SUPPLEMENTARY MATERIAL

Experimental Detail

Melting points were determined with a SGW X-4 micro melting point apparatus. Infrared spectra (IR) were recorded on Bruker VERTEX-70. ^{1}H NMR spectra were recorded using an Avance 500 MHz spectrometer. All chemical shifts were reported in δ units relative to tetramethylsilane. ESI-MS were recorded on Waters Quaptro Premier XE Mass Spectrometer. High resolution mass spectra were recorded on Brucker Solaril X70 mass spectrometer. HPLC were determined on Dionex Ultimate 3000. GC were determined on Fuli GC-9790. Optical rotations were obtained on a Perkin-Elmer 241 Autopol polarimeter. Compound **2** (CAS registry number: 2488-15-5), **3** (CAS registry number: 51372-93-1), **4** (CAS registry number: 1380243-18-4), **7** (CAS registry number: 1380243-28-6), **8** (CAS registry number: 1048703-14-5) and **9** (CAS registry number: 486460-00-8) were known without sufficient reported spectroscopic or characterization data.

(S)-2-((tert-butoxycarbonyl)amino)-4-(methylthio)butanoic acid (2)

L-methionine (110.0 g, 0.74 mol) was dissolved in 1 M sodium hydroxide solution (750 mL, 0.75 mol) in a 1000 mL oven-dried, round-bottomed flask. Boc_2O (163.7 g, 0.75 mol) was added at room temperature. The reaction mixture was stirred for 5 hours. Aqueous hydrochloric acid was added until the pH of 6. The layers were seprated when CH_2Cl_2 (300 mL×3) was poured into the solution. The organic layer was washed with saturated sodium chloride aqueous solution (400 mL), dried over anhydrous Na_2SO_4, filtered and concentrated to yield crude **2** (165.8 g, 0.67 mol, 90 % yield).

Compound Data

$[\alpha]_D^{20}$ = - 23.5 (c 1.3, CH_3OH). {lit.[25] $[\alpha]_D^{32}$ = - 21.6 (c 1.3,CH_3OH)}. IR (KBr): 3367, 3351, 2975, 2930, 1717, 1507, 1358, 1160 cm^{-1}. ^{1}H NMR (500MHz, $CDCl_3$): δ 11.62

(br, 1H), 6.91 (br, 1H), 4.40 (m, 1H), 2.52 (t, J = 4.8 Hz, 2H), 2.05 (s, 3H), 1.92 - 2.15 (m, 2H), 1.42 (s, 9H).

ESI-MS: *m/z* 250.2 $[M+H]^+$. HRMS Calcd. for: $C_{10}H_{19}NO_4SNa$ $[M+Na]^+$ requires 272.0932, found 272.0924.

(S)-tert-butyl (1-hydroxy-4-(methylthio)butan-2-yl)carbamate (3)

A solution of sodium borohydride (55.6 g, 1.47 mol) in anhydrous THF (1.6 L) was stirred in a 2 L oven-dried, round-bottom flask. Then intermediate **2** (152.1 g, 0.61 mol) was added as one portion. After cooling to 0 °C, a solution of I_2 (156.2 g, 0.61 mol) in THF (200 mL) was added dropwise to the flask over 1.5 h with considerable gas evolution. The reaction mixture was then warmed to room temperature. When the brown color dissipated to give a cloudy white solution, the reaction was brought to reflux for 19 h. The cloudy white suspension was cooled to room temperature with the aid of water bath. During the dropwise addition of MeOH (150 mL), vigorous gas evolution was observed. Small portions of MeOH were added until all of the solid white material dissolved. The mixture was concentrated by rotary evaporation to yield a white pasty oil. The oil was dissolved in 1.2 L of 20% (w/w) aqueous KOH. The solution was mechanically stirred for 6 h at room temperature. The light green solution was extracted with CH_2Cl_2 (3×1.50 L). To minimize the emulsion, 200 mL of brine was added to the aqueous layer after the first extraction. The combined organic extracts were dried over Na_2SO_4, filtered and concentrated in vacuo to yield a colorless oil (122.1 g, 0.52 mol, 85% yield).

Compound Data

$[\alpha]_D^{20}$ = - 14.0 (c 1.0, $CHCl_3$). {lit.[26] $[\alpha]_D^{20}$ = - 12.9 (c 1.0, $CHCl_3$)}. IR (KBr): 3345, 2977, 2928, 1681, 1522, 1366, 1260, 1171, 1056 cm^{-1}. ^1H NMR (500MHz, $CDCl_3$): δ 11.64 (br, 1H), 6.85 (br, 1H), 4.55 - 4.48 (m, 1H), 3.44 (s, 2H), 2.53 (t, *J* = 4.9 Hz, 2H), 2.05 (s, 3H), 2.02 - 1.87 (m, 2H), 1.48 (s, 9H).

ESI-MS: *m/z* 236.2 $[M+H]^+$. HRMS Calcd. for: $C_{10}H_{21}NO_3SNa$ $[M+Na]^+$ requires 258.1140, found 258.1129.

(S)-tert-butyl 2-(2-(methylthio)ethyl)aziridine-1-carboxylate (4)

A solution of intermediate **3** (50.0 g, 0.21 mol) and triethylamine (0.21g, 2.1 mmol) was magnetically stirred in pyridine (400 mL) in a 1 L oven-dried, round-bottom flask. The mixture was treated with methanesulfonyl chloride (36.7 g, 0.32 mol) dropwise at 0 °C. The solution was warmed to room temperature for one hour and then brought to reflux for another five hours. The cloudy white suspension was cooled to ambient temperature and poured into water (500 mL). The aqueous layer was extracted with EtOAc (150 mL×3). The combined organic layers were washed with brine, dried with $MgSO_4$, then concentrated in vacuo to yield a pale yellow oil (36.5 g, 0.17 mol, 80% yield).

Compound Data

$[\alpha]_D^{20}$ = - 5.1 (c 1.0, $CHCl_3$). IR (KBr): 3351, 2975, 2901, 1915, 1700, 1539, 1450, 1329, 1054 cm^{-1}. ^1H NMR (500MHz, $CDCl_3$) δ 2.64 (t, *J* = 12.5 Hz, 1H), 2.42 - 2.37 (m, 3H), 2.35 (s, 3H), 2.04 (t, *J* = 13.5 Hz, 2H), 1.51 (s, 9H), 1.51 - 1.46 (m, 1H). ESI-MS: *m/z* 218.1 $[M+H]^+$. HRMS Calcd. for: $C_{10}H_{19}NO_2SNa$ $[M+Na]^+$ requires 240.1034, found 240.0998.

(R)-tert-butyl (4-(methylthio)-1-(2,4,5-trifluorophenyl)butan-2-yl)carbamate (7)

In N_2 atmosphere, the Grignard reagent **6** was obtained through the Br-Mg-exchange process: Charged with 1-bromo-2,4,5-trifluorobenzene (23.1 g, 0.11 mol) in toluene (250 mL) and cooled to -10 °C, *n*-Bu-MgBr (110 mL, 0.11 mol, 1 M in toluene) was added dropwise to a three-necked flask. The reaction mixture was stirred at -10 °C for 1 h. The moment GC analysis indicated the disappearance of bromobenzene, the Grignard reagent **6** was stored as a toluene solution in N_2 atmosphere. In similar conditions, aziridine **4** (21.7 g, 0.10 mol), CuBr/Me_2S (2.58 g, 10 mmol) and dry toluene (250 mL) were stirred. The solution was cooled to -5 °C. Then 1.0 M *n*-Bu-MgBr (100 mL, 0.10 mol) was added dropwise to afford a clear solution. Subsequently, the Grignard reagent **6** above was added dropwise over 0.5 h. And the reaction mixture was allowed to warm to room temperature over 0.5 h. Then the mixture was quenched with aqueous HCl (1 M, 1 L). The aqueous layer was extracted with EtOAc (250 mL×2). The combined organic layers were washed with water (500 mL) and dried with $MgSO_4$. After evaporation of the solvent, the product was purified by flash chromatography (4:1, petroleum ether/ethyl acetate) to yield compound **7** as a pale yellow solid (26.2 g, 0.075 mol, 75% yield for two steps).

Compound Data

$[\alpha]_D^{20}$ = + 7.1 (c 1.0, $CHCl_3$). IR (KBr): 3388, 2987, 1700, 1518, 1451, 1270, 1060, 849 cm^{-1}. ^1H NMR (500MHz, $CDCl_3$) δ 7.15 - 6.94 (m, 1H), 6.88 (d, *J* = 6.8 Hz, 1H), 4.47 (d, *J* = 8.9 Hz, 1H), 4.00 - 3.80 (m,1H), 2.92 - 2.76 (m, 1H), 2.76 - 2.64 (m,1H), 2.64 - 2.44 (m, 2H), 2.06 (d, *J* = 14.6 Hz, 3H), 1.84 (s, 1H), 1.66 (qd, *J* = 14.0, 8.0 Hz,

1H), 1.47 - 1.31 (m, 9H). ESI-MS: *m/z* 350.1 $[M+H]^+$. HRMS Calcd. for: $C_{16}H_{22}F_3NO_2SNa$ $[M+Na]^+$ requires 372.1221, found 372.1209 .

(R)-tert-butyl (4-hydroxy-1-(2,4,5-trifluorophenyl)butan-2-yl)carbamate (8)

A magnetically stirred suspension of compound **7** (20 g, 0.057 mol) in H_2O (200 mL) was treated with CH_3I (50 mL) dropwise at 0 °C. After stirring for 0.5 h, the mixture was warmed to ambient temperature. While compound **7** disappeared, excess CH_3I was evaporated. Then the solution was treated with aqueous solution of $NaHCO_3$ (30 mL, 2 mol/L) dropwise at room temperature until a pH of 3-6. The solution was then brought to reflux until a pH of 7 was reached. After cooled to room temperature, the solution was extracted with CH_2Cl_2, washed with brine, dried with Na_2SO_4, then concentrated in vacuo to yield a pale yellow oil (12.8 g, 0.040 mol, 70% yield).

Compound Data

$[\alpha]_D^{20}$ = +10.2 (c 1.0, $CHCl_3$). IR (KBr): 3370, 3356, 2981, 1693, 1520, 1263, 1171, 1055, 844 cm^{-1}. ^1H NMR (500MHz, $CDCl_3$) δ 7.05 (d, *J* = 8.3 Hz, 1H), 6.91 (d, *J* = 6.6 Hz, 2H), 4.56 (d, *J* = 9.0 Hz, 1H), 4.13 - 3.96 (m,1H), 3.68 (d, *J* = 6.0 Hz, 2H), 2.85 - 2.65 (m, 2H), 1.86 (dd, *J* = 12.4, 7.7Hz, 1H), 1.68 (s,1H), 1.42 (s,9H).

ESI-MS: *m/z* 342.2 $[M+Na]^+$. HRMS Calcd. for: $C_{15}H_{20}F_3NO_3Na$ $[M+Na]^+$ requires 342.1293, found 342.1305 .

3-R-Boc-amino-4-(2,4,5-trifluorophenyl)butanoic acid (9)

Intermediate **8** (10.0 g, 31.3 mmol), was dissolved in CH_2Cl_2 (400 mL) and 90 mL of 5% (w/w) aqueous $NaHCO_3$ solution. TEMPO (0.49 g, 3.13 mmol) and NaBr (0.32 g, 3.13 mmol) was added, and the reaction mixture was cooled to 0 °C. Sodium

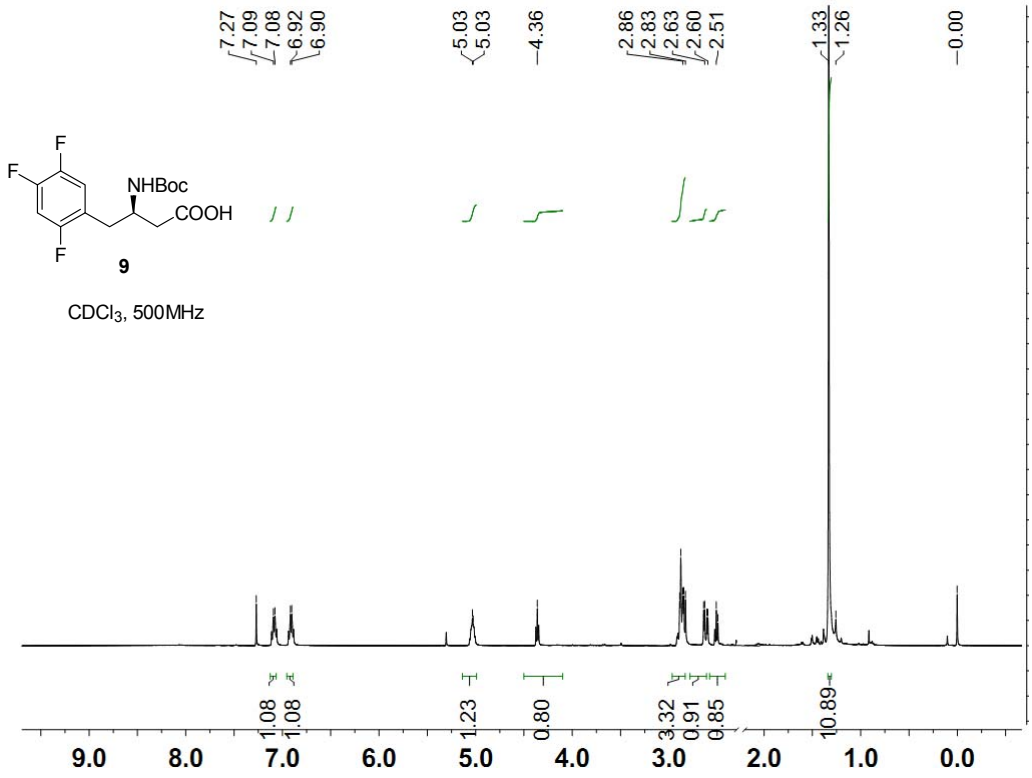
hypochlorite solution (132.5 mL, 89.5 mmol, 5% w/w) was added dropwise. The mixture was stirred for 2 hours before saturated sodium thiosulfate aqueous solution (18 mL) was added. Then the mixture was quenched by aqueous hydrochloric acid until the pH of 2. The aqueous layer was extracted with CH_2Cl_2 (100 mL×3), then the combined organic layers were dried with $MgSO_4$, concentrated in vacuo to yield crude off-white solid. Recrystallization of this crude product in CH_3OH yielded a pale white solid (9.39 g, 28.2 mmol, 90% yield). Analysis by HPLC (see the Supporting Information for details): 99.4 % pure and > 99% ee.

Compound Data

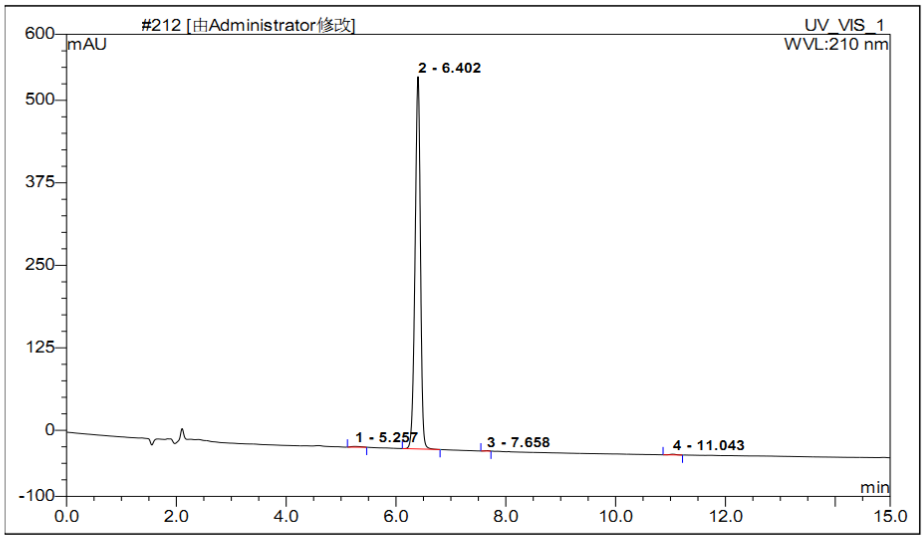
$[\alpha]_D^{20}$ = + 30.2 (c 1.0, $CHCl_3$); M.p. 122 - 124 ºC. {lit.[24] $[\alpha]_D^{20}$ = + 32.3 (c 1.0, $CHCl_3$). M.p. 124 - 125 ºC.}. IR (KBr): 3350, 2974, 1685, 1518, 1420, 1268, 1230, 1168, 1052, 832 cm^{-1}. ^1H NMR (500 MHz, $CDCl_3$) δ 7.09 (d, *J* = 7.7 Hz, 1H), 6.91 (d, *J* = 6.7 Hz, 1H), 5.03 (d, *J* = 4.0 Hz, 1H), 4.36 (s, 1H), 3.06 - 2.75 (m, 3H), 2.62 (dd, *J* = 16.4, 5.6 Hz, 1H), 2.50 (d, *J* = 8.2 Hz, 1H), 1.33 (s, 9H).

ESI-MS: *m/z* 334.2 $[M+H]^+$. HRMS Calcd for: $C_{15}H_{18}F_3NO_4Na$ $[M+Na]^+$ requires 356.1086, found 356.1101.

Spectrum 1 HNMR of 9

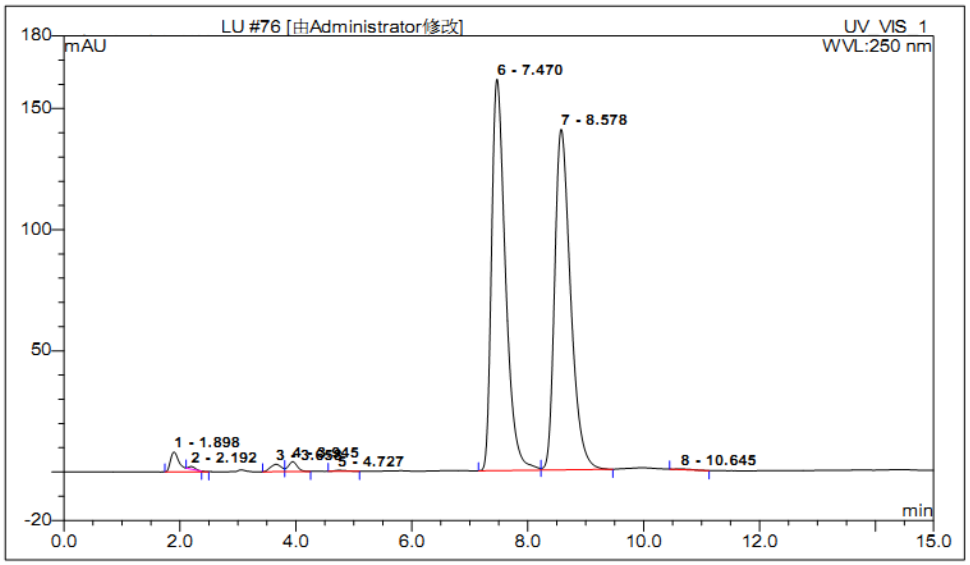


Spectrum 2 HPLC of 9



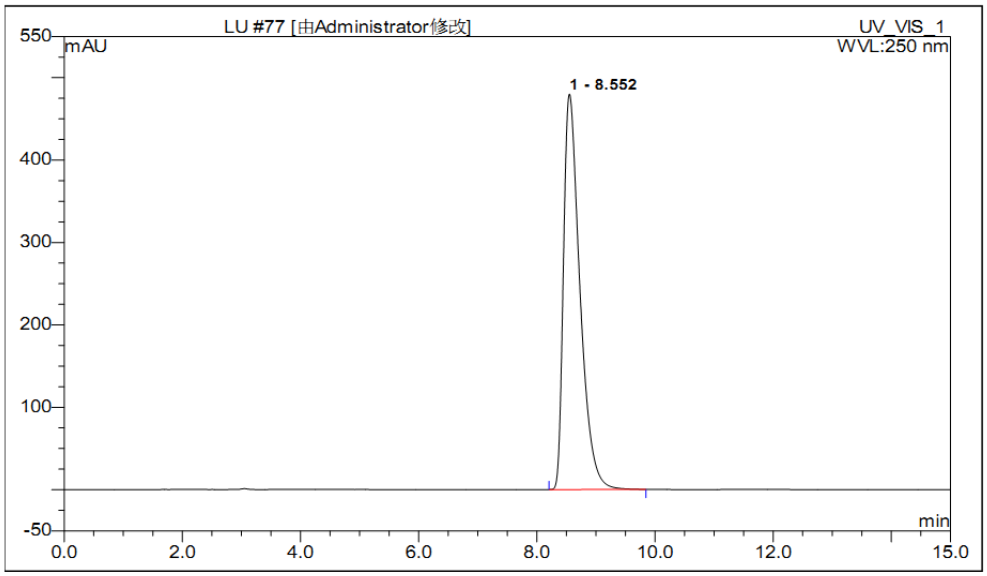
序号	保留时间 min	峰名称	峰高 mAU	峰面积 mAU*min	相对峰面积 %	样品量	类型
1	5.26	n.a.	1.104	0.222	0.34	n.a.	BMB*
2	6.40	n.a.	564.045	63.990	99.37	n.a.	BMB
3	7.66	n.a.	0.534	0.050	0.08	n.a.	BMB
4	11.04	n.a.	1.046	0.132	0.21	n.a.	BMB
总和:			566.728	64.395	100.00	0.000	

Spectrum 3 Chiral HPLC of racemate 9



序号	保留时间 min	峰名称	峰高 mAU	峰面积 mAU*min	相对峰面积 %	样品量	类型
1	1.90	n.a.	8.160	1.671	1.80	n.a.	BMB
2	2.19	n.a.	1.030	0.136	0.15	n.a.	Rd
3	3.66	n.a.	3.040	0.664	0.71	n.a.	BM
4	3.95	n.a.	4.061	0.728	0.78	n.a.	MB
5	4.73	n.a.	0.412	0.101	0.11	n.a.	BMB*
6	7.47	n.a.	161.627	44.921	48.28	n.a.	BM *
7	8.58	n.a.	140.616	44.756	48.10	n.a.	MB*
8	10.65	n.a.	0.199	0.070	0.08	n.a.	BMB*
总和:			319.145	93.048	100.00	0.000	

Spectrum 4 Chiral HPLC of 9



序号	保留时间 min	峰名称	峰高 mAU	峰面积 mAU*min	相对峰面积 %	样品量	类型
1	8.55	n.a.	479.974	154.789	100.00	n.a.	BMB
总和:			479.974	154.789	100.00	0.000	