Supporting Information

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1. General and Materials

**General:** All reactions were carried out under an atmosphere of nitrogen using the standard Schlenk techniques, unless otherwise noted. \(^1\)H NMR and \(^{13}\)C NMR spectra were recorded at room temperature in CDCl\(_3\), CD\(_3\)OD, DMSO-d\(_6\) on 400 MHz instrument with tetramethylsilane (TMS) as internal standard. Enantiomeric excess was determined by HPLC analysis, using chiral column described below in detail. Optical rotations were measured by polarimeter. Flash column chromatography was performed on silica gel (200-300 mesh). All reactions were monitored by TLC analysis.

**Materials:** Commercially available reagents were used throughout without further purification. The anhydrous solvents for asymmetric hydrogenation were also purchased without the further purification.

2. Synthesis of Quinazolinone Derivatives

Quinazolinone derivatives 1 can be conveniently synthesized according to the known literature procedure.\(^1\) Among them, the quinazolinones 1a,\(^1\) 1d,\(^2\) Ig,\(^3\) 1i,\(^4\) 1j,\(^5\) 1k,\(^6\) 1l,\(^7\) 1m,\(^8\) 1n and 1o\(^10\) are the known compounds.

**General procedure:** the Grignard reagent was prepared by reaction of magnesium (288 mg, 12 mmol) with the corresponding aryl bromide (15.6 mmol) in dry tetrahydrofuran under reflux. Then, the 2-aminobenzonitrile (708 mg, 6.0 mmol) in dry tetrahydrofuran (8 mL) was added dropwise under reflux. After a refluxed period (2 h), the mixture was cooled to 0 °C, methyl chloroformate (977 mg, 9.0 mmol) was added dropwise, and the solution was refluxed for 14 h. The mixture was cooled to room temperature and poured into the hydrochloric acid solution (2 M), then neutralized with 10% sodium bicarbonate solution and extracted with dichloromethane. The combined organic layer was dried over anhydrous sodium sulfate, concentrated in vacuo. The residue was further purified by flash column chromatography using dichloromethane/methanol as eluent to afford the desired quinazolinones 1.

4-o-Tolylquinazolin-2(1H)-one (1b): 1.066 g, 75% yield, white solid, mp: 262-263 °C, new compound, R\(_f\) = 0.30 (dichloromethane/methanol = 15/1); \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 13.05 (s, 1H), 7.73–7.68 (m, 1H), 7.59 (d, \(J = 8.2\) Hz, 1H), 7.45–7.41 (m, 2H), 7.36–7.33 (m, 3H), 7.20–7.16 (m, 1H), 2.26 (s, 3H); \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \(\delta\) 179.4, 159.3, 143.6, 137.0, 136.5, 136.4, 131.4, 130.4, 129.5, 129.4, 126.4, 126.3, 126.1, 117.5, 117.2, 20.6; HRMS (ESI) m/z Calculated for C\(_{15}\)H\(_{13}\)N\(_2\)O \([\text{M}+\text{H}]^+\) 237.1027, found 237.1027.

4-m-Tolylquinazolin-2(1H)-one (1c): 1.134 g, 80% yield, white solid, mp: 232-233 °C, new compound, R\(_f\) = 0.30 (dichloromethane/methanol = 15/1); \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 7.90 (d, \(J = 8.2\) Hz, 1H), 7.73–7.58 (m, 4H), 7.45–7.39 (m, 2H), 7.30–7.16 (m, 1H), 2.47 (s, 3H); \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \(\delta\) 176.6, 158.2, 143.2, 138.2, 136.3, 135.1, 131.4, 130.3, 128.7, 128.0, 126.8, 122.9, 116.6, 115.3, 21.3; HRMS (ESI) m/z Calculated for C\(_{15}\)H\(_{13}\)N\(_2\)O \([\text{M}+\text{H}]^+\) 237.1022, found 237.1024.
4-(3,5-Dimethylphenyl)quinazolin-2(1H)-one (1e): 0.945 g (4.0 mmol scale), 95% yield, white solid, mp: 290-291 °C, new compound, R<sub>f</sub> = 0.30 (dichloromethane/methanol = 15/1); <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.91 (d, J = 8.2 Hz, 1H), 7.73–7.62 (m, 2H), 7.43 (s, 2H), 7.27–7.21 (m, 2H), 2.43 (s, 6H); <sup>1</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 177.8, 159.2, 144.2, 138.9, 137.3, 136.0, 133.3, 129.8, 128.5, 123.8, 117.6, 116.3, 22.1; HRMS (ESI) m/z Calculated for C<sub>16</sub>H<sub>15</sub>N<sub>2</sub>O [M+H]<sup>+</sup> 251.1179, found 251.1181.

4-(3-Methoxyphenyl)quinazolin-2(1H)-one (1f): 0.920 g (4.0 mmol scale), 92% yield, white solid, mp: 254-255 °C, new compound, R<sub>f</sub> = 0.32 (dichloromethane/methanol = 15/1); 1H NMR (400 MHz, DMSO-d<sub>6</sub>) δ 7.73 (t, J = 7.8 Hz, 1H), 7.65 (d, J = 8.2 Hz, 1H), 7.48 (t, J = 7.8 Hz, 1H), 7.37 (d, J = 8.4 Hz, 1H), 7.22–7.15 (m, 4H), 3.82 (s, 3H); 13C NMR (100 MHz, DMSO-d<sub>6</sub>) δ 176.1, 160.4, 144.7, 139.1, 136.4, 130.9, 129.6, 123.6, 122.6, 117.4, 116.8, 115.5, 115.5, 110.8, 56.6; HRMS (ESI) m/z Calculated for C<sub>15</sub>H<sub>13</sub>N<sub>2</sub>O<sub>2</sub> [M+H]<sup>+</sup> 253.0972, found 253.0974.

4-(3,5-Dimethoxyphenyl)quinazolin-2(1H)-one (1h): 0.857 g (4.0 mmol scale), 76% yield, white solid, mp: 255-256 °C, new compound, R<sub>f</sub> = 0.30 (dichloromethane/methanol = 15/1); <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.94 (d, J = 8.2 Hz, 1H), 7.72 (t, J = 7.6 Hz, 1H), 7.61 (d, J = 8.2 Hz, 1H), 7.26 (d, J = 6.3 Hz, 2H), 6.92 (d, J = 1.4 Hz, 2H), 6.67 (s, 1H), 3.87 (s, 6H); <sup>1</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 177.4, 161.5, 159.0, 144.1, 139.1, 136.2, 129.7, 123.9, 117.5, 116.2, 108.6, 103.9, 56.5; HRMS (ESI) m/z Calculated for C<sub>16</sub>H<sub>15</sub>N<sub>2</sub>O<sub>3</sub> [M+H]<sup>+</sup> 283.1077, found 283.1079.

3. General Procedure for Asymmetric Hydrogenation of Quinazolinones

A mixture of [Ir(cod)Cl]<sub>2</sub> (1.3 mg, 0.002 mmol) and (R)-SegPhos (2.8 mg, 0.0044 mmol) in tetrahydrofuran (1.0 mL) was stirred at room temperature for 10 min in a glovebox, then BCDMH (4.8 mg, 0.02 mmol) and substrates 1 (0.2 mmol) together with tetrahydrofuran (2.0 mL) were added and the mixture was stirred for a further 10 min. The hydrogenation was performed at 25 °C under hydrogen gas (600 psi) in a stainless steel autoclave for 24 h. After carefully releasing the hydrogen gas, saturated aqueous sodium bicarbonate (3.0 mL) was added into the mixture and stirred for 10-15 min. The mixture was extracted with dichloromethane three times and the combined organic extract was dried over anhydrous sodium sulfate. After filtration, the filtrate was concentrated in vacuo and further purification was performed by a silica gel column eluted with hexanes/ethyl acetate (or dichloromethane/methanol) to give the desired products 2.

(S)-(±)-4-Phenyl-3,4-dihydroquinazolin-2(1H)-one (2a): 41 mg, 91% yield, white solid, the known compound,<sup>10</sup> 98% ee, [α]<sup>20</sup><sub>D</sub> = -110.4 (c 0.92, MeOH), R<sub>f</sub> = 0.31 (dichloromethane/methanol = 15/1); <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.35–7.28 (m, 5H), 7.14–7.10 (m, 1H), 6.88–6.79 (m, 3H), 5.64 (s, 1H); <sup>1</sup>C NMR (100 MHz, CD<sub>2</sub>OD) δ 155.4, 144.2, 136.0, 128.4, 127.9, 127.5, 126.7, 126.5, 122.0, 121.5, 114.0, 57.8; Enantiomeric excess was determined by HPLC (OD-H column, n-Hexane/
(-)-4-<i>o</i>-Tolyl-3,4-dihydroquinazolin-2(1<i>H</i>)-one (2b): 46 mg, 97% yield, white solid, mp: 117-118 °C, new compound, 92% ee, [α]<sub>20</sub><sup>D</sup> = -74.2 (c 0.26, MeOH), R<sub>f</sub> = 0.35 (dichloromethane/methanol = 15/1); <sup>1</sup>H NMR (400 MHz, DMSO-d<sub>6</sub>) δ 9.24 (s, 1H), 7.21–7.09 (m, 6H), 6.85–6.82 (m, 1H), 6.79–6.75 (m, 1H), 6.70 (d, J = 7.2 Hz, 1H), 5.81 (d, J = 1.8 Hz, 1H), 2.39 (s, 3H); <sup>13</sup>C NMR (100 MHz, DMSO-d<sub>6</sub>) δ 153.7, 143.0, 137.8, 135.5, 131.2, 128.6, 128.3, 127.9, 126.9, 126.8, 121.7, 121.6, 114.3, 54.7, 19.5; Enantiomeric excess was determined by HPLC (OD-H column, n-Hexane/i-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t<sub>1</sub> = 16.9 min (major), t<sub>2</sub> = 20.7 min.

(-)-4-<i>m</i>-Tolyl-3,4-dihydroquinazolin-2(1<i>H</i>)-one (2c): 42 mg, 90% yield, white solid, mp: 210-211 °C, new compound, 96% ee, [α]<sub>20</sub><sup>D</sup> = -78.3 (c 0.66, MeOH), R<sub>f</sub> = 0.35 (dichloromethane/methanol = 15/1); <sup>1</sup>H NMR (400 MHz, DMSO-d<sub>6</sub>) δ 9.21 (s, 1H), 7.38 (s, 1H), 7.20 (t, J = 7.5 Hz, 1H), 7.10–7.00 (m, 5H), 6.80 (t, J = 6.8 Hz, 2H), 5.47 (s, 1H), 2.26 (s, 3H); 13C NMR (100 MHz, DMSO-d<sub>6</sub>) δ 154.2, 145.5, 138.1, 137.4, 128.9, 128.4, 128.3, 127.2, 123.9, 122.1, 121.5, 114.3, 57.2, 21.6; Enantiomeric excess was determined by HPLC (OD-H column, n-Hexane/i-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t<sub>1</sub> = 16.5 min (major), t<sub>2</sub> = 19.7 min; HRMS (ESI) m/z Calculated for C<sub>15</sub>H<sub>15</sub>N<sub>2</sub>O [M+H]<sup>+</sup> 239.1179, found 239.1177.

(-)-4-<i>p</i>-Tolyl-3,4-dihydroquinazolin-2(1<i>H</i>)-one (2d): 45 mg, 97% yield, white solid, known compound, 95% ee, [α]<sub>20</sub><sup>D</sup> = -135.8 (c 0.33, MeOH), R<sub>f</sub> = 0.30 (dichloromethane/methanol = 15:1); <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.96 (s, 1H), 7.26–7.22 (m, 2H), 7.15–7.07 (m, 3H), 6.86–6.78 (m, 2H), 5.93 (s, 1H), 5.60 (s, 1H), 2.31 (s, 3H); 13C NMR (100 MHz, CDCl<sub>3</sub>) δ 155.2, 140.1, 138.0, 136.0, 129.6, 128.3, 127.1, 126.9, 122.3, 121.5, 114.6, 58.3, 21.1; Enantiomeric excess was determined by chiral HPLC (OD-H column, n-Hexane/i-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t<sub>1</sub> = 18.5 min (major), t<sub>2</sub> = 22.6 min;

(-)-4-(3,5-Dimethylphenyl)-3,4-dihydroquinazolin-2(1<i>H</i>)-one (2e): 46 mg, 91% yield, white solid, mp: 200-201 °C, new compound, 96% ee, [α]<sub>20</sub><sup>D</sup> = -158.8 (c 0.33, MeOH), R<sub>f</sub> = 0.30 (dichloromethane/methanol = 15:1); <sup>1</sup>H NMR (400 MHz, DMSO-d<sub>6</sub>) δ 9.21 (s, 1H), 7.17–7.13 (m, 1H), 6.96 (s, 3H), 6.89–6.82 (m, 2H), 6.76 (d, J = 7.8 Hz, 1H), 5.58 (s, 1H), 5.27 (s, 1H), 2.30 (s, 6H); 13C NMR (100 MHz, DMSO-d<sub>6</sub>) δ 154.3, 142.7, 138.7, 135.7, 130.0, 128.4, 127.1, 125.0, 122.4, 121.4, 114.3, 58.8, 21.3; Enantiomeric excess was determined by HPLC (OD-H column, n-Hexane/i-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t<sub>1</sub> = 18.5 min (major), t<sub>2</sub> = 22.6 min; HRMS (ESI) m/z Calculated for C<sub>16</sub>H<sub>17</sub>N<sub>2</sub>O [M+H]<sup>+</sup> 253.1335, found 253.1337.

(-)-4-(3-Methoxyphenyl)-3,4-dihydroquinazolin-2(1<i>H</i>)-one (2f): 45 mg, 88% yield, white solid, mp: 175-176 °C, new compound, 95% ee, [α]<sub>20</sub><sup>D</sup> = -70.4 (c 0.82, MeOH), R<sub>f</sub> = 0.40 (neat ethyl acetate); <sup>1</sup>H NMR (400 MHz, DMSO-d<sub>6</sub>) δ 9.26 (s, 1H), 7.44 (s, 1H), 7.24 (t, J = 7.8 Hz, 1H), 7.13–7.07 (m, 2H), 6.88–6.81 (m, 5H), 5.50 (s, 1H), 3.72 (s, 3H); 13C NMR (100 MHz, DMSO-d<sub>6</sub>) δ 159.8, 154.2, 147.0, 137.4, 130.2, 128.3, 127.2, 122.0, 121.6, 118.8, 114.4, 112.8, 112.7, 57.0, 55.5; Enantiomeric excess was determined by HPLC (IC column, n-Hexane/i-PrOH = 80/20, ...
(-)-4-(4-Methoxyphenyl)-3,4-dihydroquinazolin-2(1H)-one (2g): 50 mg, 98% yield, white solid, mp: 236-237 °C, new compound, 91% ee, [α]20D = -85.6 (c 0.55, MeOH), Rf = 0.30 (dichloromethane/methanol = 15/1); 1H NMR (400 MHz, DMSO-d6) δ 9.24 (s, 1H), 7.38 (s, 1H), 7.21 (d, J = 8.6 Hz, 2H), 7.11 (t, J = 7.6 Hz, 1H), 7.00 (d, J = 7.6 Hz, 1H), 6.89 (d, J = 8.6 Hz, 2H), 6.82 (t, J = 7.4 Hz, 2H), 5.48 (d, J = 1.8 Hz, 1H), 3.72 (s, 3H); 13C NMR (100 MHz, DMSO-d6) δ 159.0, 154.2, 137.6, 137.4, 128.2, 128.0, 127.2, 122.5, 121.5, 114.3, 56.6, 55.6; Enantiomeric excess was determined by HPLC (OD-3 column, n-Hexane/i-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t1 = 24.0 min, t2 = 25.7 min (major); HRMS (ESI) m/z Calculated for C15H15N2O2 [M+H]+ 255.1128, found 255.1133.

(-)-4-(3,5-Dimethoxyphenyl)-3,4-dihydroquinazolin-2(1H)-one (2h): 52 mg, 91% yield, white solid, mp: 115-116 °C, new compound, 95% ee, [α]20D = -85.5 (c 0.60, MeOH), Rf = 0.30 (dichloromethane/methanol = 15/1); 1H NMR (400 MHz, DMSO-d6) δ 9.19 (s, 1H), 7.36 (s, 1H), 7.10–7.05 (m, 2H), 6.82–6.76 (m, 2H), 6.42 (d, J = 1.8 Hz, 2H), 6.36 (s, 1H), 5.40 (d, J = 1.8 Hz, 1H), 3.67 (s, 6H); 13C NMR (100 MHz, DMSO-d6) δ 160.5, 153.7, 147.2, 136.9, 127.8, 126.7, 121.3, 121.0, 113.8, 104.5, 98.4, 56.6, 55.1; Enantiomeric excess was determined by HPLC (IA column, n-Hexane/i-PrOH = 75/25, detector: 254 nm, flow rate: 0.9 mL/min, 30 °C), t1 = 12.0 min (major), t2 = 21.0 min; HRMS (ESI) m/z Calculated for C16H17N2O3 [M+H]+ 285.1234, found 285.1236.

(-)-4-(4-Chlorophenyl)-3,4-dihydroquinazolin-2(1H)-one (2i): 50 mg, 97% yield, white solid, the known compound, 98% ee, [α]20D = -168.9 (c 0.54, MeOH), Rf = 0.30 (dichloromethane/methanol = 15/1); 1H NMR (400 MHz, DMSO-d6) δ 9.27 (s, 1H), 7.47 (s, 1H), 7.40 (d, J = 8.6 Hz, 2H), 7.31 (d, J = 8.4 Hz, 2H), 7.12 (t, J = 7.6 Hz, 1H), 7.05 (d, J = 7.4 Hz, 1H), 6.83 (t, J = 7.6 Hz, 2H), 5.56 (s, 1H); 13C NMR (100 MHz, DMSO-d6) δ 154.1, 144.4, 137.4, 132.4, 129.0, 128.6, 127.2, 121.7, 121.6, 114.5, 56.4; Enantiomeric excess was determined by HPLC (OD-3 column, n-Hexane/i-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t1 = 19.3 min, t2 = 20.1 min (major).

(-)-4-(4-Fluorophenyl)-3,4-dihydroquinazolin-2(1H)-one (2j): 46 mg, 95% yield, white solid, the known compound [CAS: 1781596-98-2], 97% ee, [α]20D = -88.3 (c 0.30, MeOH), Rf = 0.30 (dichloromethane/methanol = 15/1); 1H NMR (400 MHz, DMSO-d6) δ 9.32 (s, 1H), 7.50 (s, 1H), 7.36–7.32 (m, 2H), 7.19–7.10 (m, 3H), 7.04 (d, J = 7.4 Hz, 1H), 5.58 (d, J = 2.4 Hz, 1H); 13C NMR (100 MHz, DMSO-d6) δ 161.9 (d, J = 243.2 Hz), 154.2, 141.7, 141.6, 137.4, 128.8 (d, J = 8.3 Hz), 128.4, 127.2, 121.9, 121.7, 115.7 (d, J = 21.4 Hz), 114.5, 56.4; 19F NMR (376 MHz, DMSO-d6) δ -115.36; Enantiomeric excess was determined by HPLC (OD-3 column, n-Hexane/i-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t1 = 15.4 min, t2 = 16.6 min (major).

(-)-6-Methyl-4-phenyl-3,4-dihydroquinazolin-2(1H)-one (2k): 45 mg, 95% yield, white solid, the known compound, 97% ee, [α]20D = -31.1 (c 0.46, MeOH), Rf = 0.25 (dichloromethane/methanol = 30/1); 1H NMR (400 MHz, DMSO-d6) δ 9.18 (s, 1H), 7.39–7.22 (m, 6H), 6.92 (d, J =
8.0 Hz, 1H), 6.85 (s, 1H), 6.73 (d, J = 8.0 Hz, 1H), 5.47 (s, 1H), 2.14 (s, 3H);
$^{13}$C NMR (100 MHz, DMSO-d$_6$) δ 154.3, 145.6, 135.0, 130.3, 129.0, 128.8, 127.8, 127.5, 126.7, 121.9, 114.3, 57.3, 20.8; Enantiomeric excess was determined by HPLC (OD-H column, n-Hexane/i-PrOH = 95/05, detector: 254 nm, flow rate: 0.70 mL/min, 30 °C), $t_1$ = 44.7 min (major), $t_2$ = 51.8 min.

(-)-6-Chloro-4-phenyl-3,4-dihydroquinazolin-2(1H)-one (2l): 50 mg, 97% yield, white solid, the known compound, $^{10}$ 96% ee, [α]$^{20}_D$ = -12.2 (c 0.49, MeOH), $R_f$ = 0.23 (dichloromethane/methanol = 25/1); $^1$H NMR (400 MHz, DMSO-d$_6$) δ 9.40 (s, 1H), 7.54 (s, 1H), 7.37–7.25 (m, 5H), 7.18–7.04 (m, 2H), 6.83 (d, J = 8.4 Hz, 1H), 5.55 (d, J = 2.4 Hz, 1H); $^{13}$C NMR (100 MHz, DMSO-d$_6$) δ 153.9, 145.0, 136.5, 129.2, 128.2, 128.0, 126.8, 126.6, 116.0, 56.6; Enantiomeric excess was determined by HPLC (OD-H column, n-Hexane/i-PrOH = 90/10, detector: 254 nm, flow rate: 0.70 mL/min, 30 °C), $t_1$ = 21.4 min (major), $t_2$ = 23.9 min.

(-)-6,7-Dimethoxy-4-phenyl-3,4-dihydroquinazolin-2(1H)-one (2m): 48 mg, 85% yield, white solid, mp: 110-111 °C, new compound, 93% ee, [α]$^{20}_D$ = -53.5 (c 0.54, MeOH), $R_f$ = 0.35 (dichloromethane/methanol = 25/1); $^1$H NMR (400 MHz, DMSO-d$_6$) δ 8.97 (s, 1H), 7.34–7.28 (m, 5H), 7.25–7.21 (m, 1H), 6.69 (s, 1H), 6.48 (s, 1H), 5.42 (d, J = 2.6 Hz, 1H), 3.68 (d, J = 4.0 Hz, 3H), 3.60 (s, 3H); $^{13}$C NMR (100 MHz, DMSO-d$_6$) δ 154.2, 149.2, 145.7, 143.9, 131.2, 129.0, 127.6, 126.6, 113.0, 111.6, 99.3, 57.0, 56.6, 55.9; Enantiomeric excess was determined by HPLC (IC column, n-Hexane/i-PrOH = 72/28, detector: 254 nm, flow rate: 0.80 mL/min, 30 °C), $t_1$ = 15.7 min (major), $t_2$ = 17.2 min; HRMS (ESI) m/z Calculated for C$_{16}$H$_{16}$N$_2$O$_3$ [M+H]$^+$ 285.1234, found 285.1235.

(+)-4-Cyclohexyl-3,4-dihydroquinazolin-2(1H)-one (2n): 42 mg, 91% yield, white solid, mp: 130-131 °C, new compound, 96% ee, [α]$^{20}_D$ = +14.3 (c 0.40, MeOH), $R_f$ = 0.33 (dichloromethane/methanol = 15/1); $^1$H NMR (400 MHz, DMSO-d$_6$) δ 8.97 (s, 1H), 7.12–7.08 (m, 1H), 7.03–6.95 (m, 2H), 6.87–6.75 (m, 1H), 4.10 (t, J = 3.8 Hz, 1H), 1.66 (t, J = 9.0 Hz, 2H), 1.61–1.48 (m, 3H), 1.44–1.36 (m, 1H), 1.19–0.90 (m, 5H); $^{13}$C NMR (100 MHz, DMSO-d$_6$) δ 154.8, 138.6, 127.9, 121.0, 120.8, 113.8, 58.6, 46.8, 28.6, 27.1, 26.4, 26.2, 26.1; Enantiomeric excess was determined by HPLC (IC column, n-Hexane/i-PrOH = 92/08, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), $t_1$ = 21.1 min (major), $t_2$ = 22.5 min; HRMS (ESI) m/z Calculated for C$_{14}$H$_{19}$N$_2$O [M+H]$^+$ 231.1492, found 231.1492.

(+)-4-Isopropyl-3,4-dihydroquinazolin-2(1H)-one (2o): 35 mg, 92% yield, white solid, the known compound, $^{10}$ 86% ee, [α]$^{20}_D$ = +20.2 (c 0.56, MeOH), $R_f$ = 0.40 (dichloromethane/methanol = 15/1); $^1$H NMR (400 MHz, CDCl$_3$) δ 8.09 (s, 1H), 7.17–7.13 (m, 1H), 7.03 (d, J = 7.4 Hz, 1H), 6.95 (t, J = 7.4 Hz, 1H), 6.73 (d, J = 7.8 Hz, 1H), 5.61 (s, 1H), 4.36 (t, J = 3.4 Hz, 1H), 2.00–1.91 (m, 1H), 0.99 (d, J = 6.8 Hz, 3H), 0.87 (d, J = 6.8 Hz, 3H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 155.5, 136.7, 128.1, 126.6, 121.9, 120.3, 114.2, 60.0, 36.7, 18.5, 16.0; Enantiomeric excess was determined by HPLC (IC column, n-Hexane/i-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), $t_1$ = 13.2 min (major), $t_2$ = 14.4 min.
4. Asymmetric Hydrogenation at Gram Scale

A mixture of [Ir(cod)Cl]$_2$ (15.1 mg, 0.0225 mmol) and (R)-SegPhos (30.2 mg, 0.0495 mmol) in tetrahydrofuran (3.0 mL) was stirred at r.t. for 15 min in a glovebox, then BCDMH (108.7 mg, 0.45 mmol) and substrate 1a (1.000 g, 4.5 mmol) together with tetrahydrofuran (13 mL) were added and the mixture was stirred for a further 10 min. The hydrogenation was performed at 25 °C under hydrogen (600 psi) in a stainless steel autoclave for 36 h. After carefully releasing the hydrogen, saturated aqueous sodium bicarbonate (10 mL) was added into the mixture and stirred for 10-15 min. The mixture was extracted with dichloromethane three times and the combined organic extract was dried over anhydrous sodium sulfate. After filtration, the filtrate was concentrated in vacuo and further purification was performed by a silica gel column with dichloromethane/methanol as eluent to give the desired product (S)-2a 0.931 g in 92% yield and 97% ee.

5. Synthesis of Bioactive Molecules

The above synthetic methodology has been used as key step for facile syntheses of bioactive molecules. For example, (S)-2a could be converted into chiral thiourea (S)-3a with P$_2$S$_5$ in 67% yield, which is the Eg5 inhibitor. (S)-SDZ 267-489 3b, a serum HDL cholesterol raising agent, could be also synthesized in two steps from chiral (S)-2a.

**(S)-2a >99% ee**

**(S)-3a Eg5 Inhibitor**

**(S)-3b**

**(S)-SDZ 267-489**

The Synthesis of Eg5 Inhibitor: A mixture of (S)-2a (44.9 mg, 0.2 mmol, >99 ee) and P$_2$S$_5$ (38.3 mg, 0.2 mmol) in p-xylene (3 mL) was heated at 140 °C for 11 h under a nitrogen atmosphere. After being cooled to room temperature, the mixture was concentrated in vacuo and further purification was performed by a silica gel column eluted with hexanes/ethyl acetate to give the desired product (S)-3a.

**(S)-4-Phenyl-3,4-dihydroquinazoline-2(1H)-thione (3a):** 32 mg, 67% yield, white solid, the known compound, 13,14 >99% ee, [α]$_{D}^{20}$ = -160.41 (c 0.24, MeOH), R$_f$ = 0.55 (hexanes/ethyl acetate = 3/1); $^1$H NMR (400 MHz, CDCl$_3$) δ 9.30 (s, 1H), 7.39-7.28 (m, 6H), 7.21-7.14 (m, 1H), 6.99-6.90 (m, 2H), 6.82 (d, J = 7.6 Hz, 1H), 5.66 (s, 1H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 174.6, 141.7, 133.5, 129.1, 128.8, 128.7, 127.5, 127.2, 124.3, 120.8, 114.4, 59.0; Enantiomeric excess
was determined by HPLC (OD-H column, n-Hexane/i-PrOH = 80/20, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t₁ = 7.5 min (major), t₂ = 9.6 min.

The Synthesis of (S)-SDZ 267-489: A mixture of (S)-3a (48.1 mg, 0.20 mmol) and sodium bromide (4.1 mg, 0.04 mmol) was suspended in i-propanol (3 mL) and heated to 75 °C under a nitrogen atmosphere. To the rapidly stirred mixture was added chloroacetone (21 uL, 0.26 mmol) and the reaction was stirred at 75 °C for 3 h. After being cooled to room temperature, the mixture was concentrated in vacuo and further purification was performed by a silica gel column eluted with hexanes/ethyl acetate to give the desired product 3b (S)-SDZ 267-489.

(S)-3-Methyl-5-phenyl-5H-thiazolo[2,3-b]quinazoline (3b): 46 mg, 83% yield, pale yellow solid, the known compound, 14 99% ee, [a]₂₀ᵪ = -117.85 (c 0.70, MeOH), [lit. 14 [a]₂₅ᵪ = -181.1 (c 1.0, MeOH)), Rᵣ = 0.30 (hexanes/ethyl acetate = 1/1); ¹H NMR (400 MHz, CDCl₃) δ 7.30-7.21 (m, 5H), 7.16-7.09 (m, 1H), 7.08-7.03 (m, 1H), 7.00-6.95 (m, 1H), 6.18 (s, 1H), 5.69 (s, 1H), 1.93 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 163.5, 143.6, 141.0, 134.6, 129.3, 128.8, 128.3, 126.6, 125.2, 123.4, 123.2, 121.3, 96.9, 61.0, 14.3; Enantiomeric excess was determined by HPLC (IC column, n-Hexane/i-PrOH = 80/20, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t₁ = 19.1 min, t₂ = 20.5 min (major).

6. The Determination of Absolute Configuration

4-Phenyl-3,4-dihydroquinazolin-2(1H)-one (−)-2a was recrystallized in dichloromethane and n-hexane, optically pure product (> 99% ee) could be obtained. Then, a crystal was grown from dichloromethane and diethyl ether, which is suitable for X-ray diffraction analysis. The structure in Figure S1 shows that the absolute configuration of (−)-2a is (4S). [CCDC 1480606] contains the structure and supplementary crystallographic data. These data can be obtained free of charge from the Cambridge Crystallographic Data Centre via www.ccdc.com.ac.uk/data_request/cif.

**Figure S1.** X-ray Crystallographic Analysis of (4S)-(−)-2a
7. References

4) Kiyoshi, I.; Hironori. WO 2015093551 A1, **2015**.
11) Hans, O. FR 1571271 A, **1969**.
8. Copy of NMR and HPLC

1H NMR GF-4-40A in CDCl3

$^1$H NMR (400 MHz, CDCl3)
$^{13}$C NMR GF-4-40A in CDCl$_3$

$^{13}$C NMR (100 MHz, CDCl$_3$)
1H NMR GF-4-40B in CDCl₃

^H NMR (400 MHz, CDCl₃)
$^{13}$C NMR GF-4-40B in CDCl$_3$

$^{13}$C NMR (100 MHz, CDCl$_3$)
$^{1}$H NMR (400 MHz, CDCl$_3$)
$^{13}$C NMR GF-4-47E in CDCl$_3$
1H NMR GF-4-46 in DMSO-d6

1H NMR (400 MHz, DMSO-d6)
$^{13}$C NMR (100 MHz, DMSO-$d_6$)
$^1$H NMR (400 MHz, CDCl$_3$)

$^1$H NMR GF-4-47D in CDCl$_3$
$^{13}$C NMR GF-4-47D in CDCl$_3$

$^{13}$C NMR (100 MHz, CDCl$_3$)
$^{13}$C NMR of 49E in CD$_3$OD
$^{13}$C NMR (100 MHz, DMSO-$d_6$)
$^{1}H$ NMR (400 MHz, DMSO-d$_6$)

1H NMR GF-4-448 in DMSO

$^{1}H$ NMR (400 MHz, DMSO-d$_6$)
$^{13}$C NMR (100 MHz, DMSO-d$_6$)

$^{13}$C NMR (100 MHz, DMSO-d$_6$)
$^{13}$C NMR GF-4-44C IN CDCl₃
$^{1}H$ NMR (400 MHz, CDCl$_3$)

1H NMR GF-4-400 IN CDCL3
$^{13}$C NMR GF-4-48B IN CDCl$_3$
1H NMR GF-4-49C IN DMSO-d6

1H NMR (400 MHz, DMSO-d6)
$\text{^{13}C NMR (100 MHz, DMSO-d$_6$)}$

![Chemical structure image](image-url)

$\text{2f}$

$\text{^{13}C NMR (100 MHz, DMSO-d$_6$)}$
$^{1}$H NMR (400 MHz, DMSO-d$_6$)

$^{1}$H NMR (400 MHz, DMSO-d$_6$)

$^{1}$H NMR (400 MHz, DMSO-d$_6$)

$^{1}$H NMR (400 MHz, DMSO-d$_6$)

$^{1}$H NMR (400 MHz, DMSO-d$_6$)
$^{13}$C NMR GF-4-45C IN DMSO-d$_6$

$^{13}$C NMR (100 MHz, DMSO-d$_6$)

$2g$

\[ \text{HN} \quad \text{HN} \quad \text{O} \quad \text{OMe} \]

200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

f$_1$ (ppm)
1H NMR of **2h** in DMSO-d$_6$
$^{13}$C NMR of $45\text{-}49\text{D}$ in DMSO-d$_6$
$^1$H NMR (400 MHz, DMSO-d$_6$)
$^{13}$C NMR GF-4-45D IN DMSO-d$_6$

![NMR Spectrum](image)

$^{13}$C NMR (100 MHz, DMSO-d$_6$)
$^1$H NMR (400 MHz, DMSO-$_d$)
$^{13}$C NMR (100 MHz, DMSO-$d_6$)
19F NMR GF-4-4SE IN DMSO-d6

\( ^{19}\text{F NMR (376 MHz, DMSO-d6)} \)

S39
$^{1}\text{H NMR (400 MHz, DMSO-d$_6$)}$

![Chemical structure and NMR spectrum](image)
$^{13}$C NMR GF-4-67B IN DMSO-$d_6$
1H NMR (400 MHz, DMSO-d6)
$^{13}$C NMR GF-4-67C IN DMSO-d$_6$

$^{13}$C NMR (100 MHz, DMSO-d$_6$)
$^1$H NMR (400 MHz, DMSO-d$_6$)
$^{13}$C NMR (100 MHz, DMSO-$d_6$)
$^1$H NMR (400 MHz, DMSO-d$_6$)

2n

1H NMR GF-4-53C IN DMSO-d$_6$
13C NMR of 2n in DMSO-d6
$^{1}$H NMR (400 MHz, CDCl$_3$)

$^{1}$H NMR GF-4-528 IN CDCl$_3$
$^{13}$C NMR GF-4-S2B in CDCl$_3$
$^{1}$H NMR (400MHz, CDCl₃)

$^{1}$H NMR ZZ-4.78 in CDCl₃

\[
\text{3a}
\]

\[
\text{HN} - \text{NH}
\]
$^{13}$C NMR ZZ-4-78 in CDCl$_3$

$^{13}$C NMR (100 MHz, CDCl$_3$)
$^1$H NMR (400 MHz, CDCl$_3$)
$^1$H NMR (400 MHz, CDCl$_3$)
Data File (C:\CHEM21A\DATA\B00-16.DP-22222)B009726.D
Sample Name: OP-4-03E

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Acq. Instrument: Instrument 1
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Injection Date: 1/17/2016 9:06:00 AM
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Last Changed: 1/17/2016 6:46:33 AM by 3
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Last Changed: 9/12/2016 8:57:00 PM
Sample Info: 40-60, Mean: 4060 = 30/10, 1.0 mL/min, 30酌, 254 nm

--- Area Percent Report ---

Sorted By: Signal
Multiplier: 1.0000
Dilution: 1.0000
Sample Amount: 1.0000 mg/mL (not used in calc)
Use Multiplier & Dilution Factor with UVVis

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Peak RetTime Typ Width Area Height Area
# [min] [min] half w [half] [area] [area]
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2 20.044 DB 0.6164 4636.3925 58.5261 48.0495
Totals: 0452.44141 218.05547

*** End of Report ***

--- Area Percent Report ---

Sorted By: Signal
Multiplier: 1.0000
Dilution: 1.0000
Use Multiplier & Dilution Factor with UVVis

Signal 1: V601 A, Wavelength=254 nm
Peak RetTime Typ Width Area Height Area
# [min] [min] half w [half] [area] [area]
1 26.872 TB 0.5676 5231.2823 141.1759 98.7557
2 29.712 DB 0.6505 65.4061 1.2190 1.2404
Totals: 5277.7460 142.30897

*** End of Report ***

Instrument 1 8/15/2018 8:57:48 AM
Page 1 of 1

854
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Sample Name: DF-4-440

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Sorted By: Symul
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Dilution: 1.0000
Sample Amount: 1.0000 [ng/ul] (not used in calc.)
Use Multiplier x Dilution Factor with ISTDs

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2 29.292 0.7284 2662.2184 35.5504 40.3961
Totals: 4772.2610 96.0490

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*** End of Report ***
(+/-)-2i
NHHN
O
Cl

(-)-2i
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O
Cl
Data File C:\CHMN32\1DATA\1200-16.0P-2222\YH009073.D
Sample Name: BF-4-070-Par

Subracted Data

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Sample Info: De-M, Nal-Pump, 50%ID, 0.7mL/min, 300C, 254 nm

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Subracted Data

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Analysis Method: C:\CHMN32\1METHODS\SPEP_1Cl.M

Sample Info: De-M, Nal-Pump, 50%ID, 0.7mL/min, 300C, 254 nm

--- End of Report ---

--- End of Report ---