Supporting Information

Nickel(II)-Catalyzed Direct Arylation of Aryl C–H Bonds with Arylboron Reagents Directed by a Removable Bidentate Auxiliary

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General Information:

Toluene was dried by sodium and freshly distilled. The other materials and solvents were purchased from Aladdin and other commercial suppliers and used without additional purification. NMR spectra were recorded on a Bruker Avance operating for $^1$H NMR at 400 MHz, $^{13}$C NMR at 100 MHz using TMS as internal standard. Chemical shifts were given relative to CDCl$_3$ (7.26 ppm for $^1$H NMR, 77.16 ppm for $^{13}$C NMR) and DMSO-$d_6$ (2.50 ppm for $^1$H NMR, 39.52 ppm for $^{13}$C NMR). The following abbreviations (or combinations thereof) were used to explain multiplicities: s = singlet, d = doublet, t = triplet, m = multiplet, b = broad. Mass spectroscopy data of the products were collected on an HRMS-TOF instrument or a low-resolution MS instrument using EI. The substrates benzamides were synthesized from the corresponding carboxylic acids and PIPNH$_2$ according to the literature.$^1$

General Procedure A for the Arylation:

To a 50 mL Schlenk tube was added substrate 1 (0.1 mmol), 2 (0.15 mmol), Ni(OTf)$_2$ (3.5 mg, 0.01 mmol), P(o-MeOPh)$_3$ (5.2 mg, 0.02 mmol), Na$_2$CO$_3$ (15 mg, 0.15 mmol) Ag$_3$PO$_4$ (42.0 mg, 0.1 mmol) and Toluene (1.5 mL). This tube was charged with N$_2$ and the mixture was then heated at 140 °C for 24 hour. The reaction mixture was cooled to room temperature, diluted with ethyl acetate and quenched with saturated NaCl solution. The aqueous phase was extracted with ethyl acetate (3×10 mL). The combined organic phase was dried with anhydrous magnesium sulfate. After concentration, the resulting residue was purified by flash chromatography to give target products.

General Procedure B for the Arylation:
To a 50 mL Schlenk tube was added substrate 1 (0.1 mmol), 2 (0.15 mmol), Ni(OTf)$_2$ (3.5 mg, 0.01 mmol), PPh$_3$ (5.2 mg, 0.02 mmol), Na$_2$CO$_3$ (15 mg, 0.15 mmol) Ag$_3$PO$_4$ (42.0 mg, 0.1 mmol) and Toluene (1.5 mL). This tube was charged with N$_2$ and the mixture was then heated at 140 °C for 24 hour. The reaction mixture was cooled to room temperature, diluted with ethyl acetate and quenched with saturated NaCl solution. The aqueous phase was extracted with ethyl acetate (3×10 mL). The combined organic phase was dried with anhydrous magnesium sulfate. After concentration, the resulting residue was purified by flash chromatography to give target products.

**Characterization Data of Products:**

**4'-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide**

\[
\begin{align*}
\text{O} & \quad \text{O} \\
\text{N} & \quad \text{N}
\end{align*}
\]

The title compound 3a was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3a as a white solid (29.4 mg, 85%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.33 (d, $J$ = 4.4 Hz, 1H), 7.70 (d, $J$ = 7.6 Hz, 1H), 7.62 (t, $J$ = 7.8 Hz, 1H), 7.48 (s, 1H), 7.43 (d, $J$ = 7.6 Hz, 1H), 7.41 – 7.34 (m, 4H), 7.27 – 7.25 (m, 2H), 7.12 – 7.09 (m, 1H), 6.88 (d, $J$ = 8.4 Hz, 2H), 3.76 (s, 3H), 1.64 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 168.63, 164.34, 159.30, 147.56, 139.52, 137.19, 136.94, 133.11, 130.35, 129.77, 128.83, 127.20, 121.70, 119.34, 113.86, 57.08, 55.41, 27.15; HRMS (EI-TOF) calcd for C$_{22}$H$_{22}$N$_2$O$_2$ (M$^+$): 346.1681, found: 346.1686.

**4'-Methoxy-3-methyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide**
The title compound 3b was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3b as a white solid (20.0 mg, 56%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.35 (d, $J$ = 4.4 Hz, 1H), 7.60 (td, $J$ = 8.0, 1.6 Hz, 1H), 7.51 (s, 1H), 7.42 (d, $J$ = 8.7 Hz, 2H), 7.30 (t, $J$ = 7.6 Hz, 1H), 7.20–7.17 (m, 3H), 7.12 – 7.09 (m, 1H), 6.85 (d, $J$ = 8.7 Hz, 2H), 3.77 (s, 3H), 2.44 (s, 3H), 1.60 (s, 6H). $^{13}$C NMR (100 MHz, CDCl$_3$): $\delta$ 168.87, 164.35, 159.02, 147.54, 139.07, 137.97, 136.95, 135.47, 133.44, 130.30, 128.98, 128.46, 127.40, 121.78, 119.43, 113.58, 56.99, 55.40, 27.22, 19.55; HRMS (EI-TOF) calcd for C$_{23}$H$_{24}$N$_2$O$_2$ (M$^+$): 360.1838, found: 360.1841.

4-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1':3',1''-terphenyl]-2'-carboxamide

The title compound 3c was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3c as a white solid (31 mg, 74%) $^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 8.32 (d, $J$ = 5.2 Hz, 1H), 7.54 – 7.43 (m, 6H), 7.37 (s, 1H), 7.36 – 7.25 (m, 5H), 7.05 (ddd, $J$ = 7.6, 5.2, 1.2 Hz), 6.92 (d, $J$ = 8.0 Hz, 1H), 6.88 – 6.83 (m, 2H), 3.79 (s, 3H), 1.33 (s, 6H); $^{13}$C NMR (101 MHz, CDCl$_3$) $\delta$ 167.74, 164.24, 159.07, 147.43, 140.77, 140.23, 139.84, 137.37, 136.82, 133.19, 130.47, 129.35, 129.21, 128.79, 128.48, 128.01, 127.30, 121.57, 119.32, 113.49, 57.03, 55.36, 26.83. HRMS (EI-TOF) calcd for C$_{28}$H$_{26}$N$_2$O$_2$ (M$^+$):

3,4'-Dimethoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3d was prepared according to general procedure B. A purification by flash chromatography in petroleum ether : ethyl acetate = 1 : 1 gave 3d as a white solid (15mg, 40%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.39 (d, $J = 4.4$ Hz, 1H), 7.60 (t, $J = 7.2$ Hz, 1H), 7.45 (d, $J = 8.4$ Hz, 2H), 7.39 (s, 1H), 7.35 (t, $J = 8.0$ Hz, 2H), 7.28 (d, $J = 8.0$ Hz, 1H), 7.10 (dd, $J = 6.4$, 5.4 Hz, 1H), 6.96 (d, $J = 7.6$ Hz, 1H), 6.91 (d, $J = 8.4$ Hz, 1H), 6.86 (d, $J = 8.4$ Hz, 2H), 3.87 (s, 3H), 3.78 (s, 3H), 1.62 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 166.70, 164.56, 159.14, 156.71, 147.65, 140.82, 136.88, 132.79, 130.24, 129.56, 127.74, 122.34, 121.65, 119.57, 113.59, 109.80, 57.35, 56.22, 55.39, 27.54; HRMS (EI-TOF) caled for C$_{23}$H$_{24}$N$_2$O$_3$ (M$^+$): 376.1787, found: 376.1785.

4'-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-3-(trifluoromethyl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3e was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3e as a white solid (25 mg, 61%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.34 (d, $J = 4.8$ Hz, 1H), 7.98 (s, 1H), 7.68 (d, $J = 6.4$, 2.8Hz, 1H), 7.64 – 7.60 (m, 1H), 7.54 – 7.49 (m, 2H), 7.40 (d, $J = 8.8$ Hz, 2H), 7.21 (d, $J = 8.0$ Hz, 1H), 7.12 (dd, $J = 7.2$, 4.8 Hz, 1H), 6.85 (d, $J = 8.4$ Hz, 2H), 3.77 (s, 3H), 1.58 (s, 6H). $^{13}$C NMR (100 MHz, CDCl$_3$): $\delta$ 165.62, 164.08, 159.42, 147.31, 141.16, 137.12, 133.98, 131.92, 130.50, 128.65, 127.78 (q,
$J_{C\cdot F} = 31.0 \text{ Hz}$), 124.94 (q, $J_{C\cdot F} = 5.0 \text{ Hz}$), 121.86, 121.30 (q, $J_{C\cdot F} = 270 \text{ Hz}$), 119.46, 113.63, 57.21, 55.42, 26.75; HRMS (EI-TOF) calcd for C_{23}H_{21}F_{3}N_{2}O_{2} (M\textsuperscript{+}): 414.1555, found: 414.1548.

3-Fluoro-4'-methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3f was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3f as a white solid (28 mg, 78%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.38 (d, $J = 4.4 \text{ Hz}$, 1H), 7.83 (s, 1H), 7.64 (td, $J = 8.0$, 1.6 Hz, 1H), 7.44 (d, $J = 8.8 \text{ Hz}$, 2H), 7.40–7.34 (m, 1H), 7.28 (d, $J = 8.4 \text{ Hz}$, 1H), 7.16–7.05 (m, 3H), 6.86 (d, $J = 8.4 \text{ Hz}$, 2H), 3.78 (s, 3H), 1.67 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 164.12, 164.07, 159.68 ($J_{C\cdot F} = 246.2 \text{ Hz}$), 159.43, 147.51, 141.70 (q, $J_{C\cdot F} = 3.7 \text{ Hz}$), 137.13, 131.84, 131.82, 130.10 (q, $J_{C\cdot F} = 8.7 \text{ Hz}$), 130.10, 126.12 (q, $J_{C\cdot F} = 18.1 \text{ Hz}$), 125.61 (q, $J_{C\cdot F} = 2.9 \text{ Hz}$), 121.87, 119.46, 114.28 ($J_{C\cdot F} = 21.9 \text{ Hz}$), 113.77, 77.48, 77.16, 76.84, 57.39, 55.38, 27.29. HRMS (EI-TOF) calcd for C_{22}H_{21}FN_{2}O_{2} (M\textsuperscript{+}): 364.1587, found: 364.1590.

4-Chloro-4'-methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3g was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3g as a white solid (31 mg, 82%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.32 (d, $J = 4.4 \text{ Hz}$, 1H), 7.68 (d, $J = 2.0 \text{ Hz}$, 1H), 7.68–7.62 (m, 2H), 7.41 (dd, $J = 8.0$, 2.2 Hz, 1H), 7.36 (d, $J = 8.8 \text{ Hz}$,
2H), 7.29–7.25 (m, 3H), 7.13 – 7.10 (m, 1H), 6.87 (d, $J = 8.8$ Hz, 2H), 3.76 (s, 3H), 1.64 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 167.21, 164.04, 159.52, 147.51, 138.56, 137.95, 137.07, 133.26, 131.87, 131.69, 130.29, 129.78, 128.83, 121.83, 119.33, 113.96, 57.14, 55.43, 27.06; HRMS (EI-TOF) calcd for C$_{22}$H$_{21}$ClN$_2$O$_2$ (M$^+$): 380.1292, found: 380.1295.

4'-Methoxy-4-methyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3h was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3h as a white solid (18 mg, 50%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.33 (d, $J = 4.0$ Hz, 1H), 7.62 (t, $J = 7.8$ Hz, 1H), 7.52 (s, 1H), 7.39 (s, 1H), 7.38 (d, $J = 8.4$ Hz, 2H), 7.26 – 7.25 (m, 3H), 7.10 (t, $J = 6.0$ Hz, 1H), 6.87 (d, $J = 8.4$ Hz, 2H), 3.76 (s, 3H), 2.41 (s, 3H), 1.63 (s, 7H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 168.80, 164.38, 159.18, 147.60, 137.60, 136.95, 136.90, 136.65, 133.09, 130.52, 130.38, 130.28, 129.41, 121.68, 119.34, 113.84, 57.09, 55.43, 27.17, 21.10; HRMS (EI-TOF) calcd for C$_{23}$H$_{24}$N$_2$O$_2$ (M$^+$): 360.1838, found: 360.1834.

7-(4-methoxyphenyl)-N-(2-(pyridin-2-yl)propan-2-yl)-2,3-dihydrobenzo[b][1,4]dioxine-6-carboxamide

The title compound 3i was prepared according to general procedure B. A purification by flash chromatography in petroleum ether : ethyl acetate = 1 : 1 gave 3i as a white solid (17 mg, 43%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.32 (d, $J = 4.8$ Hz, 1H), 7.60 (td, $J = 7.8$, 2.0 Hz, 1H), 7.34 – 7.31 (m, 2H), 7.29 (s, 1H), 7.28 (s, 1H), 7.24 (d, $J = 8.0$ Hz, 2H), 7.21 (d, $J = 8.4$ Hz, 2H), 7.19 – 7.13 (m, 5H), 6.98 (d, $J = 8.4$ Hz, 2H), 3.78 (s, 3H), 2.40 (s, 3H), 1.62 (s, 7H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 168.32, 164.38, 159.18, 147.60, 137.60, 136.95, 136.90, 136.65, 133.09, 130.52, 130.38, 130.28, 129.41, 121.68, 119.34, 113.84, 57.09, 55.43, 27.17, 21.10; HRMS (EI-TOF) calcd for C$_{23}$H$_{24}$N$_2$O$_2$ (M$^+$): 360.1838, found: 360.1834.
H. 1H), 7.10 – 7.07 (m, 1H), 6.87 – 6.83 (m, 2H), 6.83 (s, 1H), 4.29 (s, 4H), 3.75 (s, 3H), 1.59 (s, 6H); 13C NMR (101 MHz, CDCl3) δ 167.60, 164.43, 159.16, 147.63, 144.61, 142.68, 136.82, 133.49, 132.66, 130.38, 130.32, 121.60, 119.28, 118.89, 118.33, 113.82, 64.74, 64.50, 57.04, 55.40, 27.16; HRMS (EI-TOF) calcd for C_{24}H_{24}N_{2}O_{4} (M⁺): 404.1736, found: 404.1735.

4'-Methoxy-3,5-dimethyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3j was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3j as a white solid (25 mg, 67%). 1H NMR (400 MHz, CDCl3) δ 8.35 (d, J = 4.8 Hz, 1H), 7.59 (td, J = 7.6, 1.4, 1H), 7.44 (s, 1H), 7.41 (d, J = 8.4 Hz, 2H), 7.18 (d, J = 8.0 Hz, 1H), 7.09 (dd, J = 7.2, 4.8 Hz, 1H), 7.01 (s, 1H), 6.99 (s, 1H), 6.85 (d, J = 8.4 Hz, 2H), 3.77 (s, 3H), 2.40 (s, 3H), 2.36 (s, 3H), 1.58 (s, 6H); 13C NMR (100 MHz, CDCl3) δ 169.08, 164.42, 158.97, 147.54, 139.07, 138.16, 136.91, 135.97, 135.46, 135.33, 133.58, 130.25, 129.73, 128.04, 121.73, 119.43, 113.56, 56.97, 55.40, 27.23, 21.30, 19.49; HRMS (EI-TOF) calcd for C_{24}H_{26}N_{2}O_{2} (M⁺): 374.1994, found: 374.1995.

4'-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-5-(trifluoromethyl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3k was prepared according to general procedure B. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3k as a white solid (30 mg, 73%). 1H NMR (400 MHz, CDCl3) δ 8.30 (d, J = 4.0 Hz 1H), 7.80 (d, J = 3.2 Hz, 1H), 7.79 (s, 1H), 7.67 – 7.62 (m, 3H), 7.41 (d, J = 8.4 Hz, 2H), 7.27 (d, J =
7.6 Hz, 1H), 7.12 (dd, \( J = 6.8, 5.2 \) Hz, 1H), 6.89 (d, \( J = 8.8 \) Hz, 2H), 3.76 (s, 3H), 1.66 (s, 6H); \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \( \delta \) 167.46, 163.96, 159.78, 147.45, 140.46, 140.21, 137.15, 131.68 (q, \( J = 32.2 \) Hz), 131.62, 129.34, 127.20 (q, \( J = 3.6 \) Hz), 123.98 (q, \( J = 270.2 \) Hz), 123.93 (q, \( J = 3.0 \) Hz), 121.90, 119.34, 114.07, 57.15, 55.45, 27.07; HRMS (EI-TOF) calcd for C\(_{23}\)H\(_{21}\)F\(_3\)N\(_2\)O\(_2\) (M\(^+\)): 414.1555, found: 414.1548.

5-Chloro-4'-methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3l was prepared according to general procedure B. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3l as a white solid (26 mg, 68%). \(^1\)H NMR (400 MHz, CDCl\(_3\)) \( \delta \) 8.31 (d, \( J = 4.8 \) Hz, 1H), 7.66 – 7.64 (m, 2H), 7.60 (s, 1H), 7.37 (d, \( J = 8.4 \) Hz, 2H), 7.35 – 7.34 (m, 2H), 7.25 (d, \( J = 7.6 \) Hz, 1H), 7.10 (dd, \( J = 7.4, 4.8 \) Hz, 1H), 6.87 (d, \( J = 8.4 \) Hz, 2H), 3.75 (s, 3H), 1.63 (s, 6H); \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \( \delta \) 167.58, 164.13, 159.67, 147.50, 141.29, 137.02, 135.58, 135.50, 131.74, 130.38, 130.29, 130.20, 127.24, 121.78, 119.31, 113.99, 57.09, 55.43, 27.08; HRMS (EI-TOF) calcd for C\(_{22}\)H\(_{21}\)ClN\(_2\)O\(_2\) (M\(^+\)): 380.1292, found: 380.1296.

5'-Chloro-4,4''-dimethoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1':3',1''-terphenyl]-2'-carboxamide

The title compound 3l' was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 1 : 2 gave 3l' as a yellow
solid (8 mg, 17%). \( ^1H \) NMR (400 MHz, CDCl\textsubscript{3}): \( \delta 8.33 \) (d, \( J = 4.4 \) Hz, 1H), 7.52 (td, \( J = 7.8, 1.6 \) Hz, 1H), 7.48 (s, 1H), 7.44 (d, \( J = 8.4 \) Hz, 4H), 7.31 (s, 2H), 7.08 (dd, \( J = 6.8, 5.2 \) Hz, 1H), 6.97 (d, \( J = 8.0 \) Hz, 1H), 6.86 (d, \( J = 8.8 \) Hz, 4H), 3.79 (s, 6H), 1.35 (s, 6H); \( ^{13}C \) NMR (100 MHz, CDCl\textsubscript{3}) \( \delta 167.18, 164.10, 159.41, 147.45, 141.63, 136.92, 135.95, 133.95, 132.02, 130.38, 128.64, 121.70, 119.35, 113.63, 57.03, 55.42, 26.87; HRMS (EI-TOF) calcd for C\textsubscript{29}H\textsubscript{27}ClN\textsubscript{2}O\textsubscript{3} (M\textsuperscript{+}): 486.1710, found: 486.1705.

4'-Methoxy-5-methyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3m was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3m as a white solid (26 mg, 72%). \( ^1H \) NMR (400 MHz, CDCl\textsubscript{3}) \( \delta 8.32 \) (d, \( J = 4.4 \) Hz, 1H), 7.61 (t, \( J = 8.8 \) Hz, 2H), 7.38 (d, \( J = 8.0 \) Hz, 2H), 7.37 (s, 1H), 7.25 (d, \( J = 8.4 \) Hz, 2H), 7.18 (d, \( J = 7.6 \) Hz, 1H), 7.15 (s, 1H), 7.09 (dd, \( J = 6.4, 4.2 \) Hz, 1H), 6.88 (d, \( J = 8.4 \) Hz, 2H), 3.76 (s, 3H), 2.40 (s, 3H), 1.62 (s, 6H); \( ^{13}C \) NMR (100 MHz, CDCl\textsubscript{3}) \( \delta 168.63, 164.40, 159.26, 147.58, 139.84, 139.52, 136.89, 134.28, 133.25, 131.05, 130.35, 129.02, 127.91, 121.65, 119.33, 113.83, 57.05, 55.41, 27.18, 21.42; HRMS (EI-TOF) calcd for C\textsubscript{23}H\textsubscript{24}N\textsubscript{2}O\textsubscript{2} (M\textsuperscript{+}): 360.1838, found: 360.1834.

5-Isopropyl-4'-methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 3n was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3n as a white
solid (17 mg, 44%). 1H NMR (400 MHz, CDCl3) δ 8.33 (d, J = 4.0 Hz, 1H), 7.67–7.60 (m, 2H), 7.39 (d, J = 8.4 Hz, 2H), 7.37 (s, 1H), 7.26 – 7.24 (m, 2H), 7.19 (s, 1H), 7.11 – 7.08 (m, 1H), 6.89 (d, J = 8.8 Hz, 2H), 3.77 (s, 3H), 2.99 – 2.93 (m, 1H), 1.62 (s, 6H), 1.29 (s, 3H), 1.27 (s, 3H); 13C NMR (100 MHz, CDCl3) δ 168.66, 164.43, 159.28, 150.81, 147.57, 139.58, 136.94, 134.65, 133.50, 130.41, 129.08, 128.54, 125.37, 121.68, 119.38, 113.86, 57.07, 55.44, 34.18, 27.20, 24.01; HRMS (EI-TOF) calcd for C25H28N2O2 (M+): 388.2151, found: 388.2159.

3-(4-Methoxyphenyl)-N-(2-(pyridin-2-yl)propan-2-yl)-2-naphthamide

The title compound 3o was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 3o as a white solid (32 mg, 80%). 1H NMR (400 MHz, CDCl3) δ 8.37 (d, J = 3.2 Hz, 1H), 8.24 (s, 1H), 7.92 (d, J = 7.6 Hz, 1H), 7.85 (d, J = 7.6 Hz, 1H), 7.80 (s, 1H), 7.67 (d, J = 7.8 Hz, 2H), 7.56 – 7.48 (m, 4H), 7.33 (d, J = 7.6 Hz, 1H), 7.15 (s, 1H), 6.92 (d, J = 8.4 Hz, 2H), 3.79 (s, 3H), 1.70 (s, 6H); 13C NMR (100 MHz, CDCl3) δ 168.61, 159.32, 137.10, 133.88, 133.23, 132.01, 130.51, 129.27, 128.85, 128.45, 127.78, 127.45, 126.52, 121.90, 119.62, 113.91, 57.12, 55.47, 27.23; HRMS (EI-TOF) calcd for C26H24N2O2 (M+): 396.1838, found: 396.1842.

N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 4a was prepared according to general procedure B. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 4a as a white solid (27 mg, 87%). 1H NMR (400 MHz, CDCl3) δ 8.33 (d, J = 4.4 Hz, 1H), 7.72 (d, J = 7.6 Hz, 1H), 7.62 (td, J = 8.0, 1.2 Hz, 1H), 7.48 – 7.40 (m, 5H), 7.39-7.33 (m, 4H), 7.28 – 7.23 (m, 1H), 7.10 (dd, J = 6.4, 5.4 Hz, 1H), 1.60 (s, 6H); 13C NMR (100 MHz, CDCl3) δ 168.52, 164.24, 147.54, 140.69, 139.93, 137.26, 137.02, 130.34, 129.83,
129.24, 128.85, 128.39, 127.59, 121.75, 119.35, 57.08, 27.07; HRMS (EI-TOF) calcd for C_{21}H_{20}N_{2}O (M^+) : 316.1576, found: 316.1573.

2'-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 4b was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 4b as a white solid (28 mg, 82%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.36 (d, $J = 4.9$ Hz, 1H), 7.77 (dd, $J = 7.5$, 1.4 Hz, 1H), 7.61 – 7.55 (m, 1H), 7.47 – 7.38 (m, 2H), 7.37 (s, 1H), 7.31–7.25 (m, 3H), 7.15 (d, $J = 8.0$ Hz, 1H), 7.08 (ddd, $J = 7.2$, 4.8, 0.8 Hz, 1H), 7.03–6.99 (m, 1H), 6.86 (d, $J = 8.2$ Hz, 1H), 3.73 (s, 3H), 1.53 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 168.11, 164.53, 156.52, 147.73, 137.84, 136.76, 136.13, 134.13, 130.95, 129.90, 129.68, 129.34, 128.49, 127.66, 121.55, 120.79, 119.27, 110.46, 57.03, 55.38, 27.24; HRMS (EI-TOF) calcd for C$_{22}$H$_{22}$N$_{2}$O$_2$ (M$^+$): 346.1681, found: 346.1686.

3'-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 4c was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 4c as a white solid (23 mg, 66%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.38 (d, $J = 4.9$ Hz, 1H), 7.73 (dd, $J = 7.4$, 1.4 Hz, 1H), 7.62 (td, $J = 8.0$, 2.0 Hz, 1H), 7.46 (m, 2H), 7.42 – 7.35 (m, 2H), 7.24 (d, $J = 7.2$ Hz, 2H), 7.10 (dd, $J = 7.0$, 5.4 Hz, 1H), 7.04 (d, $J = 7.6$ Hz, 1H), 7.02 (d, $J = 2.3$ Hz, 1H), 6.80 (dd, $J = 8.4$, 2.0 Hz, 1H), 3.78 (s, 3H), 1.61 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 168.36, 164.28, 159.61, 147.55, 142.13, 139.82, 137.32, 136.92, 130.15, 129.76, 129.42, 128.87, 127.68, 121.70, 121.65, 119.29, 114.50, 113.56, 57.09, 55.33, 27.08; HRMS (EI-TOF) calcd for C$_{22}$H$_{22}$N$_{2}$O$_2$ (M$^+$): 346.1681, found: 346.1686.
3'-Fluoro-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 4d was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 4d as a white solid (30 mg, 90%). $^1$H NMR (400 MHz, CDCl$_3$): δ 8.35 (d, $J = 4.0$ Hz, 1H), 7.80 (d, $J = 7.2$, 1H), 7.77 (s, 1H), 7.46 (m, 2H), 7.66 (t, $J = 7.2$ Hz, 1H), 7.51–7.45 (m, 2H), 7.43–7.36 (m, 2H), 7.29 (d, $J = 8.0$ Hz, 1H), 7.24–7.21 (m, 1H), 7.17–7.11 (m, 1H), 7.02 (d, $J = 8.8$ Hz, 1H), 1.64 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 167.95, 162.6 (d, $J_{C-F} = 315$ Hz), 147.15, 137.89, 133.70, 131.71 (d, $J_{C-F} = 3$ Hz), 131.09, 129.88, 129.6 (d, $J_{C-F} = 8$ Hz), 128.61, 128.28, 124.17, 121.85, 119.53, 115.54 (d, $J_{C-F} = 21.9$ Hz), 56.88, 27.05; HRMS (EI-TOF) calcd for C$_{21}$H$_{19}$FN$_2$O (M$^+$): 334.1481, found: 334.1487.

N-(2-(pyridin-2-yl)propan-2-yl)-4'-(trifluoromethyl)-[1,1'-biphenyl]-2-carboxamide

The title compound 4e was prepared according to general procedure B. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 4e as a white solid (31 mg, 81%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.29 (d, $J = 4.4$ Hz, 1H), 7.81 (s, 1H), 7.74 (d, $J = 7.2$ Hz, 1H), 7.64 (t, $J = 7.6$ Hz, 1H), 7.58 (brs, 4H), 7.52–7.44 (m, 2H), 7.37 (d, $J = 7.6$ Hz, 1H), 7.27 (d, $J = 6.0$ Hz, 2H), 7.12 (dd, $J = 6.8$, 4.8 Hz, 1H), 1.66 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 168.09, 164.02, 147.39, 144.42, 138.61, 137.61, 137.17, 130.23, 129.98, 129.63 (q, $J_{C-F} = 32.2$ Hz), 129.55, 128.80, 128.29, 125.19 (q, $J_{C-F} = 3.7$ Hz), 124.29 (q, $J_{C-F} = 270.4$ Hz), 121.91, 119.33, 77.48, 77.16, 76.84, 57.07, 27.01; HRMS (EI-TOF) calcd for C$_{22}$H$_{19}$F$_3$N$_2$O (M$^+$): 384.1449, found:
Ethyl 2'-((2-(pyridin-2-yl)propan-2-yl)carbamoyl)-[1,1'-biphenyl]-4-carboxylate

The title compound 4f was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 1 : 1 gave 4f as a white solid (27mg, 70%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.31 (d, J = 4.8 Hz, 1H), 8.01 (d, J = 8.4 Hz, 2H), 7.77 (s, 1H), 7.72 (d, J = 7.4 Hz, 1H), 7.63 (t, J = 7.4 Hz, 1H), 7.54 (d, J = 8.1 Hz, 2H), 7.51 – 7.43 (m, 2H), 7.38 (d, J = 7.4 Hz, 1H), 7.26 (d, J = 8.0 Hz, 1H), 7.12-7.18 (m, 1H), 4.35 (q, J = 7.2 Hz, 2H), 1.65 (s, 6H), 1.38 (t, J = 7.2 Hz, 3H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 168.25, 166.57, 164.11, 147.48, 145.35, 139.01, 137.53, 137.08, 130.24, 129.90, 129.59, 129.52, 129.17, 128.75, 128.15, 121.86, 119.36, 61.05, 57.11, 27.07, 14.47; HRMS (EI-TOF) calcd for C$_{24}$H$_{24}$N$_2$O$_3$ (M+): 388.1787, found: 388.1790.

4'-Cyano-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 4g was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 1 : 1 gave 4g as a yellow solid (31mg, 91%). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.31 (d, J = 4.8 Hz, 1H), 7.98 (s, 1H), 7.73 – 7.68 (m, 2H), 7.59 (q, J = 8.4 Hz, 4H), 7.53 – 7.47 (m, 2H), 7.36 (d, J = 7.2 Hz, 1H), 7.31 (d, J = 8.0 Hz, 1H), 7.16 (dd, J = 7.4, 4.8 Hz, 1H), 1.68 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 168.00, 163.98, 147.34, 145.63, 138.22, 137.67, 137.36, 132.04, 130.11, 130.07, 129.91, 128.74, 128.64, 122.11, 119.47, 111.25, 57.07, 27.05; HRMS (EI-TOF) calcd for C$_{22}$H$_{19}$N$_3$O (M+): 341.1528, found: 341.1532.
4'-Formyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 4h was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 2 : 1 gave 2i as a white solid (31 mg, 91%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 9.96 (s, 1H), 8.29 (d, $J$ = 3.6 Hz, 1H), 7.91 (s, 1H), 7.85 (d, $J$ = 7.2 Hz, 2H), 7.73 (d, $J$ = 7.2 Hz, 1H), 7.65 (d, $J$ = 8.0 Hz, 3H), 7.53-7.45 (m, 2H), 7.40 (d, $J$ = 7.2 Hz, 1H), 7.27 (d, $J$ = 10.0 Hz, 1H), 7.12 (t, $J$ = 6.0 Hz, 1H), 1.66 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 192.07, 168.15, 164.02, 147.36, 147.16, 138.76, 137.65, 137.23, 135.38, 130.20, 130.19, 129.99, 129.88, 129.74, 128.76, 128.43, 121.97, 119.41, 57.07 (s, 2H), 27.04 (s, 4H); HRMS (EI-TOF) calcd for C$_{22}$H$_{20}$N$_2$O$_2$ (M+) 344.1525, found: 344.1529.

N-(2-(pyridin-2-yl)propan-2-yl)-4'-(pyridin-3-yl)-[1,1'-biphenyl]-2-carboxamide

The title compound 4i was prepared according to general procedure A. A purification by flash chromatography in petroleum ether : ethyl acetate = 1 : 1 gave 4i as a yellow solid (23 mg, 59%). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 8.75 (s, 1H), 8.57 (d, $J$ = 4.0 Hz, 1H), 8.32 (d, $J$ = 4.4 Hz, 1H), 7.81 (d, $J$ = 8.0 Hz, 1H), 7.77 (s, 1H), 7.74 (d, $J$ = 7.6 Hz, 1H), 7.63 – 7.54 (m, 6H), 7.49 (dd, $J$ = 7.6, 1.6 Hz, 1H), 7.46 – 7.42 (m, 2H), 7.35 (dd, $J$ = 7.6, 4.8 Hz, 1H), 7.27 (d, $J$ = 4.8 Hz, 1H), 7.10 – 7.07 (m, 1H), 1.67 (s, 6H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 168.45, 164.18, 148.45, 148.19, 147.41, 140.67, 139.27, 137.42, 137.09, 136.90, 136.44, 134.49, 130.28, 129.97, 129.93, 128.83, 127.82, 127.06, 123.73, 121.82, 119.35, 57.08, 27.07; HRMS (EI-TOF) calcd for
C_{26}H_{23}N_{3}O (M+): 393.1841, found: 393.1843.

**Gram-Scale Synthesis of 3a and Removal of the Directing Group**

A mixture of 1a (1.2 g, 5.0 mmol), 2a (1.76 g, 7.5 mmol), Ni(OTf)\textsubscript{2} (0.131 g, 0.5 mmol), Na\textsubscript{2}CO\textsubscript{3} (0.79 g, 7.5 mmol), P(o-MeOPh)\textsubscript{3} (0.262 g, 1.0 mmol), Ag\textsubscript{3}PO\textsubscript{3} (2.01 g, 5.0 mmol) and Toluene (10.0 mL) in a 100 mL Schlenk tube was vigorously stirred at 140 °C under N\textsubscript{2} for 24 hours. The reaction mixture was cooled to room temperature, diluted with dichloromethane and quenched with saturated NaCl solution. The aqueous phase was extracted with dichloromethane (3\times100 mL). The combined organic phase was dried with anhydrous magnesium sulfate. After concentration, the resulting residue was purified by flash chromatography (petroleum ether : ethyl acetate = 1 : 1) to give the desired product 3a (1.2 g, 70%).

A solution of substrate 3a (67.5 mg, 0.25 mmol) in a mixture of acetic acid (0.7 mL) and acetic anhydride (3.5 mL) was cooled to -15 °C and 380 mg of granular sodium nitrite (22 equiv) was added slowly in portions. After being stirred for 48 hours at -15 °C, the mixture was poured into a mixture of ice and water. (Caution! The nitrosoamide is unstable and the subsequent work-up should be carried out at 0 °C) The nitrosoamide was extracted with cold ether, and the organic phase was washed with ice water, with an aqueous solution of sodium carbonate (5%), with ice water, and then dried with anhydrous sodium sulfate under ice bath. The solvent was removed under reduce pressure under ice bath. The residue was dissolved in THF (10 mL)/ H\textsubscript{2}O (3 mL) and cooled to -15 °C. Then 30% H\textsubscript{2}O\textsubscript{2} (1.2 mL) was added followed by lithium hydroxide monohydrate (209.8 mg, 5.0 mmol). The mixture was stirred at -15 °C for 2 hours and at 0 °C overnight, and then quenched with an aqueous solution of Na\textsubscript{2}SO\textsubscript{3}. The mixture was basified with 1N NaOH and washed with ethyl acetate.
The aqueous phase was acidified with 1M HCl and extracted with ethyl acetate. The organic layer was washed with brine, dried over anhydrous sodium sulfate and concentrated in vacuo. The resulting residue was purified by flash chromatography (petroleum ether : ethyl acetate = 1 : 1). Product 5 was obtained as a light yellow solid (51.3 mg, 90%). \( ^1H \) NMR (400 MHz, CDCl\(_3\)) \( \delta \) 7.91 (d, \( J = 8.4, 1.2 \) Hz, 1H), 7.53 (td, \( J = 7.6, 1.4 \) Hz, 1H), 7.40-7.36 (m, 2H), 7.28 – 7.27 (m, 1H), 7.25 (d, \( J = 2.0 \) Hz, 1H), 6.94 – 6.90 (m, 2H), 3.84 (s, 3H); \( ^{13}C \) NMR (101 MHz, CDCl\(_3\)) \( \delta \) 172.94, 159.25, 143.01, 133.46, 132.14, 131.33, 130.80, 129.79, 129.43, 126.99, 113.77, 55.40.

**Mechanistic Investigation**

1) **Radical Scavenger Reactions**

![Radical Scavenger Reactions](image)

<table>
<thead>
<tr>
<th>Additive (1.0 equiv)</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPO</td>
<td>86%</td>
</tr>
<tr>
<td>Hydroquinone</td>
<td>Trace</td>
</tr>
<tr>
<td>2,6-Di-tert-butyl-4-methylphenol</td>
<td>N.R</td>
</tr>
</tbody>
</table>

To a 50 mL Schlenk tube was added substrate 1 (0.1 mmol), 2 (0.15 mmol), Ni(OTf)\(_2\) (3.5 mg, 0.01 mmol), P(o-MeOPh)\(_3\) (5.2 mg, 0.02 mmol), Na\(_2\)CO\(_3\) (15 mg, 0.15 mmol) Ag\(_3\)PO\(_4\) (42.0 mg, 0.1 mmol), Additive (0.1 mmol) and Toluene (1.5 mL). This tube was charged with N\(_2\) and the mixture was then heated at 140 °C for 24 hour. The reaction mixture was cooled to room temperature, diluted with ethyl acetate and quenched with saturated NaCl solution. The results were observed by TLC.

2) **Investigation of intermolecular Kinetic Isotopic Effect**
To a 50 mL Schlenk tube was added substrate 1 (0.1 mmol), \(d_{-}1\) (0.1 mmol), 2 (0.3 mmol), Ni(OTf)\(_2\) (7.0 mg, 0.02 mmol), P(o-MeOPh)\(_3\) (10.4 mg, 0.04 mmol), Na\(_2\)CO\(_3\) (30 mg, 0.3 mmol) Ag\(_3\)PO\(_4\) (84.0 mg, 0.2 mmol) and Toluene (2.0 mL). This tube was charged with N\(_2\) and the mixture was then heated at 140 \(\degree\)C for 3 hour. The reaction mixture was cooled to room temperature, diluted with ethyl acetate and quenched with saturated NaCl solution. The aqueous phase was extracted with ethyl acetate (3\(\times\)10 mL). The combined organic phase was dried with anhydrous magnesium sulfate. After concentration, the resulting residue was purified by flash chromatography to give product, which was analyzed by \(^1\)H NMR. Yield: 20%, \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.35 (d, \(J = 4.2\) Hz, 1H), 7.77 (dd, \(J = 7.5, 1.4\) Hz, 0.76H), 7.58 (td, \(J = 7.9, 1.8\) Hz, 1H), 7.43 (m, 2H), 7.36 (s, 1H), 7.31-7.25 (m, 3H), 7.15 (d, \(J = 8.0\) Hz, 1H), 7.10 – 7.05 (m, 1H), 7.01 (t, \(J = 7.1\) Hz, 1H), 6.86 (d, \(J = 8.2\) Hz, 1H), 3.73 (s, 3H), 1.53 (s, 6H).
References:
NMR Spectra:

4'-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
4'-Methoxy-3-methyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
4-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1':3',1''-terphenyl]-2'-carboxamide
3,4'-Dimethoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
4'-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-3-(trifluoromethyl)-[1,1'-biphenyl]-2-carboxamide
3-Fluoro-4'-methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
4-Chloro-4’-methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
4’-Methoxy-4-methyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1’-biphenyl]-2-carboxamide
7-(4-methoxyphenyl)-N-(2-(pyridin-2-yl)propan-2-yl)-2,3-dihydrobenzo[b][1,4]dioxine-6-carboxamide
4’-Methoxy-3,5-dimethyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1’-biphenyl]-2-carboxamide
4’-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-5-(trifluoromethyl)-[1,1’-biphenyl]-2-carboxamide
5-Chloro-4'-methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
5'-Chloro-4,4''-dimethoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1':3',1''-terphenyl]-2'-carboxamide
4'-Methoxy-5-methyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
5-Isopropyl-4'-methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
3-(4-Methoxyphenyl)-N-(2-(pyridin-2-yl)propan-2-yl)-2-naphthamide
N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
2'-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
3'-Methoxy-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
3'-Fluoro-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
N-(2-(pyridin-2-yl)propan-2-yl)-4'-(trifluoromethyl)-[1,1'-biphenyl]-2-carboxamide
Ethyl 2'-(2-(pyridin-2-yl)propan-2-yl)carbamoyl)-[1,1'-biphenyl]-4-carboxylate
4’-Cyano-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1’-biphenyl]-2-carboxamide
4'-Formyl-N-(2-(pyridin-2-yl)propan-2-yl)-[1,1'-biphenyl]-2-carboxamide
N-(2-(pyridin-2-yl)propan-2-yl)-4'-(pyridin-3-yl)-[1,1'-biphenyl]-2-carboxamide
4'-Methoxy-[1,1'-biphenyl]-2-carboxylic acid