRES 0.303176 Kh
AQ 1.6383000 sec
RG 512
DW 50.000 usec
DE 6.00 usec
TE 673.2 K
D1 1.00000000 sec
TDO 1
----- CHANNEL f1 -----
NUC1 1H
P1 13.00 usec
PL1 2.00 dB
SFO1 300.0355010 MHz
SI 16384
SF 300.0300422 MHz
WDW EM
SSB 0
LB 0.30 Kh
GB 0
PC 4.00
    
```

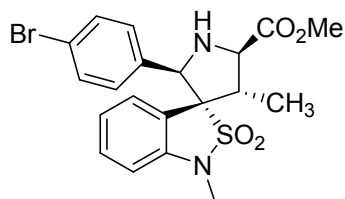
¹³C NMR Spectrum of 3f

LF-9-2-6-S 13C 2015 09 08



```

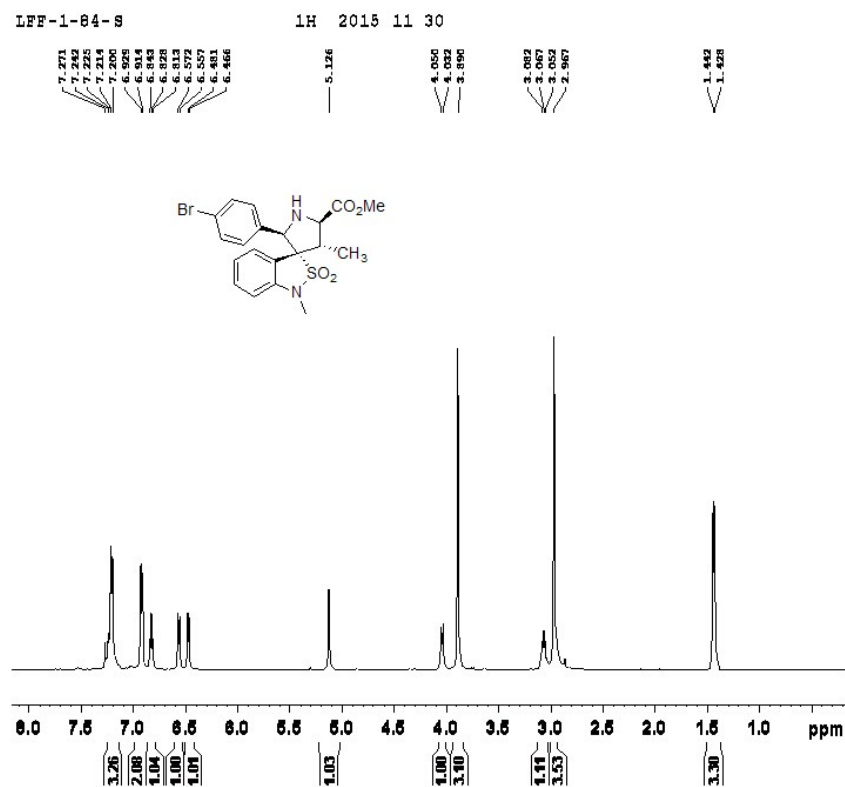
NAME LF7-9-2-6-S
EXPNO 2
PROCNO 1
DATE_ 20150908
Time 11.13
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 85536
SOLVENT CDCl3
NS 353
DS 2
SWH 32679.738 Hz
FIDRES 0.498653 Hz
AQ 1.0027651 sec
RG 1820
DW 15.300 usec
DE 6.00 usec
TE 673.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TDO 4
----- CHANNEL f1 -----
NUC1 13C
P1 12.20 usec
PL1 3.00 dB
SFO1 125.7464780 MHz
----- CHANNEL f2 -----
CFDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 2.00 dB
PL12 17.70 dB
PL13 17.70 dB
SFO2 500.0355000 MHz
SI 32768
SF 125.7326452 MHz
WDW EM
SSB 0
LB 10.00 Hz
GB 0
PC 1.00
    
```



(2'*R*,3*R*,4'*S*,5'*R*)-1,4'-dimethyl-2'-(4-bromophenyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3g**)

¹H NMR (500 MHz, CDCl₃): δ 7.24-7.20 (m, 3H), 6.92 (d, 2H, *J* = 7.7 Hz), 6.83 (t, 1H, *J* = 7.5 Hz), 6.56 (d, 1H, *J* = 7.9 Hz), 6.47 (d, 1H, *J* = 7.5 Hz), 5.13 (s, 1H), 4.04 (d, 1H, *J* = 8.9 Hz), 3.89 (s, 3H), 3.08-3.05 (m, 1H), 2.97 (s, 3H), 1.43 (d, 3H, *J* = 6.8 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 173.4, 140.8, 137.1, 130.4, 129.7, 129.5, 125.3, 122.7, 121.8, 108.8, 76.2, 65.5, 64.5, 52.5, 42.9, 26.1, 12.8.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₀H₂₂BrN₂O₄S [(M+H)⁺]: 465.0484. Found: 465.0477. Chiral HPLC (Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min, λ = 254 nm) *t*_R(major) = 8.742 min, *t*_R(minor) = 10.748 min; [α]_D²⁵ = +43.3° (c = 0.40, CH₂Cl₂).

¹H NMR Spectrum of **3g**



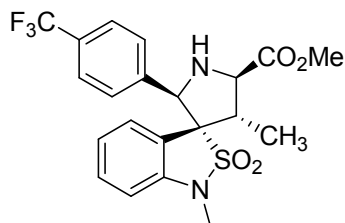
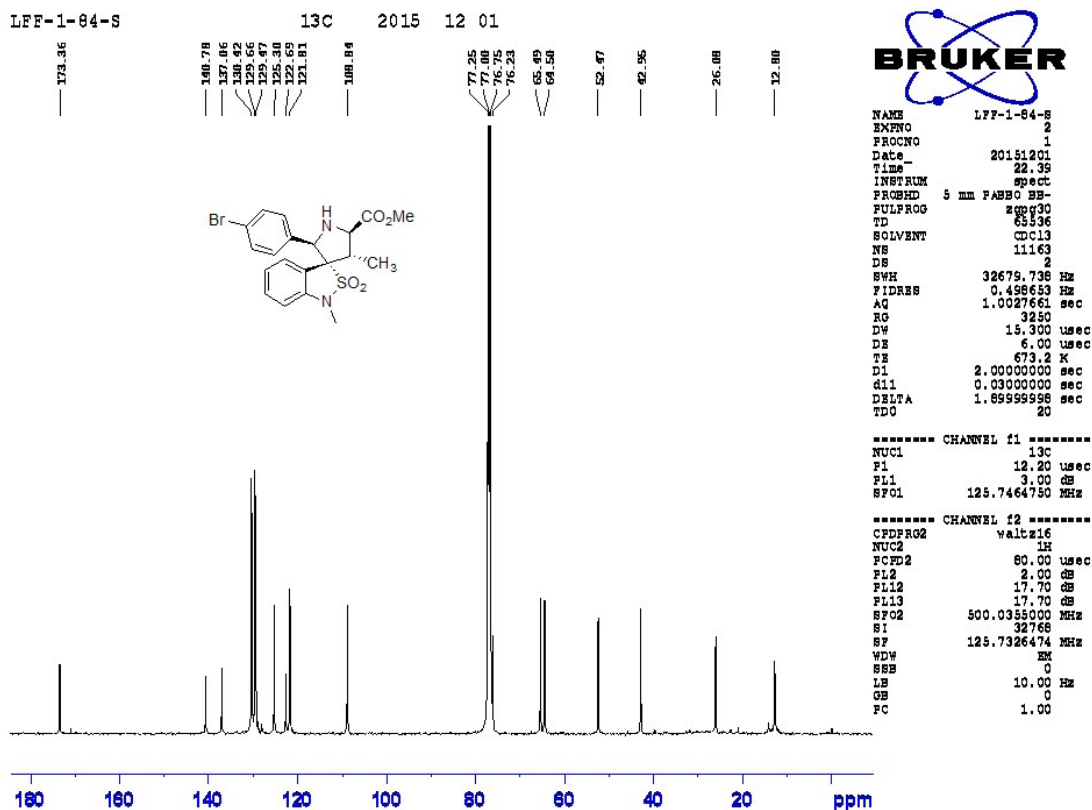
```

NAME          LFF-1-84-S
EXPNO         1
PROCNO        1
Date_         20151130
Time         16.52
INSTRUM       spect
PROBHD        5 mm PABBO BBO
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            8
DS            2
SWH           10000.000 Hz
FIDRES        0.305176 Hz
AQ            1.6365000 sec
RG            161
DE            50.000 usec
TE            673.2 K
DL            2.00000000 sec
TDO           1

----- CHANNEL f1 -----
NUC1          1H
P1            13.00 usec
PL1           2.00 dB
SFO1          500.0335010 MHz
SI            16384
SF            500.0300039 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            4.00

```

¹³C NMR Spectrum of **3g**

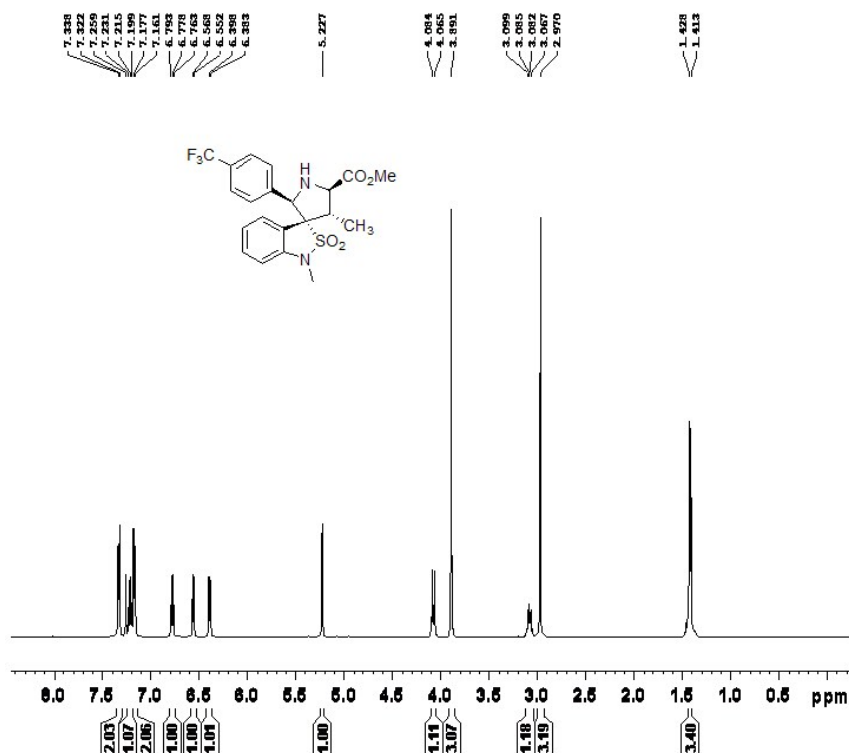


(2*R*,3*R*,4'*S*,5'*R*)-1,4'-dimethyl-2'-(4-(trifluoromethyl)phenyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3h**)

¹H NMR (500 MHz, CDCl₃): δ 7.33 (d, 2H, *J* = 8.1 Hz), 7.22 (t, 1H, *J* = 7.8 Hz), 7.17 (d, 2H, *J* = 8.0 Hz), 6.78 (t, 1H, *J* = 7.6 Hz), 6.56 (d, 1H, *J* = 7.9 Hz), 6.39 (d, 1H, *J* = 7.6 Hz), 5.23 (s, 1H), 4.07 (d, 1H, *J* = 9.5 Hz), 3.89 (s, 3H), 3.10-3.07 (m, 1H), 2.97 (s, 3H), 1.42 (d, 3H, *J* = 7.1 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 173.4, 142.3, 140.8, 131.0, 129.7, 128.9, 128.4, 125.3, 124.3, 122.4, 121.9, 109.0, 76.4, 65.6, 64.5, 52.6, 42.8, 26.1, 12.6.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₁H₂₂F₃N₂O₄S [(M+H)⁺]: 455.1252. Found: 455.1257. Chiral HPLC (Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.5 mL/min, λ = 254 nm) *t*_R(major) = 17.586 min, *t*_R(minor) = 18.827 min; [α]_D¹⁸ = +22.3° (c = 0.31, CH₂Cl₂).

¹H NMR Spectrum of 3h

LFF-3-92A 1H 2017 01 03



```

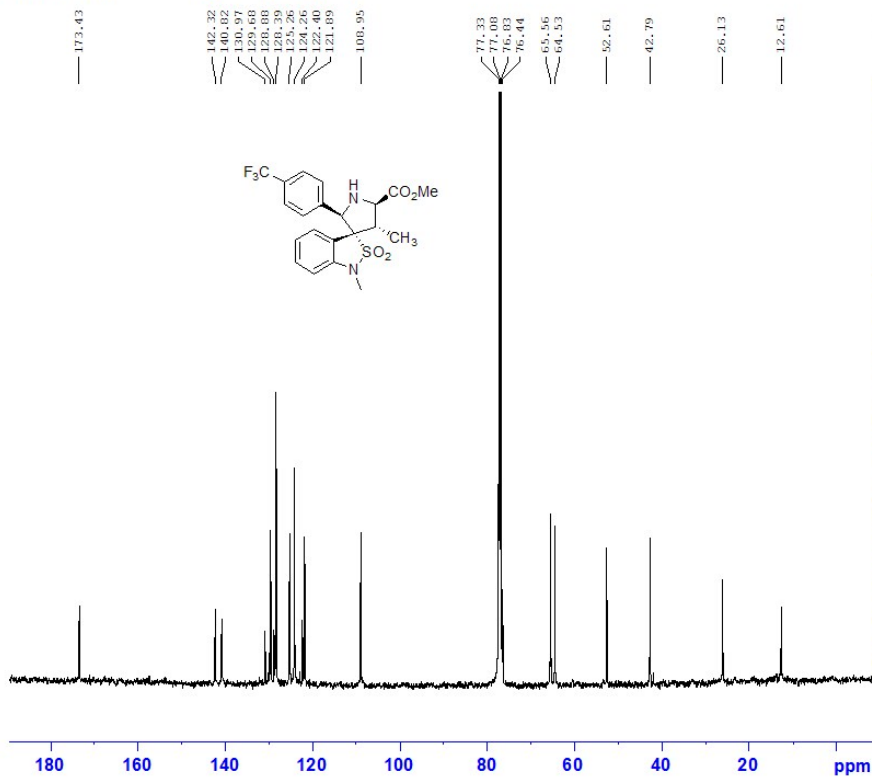
NAME          LFF-3-92A
EXPNO         1
PROCNO        1
Date_         20161229
Time          16.35
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            32768
SOLVENT       CDC13
NS            11
DS            1
SWH           10000.000 Hz
FIDRES        0.305176 Hz
AQ            1.6385000 sec
RG            228
DW            50.000 usec
DE            6.00 usec
TE            673.2 K
D1            1.00000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          1H
P1            13.00 usec
PL1           2.00 dB
SFO1          500.0335010 MHz
SI            16384
SF            500.0300106 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            2.00
    
```

¹³C NMR Spectrum of 3h

LFF-3-92A

¹³C 2017 01 10

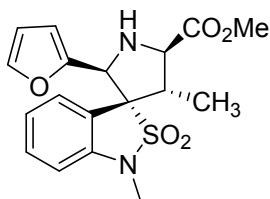


```

NAME          LFF-3-92A
EXPNO         2
PROCNO        1
Date_         20170110
Time          12.20
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDC13
NS            1223
DS            2
SWH           32679.738 Hz
FIDRES        0.498653 Hz
AQ            1.0027661 sec
RG            3250
DW            15.300 usec
DE            6.00 usec
TE            673.2 K
D1            2.00000000 sec
d11           0.03000000 sec
DELTA         1.89999998 sec
TD0           2

===== CHANNEL f1 =====
NUC1          13C
P1            12.20 usec
PL1           3.00 dB
SFO1          125.7464750 MHz

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           2.00 dB
PL12          17.70 dB
PL13          17.70 dB
SFO2          500.0355000 MHz
SI            32768
SF            125.7326392 MHz
WDW           EM
SSB           0
LB            8.00 Hz
GB            0
PC            2.00
    
```

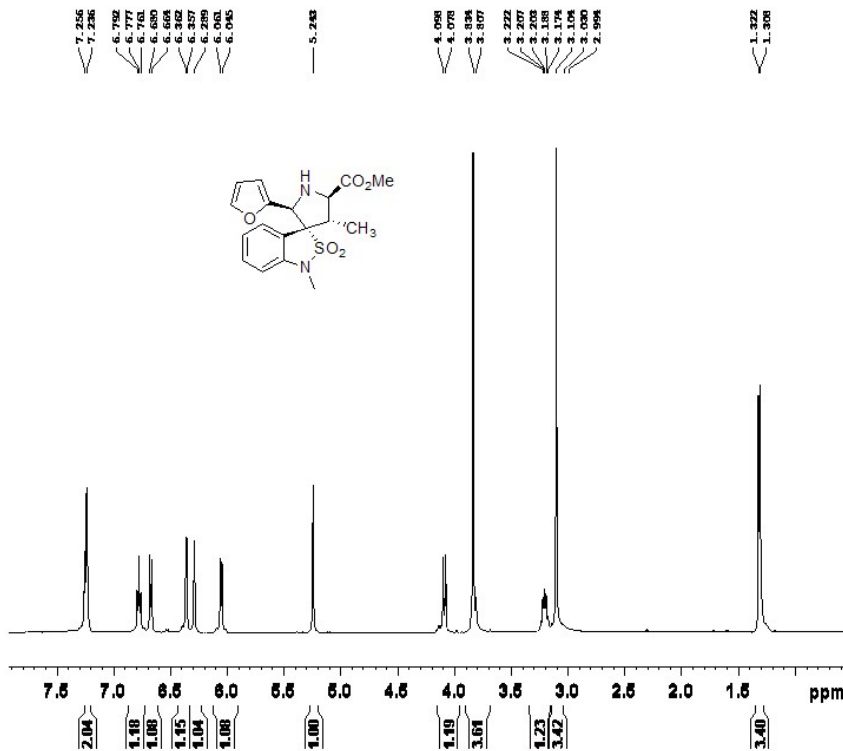


(2'*R*,3'*R*,4'*S*,5'*R*)-1,4'-dimethyl-2'-(furan-2-yl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3i**)

¹H NMR (500 MHz, CDCl₃): δ 7.26-7.24 (m, 2H), 6.78 (t, 1H, *J* = 7.6 Hz), 6.67 (d, 1H, *J* = 7.9 Hz), 6.36 (d, 1H, *J* = 2.5 Hz), 6.29 (s, 1H), 6.06 (d, 1H, *J* = 7.7 Hz), 5.24 (s, 1H), 4.09 (d, 1H, *J* = 10.0 Hz), 3.83 (s, 3H), 3.22-3.17 (m, 1H), 3.10 (s, 3H), 1.31 (d, 3H, *J* = 7.1 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 173.8, 152.7, 142.0, 141.1, 129.5, 124.2, 121.8, 121.2, 110.6, 109.8, 108.8, 63.0, 59.2, 52.4, 44.8, 26.5, 11.2.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₁₈H₂₁N₂O₅S [(*M*+*H*)⁺]: 377.4350. Found: 377.4355. Chiral HPLC (Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min, λ = 254 nm) *t*_R(major) = 21.408 min, *t*_R(minor) = 23.827 min; [α]_D²⁵ = +42.4° (c = 0.31, CH₂Cl₂).

¹H NMR Spectrum of **3i**

LFF-1-74 1H 2015 11 18



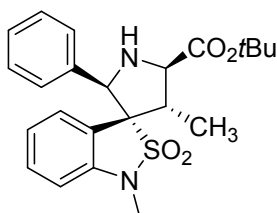
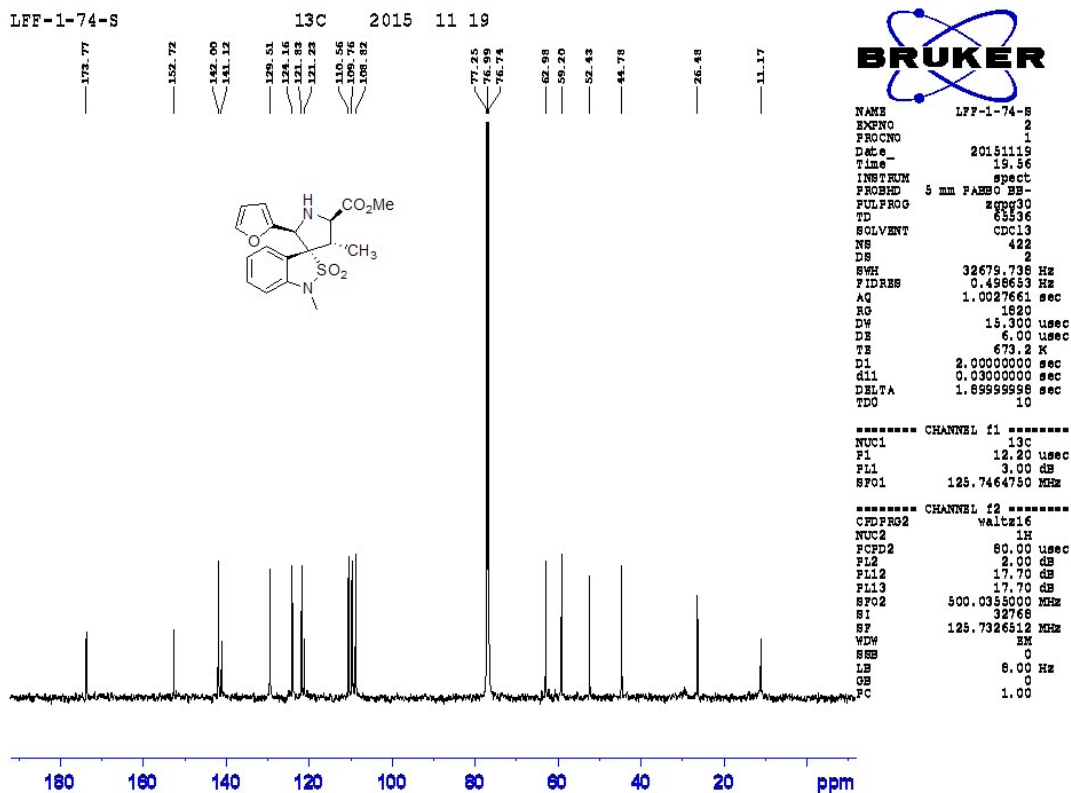
```

NAME          LFF-1-74
EXPNO         1
PROCNO        1
Date_         20151118
Time         15.18
INSTRUM       spect
PROBHD        5 mm F400 EB-
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            2
DS            2
SWH           10000.000 Hz
FIDRES        0.305176 Hz
AQ            1.6365000 sec
RG            161
DW            50.000 usec
DE            6.00 usec
TE            673.2 K
D1            2.00000000 sec
TDC           1

----- CHANNEL f1 -----
NUC1          1H
P1            13.00 usec
PL1           2.00 dB
SFO1          500.0335010 MHz
SI            16384
SF            500.0300122 MHz
WDW           EM
SSB           0
LB            0.10 Hz
GB            0
PC            4.00

```

¹³C NMR Spectrum of **3i**



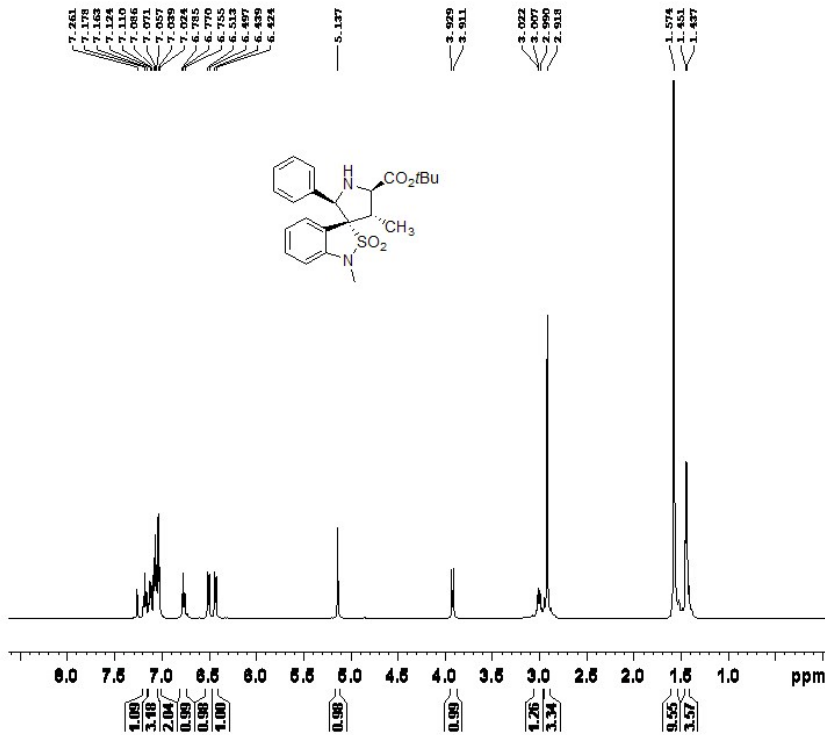
(2'*R*,3*R*,4'*S*,5'*R*)-1,4'-dimethyl-2'-phenyl-5'-*tert*-butoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3j**)

¹H NMR (500 MHz, CDCl₃): δ 7.16 (t, 1H, *J* = 7.8 Hz), 7.12-7.02 (m, 5H), 6.77 (t, 1H, *J* = 7.6 Hz), 6.50 (d, 1H, *J* = 7.9 Hz), 6.43 (d, 1H, *J* = 7.5 Hz), 5.14 (s, 1H), 3.92 (d, 1H, *J* = 9.1 Hz), 3.04-2.98 (m, 1H), 2.92 (s, 3H), 1.57 (s, 9H), 1.44 (d, 3H, *J* = 7.1 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 172.3, 140.7, 137.9, 129.2, 127.9, 127.7, 127.3, 125.1, 123.1, 121.6, 108.7, 82.0, 66.2, 65.5, 43.5, 28.1, 26.1, 13.2.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₃H₂₉N₂O₄S [(*M*+*H*)⁺]: 429.1848. Found: 429.1857. Chiral HPLC (Daicel Chiralpak AD-H, 5% IPA/hexanes, 0.25 mL/min, λ = 254 nm) *t*_R(major) = 71.125 min, *t*_R(minor) = 75.932 min; [α]_D¹⁸ = + 58.0° (c = 0.35, CH₂Cl₂).

¹H NMR Spectrum of **3j**

LFF-3-80

1H 2016 12 19



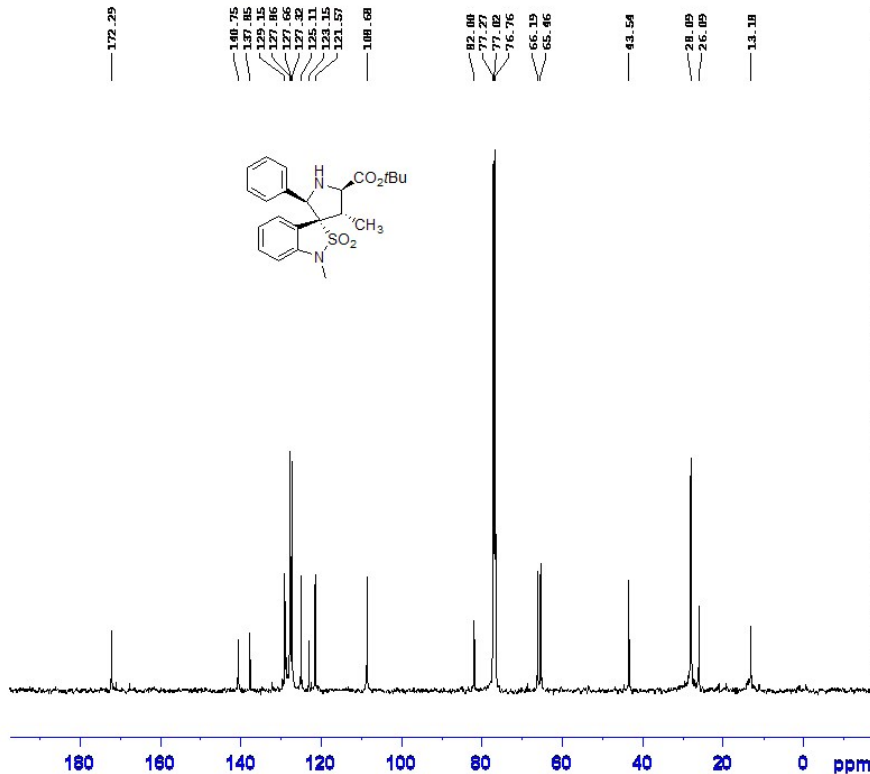
```

NAME      LFF-3-80
EXPNO    1
PROCNO   1
Date_    20161219
Time     15.24
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD       16384
SOLVENT  CDCl3
NS       16
DS       1
SWH      10000.000 Hz
FIDRES   0.610352 Hz
AQ       0.6193000 sec
RG       161
DW       50.000 usec
DE       6.00 usec
TE       673.2 K
D1       1.00000000 sec
TDO      1
  
```

```

----- CHANNEL f1 -----
NUC1     1H
P1       13.00 usec
PL1      2.00 dB
SF01     500.035010 MHz
SI       16384
SP       500.0300097 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       2.00
  
```

¹³C NMR Spectrum of 3j

LFF-3-80 ¹³C 2016 12 24

```

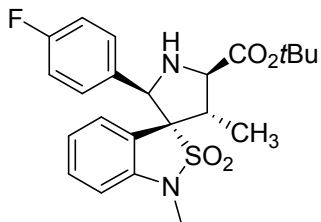
NAME      LFF-3-80
EXPNO    2
PROCNO   2
Date_    20161224
Time     11.27
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD       65536
SOLVENT  CDCl3
NS       647
DS       2
SWH      32678.738 Hz
FIDRES   0.459653 Hz
AQ       1.0027661 sec
RG       6500
DW       15.300 usec
DE       6.00 usec
TE       673.2 K
D1       2.00000000 sec
d11      0.03000000 sec
DELTA    1.89999996 sec
TDO      10
  
```

```

----- CHANNEL f1 -----
NUC1     13C
P1       12.20 usec
PL1      3.00 dB
SF01     125.7464750 MHz
  
```

```

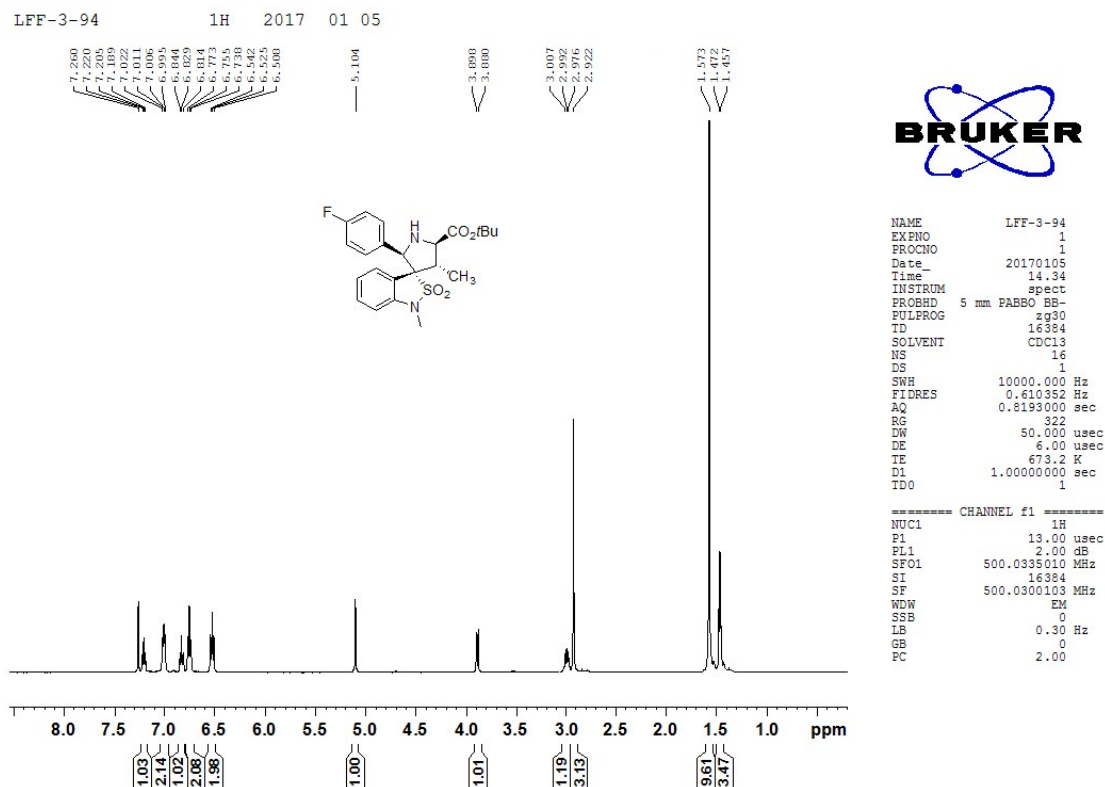
----- CHANNEL f2 -----
CPDPRG2  waltz16
NUC2     1H
PCPD2    80.00 usec
PL2      2.00 dB
PL12     17.70 dB
PL13     17.70 dB
SF02     500.0355000 MHz
SI       32768
SF       125.7326498 MHz
WDW      EM
SSB      0
LB       10.00 Hz
GB       0
PC       3.00
  
```



(2'*R*,3*R*,4'*S*,5'*R*)-2'-(4-fluorophenyl)-1,4'-dimethyl-5'-*tert*-butoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3k**)

¹H NMR (500 MHz, CDCl₃): δ 7.20 (t, 1H, *J* = 7.7 Hz), 7.02-6.99 (m, 2H), 6.83 (t, 1H, *J* = 7.6 Hz), 6.76 (t, 2H, *J* = 8.6 Hz), 6.52 (t, 2H, *J* = 8.6 Hz), 5.10 (s, 1H), 3.89 (d, 1H, *J* = 8.9 Hz), 3.02-2.96 (m, 1H), 2.92 (s, 3H), 1.57 (s, 9H), 1.46 (d, 3H, *J* = 7.1 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 172.4, 140.8, 133.6, 129.6, 129.4, 125.2, 121.8, 114.3, 114.1, 108.8, 82.2, 76.4, 65.8, 65.6, 43.4, 28.2, 26.1, 13.5.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₃H₂₈FN₂O₄S [(M+H)⁺]: 447.1754. Found: 447.1759. Chiral HPLC (Daicel Chiralpak AD-H, 70% IPA/hexanes, 0.18 mL/min, λ = 254 nm) *t*_R(major) = 27.143 min, *t*_R(minor) = 29.060 min; [α]_D¹⁸ = +69.4° (c = 0.33, CH₂Cl₂).

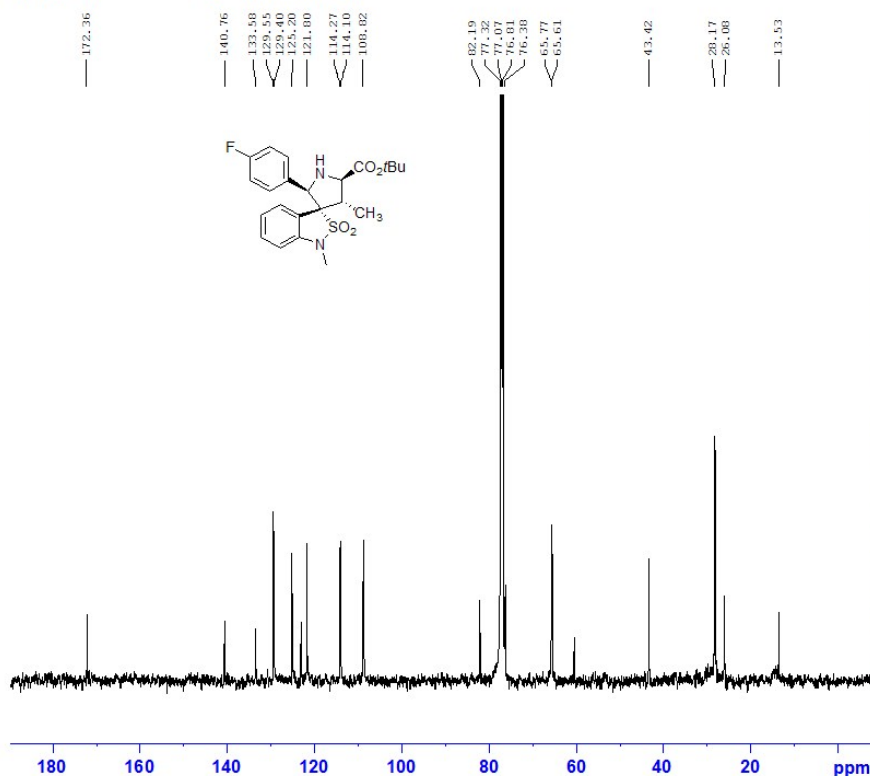
¹H NMR Spectrum of **3k**



¹³C NMR Spectrum of **3k**

LFF-3-94

13C 2017 01 10



```

NAME      LFF-3-94
EXPNO     2
PROCNO    1
Date_     20170110
Time      10.46
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         1171
DS         2
SWH        32679.738 Hz
FIDRES    0.498653 Hz
AQ         1.0027661 sec
RG         1320
DW         15.300 usec
DE         6.00 usec
TE         673.2 K
D1         2.0000000 sec
d11        0.0300000 sec
DELTA     1.8999999 sec
TD0        2

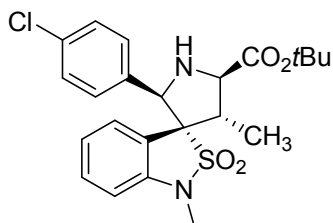
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        12.20 usec
PL1       3.00 dB
SFO1     125.7464750 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       2.00 dB
PL12      17.70 dB
PL13      17.70 dB
SFO2     500.0355000 MHz
SI        32768
SF        125.7326392 MHz
WDW       EM
SSB       0
LB        8.00 Hz
GB        0
PC        2.00

```

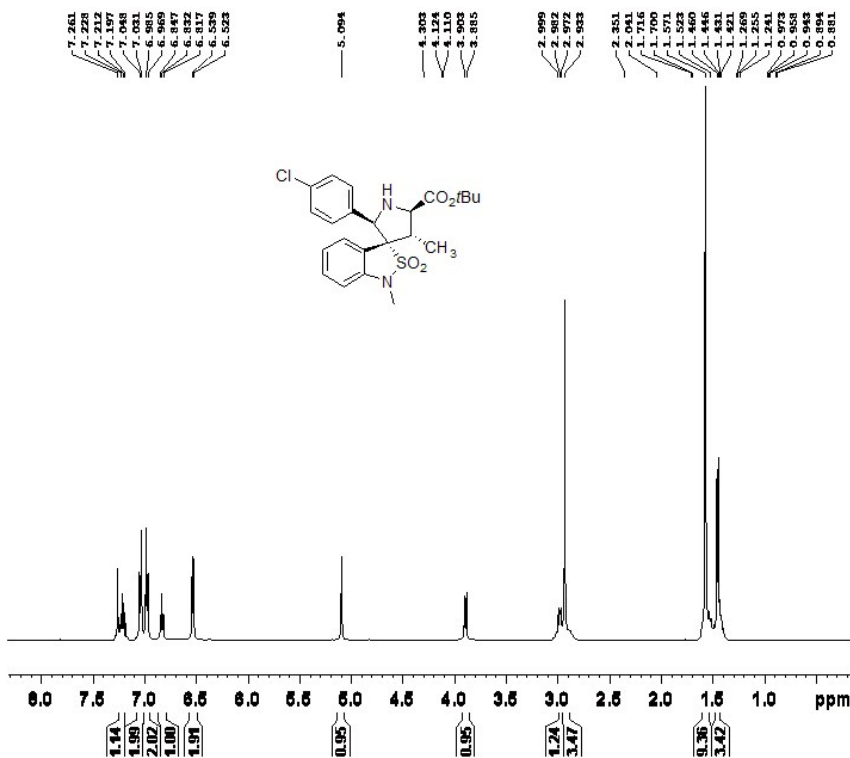


(2'*R*,3*R*,4'*S*,5'*R*)-2'-(4-chlorophenyl)-1,4'-dimethyl-5'-*tert*-butoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**31**)

¹H NMR (500 MHz, CDCl₃): δ 7.21 (t, 1H, *J* = 7.8 Hz), 7.05-6.97 (m, 4H), 6.83 (t, 1H, *J* = 7.6 Hz), 6.53 (d, 2H, *J* = 7.8 Hz), 5.09 (s, 1H), 3.89 (d, 1H, *J* = 9.0 Hz), 3.00-2.95 (m, 1H), 2.93 (s, 3H), 1.57 (s, 9H), 1.45 (d, 3H, *J* = 7.2 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 172.2, 140.7, 136.3, 133.4, 129.4, 129.3, 127.4, 125.1, 122.9, 121.8, 108.8, 82.1, 76.3, 65.6, 65.5, 43.3, 28.1, 26.0, 13.3.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₃H₂₈ClN₂O₄S [(M+H)⁺]: 463.1458. Found: 463.1450. Chiral HPLC (Daicel Chiralpak AD-H, 70% IPA/hexanes, 0.2 mL/min, λ = 254 nm) *t*_R(major) = 24.554 min, *t*_R(minor) = 26.050 min; [α]_D¹⁸ = +62.1° (c = 0.34, CH₂Cl₂).

¹H NMR Spectrum of **31**

LFF-3-81 1H 2016 12 19



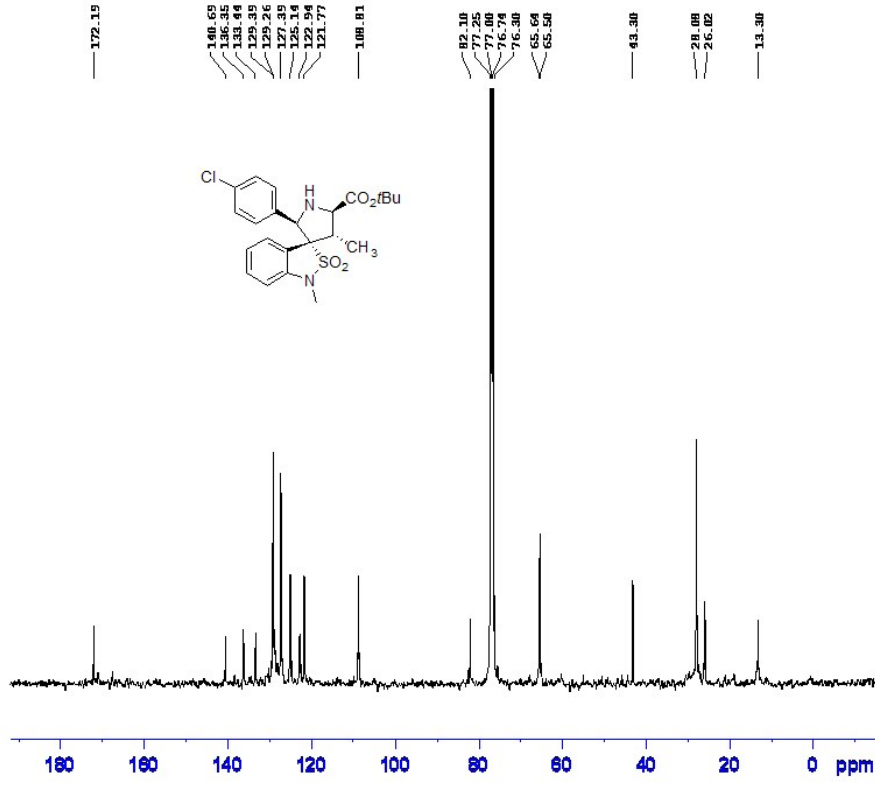
```

NAME          LFF-3-81
EXPNO         1
PROCNO        1
Date_         20161219
Time         15.29
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            16384
SOLVENT       CDCl3
NS            16
DS            1
SWH           10000.000 Hz
FIDRES        0.610352 Hz
AQ            0.6193000 sec
RG            161
DW            50.000 usec
DE            6.00 usec
TE            673.2 K
D1            1.0000000 sec
TD0           1

----- CHANNEL f1 -----
NUC1          1H
P1            13.00 usec
PL1           2.00 dB
SFO1         500.0338010 MHz
SI            16384
SF           500.0330000 MHz
WDW#          EM
SSB           0
LB            0.30 Hz
GB            0
PC            2.00
    
```

¹³C NMR Spectrum of 31

LFF-3-81 ¹³C 2016 12 22

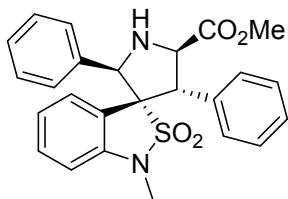


```

NAME          LFF-3-81
EXPNO         2
PROCNO        1
Date_         20161222
Time         16.55
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            1836
DS            2
SWH           32679.796 Hz
FIDRES        0.486533 Hz
AQ            1.0027661 sec
RG            5790
DW            15.300 usec
DE            6.00 usec
TE            673.2 K
D1            2.0000000 sec
d11           0.0300000 sec
DELTA        1.89999998 sec
TD0           10

----- CHANNEL f1 -----
NUC1          13C
P1            12.20 usec
PL1           3.00 dB
SFO1         125.7464750 MHz

----- CHANNEL f2 -----
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           17.70 dB
PL12          17.70 dB
SFO2         500.0355000 MHz
SI            32768
SF           125.7326498 MHz
WDW#          EM
SSB           0
LB            12.00 Hz
GB            0
PC            3.00
    
```

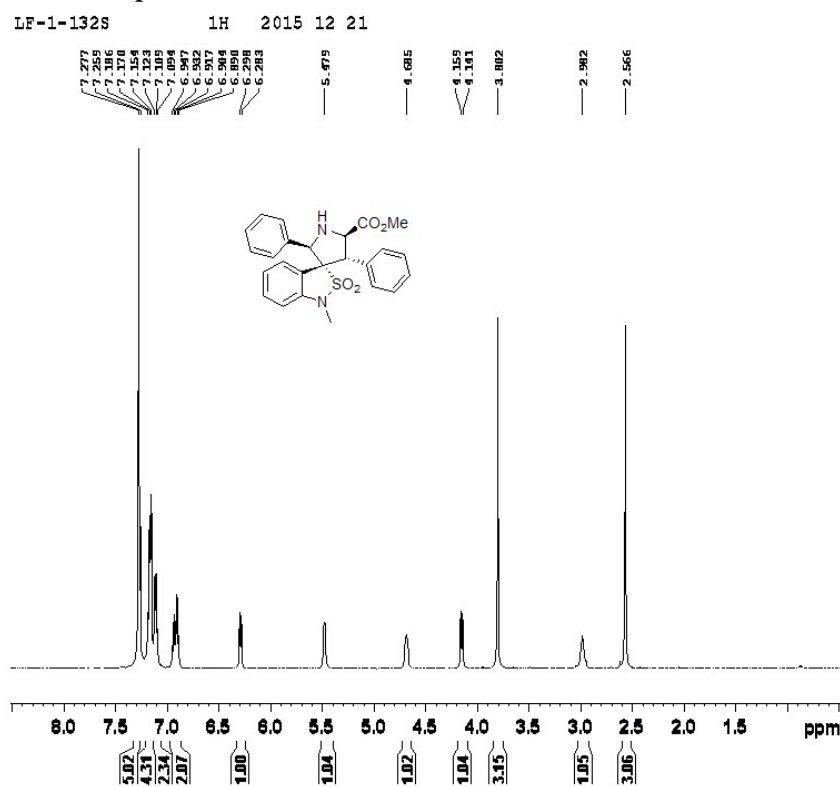



(2'*R*,3*R*,4'*S*,5'*R*)-1-methyl-2',4'-diphenyl-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3m**)

¹H NMR (500 MHz, CDCl₃): δ 7.28-7.26 (m, 5H), 7.19-7.09 (m, 6H), 6.95-6.89 (m, 2H), 6.29 (d, 1H, *J* = 7.9 Hz), 5.48 (s, 1H), 4.68 (s, 1H), 4.15 (d, 1H, *J* = 8.7 Hz), 3.80 (s, 3H), 2.98 (br, 1H), 2.57 (s, 3H).

¹³C NMR (125 MHz, CDCl₃): δ 172.9, 140.6, 136.4, 136.0, 129.3, 128.3, 128.1, 128.0, 127.3, 125.6, 124.8, 121.6, 108.8, 68.0, 64.8, 55.6, 52.6, 26.0.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₅H₂₅N₂O₄S [(M+H)⁺]: 449.1535. Found: 449.1539. Chiral HPLC (Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min, λ = 254 nm) *t*_R(major) = 26.979 min, *t*_R(minor) = 35.305 min; [α]_D²⁵ = +70.6° (c = 0.47, CH₂Cl₂).

¹H NMR Spectrum of 3m



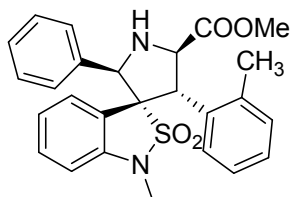
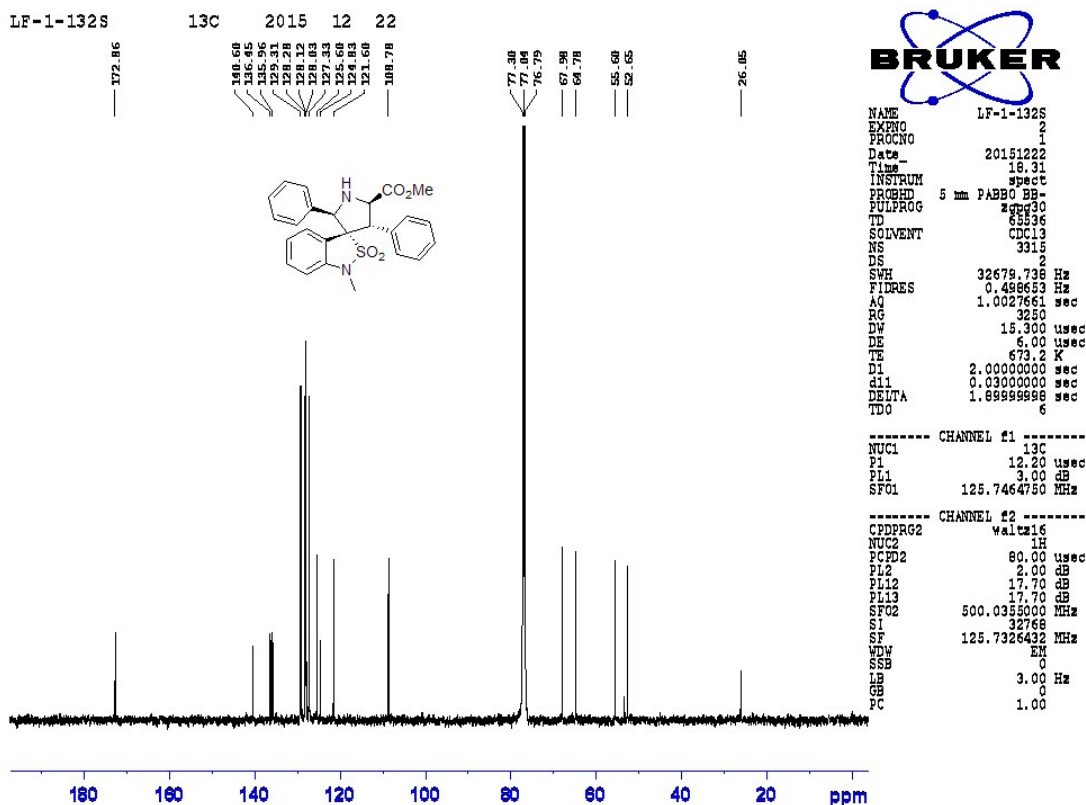
```

NAME          LF-1-132S
EXPNO         1
PROCNO        1
Date_         20151221
Time          15.47
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            6
DS            1
SWH           10000.000 Hz
FIDRES        0.305176 Hz
AQ            1.6365000 sec
RG            406
DW            50.000 usec
DE            6.00 usec
TE            673.2 K
D1            1.0000000 sec
TDO           1

----- CHANNEL f1 -----
NUC1          1H
P1            13.00 usec
PL1           2.00 dB
SFO1          500.0335010 MHz
SI            16384
SF            500.0300109 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            4.00

```

¹³C NMR Spectrum of 3m

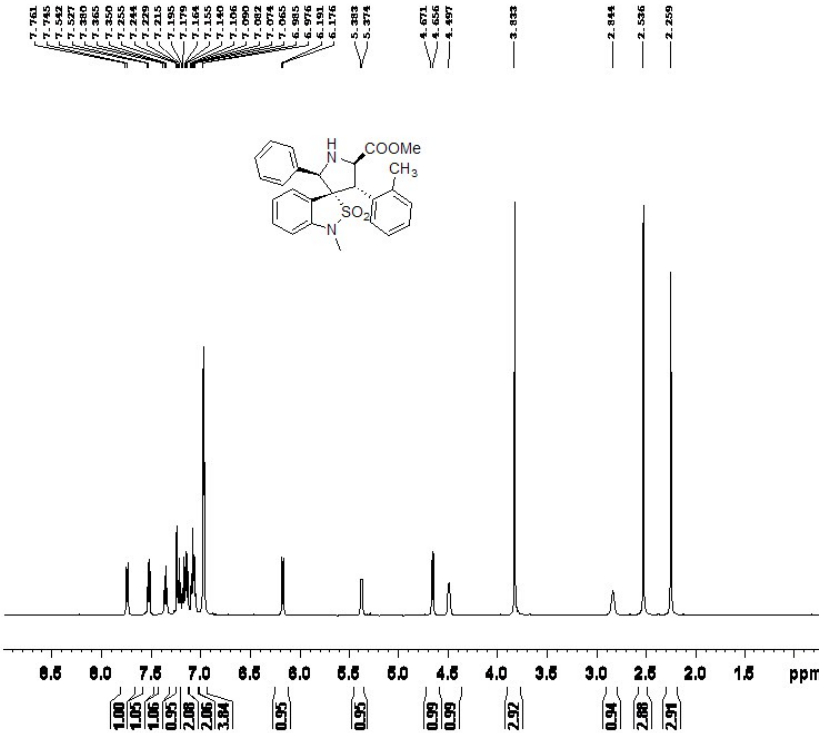


(2'*R*,3*R*,4'*S*,5'*R*)-1-methyl-2'-phenyl-4'-(*o*-tolyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3n**)

¹H NMR (500 MHz, CDCl₃): δ 7.76 (d, 1H, *J* = 7.8 Hz), 7.54 (d, 1H, *J* = 7.5 Hz), 7.37 (t, 1H, *J* = 7.6 Hz), 7.23 (t, 1H, *J* = 7.5 Hz), 7.19-7.14 (m, 2H), 7.11-7.06 (m, 2H), 6.98-6.97 (m, 4H), 6.18 (d, 1H, *J* = 7.8 Hz), 5.38 (s, 1H), 4.66 (d, 1H, *J* = 7.2 Hz), 4.50 (s, 1H), 3.83 (s, 3H), 2.84 (br, 1H), 2.54 (s, 3H), 2.26 (s, 3H). ¹³C NMR (125 MHz, CDCl₃): δ 172.6, 140.1, 137.9, 136.9, 134.1, 130.2, 129.2, 128.1, 127.8, 126.7, 126.3, 126.2, 124.8, 121.6, 108.3, 75.6, 71.2, 67.6, 52.6, 49.0, 25.3, 20.4.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₆H₂₇N₂O₄S [(*M*+*H*)⁺]: 463.1692. Found: 463.1702. Chiral HPLC (Daicel Chiralpak AD-H, 30% IPA/hexanes, 0.9 mL/min, λ = 254 nm) *t*_R(major) = 17.496 min, *t*_R(minor) = 19.332 min; [α]_D²⁵ = +20.0° (c = 0.28, CH₂Cl₂).

¹H NMR Spectrum of **3n**

LF-1-136 1H 2015 12 24

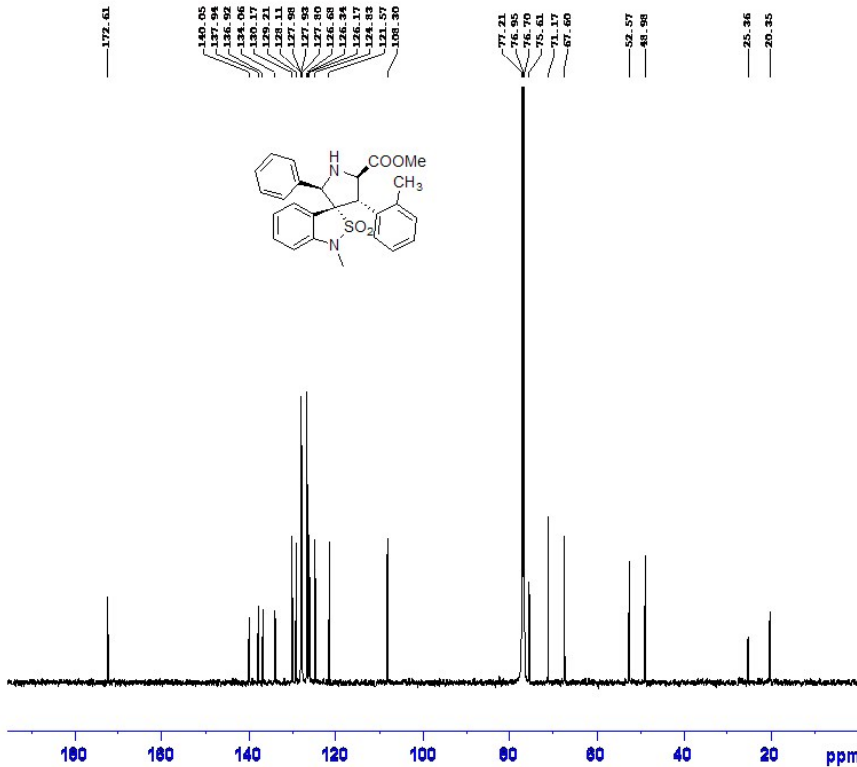


```

NAME LF-1-136
EXPNO 1
PROCNO 1
DATE_ 20151224
TIME 15.33
INSTRUM spect
PROBHD 5 mm F4BBO BB-
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 6
DS 1
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6385000 sec
RG 406
DW 50.000 usec
DE 6.00 usec
TE 673.2 K
D1 1.00000000 sec
TDO 1
----- CHANNEL f1 -----
NUC1 1H
P1 13.00 usec
PL1 2.00 dB
SFO1 500.0335010 MHz
SI 16384
SF 300.0300129 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
FC 4.00
  
```

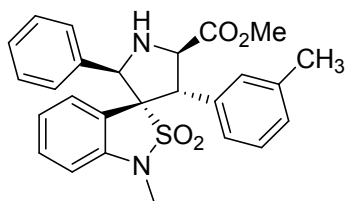
¹³C NMR Spectrum of 3n

LF-1-136 13C 2015 12 24



```

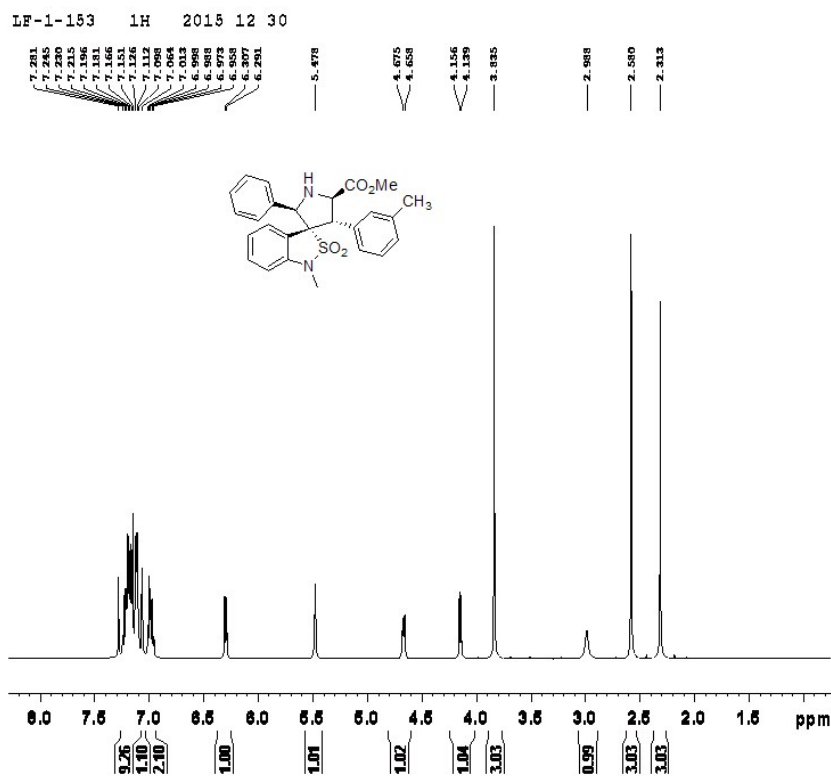
NAME LF-1-136
EXPNO 2
PROCNO 1
DATE_ 20151224
TIME 18.44
INSTRUM spect
PROBHD 5 mm F4BBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 3660
DS 2
SWH 32679.736 Hz
FIDRES 0.498653 Hz
AQ 1.0027661 sec
RG 6500
DW 15.300 usec
DE 6.00 usec
TE 673.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999996 sec
TDO 10
----- CHANNEL f1 -----
NUC1 13C
P1 12.20 usec
PL1 3.00 dB
SFO1 125.7464750 MHz
----- CHANNEL f2 -----
CPDPRG2 waltz16
NUC2 1H
PCPD2 60.00 usec
PL2 2.00 dB
PL12 17.70 dB
PL13 17.70 dB
SFO2 500.0355000 MHz
SI 32768
SF 125.7326512 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
FC 1.00
  
```



(2'*R*,3*R*,4'*S*,5'*R*)-1-methyl-2'-phenyl-4'-(*m*-tolyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**30**)

¹H NMR (500 MHz, CDCl₃): δ 7.28-7.10 (m, 9H), 7.06 (s, 1H), 7.01-6.96 (m, 2H), 6.29 (d, 1H, *J* = 7.9 Hz), 5.48 (s, 1H), 4.66 (d, 1H, *J* = 8.4 Hz), 4.15 (d, 1H, *J* = 8.5 Hz), 3.83 (s, 3H), 2.99 (br, 1H), 2.58 (s, 3H), 2.31 (s, 3H). ¹³C NMR (125 MHz, CDCl₃): δ 172.8, 140.5, 137.6, 136.1, 130.2, 129.3, 128.8, 128.2, 128.0, 127.2, 126.2, 125.5, 125.0, 121.5, 108.6, 68.3, 65.1, 55.4, 52.6, 26.0, 21.4.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₆H₂₇N₂O₄S [(M+H)⁺]: 463.1692. Found: 463.1695. Chiral HPLC (Daicel Chiralpak AD-H, 30% IPA/hexanes, 0.9 mL/min, λ = 254 nm) *t*_R(major) = 11.072 min, *t*_R(minor) = 16.708 min; [α]_D²⁵ = +68.4° (c = 0.38, CH₂Cl₂).

¹H NMR Spectrum of **30**



¹³C NMR Spectrum of **30**

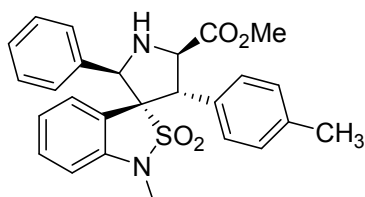
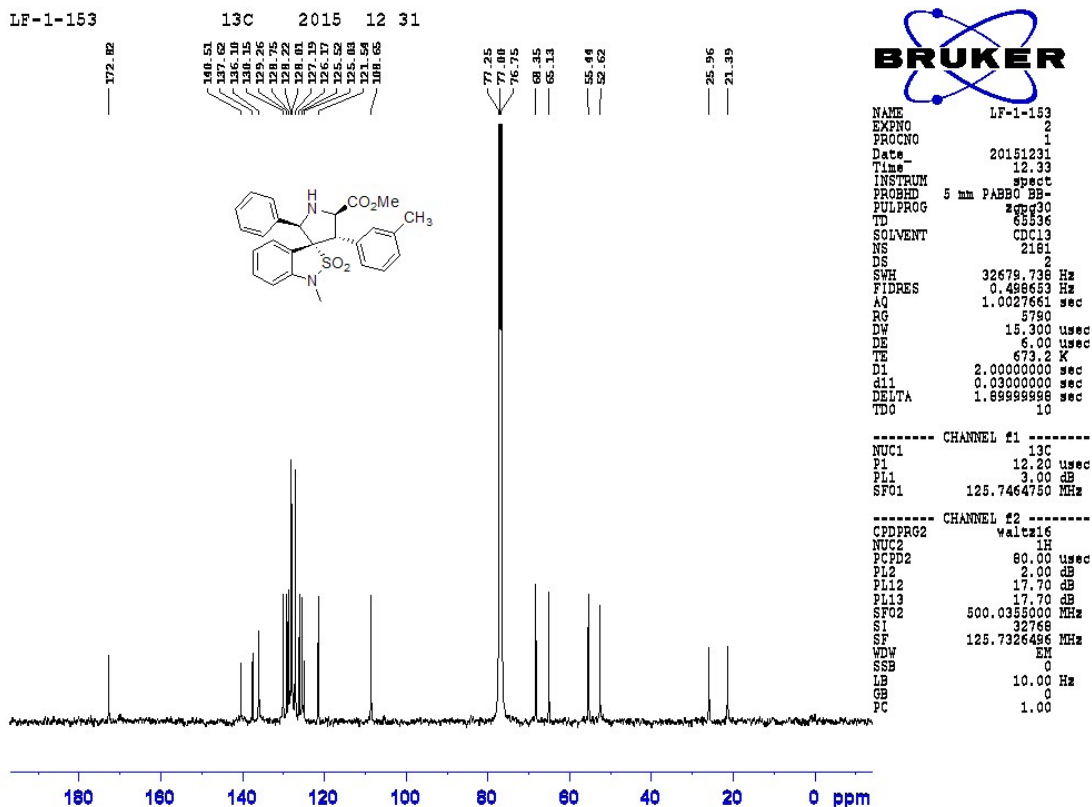


```

NAME          LF-1-153
EXPNO         1
PROCNO        1
Date_         20151230
Time          16.48
INSTRUM       spect
PROBHD        5 mm F4BBO BB-
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            6
DS            1
SWH           10000.000 Hz
FIDRES        0.305176 Hz
AQ            1.6365000 sec
RG            362
DW            50.000 usec
DE            6.00 usec
TE            293.2 K
D1            2.00000000 sec
TDO           1

===== CHANNEL f1 =====
NUC1          1H
P1            13.00 usec
PL1           2.00 dB
SFO1          500.0335010 MHz
SI            1.6384
SF            500.0300000 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            4.00

```

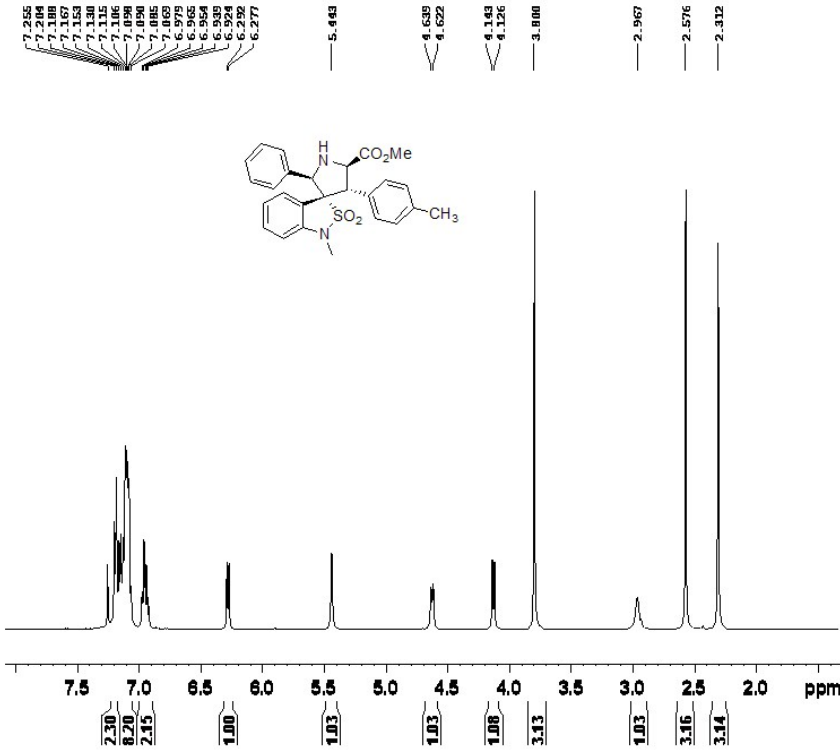


(2'*R*,3*R*,4'*S*,5'*R*)-1-methyl-2'-phenyl-4'-(*p*-tolyl)-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3p**)

^1H NMR (500 MHz, CDCl_3): δ 7.25-7.07 (m, 10H), 6.98-6.92 (m, 2H), 6.28 (d, 1H, $J = 7.9$ Hz), 5.44 (s, 1H), 4.63 (d, 1H, $J = 8.3$ Hz), 4.13 (d, 1H, $J = 8.5$ Hz), 3.80 (s, 3H), 2.97 (br, 1H), 2.58 (s, 3H), 2.31 (s, 3H). ^{13}C NMR (125 MHz, CDCl_3): δ 172.9, 140.6, 137.6, 136.3, 133.2, 129.3, 129.2, 128.9, 128.3, 128.0, 127.2, 125.6, 125.0, 121.5, 108.7, 68.3, 65.2, 55.2, 52.6, 26.0, 21.2.; HRMS (ESI-TOF $^+$): m/z Calcd. for $\text{C}_{26}\text{H}_{27}\text{N}_2\text{O}_4\text{S}$ [($\text{M}+\text{H}$) $^+$]: 463.1692. Found: 463.1689. Chiral HPLC (Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min, $\lambda = 254$ nm) t_{R} (major) = 37.084 min, t_{R} (minor) = 39.304 min; $[\alpha]_{\text{D}}^{25} = +85.9^\circ$ ($c = 0.58$, CH_2Cl_2).

^1H NMR Spectrum of **3p**

LF-1-1338 1H 2015 12 21



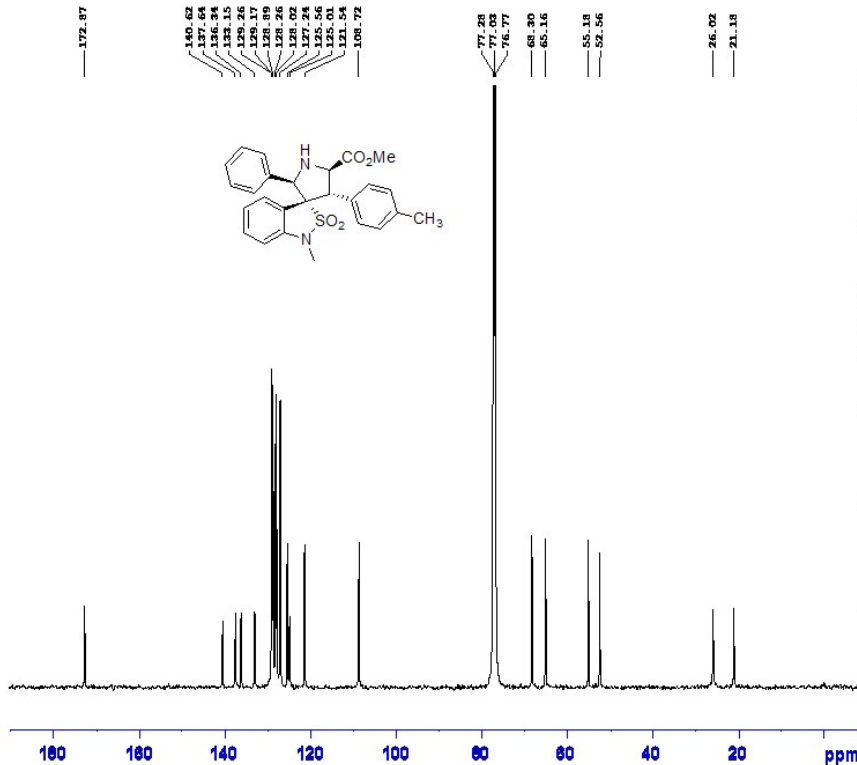
```

NAME LF-1-1338
EXPNO 1
PROCNO 1
Date_ 20151221
Time 15.42
INSTRUM spect
PROBHD 5 mm F400 BB-
PULPROG zg30
TD 32768
SOLVENT cdcl3
NS 8
DS 1
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6365000 sec
RG 228
DW 50.000 usec
DE 6.00 usec
TE 673.2 K
D1 1.00000000 sec
TDO 1

----- CHANNEL f1 -----
NUC1 1H
P1 13.00 usec
PL1 2.00 dB
SFO1 500.0335010 MHz
SI 16384
SF 500.0300129 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
FC 4.00
    
```

¹³C NMR Spectrum of 3p

LF-1-1338 13C 2015 12 22

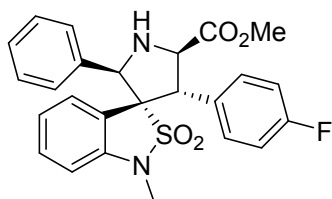


```

NAME LF-1-1338
EXPNO 2
PROCNO 1
Date_ 20151222
Time 21.26
INSTRUM spect
PROBHD 5 mm F400 BB-
PULPROG zgpg30
TD 65536
SOLVENT cdcl3
NS 6000
DS 2
SWH 32679.738 Hz
FIDRES 0.498663 Hz
AQ 1.0027661 sec
RG 3250
DW 15.300 usec
DE 6.00 usec
TE 673.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999996 sec
TDO 6

----- CHANNEL f1 -----
NUC1 13C
P1 12.20 usec
PL1 3.00 dB
SFO1 125.7464750 MHz

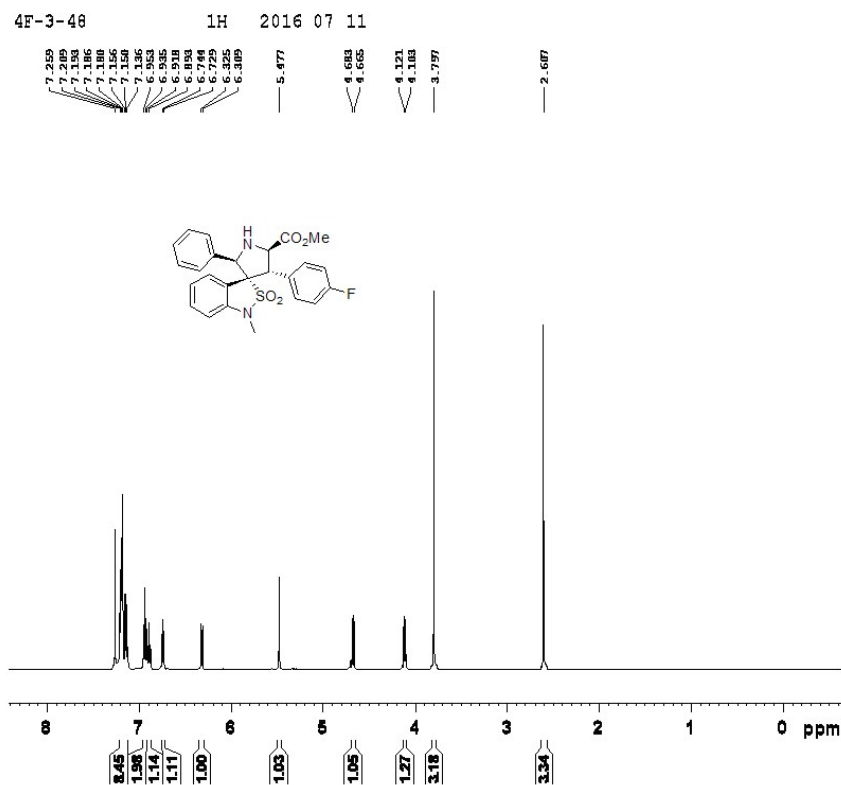
----- CHANNEL f2 -----
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 2.00 dB
PL12 17.70 dB
PL13 17.70 dB
SFO2 500.0355000 MHz
SI 32768
SF 125.7326432 MHz
WDW EM
SSB 0
LB 10.00 Hz
GB 0
FC 1.00
    
```



(2'*R*,3*R*,4'*S*,5'*R*)-4'-(4-fluorophenyl)-1-methyl-2'-phenyl--5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3q**)

¹H NMR (500 MHz, CDCl₃): δ 7.26-7.14 (m, 8H), 6.95-6.92 (m, 2H), 6.89 (t, 1H, *J* = 7.7 Hz), 6.73 (d, 1H, *J* = 7.6 Hz), 6.31 (d, 1H, *J* = 7.9 Hz), 5.48 (s, 1H), 4.67 (d, 1H, *J* = 9.0 Hz), 4.11 (d, 1H, *J* = 9.0 Hz), 3.80 (s, 3H), 2.61 (s, 3H). ¹³C NMR (125 MHz, CDCl₃) δ 172.8, 140.7, 136.9, 131.0, 129.4, 128.3, 128.2, 127.5, 125.6, 124.4, 121.6, 115.1, 114.9, 108.8, 67.2, 64.2, 55.0, 52.7, 26.1.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₅H₂₄FN₂O₄S [(*M*+*H*)⁺]: 467.1441. Found: 467.1448. Chiral HPLC (Daicel Chiralpak AD-H, 30% IPA/hexanes, 0.9 mL/min, λ = 254 nm) *t*_R(major) = 24.426 min, *t*_R(minor) = 27.713 min; [α]_D²⁵ = +19.5° (c = 0.19, CH₂Cl₂).

¹H NMR Spectrum of **3q**

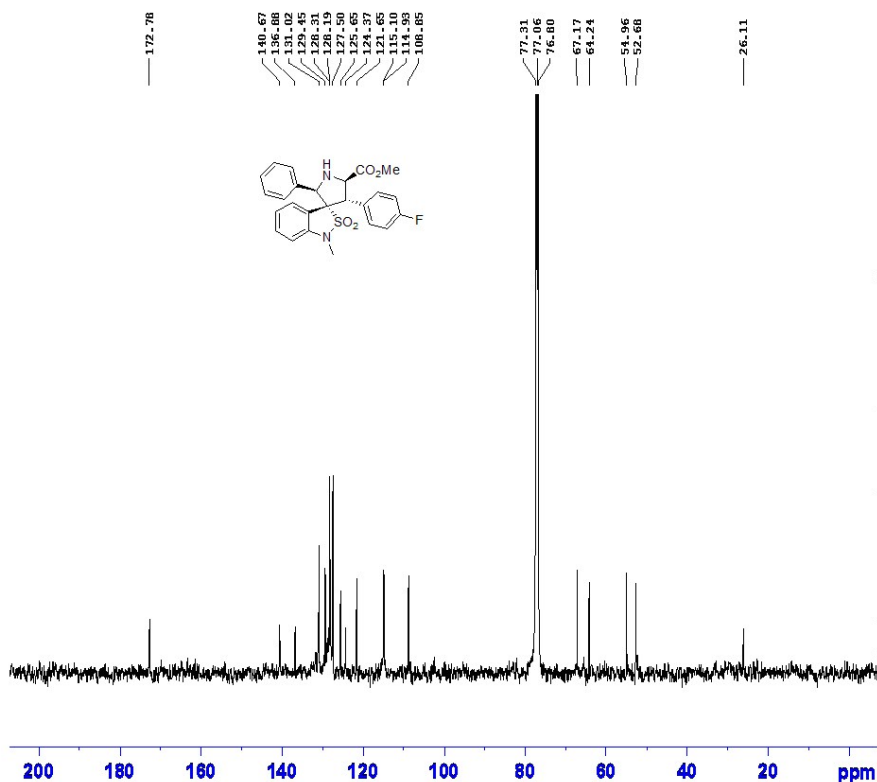


```

NAME          LFF-3-48
EXPNO         1
PROCNO        1
Date_         20160711
Time         16.41
INSTRUM       spect
PROBHD        5 mm PABBO EB-
PULPROG       zg30
TD            16384
SOLVENT       CDCl3
NS            16
DS            1
SWH           10000.000 Hz
FIDRES        0.610352 Hz
AQ            0.8193000 sec
RG            812
DF            50.000 usec
DE            6.00 usec
TE            673.2 K
D1            1.00000000 sec
TDO           1
----- CHANNEL f1 -----
NUC1          1H
P1            13.00 usec
PL1           2.00 dB
SFO1          500.0335010 MHz
SI            16384
SF            500.0300110 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            2.00
  
```

¹³C NMR Spectrum of **3q**

LFF-3-48 13C 20160712



```

NAME      LFF-3-48
EXPNO     2
PROCNO    1
Date_     20160712
Time      18.14
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        1000
DS        2
SWH       32679.738 Hz
FIDRES    0.498653 Hz
AQ        1.0027661 sec
RG        1820
DW        15.300 usec
DE        6.00 usec
TE        673.2 K
D1        2.00000000 sec
d11       0.03000000 sec
DELTA     1.89999998 sec
TD0       2

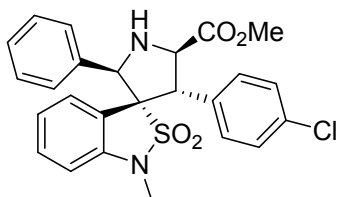
```

```

----- CHANNEL f1 -----
NUC1      13C
P1        12.20 usec
PL1       3.00 dB
SFO1     125.7464750 MHz

----- CHANNEL f2 -----
CPDPRG2   wa1tz16
NUC2      1H
PCPD2     80.00 usec
PL2       2.00 dB
PL12     17.70 dB
PL13     17.70 dB
SFO2     500.0355000 MHz
SI        32768
SF        125.7326392 MHz
WDW       EM
SSB       0
LB        6.00 Hz
GB        0
PC        2.00

```

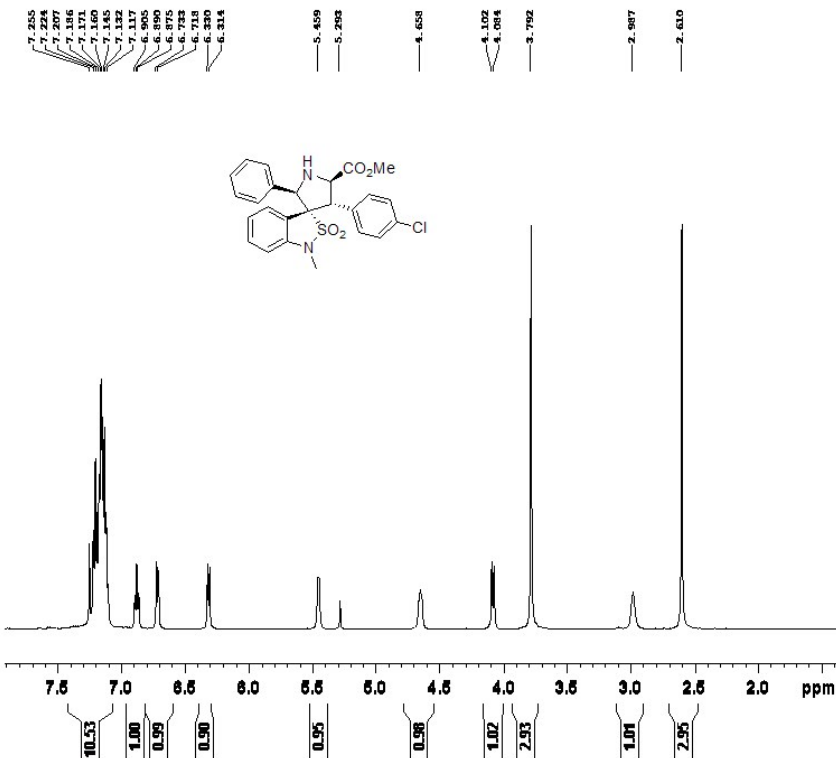


(2'*R*,3*R*,4'*S*,5'*R*)-4'-(4-chlorophenyl)-1-methyl-2'-phenyl-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3r**)

¹H NMR (500 MHz, CDCl₃): δ 7.25-7.11 (m, 10H), 6.89 (t, 1H, *J* = 7.6 Hz), 6.72 (d, 1H, *J* = 7.6 Hz), 6.32 (d, 1H, *J* = 7.9 Hz), 5.46 (s, 1H), 4.66 (s, 1H), 4.09 (d, 1H, *J* = 9.1 Hz), 3.79 (s, 3H), 2.99 (br, 1H), 2.61 (s, 3H). ¹³C NMR (125 MHz, CDCl₃): δ 172.6, 140.6, 136.8, 133.9, 133.8, 130.6, 129.4, 128.2, 128.1, 127.4, 125.6, 124.2, 121.6, 108.8, 67.1, 64.0, 54.9, 52.6, 26.1.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₅H₂₄ClN₂O₄S [(M+H)⁺]: 483.1145. Found: 483.1151. Chiral HPLC (Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min, λ = 254 nm) *t*_R(major) = 48.852 min, *t*_R(minor) = 54.080 min; [α]_D²⁵ = +61.6° (*c* = 0.56, CH₂Cl₂).

¹H NMR Spectrum of **3r**

LF-1-135 1H 2015 12 24

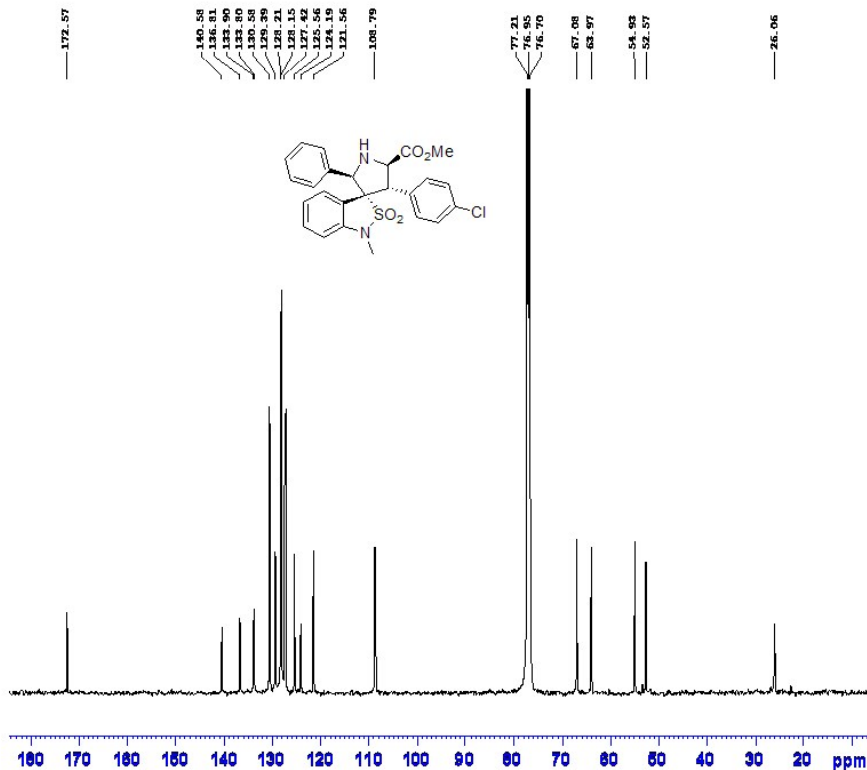


```

NAME LF-1-135
EXPNO 1
PROCNO 1
Date_ 20151224
Time_ 15.29
INSTRUM spect
PROBHD 5 mm FAPBQ BB-
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 8
DS 1
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6385000 sec
RG 406
DW 50.000 usec
DE 6.00 usec
TE 673.2 K
DL 1.0000000 sec
TDO 1
----- CHANNEL f1 -----
NUC1 1H
P1 13.00 usec
PL1 2.00 dB
SFO1 500.0335010 MHz
SI 16384
SF 500.0300129 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 4.00
  
```

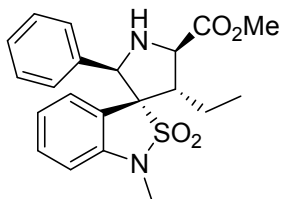
¹³C NMR Spectrum of 3r

LF-1-135 13C 2015 12 24



```

NAME LF-1-135
EXPNO 2
PROCNO 1
Date_ 20151224
Time_ 21.36
INSTRUM spect
PROBHD 5 mm FAPBQ BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 10000
DS 2
SWH 32679.736 Hz
FIDRES 0.488653 Hz
AQ 1.0027661 sec
RG 6800
DW 15.300 usec
DE 6.00 usec
TE 673.2 K
DL 2.0000000 sec
d11 0.0300000 sec
DELTA 1.89999998 sec
TDO 10
----- CHANNEL f1 -----
NUC1 13C
P1 12.20 usec
PL1 3.00 dB
SFO1 125.7464750 MHz
----- CHANNEL f2 -----
CDEPRG2 valtz16
NUC2 1H
PCPD2 80.00 usec
PL2 2.00 dB
PL12 17.70 dB
PL13 17.70 dB
SFO2 500.0355000 MHz
SI 32768
SF 125.7326512 MHz
WDW EM
SSB 0
LB 6.00 Hz
GB 0
PC 1.00
  
```



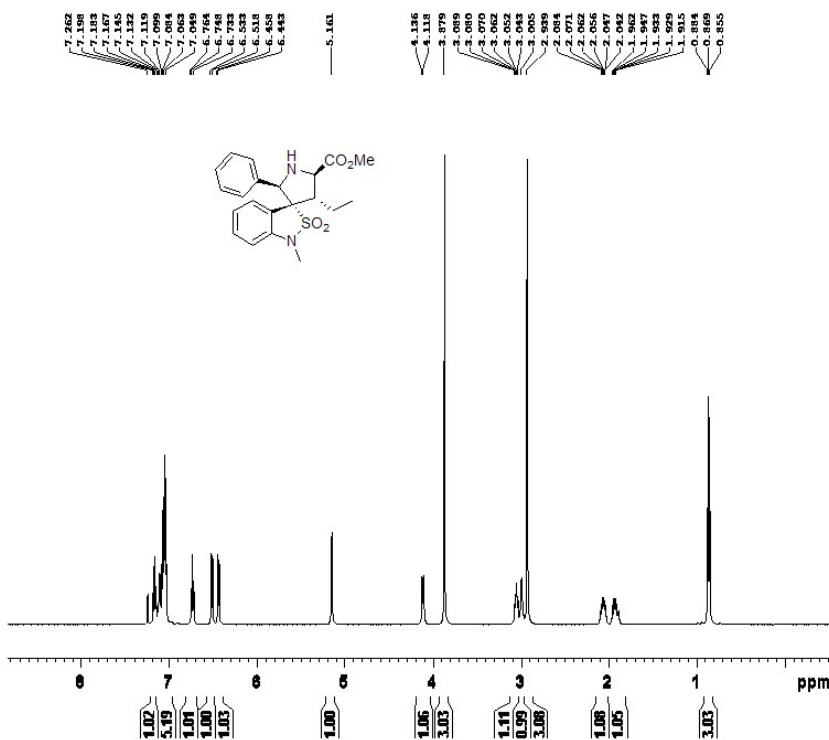
(2'R,3R,4'S,5'R)-4'-ethyl-1-methyl-2'-phenyl-5'-methoxycarbonyl-1H-spiro[benzo[c]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3s**)

¹H NMR (500 MHz, CDCl₃): δ 7.18 (t, 1H, *J* = 7.8 Hz), 7.15-7.05 (m, 5H), 6.75 (t, 1H, *J* = 7.6 Hz), 6.52 (d, 1H, *J* = 7.9 Hz), 6.45 (d, 1H, *J* = 7.6 Hz), 5.16 (s, 1H), 4.12 (d, 1H, *J* = 9.0 Hz), 3.88 (s, 3H), 3.09-3.04 (m, 1H), 3.01 (br, 1H), 2.94 (s, 3H), 2.08-2.04 (m, 1H), 1.96-1.91 (m, 1H), 0.87 (t, 3H, *J* = 7.4 Hz).

¹³C NMR (125 MHz, CDCl₃): δ 174.2, 140.7, 138.2, 129.2, 127.9, 127.6, 127.4, 125.5, 123.1, 121.5, 108.7, 77.2, 66.4, 63.3, 52.5, 49.4, 26.1, 21.0, 12.9.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₁H₂₅N₂O₄S [(M+H)⁺]: 401.1535. Found: 401.1546. Chiral HPLC (Daicel Chiralpak AD-H, 30% IPA/hexanes, 0.9 mL/min, λ = 254 nm) *t*_R(major) = 9.688 min, *t*_R(minor) = 12.850 min; [α]_D²⁵ = +8.1° (c = 0.44, CH₂Cl₂).

¹H NMR Spectrum of **3s**

LF-1-146 1H 2015 12 28



```

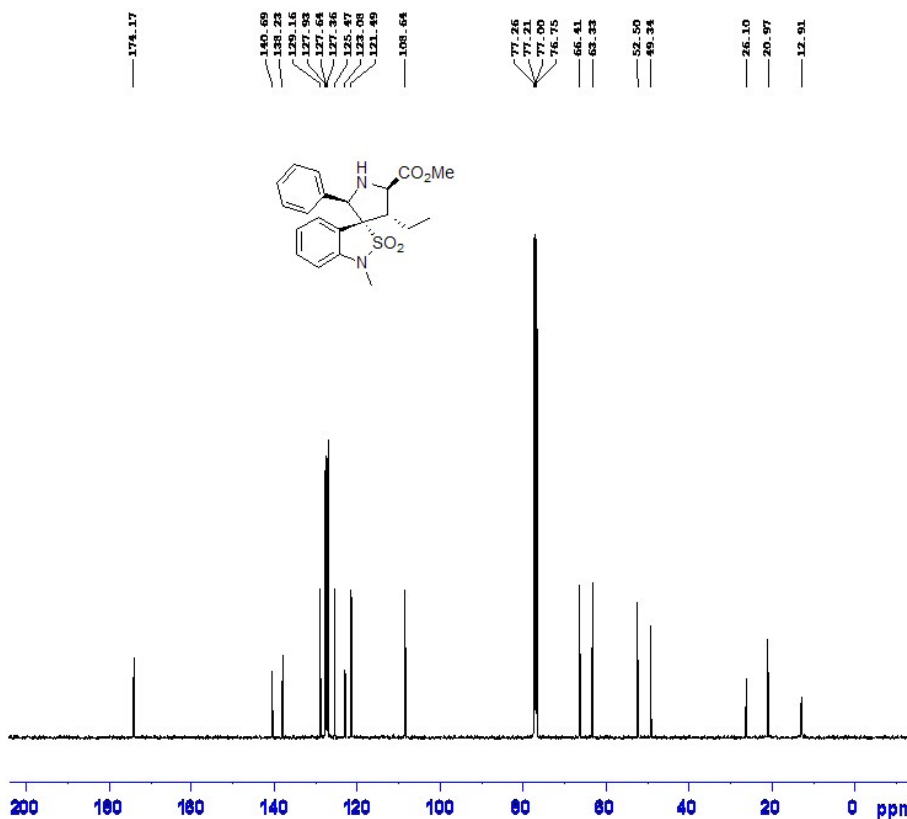
NAME          LF-1-146
EXPNO         1
PROCNO        1
Date_         20151228
Time          16.15
INSTRUM       spect
PROBHD        5 mm FAPBBO BB-
PULPROG       zg30
TD            32768
SOLVENT       CDCl3
NS            8
DS            1
SWH           10000.000 Hz
FIDRES        0.305176 Hz
AQ            1.6385000 sec
RG            181
DW            50.000 usec
DE            6.00 usec
TE            673.2 K
D1            1.00000000 sec
TDO           1

----- CHANNEL f1 -----
NUC1          1H
P1            13.00 usec
PL1           2.00 dB
SFO1          500.0335010 MHz
SI            16384
SF            500.0300093 MHz
WDW           EM
SSB           0
LB            0.20 Hz
GB            0
PC            4.00
  
```

¹³C NMR Spectrum of **3s**

LF-1-146

13C 2015 12 30



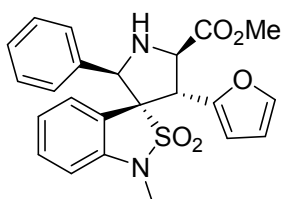
```

NAME LF-1-146
EXPNO 2
PROCNO 1
Date_ 20151230
Time 10.20
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1120
DS 2
SWH 32679.738 Hz
FIDRES 0.498653 Hz
AQ 1.0027661 sec
RG 6500
DM 15.300 usec
DE 6.00 usec
TE 673.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TDC 10

----- CHANNEL f1 -----
NUC1 13C
P1 12.20 usec
PL1 3.00 dB
SFO1 125.7464750 MHz

----- CHANNEL f2 -----
CPDPRG2 waltz16
NUC2 1H
PCPD2 60.00 usec
PL2 2.00 dB
PL12 17.70 dB
PL13 17.70 dB
SFO2 500.0355000 MHz
SI 32768
SF 125.7326512 MHz
WDW EM
SSB 0
LB 3.00 Hz
GB 0
PC 1.00

```

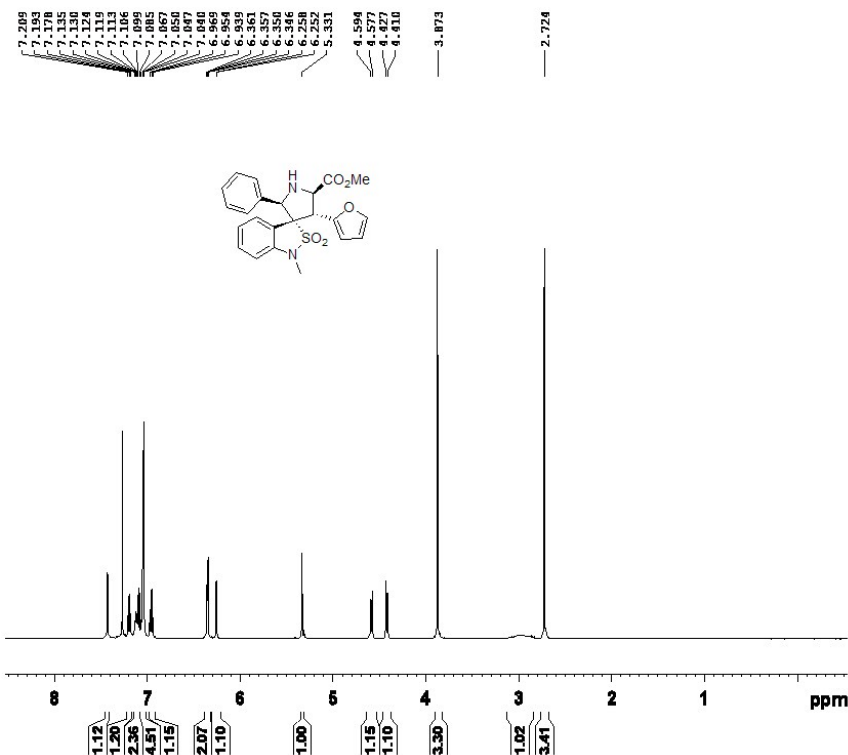


(2'*R*,3*R*,4'*S*,5'*R*)-4'-(furan-2-yl)-1-methyl-2'-phenyl-5'-methoxycarbonyl-1*H*-spiro[benzo[*c*]isothiazole-3,3'-pyrrolidine]-2,2-dioxide (**3t**)

¹H NMR (500 MHz, CDCl₃) δ 7.43 (d, 1H, *J* = 1.2 Hz), 7.19 (t, 1H, *J* = 7.9 Hz), 7.13-7.04 (m, 6H), 6.95 (t, 1H, *J* = 7.6 Hz), 6.36-6.35 (m, 2H), 6.26 (d, 1H, *J* = 3.2 Hz), 5.33 (s, 1H), 4.58 (d, 1H, *J* = 8.5 Hz), 4.41 (d, 1H, *J* = 8.5 Hz), 3.87 (s, 3H), 2.98 (br, 1H), 2.72 (s, 3H). ¹³C NMR (125 MHz, CDCl₃) δ 172.4, 149.2, 142.3, 140.5, 135.8, 129.4, 128.2, 128.0, 127.2, 125.4, 124.3, 121.6, 110.7, 109.0, 108.6, 75.1, 68.6, 63.1, 52.7, 47.2, 26.1.; HRMS (ESI-TOF⁺): *m/z* Calcd. for C₂₃H₂₃N₂O₅S [(*M*+*H*)⁺]: 439.1328. Found: 439.1323. Chiral HPLC (Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min, λ = 254 nm) *t*_R(major) = 29.453 min, *t*_R(minor) = 41.371 min; [α]_D²⁵ = +76.3° (c = 0.38, CH₂Cl₂).

¹H NMR Spectrum of **3t**

LFF-1-154P 1H 2016 1102



```

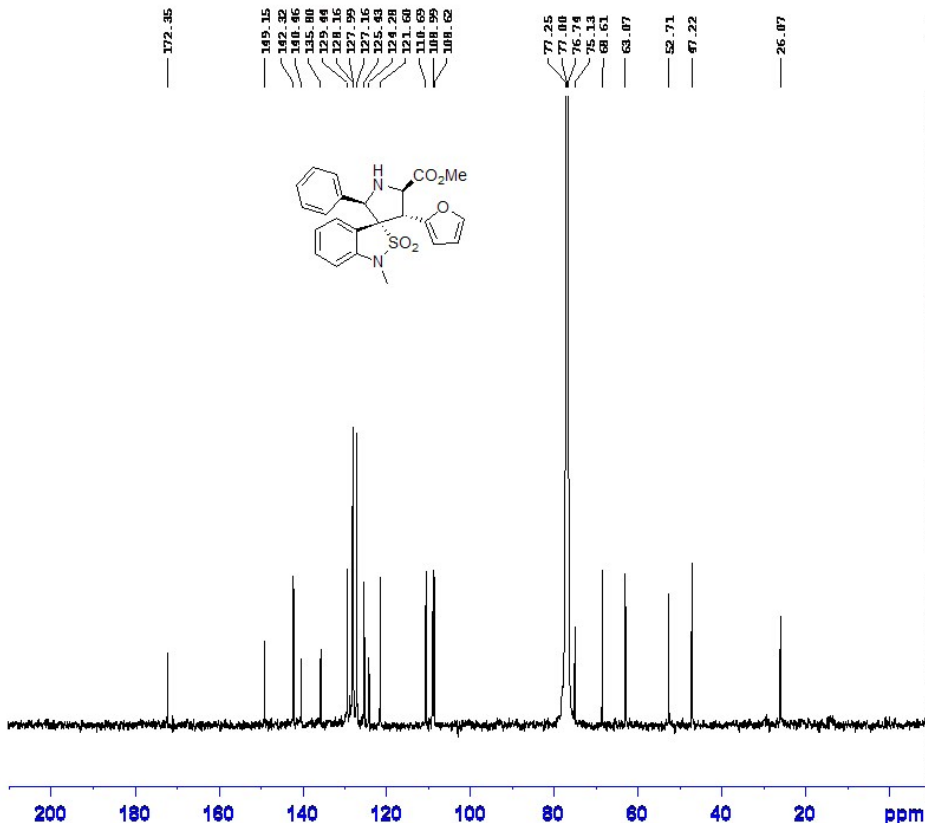
NAME      LFF-1-154P
EXPNO     1
PROCNO    1
Date_     20161102
Time      14.57
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        32768
SOLVENT   CDC13
NS        16
DS        1
SVH       10000.000 Hz
FIDRES    0.305176 Hz
AQ        1.6385000 sec
RG        512
DW        50.000 usec
DE        6.00 usec
TE        673.2 K
D1        1.0000000 sec
TDO       1
  
```

```

----- CHANNEL f1 -----
NUC1      1H
P1        13.00 usec
PL1       2.00 dB
SFO1     500.0335010 MHz
SI        16384
SF        500.0300078 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        2.00
  
```

¹³C NMR Spectrum of 3t

LFF-1-154P-1a ¹³C 2016 11 04



Current Data Parameters
NAME LFF-1-154P-1a
EXPNO 2
PROCNO 1

```

F2 - Acquisition Parameters
Date_     20161104
Time      20.24
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDC13
NS        20000
DS        2
SVH       32679.738 Hz
FIDRES    0.498653 Hz
AQ        1.0027661 sec
RG        1820
DW        15.000 usec
DE        6.00 usec
TE        673.2 K
D1        2.0000000 sec
d11       0.03000000 sec
DELTA     1.89999998 sec
TDO       20
  
```

```

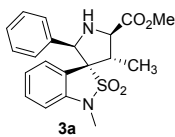
----- CHANNEL f1 -----
NUC1      13C
P1        12.20 usec
PL1       3.00 dB
SFO1     125.7464750 MHz
  
```

```

----- CHANNEL f2 -----
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       2.00 dB
PL12     17.70 dB
PL13     17.70 dB
SFO2     500.0355000 MHz
  
```

```

F2 - Processing parameters
SI        32768
SF        125.7326432 MHz
WDW       EM
SSB       0
LB        6.00 Hz
GB        0
PC        3.00
  
```

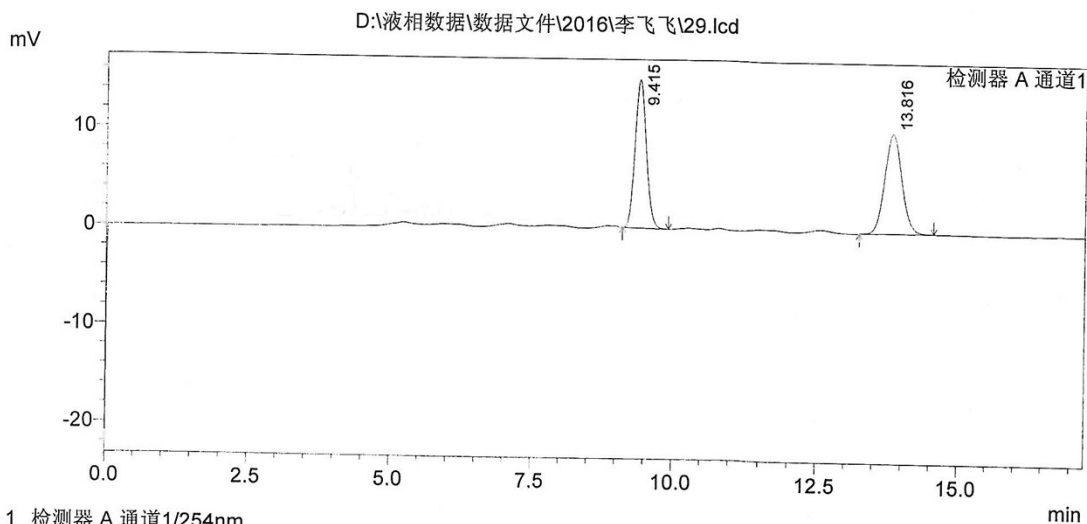


HPLC Conditions: Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 1s
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 29.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-5-6 16:13:00
 数据处理 : 2016-5-6 16:30:16

<色谱图>



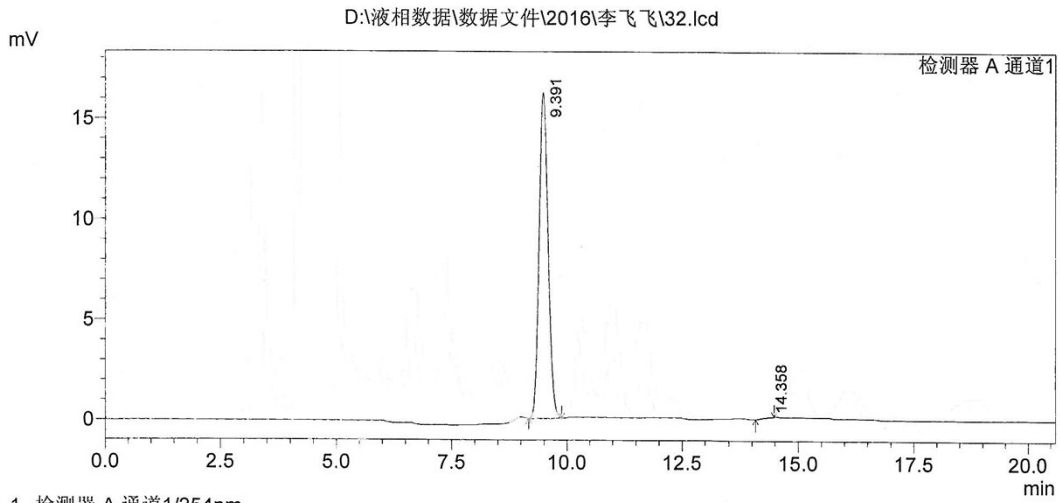
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	9.415	206621	14983	49.149	59.735
2	13.816	213776	10100	50.851	40.265
总计		420397	25083	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

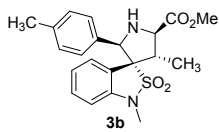
采集人 : Admin
 样品名称 : 3
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 32.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-5-6 17:30:26
 数据处理 : 2016-5-6 17:51:02

<色谱图>



峰表

检测器 A Ch1 254nm					
峰#	保留时间	面积	高度	面积 %	高度 %
1	9.391	220458	16195	99.803	99.808
2	14.358	435	31	0.197	0.192
总计		220893	16226	100.000	100.000

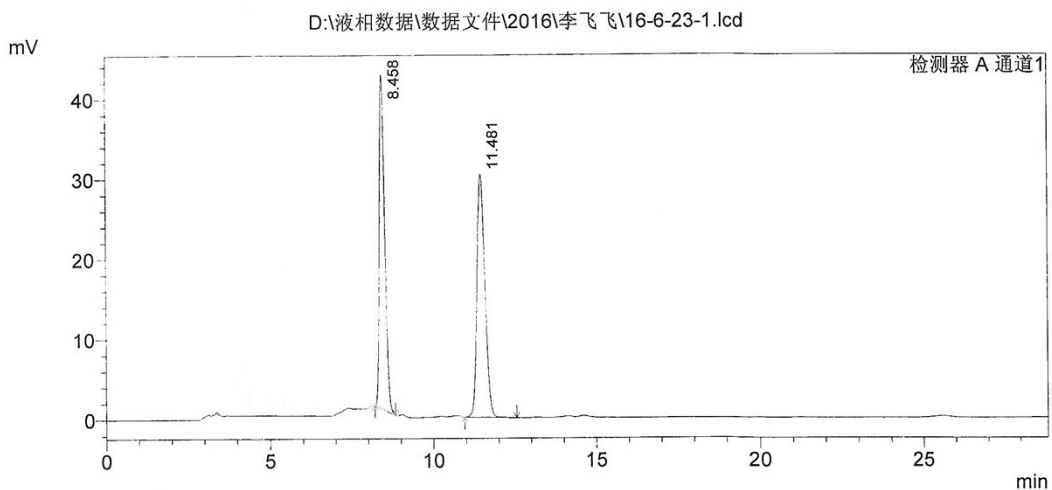


HPLC Conditions: Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 2ss
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-6-23-1.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-6-23 10:19:00
 数据处理 : 2016-6-23 10:47:51

<色谱图>



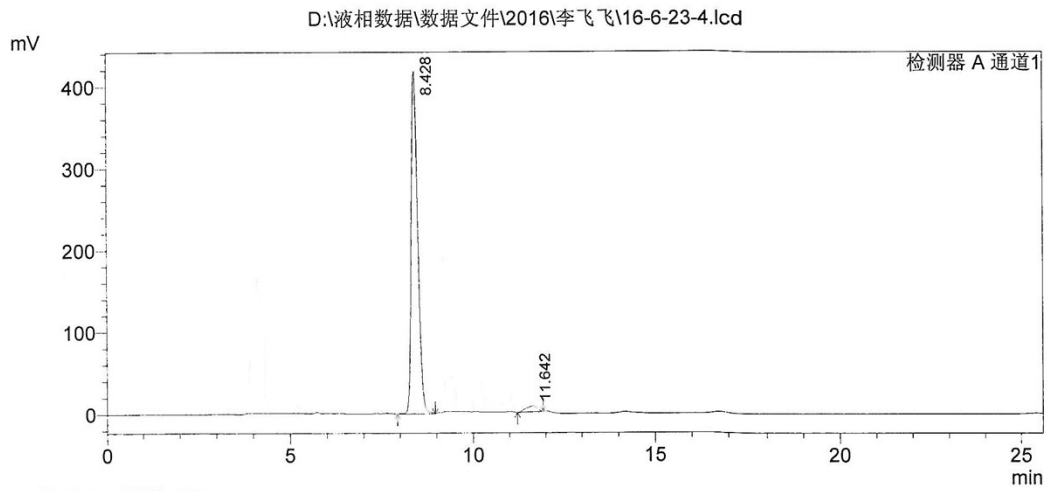
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	8.458	493539	41751	49.051	57.923
2	11.481	512638	30330	50.949	42.077
总计		1006178	72081	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

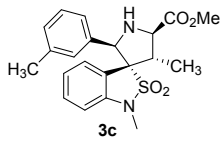
采集人 : Admin
 样品名称 : 2rs
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-6-23-4.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-6-23 13:00:53
 数据处理 : 2016-6-23 13:26:30

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	8.428	5207748	417710	97.050	98.294
2	11.642	158296	7252	2.950	1.706
总计		5366044	424962	100.000	100.000

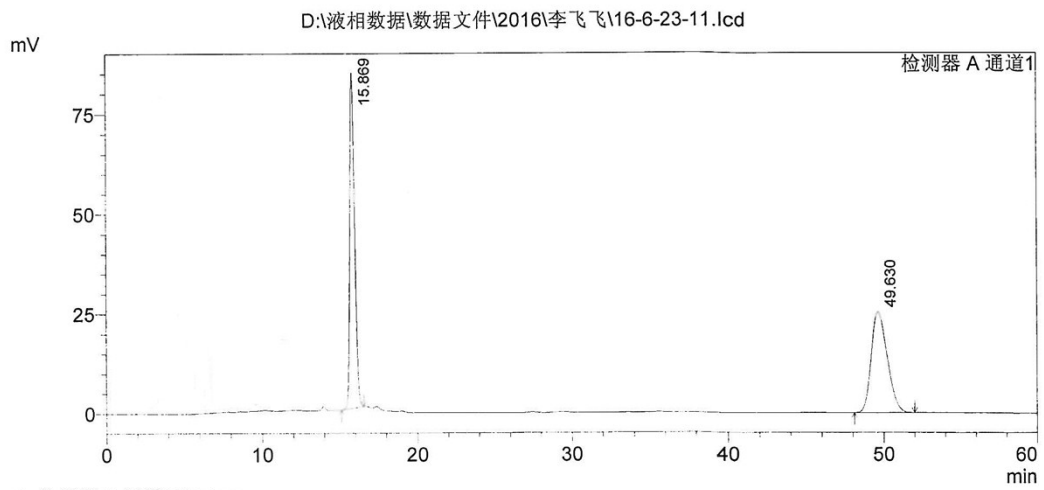


HPLC Conditions: Daicel Chiralpak AD-H, 10% IPA/hexanes, 1 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 3ss-2
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-6-23-11.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-6-23 19:33:15
 数据处理 : 2016-6-23 20:33:18

<色谱图>



峰表

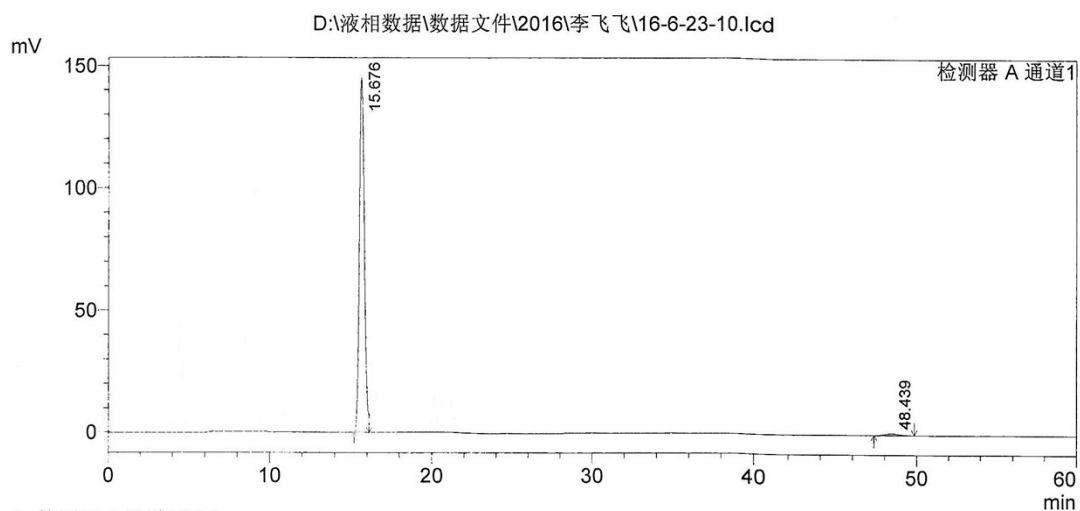
峰#	保留时间	面积	高度	面积 %	高度 %
1	15.869	1829114	83912	50.046	76.845
2	49.630	1825745	25285	49.954	23.155
总计		3654859	109198	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

```

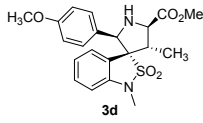
采集人       : Admin
样品名称     : 3r
样品 ID     : 0
样品架      : 1
样品瓶#     : 1
进样体积    : 5 uL
数据文件名  : 16-6-23-10.lcd
方法文件名  : LF.lcm
批处理文件名 :
报告文件名  : Default.lcr
数据采集    : 2016-6-23 18:26:16
数据处理    : 2016-6-23 19:26:20
    
```

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	15.676	3095243	144917	98.506	99.509
2	48.439	46947	715	1.494	0.491
总计		3142190	145632	100.000	100.000

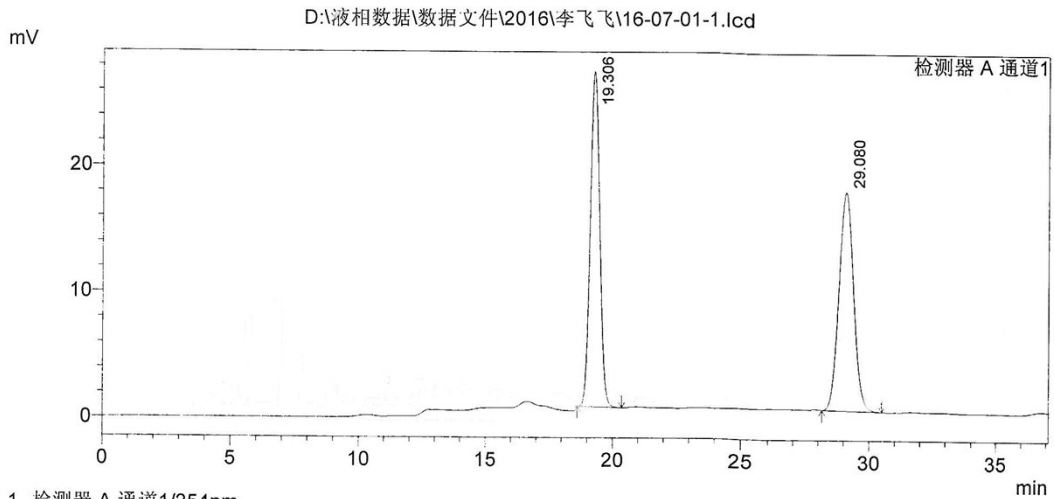


HPLC Conditions: Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 5ss
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-07-01-1.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-1 10:21:26
 数据处理 : 2016-7-1 10:58:32

<色谱图>



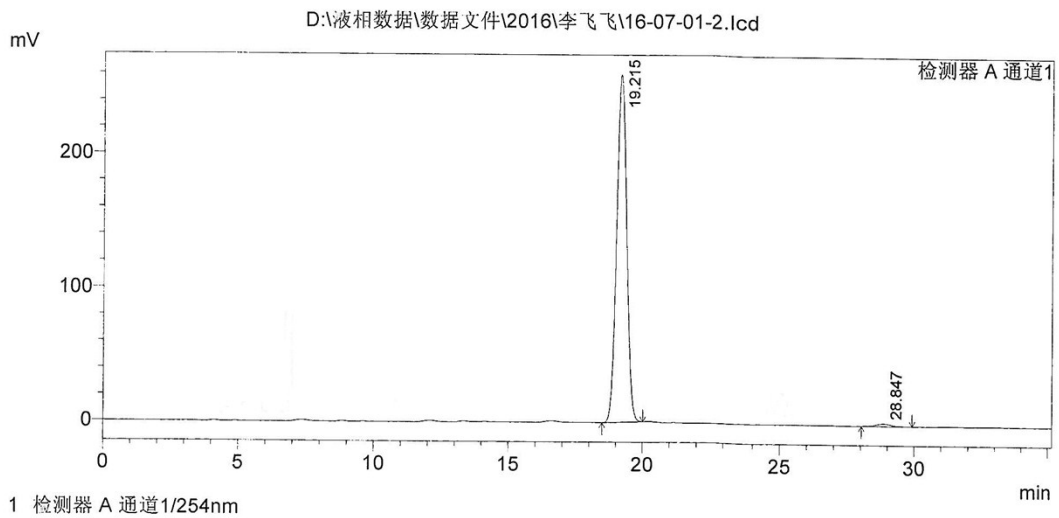
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	19.306	686034	26624	49.518	60.552
2	29.080	699389	17345	50.482	39.448
总计		1385423	43969	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

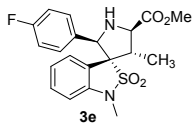
采集人 : Admin
 样品名称 : 5rs
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-07-01-2.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-1 11:02:21
 数据处理 : 2016-7-1 11:37:32

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	19.215	6767006	259701	98.930	99.278
2	28.847	73206	1889	1.070	0.722
总计		6840212	261589	100.000	100.000

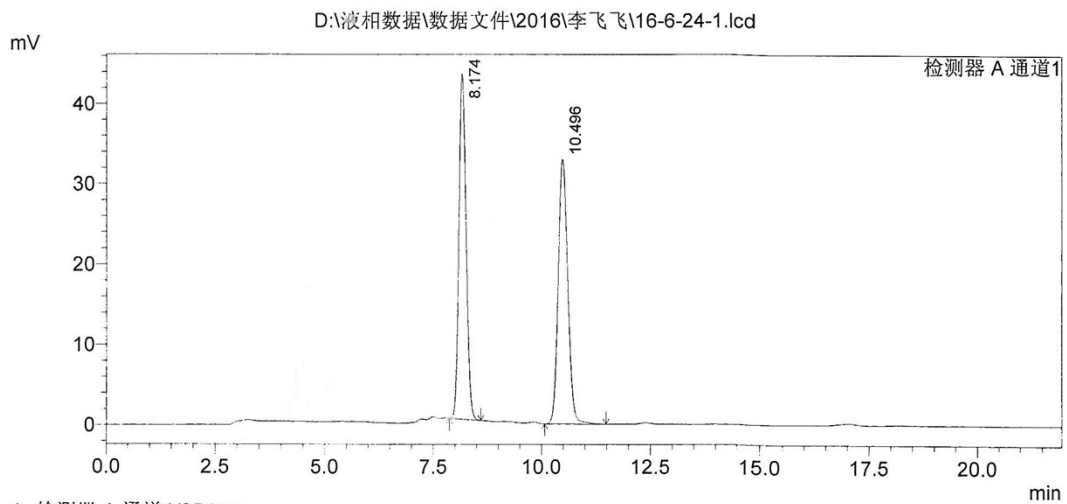


HPLC Conditions: Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 4ss
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-6-24-1.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-6-24 10:39:02
 数据处理 : 2016-6-24 11:01:00

<色谱图>



1 检测器 A 通道1/254nm

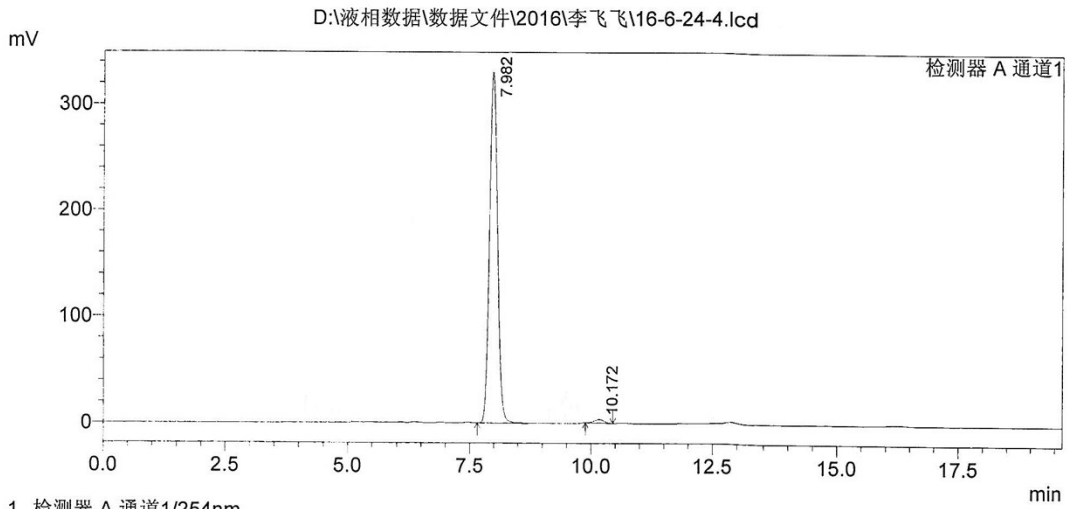
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	8.174	499655	43036	49.585	56.643
2	10.496	508014	32942	50.415	43.357
总计		1007669	75978	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

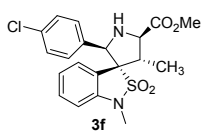
采集人 : Admin
 样品名称 : 4rs
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-6-24-4.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-6-24 13:25:48
 数据处理 : 2016-6-24 13:45:28

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	7.982	3812142	330367	98.762	99.007
2	10.172	47805	3314	1.238	0.993
总计		3859947	333681	100.000	100.000

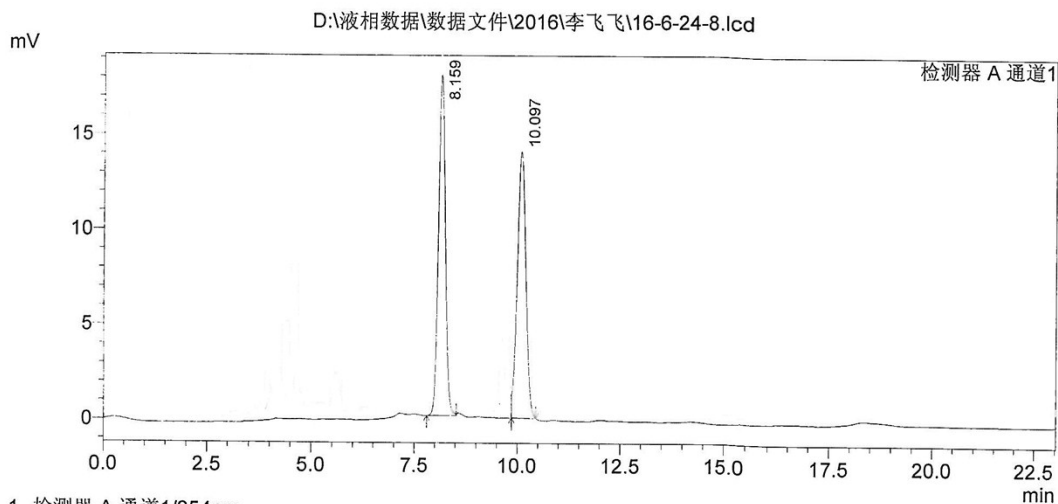


HPLC Conditions: Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 6ss
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-6-24-8.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-6-24 15:20:27
 数据处理 : 2016-6-24 15:43:29

<色谱图>



1 检测器 A 通道1/254nm

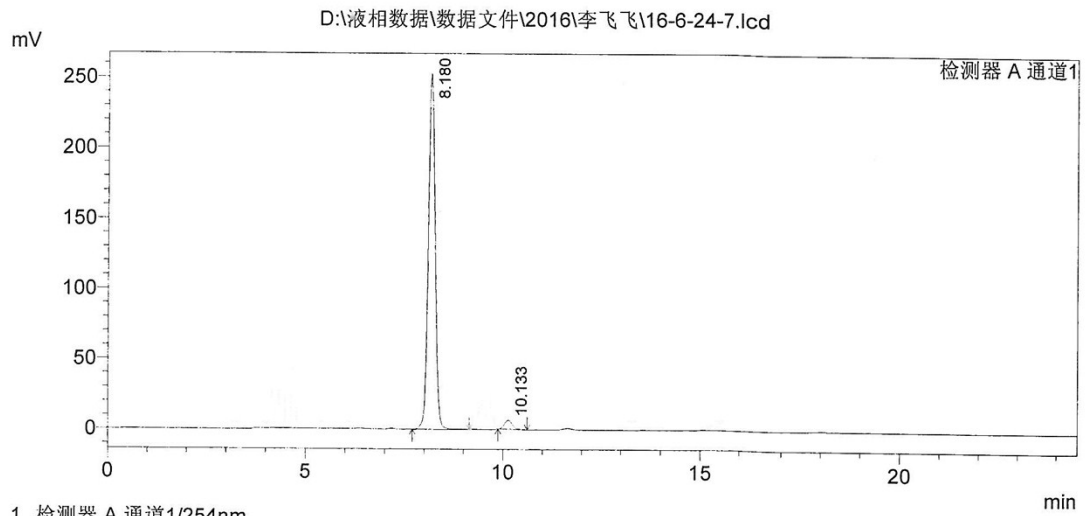
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	8.159	209161	17906	50.679	56.087
2	10.097	203555	14020	49.321	43.913
总计		412716	31926	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

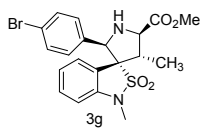
采集人 : Admin
 样品名称 : 6rs
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-6-24-7.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-6-24 14:53:23
 数据处理 : 2016-6-24 15:17:57

<色谱图>



峰表

检测器 A Ch1 254nm					
峰#	保留时间	面积	高度	面积 %	高度 %
1	8.180	3032984	252907	97.134	97.548
2	10.133	89486	6358	2.866	2.452
总计		3122470	259265	100.000	100.000

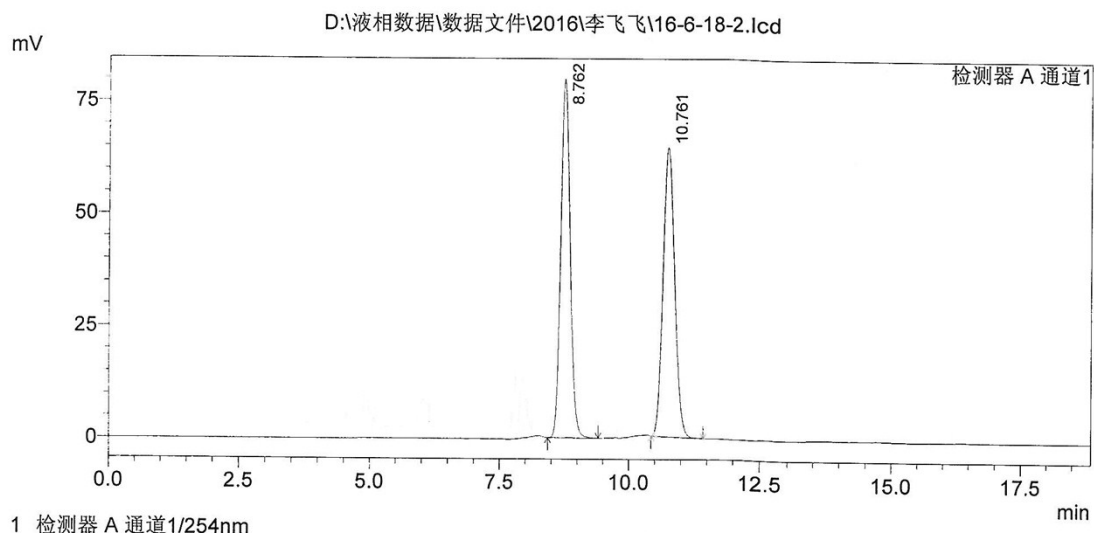


HPLC Conditions: Daicel Chiralpak AD-H, 30% IPA/hexanes, 1 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 10-ss
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-6-18-2.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-6-18 10:15:48
 数据处理 : 2016-6-18 10:34:41

<色谱图>



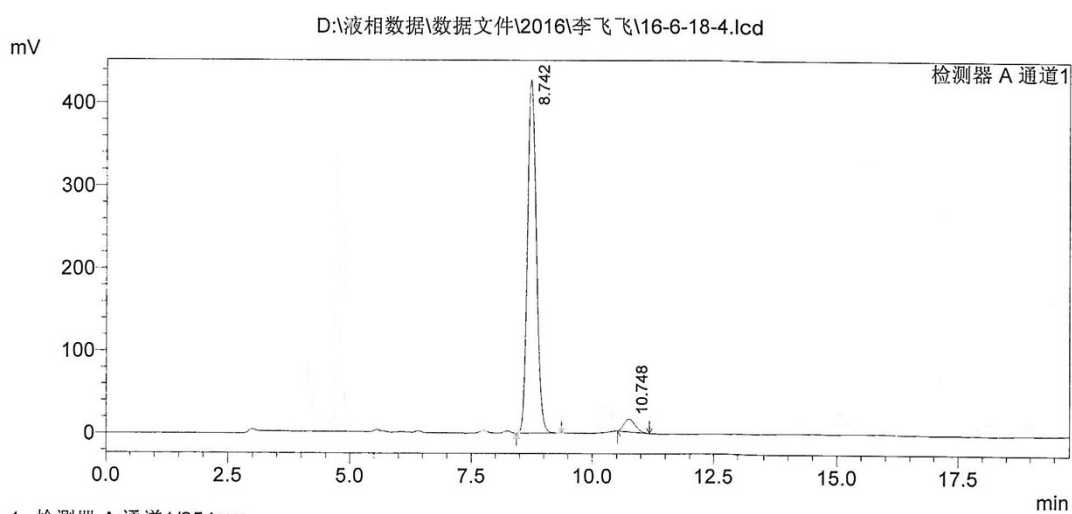
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	8.762	1006553	79757	50.158	55.339
2	10.761	1000227	64366	49.842	44.661
总计		2006781	144123	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

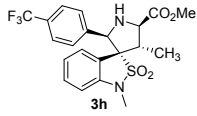
采集人 : Admin
 样品名称 : 10-s
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-6-18-4.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-6-18 11:23:28
 数据处理 : 2016-6-18 11:43:17

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	8.742	5519377	427202	95.696	96.490
2	10.748	248256	15539	4.304	3.510
总计		5767633	442741	100.000	100.000



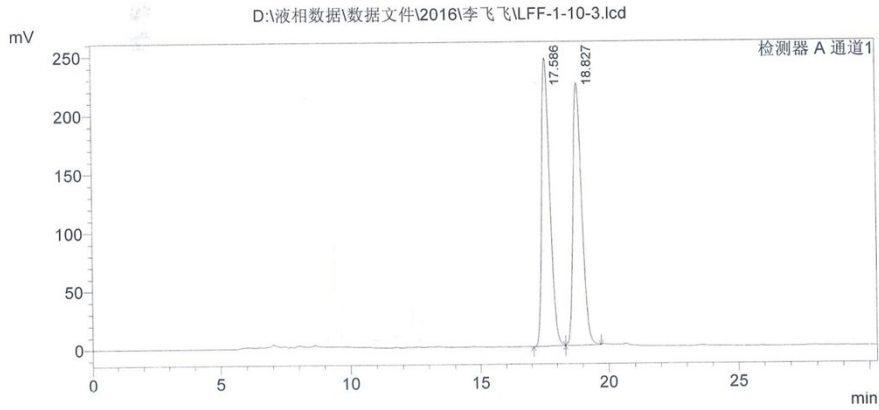
HPLC Conditions: Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.5 mL/min

2017-1-10 11:38:36 1 / 1

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : LFF-3-92
 样品 ID :
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : LFF-1-10-3.lcd
 方法文件名 : LF-3.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2017-1-10 11:06:07
 数据处理 : 2017-1-10 11:36:26

<色谱图>



1 检测器 A 通道1/254nm

峰表

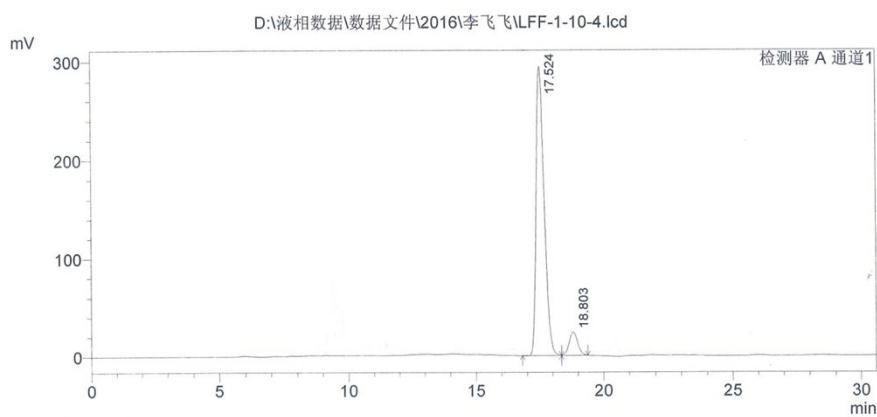
峰#	保留时间	面积	高度	面积 %	高度 %
1	17.586	5522605	246211	51.129	52.344
2	18.827	5278713	224159	48.871	47.656
总计		10801317	470370	100.000	100.000

D:\液相数据\数据文件\2016\李飞飞\LFF-1-10-3.lcd

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : LFF-3-92-1
 样品ID :
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : LFF-1-10-4.lcd
 方法文件名 : LF-3.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2017-1-10 11:40:09
 数据处理 : 2017-1-10 12:10:45

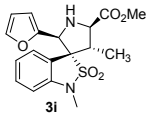
<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	17.524	6510433	293957	92.256	92.495
2	18.803	546456	23852	7.744	7.505
总计		7056889	317809	100.000	100.000

D:\液相数据\数据文件\2016\李飞飞\LFF-1-10-4.lcd

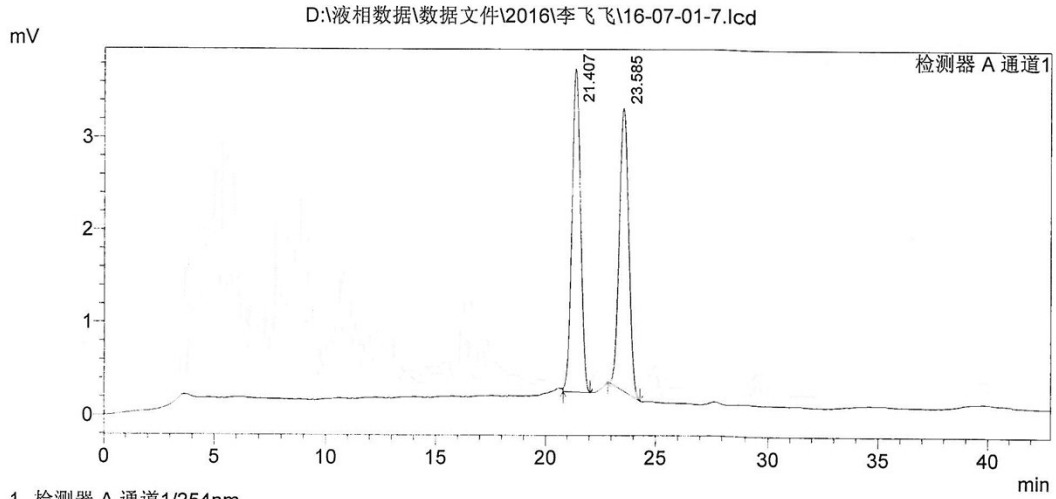


HPLC Conditions: Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 7ss
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-07-01-7.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-1 15:51:50
 数据处理 : 2016-7-1 16:34:45

<色谱图>



1 检测器 A 通道1/254nm

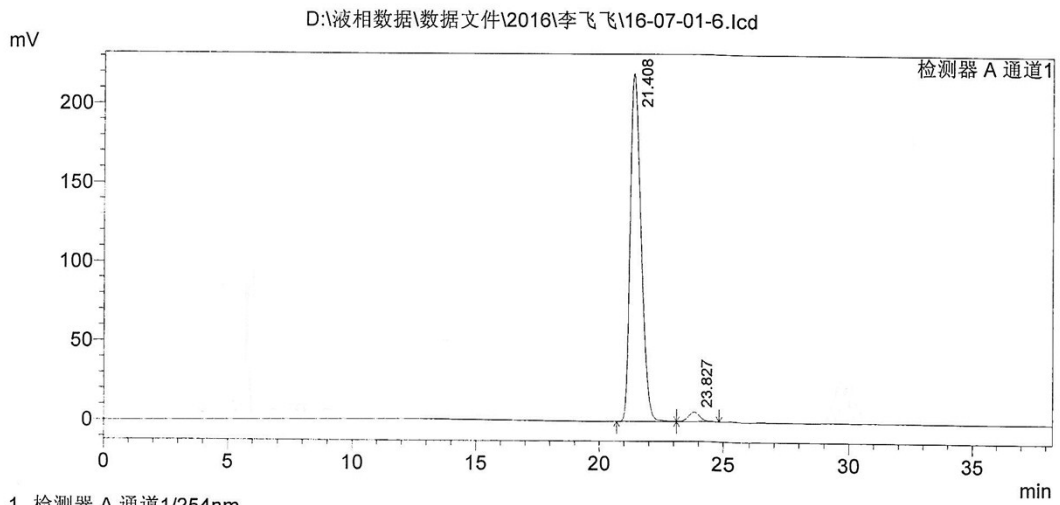
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	21.407	96142	3490	51.416	53.325
2	23.585	90847	3055	48.584	46.675
总计		186989	6545	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

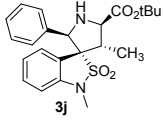
采集人 : Admin
 样品名称 : 7rs
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-07-01-6.lcd
 方法文件名 : LF.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-1 15:04:13
 数据处理 : 2016-7-1 15:42:30

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	21.408	6662362	219471	97.239	97.397
2	23.827	189192	5864	2.761	2.603
总计		6851554	225336	100.000	100.000



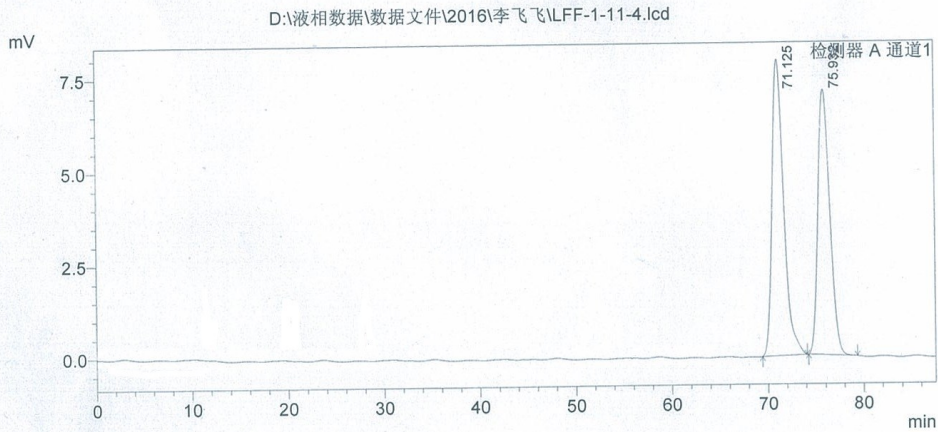
HPLC Conditions: Daicel Chiralpak AD-H, 5% IPA/hexanes, 0.25 mL/min

2017-1-11 21:01:18 1 / 1

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : LFF-3-80
 样品 ID :
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : LFF-1-11-4.lcd
 方法文件名 : LF-3.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2017-1-11 19:31:51
 数据处理 : 2017-1-11 20:59:22

<色谱图>



1 检测器 A 通道1/254nm

峰表

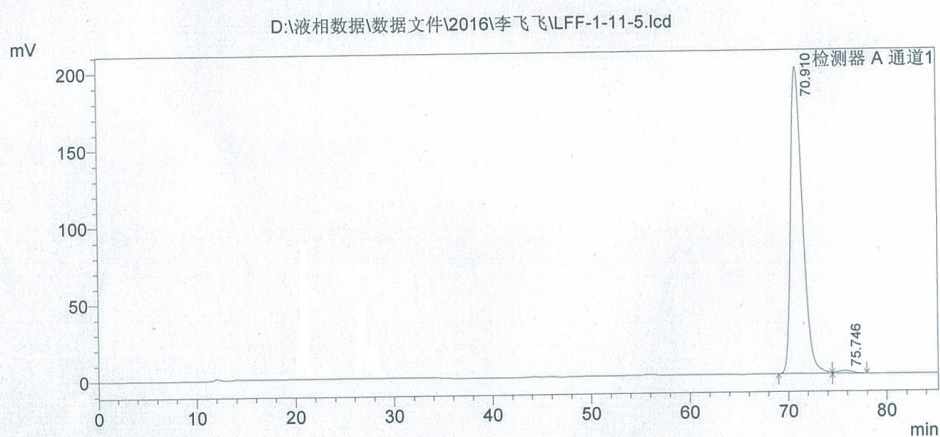
峰#	保留时间	面积	高度	面积 %	高度 %
1	71.125	673518	7971	52.183	52.781
2	75.932	617173	7131	47.817	47.219
总计		1290691	15103	100.000	100.000

D:\液相数据\数据文件\2016\李飞飞\LFF-1-11-4.lcd

==== Shimadzu LCsolution 分析报告 ====

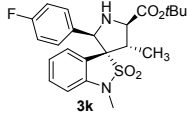
采集人 : Admin
 样品名称 : LFF-3-80-1
 样品 ID :
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : LFF-1-11-5.lcd
 方法文件名 : LF-3.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2017-1-11 21:06:52
 数据处理 : 2017-1-11 22:32:06

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	70.910	16745807	198781	98.916	99.099
2	75.746	183450	1807	1.084	0.901
总计		16929256	200588	100.000	100.000



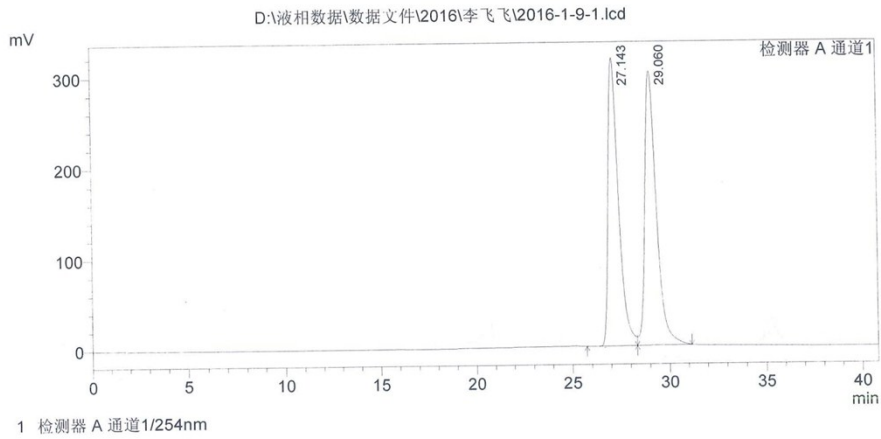
HPLC Conditions: Daicel Chiralpak AD-H, 70% IPA/hexanes, 0.18 mL/min

2017-1-9 11:16:21 1 / 1

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : LFF-3-94
 样品 ID :
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 2016-1-9-1.lcd
 方法文件名 : LF-3.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2017-1-9 10:01:11
 数据处理 : 2017-1-9 10:42:01

<色谱图>



峰表

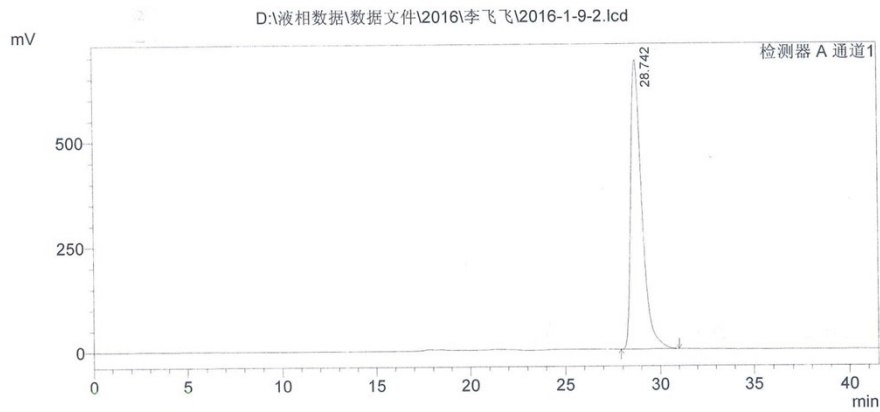
峰#	保留时间	面积	高度	面积 %	高度 %
1	27.143	11901654	316918	48.923	51.215
2	29.060	12425475	301877	51.077	48.785
总计		24327129	618795	100.000	100.000

D:\液相数据\数据文件\2016\李飞飞\2016-1-9-1.lcd

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : LFF-3-94-1
 样品 ID :
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 2016-1-9-2.lcd
 方法文件名 : LF-3.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2017-1-9 10:44:32
 数据处理 : 2017-1-9 11:26:05

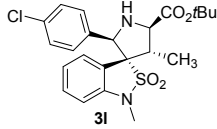
<色谱图>



1 检测器 A 通道1/254nm

峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	28.742	28099242	688896	100.000	100.000
总计		28099242	688896	100.000	100.000



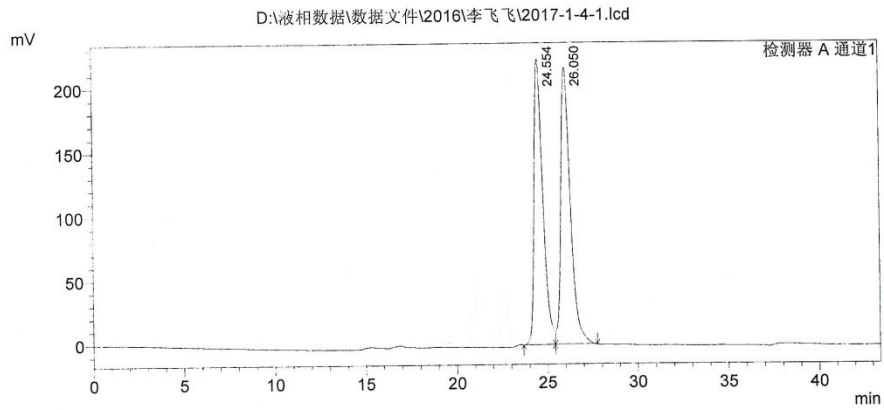
HPLC Conditions: Daicel Chiralpak AD-H, 70% IPA/hexanes, 0.2 mL/min

2017-1-4 17:52:01 1 / 1

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 4消旋
 样品 ID :
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 2017-1-4-1.lcd
 方法文件名 : LF-3.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2017-1-4 13:26:37
 数据处理 : 2017-1-4 14:10:03

<色谱图>



1 检测器 A 通道1/254nm

峰表

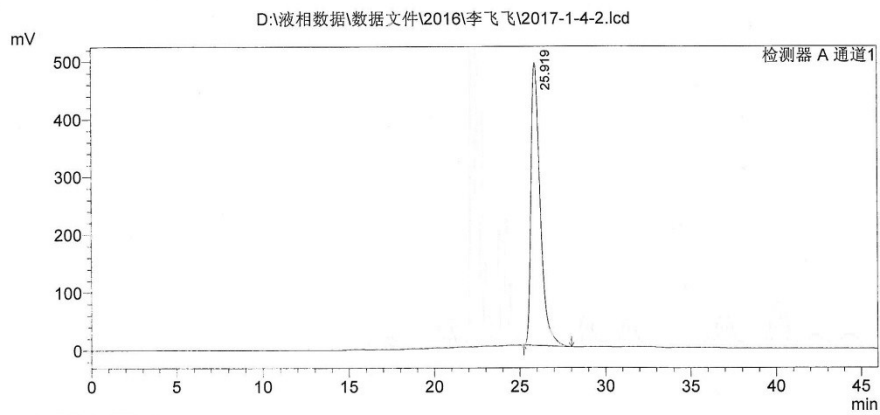
峰#	保留时间	面积	高度	面积 %	高度 %
1	24.554	7533427	223213	48.791	50.795
2	26.050	7906627	216225	51.209	49.205
总计		15440053	439438	100.000	100.000

D:\液相数据\数据文件\2016\李飞飞\2017-1-4-1.lcd

==== Shimadzu LCsolution 分析报告 ====

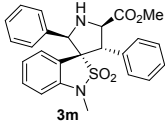
采集人 : Admin
 样品名称 : 4手性
 样品 ID :
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 2017-1-4-2.lcd
 方法文件名 : LF-3.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2017-1-4 14:13:53
 数据处理 : 2017-1-4 14:59:54

<色谱图>



峰表

检测器 A Ch1 254nm					
峰#	保留时间	面积	高度	面积 %	高度 %
1	25.919	18415942	489709	100.000	100.000
总计		18415942	489709	100.000	100.000

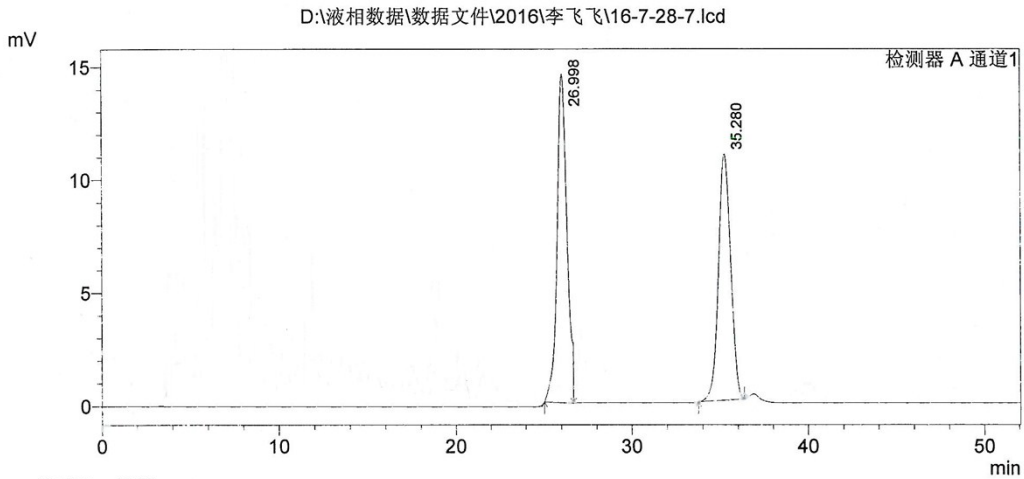


HPLC Conditions: Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 双1
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-28-7.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-28 15:53:58
 数据处理 : 2016-7-28 16:46:04

<色谱图>



1 检测器 A 通道1/254nm

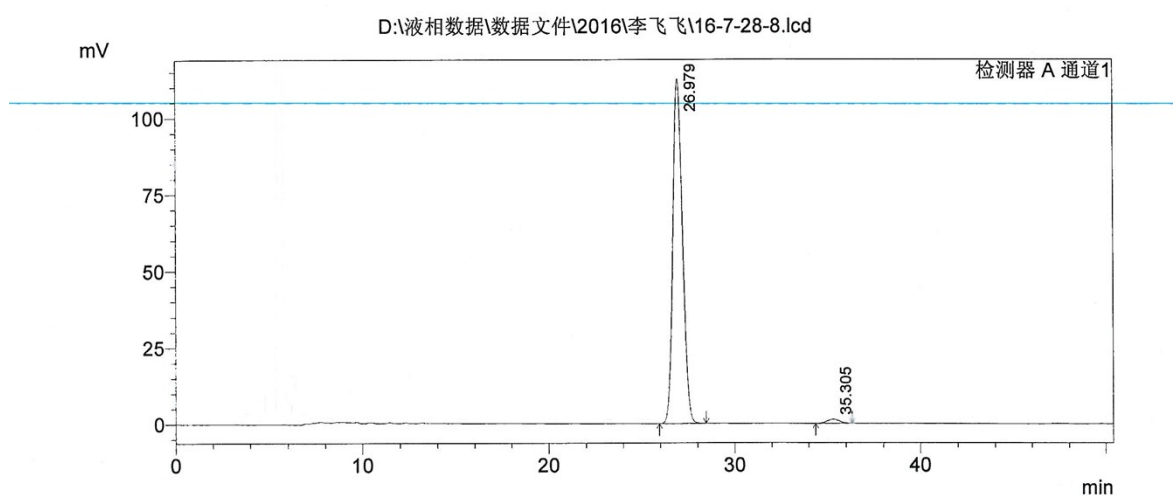
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	26.998	564630	14548	51.802	57.223
2	35.280	525354	10875	48.198	42.777
总计		1089984	25424	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

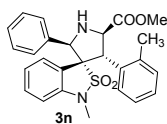
采集人 : Admin
 样品名称 : 手性双1
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-28-8.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-28 16:50:08
 数据处理 : 2016-7-28 17:40:33

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	26.979	4071802	112656	98.529	98.854
2	35.305	60811	1307	1.471	1.146
总计		4132613	113962	100.000	100.000

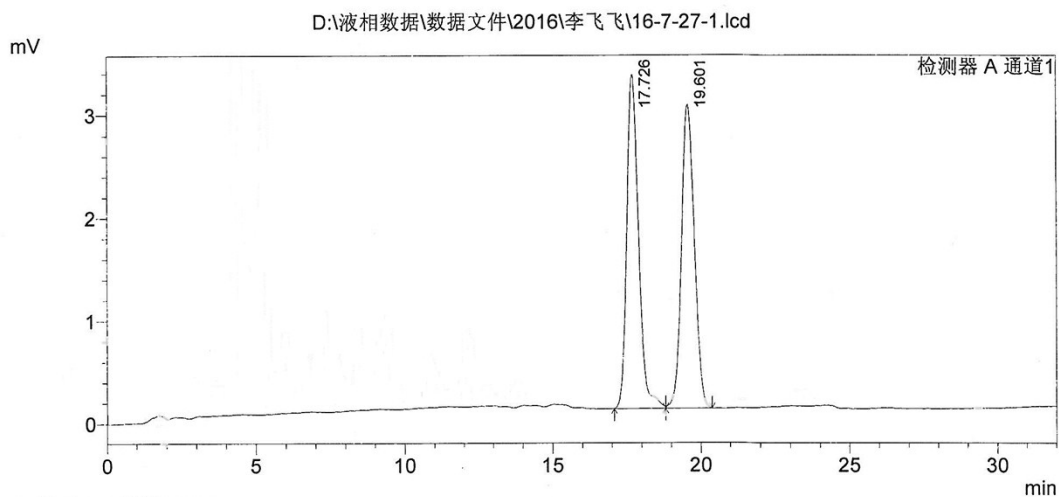


HPLC Conditions: Daicel Chiralpak AD-H, 30% IPA/hexanes, 0.9 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 双4
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-27-1.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-27 9:49:58
 数据处理 : 2016-7-27 10:21:59

<色谱图>



1 检测器 A 通道1/254nm

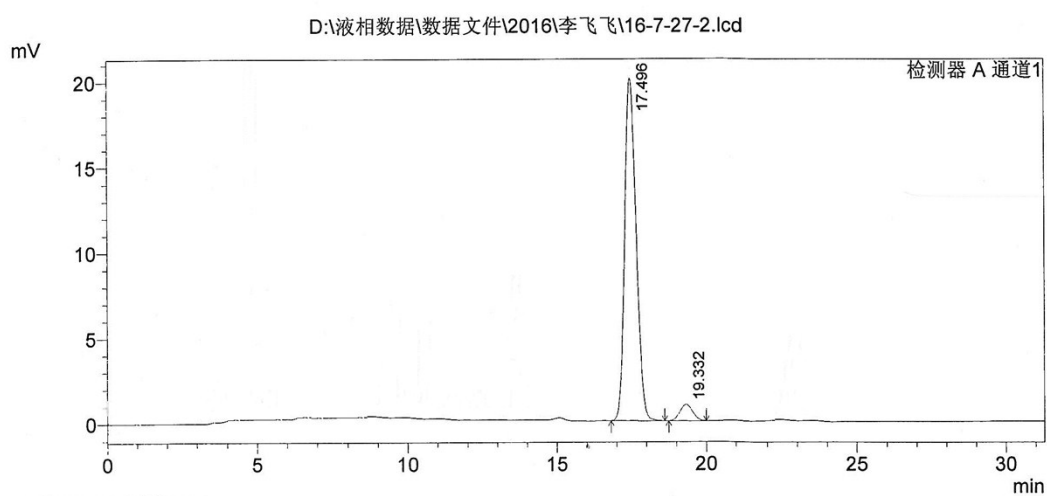
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	17.726	90379	3247	50.266	52.349
2	19.601	89422	2955	49.734	47.651
总计		179801	6202	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 手性双4
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-27-2.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-27 10:28:50
 数据处理 : 2016-7-27 11:00:07

<色谱图>

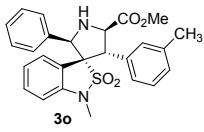


1 检测器 A 通道1/254nm

峰表

检测器 A Ch1 254nm

峰#	保留时间	面积	高度	面积 %	高度 %
1	17.496	532874	20045	95.000	95.445
2	19.332	28045	957	5.000	4.555
总计		560919	21002	100.000	100.000

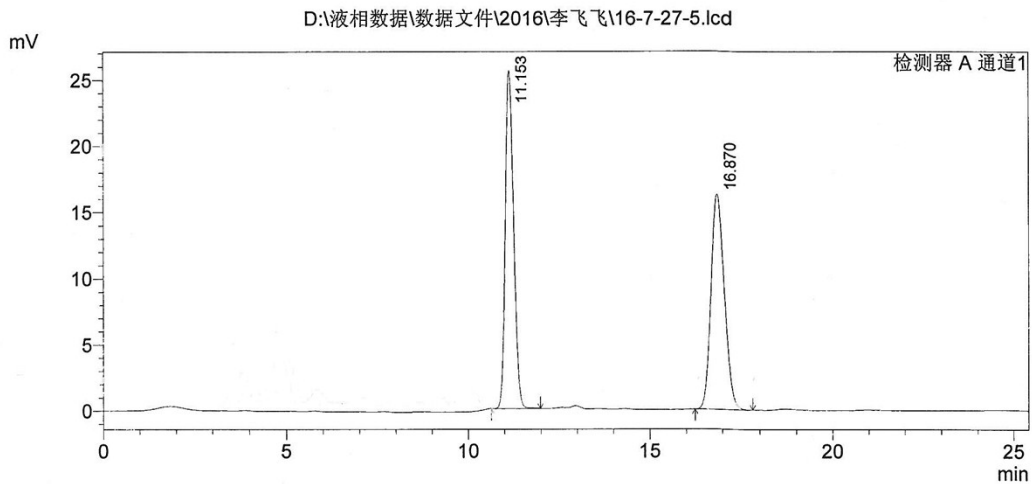


HPLC Conditions: Daicel Chiralpak AD-H, 30% IPA/hexanes, 0.9 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 双6
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-27-5.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-27 12:11:25
 数据处理 : 2016-7-27 12:36:50

<色谱图>



1 检测器 A 通道1/254nm

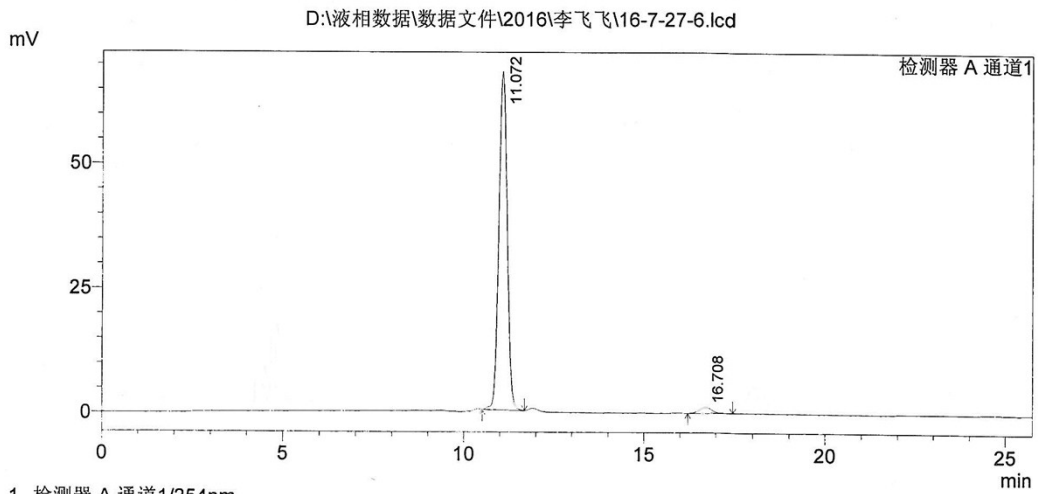
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	11.153	407659	25536	49.997	61.102
2	16.870	407702	16256	50.003	38.898
总计		815361	41792	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

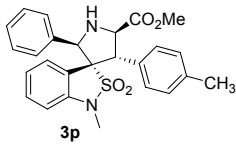
采集人 : Admin
 样品名称 : 手性双6
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-27-6.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-27 12:41:25
 数据处理 : 2016-7-27 13:07:11

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	11.072	1083880	67995	97.343	98.292
2	16.708	29585	1182	2.657	1.708
总计		1113465	69176	100.000	100.000

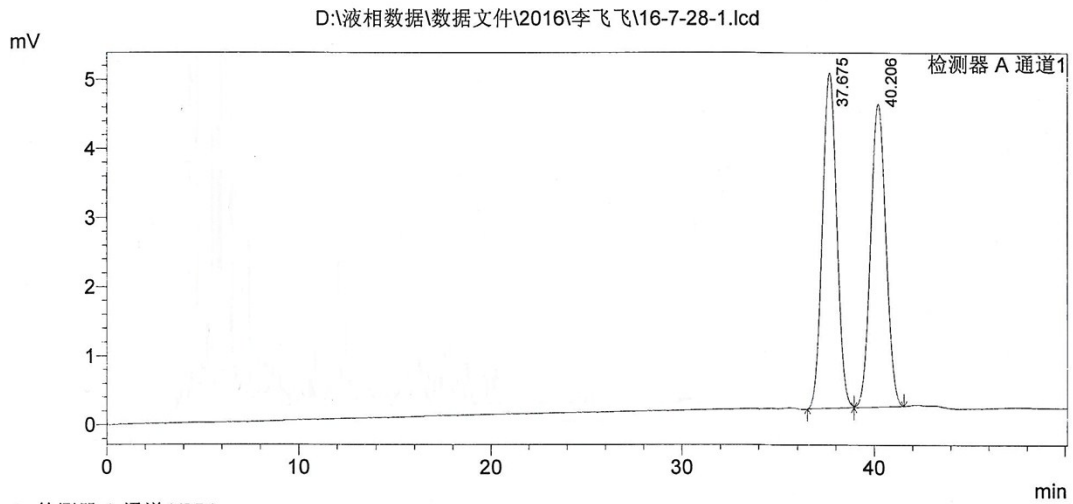


HPLC Conditions: Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 双2
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-28-1.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-28 10:01:51
 数据处理 : 2016-7-28 10:52:01

<色谱图>



1 检测器 A 通道1/254nm

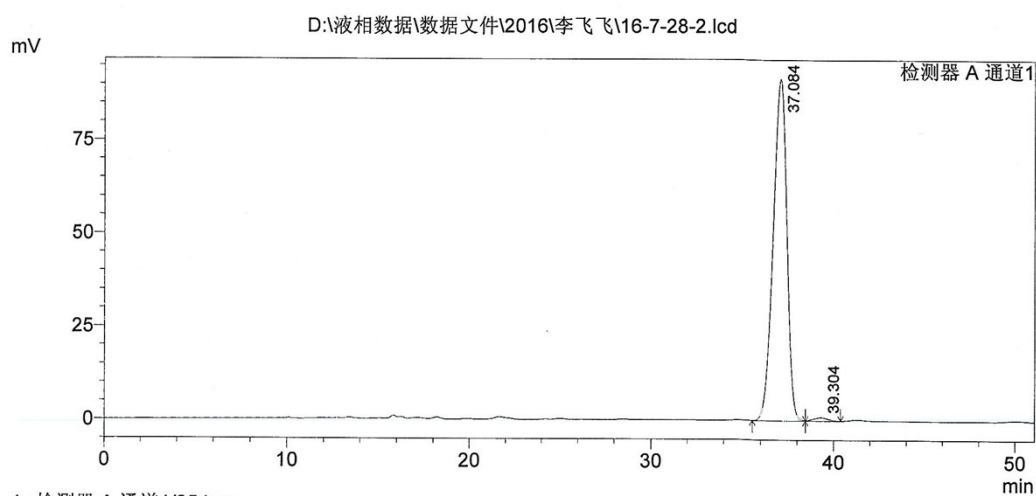
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	37.675	251928	4854	50.734	52.551
2	40.206	244636	4382	49.266	47.449
总计		496564	9236	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

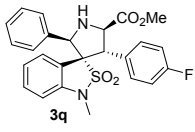
采集人 : Admin
 样品名称 : 手性双2
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-28-2.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-28 10:57:56
 数据处理 : 2016-7-28 11:49:03

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	37.084	4798929	91495	98.974	99.031
2	39.304	49739	895	1.026	0.969
总计		4848669	92390	100.000	100.000

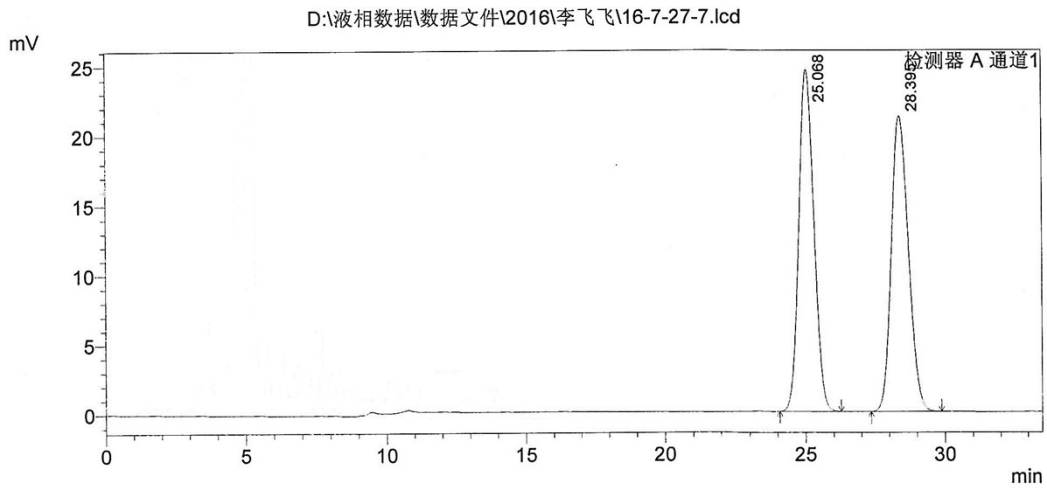


HPLC Conditions: Daicel Chiralpak AD-H, 30% IPA/hexanes, 0.9 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 双7
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-27-7.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-27 13:10:40
 数据处理 : 2016-7-27 13:44:11

<色谱图>



1 检测器 A 通道1/254nm

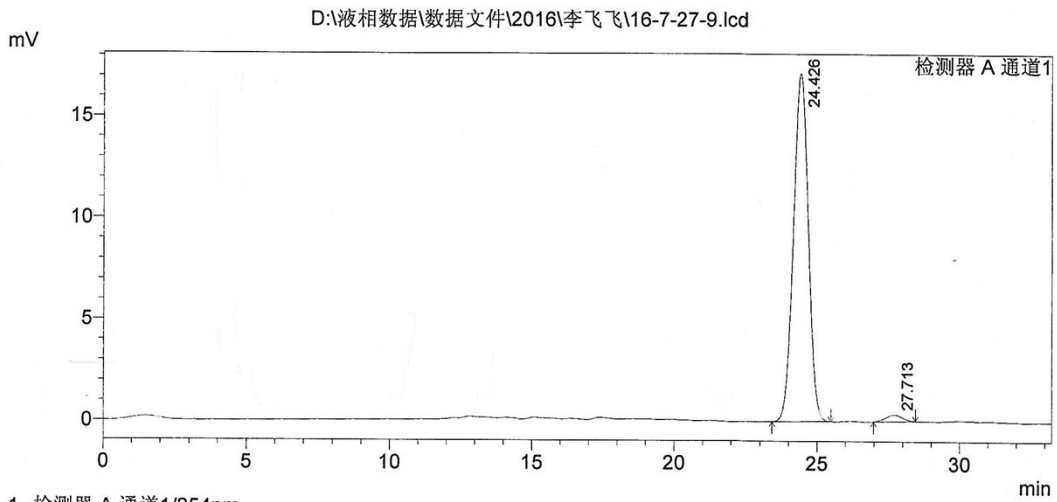
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	25.068	918932	24548	50.198	53.658
2	28.395	911685	21201	49.802	46.342
总计		1830617	45750	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

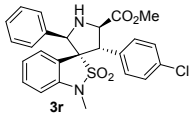
采集人 : Admin
 样品名称 : 手性双7
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-27-9.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-27 14:20:54
 数据处理 : 2016-7-27 14:54:09

<色谱图>



峰表

检测器 A Ch1_254nm					
峰#	保留时间	面积	高度	面积 %	高度 %
1	24.426	623852	17131	97.902	98.097
2	27.713	13371	332	2.098	1.903
总计		637223	17463	100.000	100.000

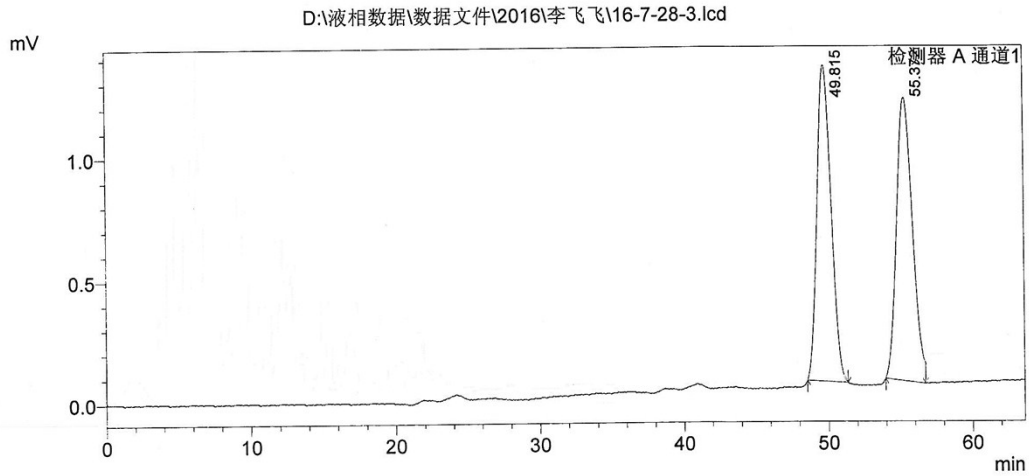


HPLC Conditions: Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 双3
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-28-3.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-28 11:54:20
 数据处理 : 2016-7-28 12:58:00

<色谱图>



1 检测器 A 通道1/254nm

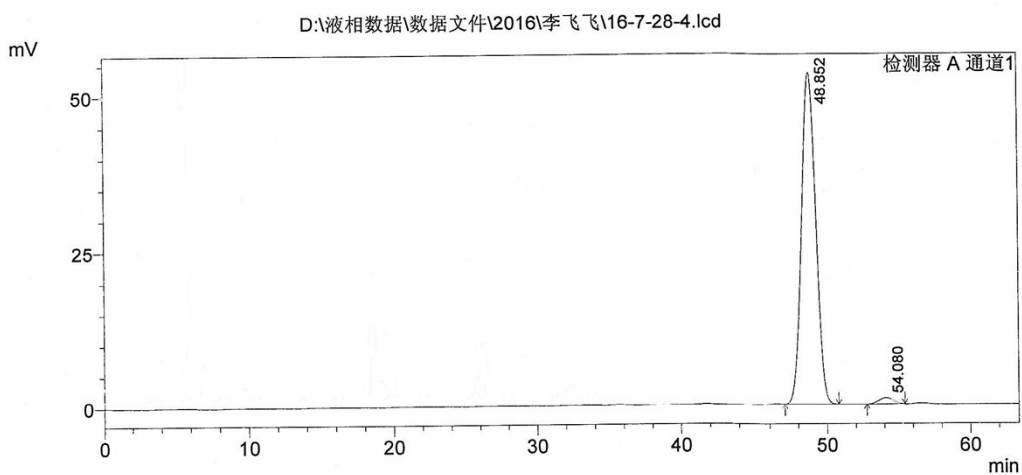
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	49.815	87044	1288	49.554	52.753
2	55.372	88610	1154	50.446	47.247
总计		175654	2442	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 手性双3
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-28-4.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-28 13:03:42
 数据处理 : 2016-7-28 14:07:06

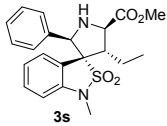
<色谱图>



1 检测器 A 通道1/254nm

峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	48.852	3646455	53342	98.014	98.110
2	54.080	73901	1027	1.986	1.890
总计		3720357	54369	100.000	100.000

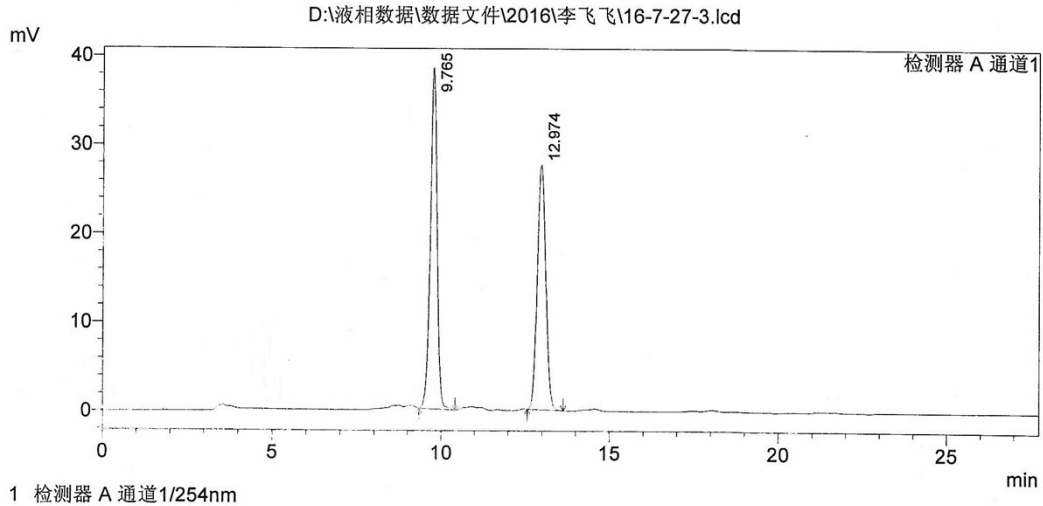


HPLC Conditions: Daicel Chiralpak AD-H, 30% IPA/hexanes, 0.9 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 双5
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-27-3.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-27 11:07:08
 数据处理 : 2016-7-27 11:34:53

<色谱图>



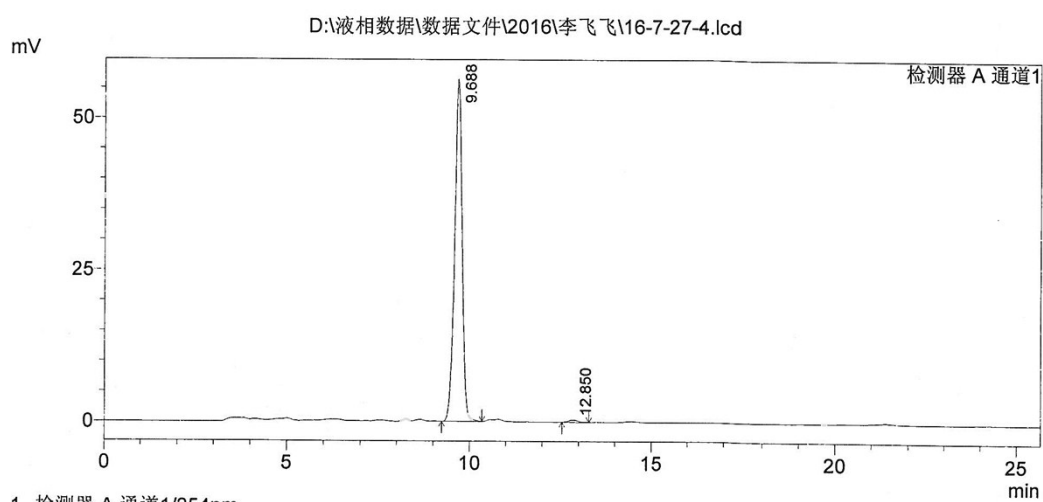
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	9.765	544131	38401	52.928	58.227
2	12.974	483927	27550	47.072	41.773
总计		1028058	65951	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

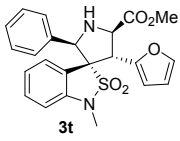
采集人 : Admin
 样品名称 : 手性双5
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-27-4.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-27 11:40:50
 数据处理 : 2016-7-27 12:06:31

<色谱图>



峰表

检测器 A Ch1 254nm					
峰#	保留时间	面积	高度	面积 %	高度 %
1	9.688	815039	56422	99.161	99.315
2	12.850	6897	389	0.839	0.685
总计		821936	56811	100.000	100.000

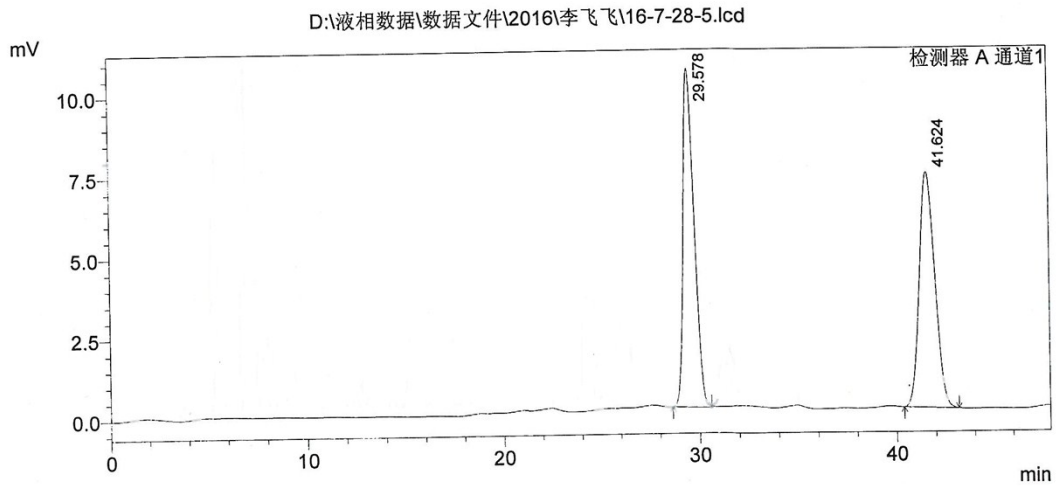


HPLC Conditions: Daicel Chiralpak AD-H, 20% IPA/hexanes, 0.8 mL/min

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 双8
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-28-5.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-28 14:11:41
 数据处理 : 2016-7-28 14:59:36

<色谱图>



1 检测器 A 通道1/254nm

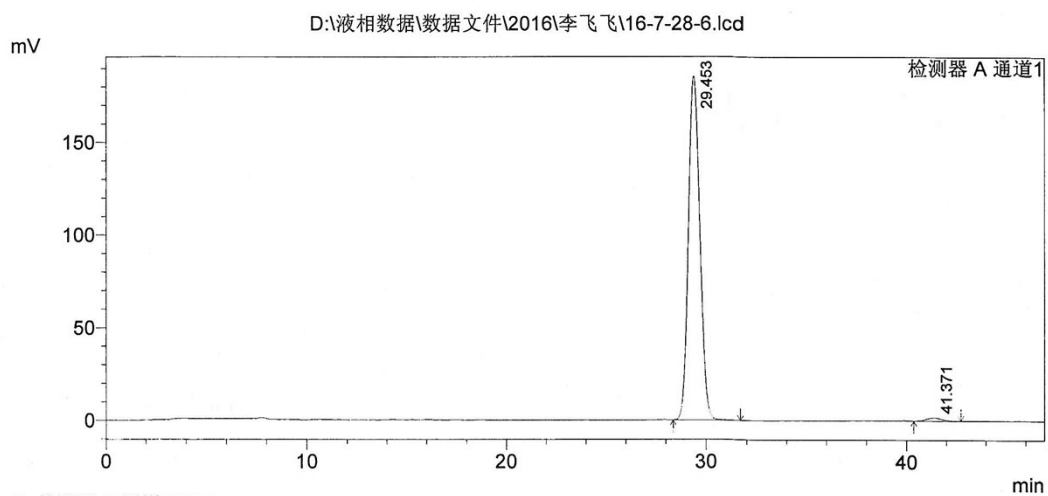
峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	29.578	406838	10485	50.296	59.001
2	41.624	402056	7286	49.704	40.999
总计		808894	17771	100.000	100.000

==== Shimadzu LCsolution 分析报告 ====

采集人 : Admin
 样品名称 : 手性双8
 样品 ID : 0
 样品架 : 1
 样品瓶# : 1
 进样体积 : 5 uL
 数据文件名 : 16-7-28-6.lcd
 方法文件名 : LF反应体系.lcm
 批处理文件名 :
 报告文件名 : Default.lcr
 数据采集 : 2016-7-28 15:03:52
 数据处理 : 2016-7-28 15:50:50

<色谱图>



峰表

峰#	保留时间	面积	高度	面积 %	高度 %
1	29.453	7333539	185718	98.739	99.066
2	41.371	93635	1751	1.261	0.934
总计		7427175	187469	100.000	100.000