Intramolecular oxyacetoxylation of N-allylcorboxamides: An Expeditious Synthesis of Oxazolines and Oxazines by Phl(OAc)$_2$/Hydrogen fluoride-Pyridine System.

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General.

Unless otherwise noted, commercial chemicals were used without any further purification. Solvents were dried and distilled prior to use by the usual methods. Melting points were recorded on Büchi 535 melting point apparatus and are uncorrected. $^1$H NMR spectra were recorded at 400 and 500 MHz in CDCl$_3$ unless otherwise stated. Chemical shifts are reported in ppm from tetramethylsilane with the solvent resonance as the internal standard (CDCl$_3$: 7.26 ppm). Data are reported as follows: chemical shift, integration, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, br = broad, m = multiplet), and coupling constants (Hz). $^{13}$C NMR was recorded at 100 and 125 MHz in CDCl$_3$ unless otherwise stated with complete proton decoupling. Chemical shifts are reported in ppm from tetramethylsilane with the solvent as the internal standard (CDCl$_3$: 77.4 ppm). Mass spectrometry (m/z) was performed in ESI mode. High-resolution mass spectra for all the new compounds were collected on Micromass Q-Tof instrument (ESI). Infrared (IR) spectra $\nu_{\text{max}}$ are reported in cm$^{-1}$. 
Representative procedure: (2-(2-Benzamidophenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2a

\[ \text{N- Allyl-2-benzamidobenzamide } 1 \text{a (0.1 g, 0.35 mmol, 1 equiv.) and } \text{PhI(OAc)}_2 \text{ (0.287 g, 0.89 mmol, 2.5 equiv.) was dissolved in CH}_2Cl_2/\text{THF (1:1) (2 mL) and the mixture was stirred for 10 min. at room temperature. Then, HF-pyridine complex (70/30 w/w) (0.3 mL, 3.5 mmol, 10 equiv.) was then added and the resultant solution was stirred for 2 h at same temperature. The reaction was diluted with CH}_2Cl_2 \text{ (10 mL), and the resulting solution was carefully added to an aqueous solution containing NaHCO}_3 \text{ and Na}_2S_2O_3 (10 mL 1:1). The resulting layers were separated, and the aqueous layer was extracted with CH}_2Cl_2 \text{. The combined organic layers were washed with saturated aqueous NaCl. The resultant organic phase was dried over Na}_2SO_4 \text{, filtered, and concentrated under vacuum. Purification by column chromatography (1.2 : 8.8 EtOAc/petroleum ether) to provide 2a as a white solid (0.105 g, 85%); mp 171-174 °C; } \text{H NMR (400 MHz, CDCl}_3) \delta 12.85 (1H, s), 8.97 (1H, d, } J = 8.4 \text{ Hz), 8.08 (2H, dd, } J = 6.8, 1.7 \text{ Hz), 7.92 (1H, dd, } J = 7.9, 1.4 \text{ Hz), 7.58-7.47 (4H, m), 7.13 (1H, td, } J = 8.1, 0.9 \text{ Hz), 4.95-4.88 (1H, m), 4.36 (1H, dd, } J = 12.2, 3.5 \text{ Hz), 4.30 (1H, dd, } J = 14.6, 10.0 \text{ Hz), 4.22 (1H, dd, } J = 12.2, 5.9 \text{ Hz), 3.98 (1H, dd, } J = 14.6, 7.3 \text{ Hz), 2.10 (3H, s); } \text{C NMR (100 MHz, CDCl}_3) \delta 170.7, 166.0, 164.4, 140.2, 135.3, 132.9, 131.6, 129.3, 128.6, 127.7, 122.4, 113.2, 75.7, 64.8, 56.7, 20.8; IR(neat) 3019, 2890, 1730, 1640, 1548, 1515, 1419, 1307, 1214, 1052, 928, 741, 667, 627 cm}^{-1}; \text{HRMS } m/z \text{ calcd for } [\text{M+H}]^+ C_{19}H_{19}O_4N_2 339.1339, \text{ found 339.1338.}

(2-(2-(4-Methoxybenzamido)phenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2b

This compound was prepared according to the representative procedure for 2a using N- Allyl-2-(4-methoxybenzamido)benzamide 1b and PhI(OAc)_2, HF.py giving 2b as a white solid (0.095 g, 80%); mp 146-148 °C; \text{H NMR (400 MHz, CDCl}_3) \delta 12.73 (1H, s), 8.95 (1H, dd, } J = 8.5, 0.9 \text{ Hz), 8.05 (2H, dd, } J = 9.0, 2.1 \text{ Hz), 7.91 (1H, dd, } J = 7.9, 1.5 \text{ Hz), 7.52 (1H, dd, } J = 8.6, 1.5 \text{ Hz), 7.10 (1H, dd, } J = 8.0, 1.1 \text{ Hz), 6.99 (2H, dd, } J = 9.0, 2.1 \text{ Hz), 4.94-4.87 (1H, m), 4.36 (1H, dd, } J = 12.2, 3.5 \text{ Hz), 4.30 (1H, dd, } J = 14.6, 9.9 \text{ Hz), 4.22 (1H, dd, } J = 12.2, 5.9 \text{ Hz), 3.98 (1H, dd, } J = 14.6, 7.3 \text{ Hz), 3.88 (3H, s), 2.10 (3H, s); } \text{C NMR (125 MHz, CDCl}_3) \delta 170.7, 166.0, 164.4, 140.5, 135.3, 132.9, 131.6, 129.3, 128.6, 127.7, 122.4, 120.0, 113.2, 75.7, 64.8, 56.7, 20.8; IR(neat) 3224, 2957, 2852, 1745, 1677, 1639, 1578, 1511, 1449, 1302, 1254, 1178, 1032, 772, 686 cm}^{-1}; \text{HRMS } m/z \text{ calcd for } [\text{M+Na}]^+ C_{20}H_{20}O_5NaN_2 391.1264, \text{ found 391.1267.}

(2-(2-(4-Fluorobenzamido)phenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2c

This compound was prepared according to the representative procedure for 2a using N- Allyl-2-(4-fluorobenzamido)benzamide 1c and PhI(OAc)_2, HF.py giving 2c as a white solid (0.078 g, 42%); mp 177-179 °C; \text{H NMR (400 MHz, CDCl}_3) \delta 11.91 (1H, s), 8.77 (1H, dd, } J = 8.6, 0.9 \text{ Hz), 8.05 (2H, dd, } J = 9.0, 2.1 \text{ Hz), 7.91 (1H, dd, } J = 7.9, 1.5 \text{ Hz), 7.52 (1H, dd, } J = 8.6, 1.5 \text{ Hz), 7.10 (1H, dd, } J = 8.0, 1.1 \text{ Hz), 6.99 (2H, dd, } J = 9.0, 2.1 \text{ Hz), 4.94-4.87 (1H, m), 4.36 (1H, dd, } J = 12.2, 3.5 \text{ Hz), 4.30 (1H, dd, } J = 14.6, 9.9 \text{ Hz), 4.22 (1H, dd, } J = 12.2, 5.9 \text{ Hz), 3.98 (1H, dd, } J = 14.6, 7.3 \text{ Hz), 3.88 (3H, s), 2.10 (3H, s); } \text{C NMR (125 MHz, CDCl}_3) \delta 170.7, 166.0, 164.4, 140.5, 135.3, 132.9, 131.6, 129.3, 128.6, 127.7, 122.4, 120.0, 113.2, 75.7, 64.8, 56.7, 20.8; IR(neat) 3224, 2957, 2852, 1745, 1677, 1639, 1578, 1511, 1449, 1302, 1254, 1178, 1032, 772, 686 cm}^{-1}; \text{HRMS } m/z \text{ calcd for } [\text{M+Na}]^+ C_{20}H_{20}O_5NaN_2 391.1264, \text{ found 391.1267.}
This compound was prepared according to the representative procedure for 2a using N-Allyl-2-(4-fluorobenzamido)benzamide 1c and PhI(OAc)₂. HF.py giving 2c as a white solid (0.1 g, 85%); mp 158-160 °C; ¹H NMR (500 MHz, CDCl₃) δ 12.83 (1H, s), 8.93 (1H, dd, J = 8.5, 0.85 Hz), 8.09 (2H, td, J = 8.6, 1.2 Hz), 7.93 (1H, dd, J = 7.8, 1.5 Hz), 7.54 (1H, td, J = 8.6, 1.5 Hz), 7.18 (2H, t, J = 8.0 Hz), 7.13 (1H, td, J = 8.0, 1.0 Hz). 4.98-4.88 (1H, m), 4.37 (1H, dd, J = 12.1, 3.5 Hz), 4.3 (1H, dd, J = 14.6, 10.0 Hz), 4.22 (1H, dd, J = 12.2, 5.9 Hz), 3.98 (1H, dd, J = 14.6, 7.3 Hz), 2.10 (3H, s); ¹³C NMR (100 MHz, CDCl₃) δ 170.7, 166.2, 164.9, 164.5, 140.1, 132.9, 131.4, 130.1, 129.9, 129.4, 122.5, 119.9, 115.7, 115.5, 113.1, 75.7, 64.8, 56.7, 29.7; IR(neat) 3450, 2923, 2820, 1748, 1620, 1610, 1590, 1430, 1340, 1306, 1120, 1040, 950, 730, 654 cm⁻¹; HRMS m/z calcd for [M+Na]^+ C₁₉H₁₉O₄N₂FNa 379.1064, found 379.1065.

(2-(2-(4-(Trifluoromethyl)benzamido)phenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2d

This compound was prepared according to the representative procedure for 2a using N-Allyl-2-(4-(trifluoromethyl)benzamido)benzamide 1d and PhI(OAc)₂, HF.py giving 2d as a white solid (0.1 g, 90%); mp 160-163 °C; ¹H NMR (500 MHz, CDCl₃) δ 12.99 (1H, s), 8.94 (1H, dd, J = 8.4, 0.7 Hz), 8.19 (2H, d, J = 8.1 Hz), 7.94 (1H, d, J = 7.8 Hz), 7.77 (2H, d, J = 8.0 Hz), 7.56 (1H, t, J = 7.3 Hz), 7.16 (1H, td, J = 7.9, 1.1 Hz), 4.99-4.89 (1H, m), 4.37 (1H, dd, J = 12.2, 3.6 Hz), 4.30 (1H, dd, J = 14.7, 10.0 Hz), 4.23 (1H, dd, J = 12.1, 5.8 Hz), 3.98 (1H, dd, J = 14.7, 7.3 Hz), 2.10 (3H, s); ¹³C NMR (100 MHz, CDCl₃) δ 170.7, 164.6, 164.5, 139.8, 138.5, 133.0, 129.4, 128.1, 125.6, 122.9, 113.3, 75.8, 64.7, 56.6, 20.7; IR(neat) 3157, 2958, 2843, 1743, 1652, 1620, 1593, 1564, 1431, 1323, 1254, 1116, 1051, 983, 856, 775, 693, 620 cm⁻¹; HRMS m/z calcd for [M+H]^+ C₂₀H₁₈O₄N₂F₃ 407.1213, found 407.1200.

(2-(2-(3,4-Dichlorobenzamido)phenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2e

This compound was prepared according to the representative procedure for 2a using N-(2-(Allylcarbamoyl)phenyl)-3,4-dichlorobenzamide 1e and PhI(OAc)₂, HF.py giving 2e as a white solid (0.097 g, 83%); mp 139-142 °C; ¹H NMR (400 MHz, CDCl₃) δ 12.99 (1H, s), 8.94 (1H, dd, J = 8.4, 0.7 Hz), 8.19 (2H, d, J = 8.1 Hz), 7.94 (1H, d, J = 7.8 Hz), 7.77 (2H, d, J = 8.0 Hz), 7.56 (1H, t, J = 7.3 Hz), 7.16 (1H, td, J = 7.9, 1.1 Hz), 4.99-4.89 (1H, m), 4.37 (1H, dd, J = 12.2, 3.6 Hz), 4.30 (1H, dd, J = 14.7, 10.0 Hz), 4.23 (1H, dd, J = 12.1, 5.8 Hz), 3.98 (1H, dd, J = 14.7, 7.3 Hz), 2.10 (3H, s); ¹³C NMR (125MHz, CDCl₃) δ 170.7, 164.5, 163.6, 139.8, 133.0, 129.4, 128.1, 125.6, 122.9, 113.3, 75.8, 64.7, 56.6, 20.7; IR(neat) 3157, 2958, 2843, 1743, 1652, 1620, 1593, 1564, 1431, 1323, 1254, 1116, 1051, 983, 856, 775, 693, 620 cm⁻¹; HRMS m/z calcd for [M+H]^+ C₂₀H₁₈O₄N₂F₃ 407.1213, found 407.1200.
(2-(2-Azetamidophenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2f

This compound was prepared according to the representative procedure for 2a using 2-Azetamidophenyl N-allylbenzamide 1f and PhI(OAc), HF.py giving 2f asa a white solid (0.1 g, 80%); mp 132-135 °C; 1H NMR (500 MHz, CDCl3) δ 12.0 (1H, s), 8.72 (1H, d, J = 8.3 Hz), 7.86 (1H, dd, J = 7.9, 1.5 Hz), 7.47 (1H, td, J = 8.6, 1.5 Hz), 7.07 (1H, td, J = 8.5, 1.0 Hz), 4.91-4.84 (1H, m), 4.34 (1H, dd, J = 12.0, 3.5 Hz), 4.25 (1H, dd, J = 11.2, 6.1 Hz), 4.19 (1H, dd, J = 12.2, 6.1 Hz), 3.91 (1H, dd, J = 14.8, 7.4 Hz), 2.22 (3H, s), 2.10 (3H, s); 13C NMR (125 MHz, CDCl3) δ 170.7, 169.2, 164.1, 140.0, 132.7, 129.2, 122.2, 119.6, 112.5, 75.5, 64.8, 56.8, 25.4, 20.8; IR(neat) 3110, 3034, 2924, 2853, 1744, 1697, 1614, 1587, 1536, 1448, 1367, 1299, 1224, 1133, 1052, 982, 855, 772, 651 cm⁻¹; HRMS m/z calcd for [M+Na]+ C19H16O4N2Cl2Na 429.0379, found 429.0383.

(2-(2-(But-3-enamido)phenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2g

This compound was prepared according to the representative procedure for 2a using N-Allyl-2-(but-3-enamido)benzamide 1g and PhI(OAc), HF.py giving 2g as a white solid (0.077 g, 62%); mp 165-167 °C; 1H NMR (500 MHz, CDCl3) δ 12.03 (1H, s), 8.73 (1H, d, J = 8.3 Hz), 7.85 (1H, td, J = 9.9, 2.2 Hz), 4.19 (1H, dd, J = 12.2, 6.1 Hz), 3.91 (1H, dd, J = 14.8, 7.3 Hz), 2.22 (3H, s), 2.10 (3H, s); 13C NMR (125 MHz, CDCl3) δ 170.7, 169.2, 164.1, 140.0, 132.7, 129.2, 122.2, 119.6, 112.5, 75.5, 64.8, 56.8, 25.4, 20.8; IR(neat) 3110, 3034, 2924, 2853, 1744, 1697, 1614, 1587, 1536, 1448, 1367, 1299, 1224, 1133, 1052, 982, 855, 772, 651 cm⁻¹; HRMS m/z calcd for [M+H]+ C16H19O4N2 303.1339, found 303.1338.

(2-(2-Benzamido-5-chlorophenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2h

This compound was prepared according to the representative procedure for 2a using N-Allyl-2-benzamido-5-chlorobenzamide 1h and PhI(OAc), HF.py giving 2h as a white solid (0.087 g, 73%); mp 140-142 °C; 1H NMR (400 MHz, CDCl3) δ 12.77 (1H, s), 8.95 (1H, d, J = 9.0 Hz), 8.05 (2H, dd, J = 7.1, 1.8 Hz), 7.88 (1H, d, J = 12.5 Hz), 7.55 (1H, dt, J = 8.8, 3.0 Hz), 7.52-7.46 (3H, m), 4.95-4.89
(1H, m), 4.36 (1H, dd, J = 12.2, 3.5 Hz), 4.30 (1H, dd, J = 14.8, 10.0 Hz), 4.22 (1H, dd, J = 12.2, 6.1 Hz), 3.98 (1H, dd, J = 14.9, 7.6 Hz), 2.11 (3H, s); 13C NMR (100 MHz, CDCl₃) δ 170.7, 166.0, 163.4, 138.8, 134.9, 132.6, 131.8, 128.9, 128.6, 127.7, 127.4, 121.3, 114.4, 76.0, 64.7, 56.8, 20.8; IR(neat) 3193, 3019, 2353, 1742, 1653, 1516, 1419, 1326, 1214, 1020, 928, 741, 667, 627 cm⁻¹; HRMS m/z calcd for [M+Na]^+ C₁₉H₁₇O₄N₂ClNa 395.0769, found 395.0767.

(2-(4-Fluoro-2-(4-(trifluoromethyl)benzamido)phenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2i

This compound was prepared according to the representative procedure for 2a using N-allyl-4-fluoro-2-(4-(trifluoromethyl)benzamido)benzamide 1i and PhI(OAc)₂, HF.py giving 2i as a white solid (0.1 g, 87%); mp 176-178 °C; ¹H NMR (400 MHz, CDCl₃) δ 13.13 (1H, s), 8.76 (1H, dd, J = 11.8, 2.5 Hz), 8.17 (2H, d, J = 8.1 Hz), 7.92 (1H, dd, J = 8.0, 6.3 Hz), 7.78 (2H, d, J = 8.3 Hz), 6.85 (1H, td, J = 7.5, 2.5 Hz), 4.97-4.89 (1H, m), 4.37 (1H, dd, J = 12.2, 3.5 Hz), 4.30 (1H, dd, J = 14.6, 10.0 Hz), 4.23 (1H, dd, J = 12.2, 5.9 Hz), 3.97 (1H, dd, J = 14.6, 7.4 Hz), 2.10 (3H, s); 13C NMR (100 MHz, CDCl₃) δ 170.7, 166.4, 164.8, 163.9, 141.8, 138.0, 131.4, 131.3, 128.1, 125.7, 110.2, 110.0, 109.6, 107.6, 107.3, 75.9, 64.6, 56.5, 20.7; IR(neat) 3357, 3019, 2938, 1744, 1684, 1639, 1599, 1548, 1432, 1327, 1266, 1215, 1130, 1016, 982, 858, 747, 680 cm⁻¹; HRMS m/z calcd for [M+H]^+ C₂₀H₁₈O₄N₂F₄ 425.1119, found 425.1116.

(2-(2-Benzamido-4-fluorophenyl)-4,5-dihydrooxazol-5-yl)methyl acetate, 2j

This compound was prepared according to the representative procedure for 2a using N-allyl-4-fluoro-2-benzamido-4-fluorobenzamide 1j and PhI(OAc)₂, HF.py giving 2j as a white solid (0.09 g, 75%); mp 143-147 °C; ¹H NMR (400 MHz, CDCl₃) δ 12.98 (1H, s), 8.79 (1H, dd, J = 12.0, 2.5 Hz), 8.07 (2H, d, J = 7.0 Hz), 7.91 (1H, dd, J = 8.8, 6.5 Hz), 7.56 (1H, dt, J = 8.8, 2.3 Hz), 7.51 (2H, t, J = 7.5 Hz), 6.82 (1H, td, J = 8.9, 2.6 Hz), 4.94-4.88 (1H, m), 4.36 (1H, dd, J = 12.2, 3.5 Hz), 4.29 (1H, dd, J = 14.6, 9.9 Hz), 4.22 (1H, dd, J = 12.2, 6.1 Hz), 3.97 (1H, dd, J = 14.6, 7.3 Hz), 2.10 (3H, s); ¹3C NMR (100 MHz, CDCl₃) δ 170.7, 166.2, 164.1, 163.8, 142.2, 142.1, 134.8, 132.0, 131.2, 128.6, 127.7, 109.7, 109.5, 107.5, 107.2, 75.8, 64.7, 56.6, 20.8; IR(neat) 3049, 2923, 1745, 1680, 1641, 1599, 1548, 1432, 1369, 1220, 1165, 1096, 982, 875, 772, 702 cm⁻¹; HRMS m/z calcd for [M+H]^+ C₁₉H₁₇O₄N₂F 357.1239.
Representative procedure: 2-Benzamido-N-cinnamylbenzamide, 3a

To a solution of N-Allyl-2-benzimidobenzamide 1a (0.1 g, 0.35 mmol, 1 equiv.), iodobenzene (0.04 mL, 0.39 mmol, 1.1 equiv.), and triethylamine (0.1 mL, 0.726 mmol, 2 equiv.) in toluene (3 mL) were added Pd(OAc)$_2$ (10 mol%) successively. The resulting mixture was stirred at 120 °C for 3 h under nitrogen. After completion of the reaction (monitored by TLC), the crude reaction mixture was extracted with EtOAc. The organic extract was washed with brine solution, dried over anhydrous Na$_2$SO$_4$, and concentrated under vacuum. Purification by column chromatography (1 : 9 EtOAc/petroleum ether) to provide 3a as a white solid (0.12 g, 94%); mp 145-148 °C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 12.10 (1H, s), 8.80 (1H, d, $J$ = 8.3 Hz), 8.04 (2H, d, $J$ = 6.8 Hz), 7.57-7.47 (5H, m), 7.39-7.24 (5H, m), 7.08 (1H, t, $J$ = 5.7 Hz), 6.62 (1H, d, $J$ = 15.8 Hz), 6.56 (1H, s), 6.28 (1H, ddd, $J$ = 15.8, 12.7, 6.3 Hz), 4.25 (2H, t, $J$ = 5.9 Hz); $^{13}$C NMR (125 MHz, CDCl$_3$) $\delta$ 169.0, 165.7, 139.9, 136.3, 134.8, 132.9, 132.8, 131.8, 128.8, 128.6, 127.9, 127.4, 126.6, 126.4, 124.6, 122.9, 121.7, 120.4, 42.1; IR(neat) 3346, 2972, 2821, 1620, 1597, 1531, 1420, 1343, 1260, 1205, 1146, 1058, 943, 774, 664 cm$^{-1}$; HRMS m/z calcd for [M+H]$^+$ C$_{23}$H$_{21}$O$_2$N$_2$ 357.1656, found 357.1652.

$(E)$-2-Benzamido-N-(3-(p-tolyl)allyl)benzamide, 3ab

This compound was prepared according to the representative procedure for 3a using N-Allyl-2-benzimidobenzamide 1a, 1-iodo-4-methylbenzene, Pd(OAc)$_2$, and triethylamine giving 3ab as a white solid (0.12 g, 91%); mp 145-148 °C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 12.11 (1H, s), 8.80 (1H, dd, $J$ = 8.4, 0.73 Hz), 8.04 (2H, dd, $J$ = 7.9, 1.3 Hz), 7.57-7.47 (5H, m), 7.28-7.23 (2H, m), 7.12 (2H, d, $J$ = 8.0 Hz), 7.07 (1H, dd, $J$ = 7.5, 0.8 Hz), 6.59 (1H, d, $J$ = 15.7 Hz), 6.53 (1H, s), 6.23 (1H, ddd, $J$ = 15.8, 12.8, 6.4 Hz), 4.23 (2H, td, $J$ = 6.4, 1.1 Hz), 2.33 (3H, s); $^{13}$C NMR (125 MHz, CDCl$_3$) $\delta$ 169.0, 165.7, 140.0, 137.8, 134.8, 133.4, 133.0, 132.8, 131.8, 129.3, 128.8, 127.4, 126.5, 126.3, 123.4, 122.9, 121.7, 120.4, 42.1, 21.2; IR(neat) 3346, 2972, 2821, 1620, 1597, 1531, 1420, 1343, 1260, 1205, 1146, 1058, 943, 774, 664 cm$^{-1}$; HRMS m/z calcd for [M+H]$^+$ C$_{24}$H$_{23}$O$_2$N$_2$ 371.1754, found 371.1754.

$(E)$-2-Benzamido-N-(3-(4-fluorophenyl)allyl)benzamide, 3ac

This compound was prepared according to the representative procedure for 3a using N-Allyl-2-benzimidobenzamide 1a, 1-fluoro-4-iodobenzene, Pd(OAc)$_2$, and triethylamine giving 3ac as a white solid (0.12 g, 89%); mp 145-148 °C; $^1$H NMR (500 MHz, CDCl$_3$) $\delta$ 12.08 (1H, s), 8.78 (1H, d, $J$ = 8.2 Hz), 7.97 (2H, d, $J$ = 8.2 Hz), 7.83 (2H, d, $J$ = 8.2 Hz), 7.57 (2H, tdd, $J$ = 8.2, 8.2, 0.8 Hz), 7.37 (2H, d, $J$ = 8.2 Hz), 7.01 (1H, t, $J$ = 8.2 Hz), 6.49 (1H, d, $J$ = 15.8 Hz), 6.45 (1H, d, $J$ = 15.8 Hz), 6.18 (1H, td, $J$ = 6.4, 1.1 Hz), 2.33 (3H, s); $^{13}$C NMR (125 MHz, CDCl$_3$) $\delta$ 169.0, 165.7, 140.0, 137.8, 134.8, 133.4, 133.0, 132.8, 131.8, 129.3, 128.8, 127.4, 126.5, 126.3, 123.4, 122.9, 121.7, 120.4, 42.1, 21.2; IR(neat) 3346, 3019, 2984, 2830, 1654, 1605, 1548, 1453, 1345, 1286, 1234, 1108, 1094, 983, 792,775, 673 cm$^{-1}$; HRMS m/z calcd for [M+H]$^+$ C$_{25}$H$_{25}$O$_2$F$_2$N$_2$ 395.1810, found 395.1808.
Hz), 8.20 (1H, s), 8.03 (2H, dd, J = 8.3, 1.5 Hz), 7.56-7.48 (5H, m), 7.32 (2H, dd, J = 8.8, 2.1 Hz), 7.18 (1H, t, J = 7.9 Hz), 7.08 (1H, t, J = 7.6 Hz), 6.99 (1H, t, J = 8.6 Hz), 6.57 (1H, d, J = 15.8 Hz), 6.19 (1H, ddd, J = 15.2, 12.5, 6.2 Hz), 4.23 (2H, t, J = 5.4 Hz); 13C NMR (125 MHz, CDCl3) δ 169.1, 165.7, 163.4, 139.8, 138.0, 134.8, 132.8, 132.5, 131.9, 131.7, 128.8, 127.4, 126.6, 124.3, 122.9, 121.7, 120.4, 115.6, 42.0; IR(neat) 3370, 3019, 2936, 2893, 1672, 1531, 1483, 1364, 1246, 1154, 1074, 1036, 789, 741, 683 cm⁻¹; HRMS m/z calcd for [M+H]+ C23H20O2N2F 375.1506, found 375.1509.

(E)-2-Benzamido-N-(3-(4-methoxyphenyl)allyl)benzamide, 3ad

This compound was prepared according to the representative procedure for 3a using N-Allyl-2-benzamidobenzamide 1a, 1-iodo-4-methoxybenzene, Pd(OAc)2, and triethylamine giving 3ad as a white solid (0.13 g, 94%); mp 150-153 °C; 1H NMR (500 MHz, CDCl3) δ 12.12 (1H, s), 8.81 (1H, dd, J = 8.3, 0.7 Hz), 8.05 (2H, dd, J = 7.7, 0.9 Hz), 7.57-7.48 (5H, m), 7.03 (2H, d, J = 8.8 Hz), 7.09 (1H, td, J = 8.7, 1.0 Hz), 6.84 (2H, d, J = 8.8 Hz), 6.56 (1H, d, J = 15.7 Hz), 6.50 (1H, s), 6.14 (1H, ddd, J = 15.1, 12.9, 6.5 Hz), 4.22 (2H, td, J = 6.7, 1.2 Hz), 3.80 (3H, s); 13C NMR (125 MHz, CDCl3) δ 169.0, 165.6, 159.5, 140.0, 134.8, 132.8, 132.7, 131.8, 129.0, 128.8, 127.6, 127.4, 126.5, 122.9, 122.2, 121.6, 120.4, 114.1, 55.3, 42.2; IR(neat) 3329, 3019, 2966, 2830, 1684, 1620, 1534, 1428, 1365, 1261, 1126, 1036, 993, 926, 843, 774, 724 cm⁻¹; HRMS m/z calcd for [M+Na]+ C24H23O3N2ClNa 387.1703, found 387.1702.

(E)-2-Benzamido-N-(3-(2-chlorophenyl)allyl)benzamide, 3ae

This compound was prepared according to the representative procedure for 3a using N-Allyl-2-benzamidobenzamide 1a, 1-chloro-2-iodobenzene, Pd(OAc)2, and triethylamine giving 3ae as a white solid (0.12 g, 86%); mp 176-178 °C; 1H NMR (400 MHz, CDCl3) δ 12.08 (1H, s), 8.79 (1H, d, J = 8.3 Hz), 8.04 (2H, dd, J = 7.8, 1.3 Hz), 7.58-7.48 (6H, m), 7.34 (1H, dd, J = 7.0, 1.5 Hz), 7.19 (2H, td, J = 6.9, 1.7 Hz), 7.07 (1H, t, J = 7.2 Hz), 7.01 (1H, d, J = 15.8 Hz), 6.67 (1H, s), 6.28 (1H, ddd, J = 15.5, 12.4, 6.2 Hz), 4.29 (2H, t, J = 5.3 Hz); 13C NMR (100 MHz, CDCl3) δ 169.1, 165.6, 139.9, 134.8, 134.4, 133.0, 132.8, 132.5, 131.9, 129.7, 128.9, 128.8, 127.6, 127.4, 126.9, 126.6, 122.9, 122.1, 120.3, 42.1; IR(neat) 3310, 3025, 2953, 2864, 1674, 1553, 1489, 1374, 1284, 1209, 1165, 1038, 982, 771, 654 cm⁻¹; HRMS m/z calcd for [M+Na]+ C24H19O2N2ClNa 413.1732, found 413.1729.

(E)-2-Benzamido-N-(3-(naphthalen-2-yl)allyl)benzamide, 3af

This compound was prepared according to the representative procedure for 3a using N-Allyl-2-benzamidobenzamide 1a, 1-iodo-naphthalene, Pd(OAc)2, and triethylamine giving 3af as a white solid (0.13 g, 94%); mp 150-153 °C; 1H NMR (500 MHz, CDCl3) δ 12.12 (1H, s), 8.81 (1H, dd, J = 8.3, 0.7 Hz), 8.05 (2H, dd, J = 7.7, 0.9 Hz), 7.57-7.48 (5H, m), 7.03 (2H, d, J = 8.8 Hz), 7.09 (1H, td, J = 8.7, 1.0 Hz), 6.84 (2H, d, J = 8.8 Hz), 6.56 (1H, d, J = 15.7 Hz), 6.50 (1H, s), 6.14 (1H, ddd, J = 15.1, 12.9, 6.5 Hz), 4.22 (2H, td, J = 6.7, 1.2 Hz), 3.80 (3H, s); 13C NMR (125 MHz, CDCl3) δ 169.0, 165.6, 159.5, 140.0, 134.8, 132.8, 132.7, 131.8, 129.0, 128.8, 127.6, 127.4, 126.5, 122.9, 122.2, 121.6, 120.4, 114.1, 55.3, 42.2; IR(neat) 3329, 3019, 2964, 2830, 1684, 1620, 1534, 1428, 1365, 1261, 1126, 1036, 993, 926, 843, 774, 724 cm⁻¹; HRMS m/z calcd for [M+Na]+ C24H19O2N2ClNa 413.1732, found 413.1729.
This compound was prepared according to the representative procedure for 3a using N-Allyl-2-benzamidobenzamide 1a, 2-iodonaphthalene, Pd(OAc)$_2$, and triethylamine, giving 3af as a white solid (0.12 g, 81%); mp 131-133 °C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 12.14 (1H, s), 8.80 (1H, d, $J = 8.3$ Hz), 8.05 (3H, dd, $J = 7.7$, 0.9 Hz), 7.84 (1H, dd, $J = 5.9$, 2.4 Hz), 7.78 (1H, d, $J = 8.0$ Hz), 7.56 (1H, d, $J = 6.7$ Hz), 7.54-7.41 (8H, m), 7.38 (1H, d, $J = 15.7$ Hz), 7.07 (1H, t, $J = 7.5$ Hz), 6.71 (1H, s), 6.31 (1H, ddd, $J = 15.2$, 12.5, 6.2 Hz), 4.35 (2H, t, $J = 5.2$ Hz); $^{13}$C NMR (125 MHz, CDCl$_3$) $\delta$ 169.1, 165.6, 140.0, 134.8, 134.0, 133.6, 132.9, 131.9, 131.0, 130.3, 128.8, 128.6, 128.3, 127.8, 127.4, 126.5, 126.2, 125.9, 125.6, 124.0, 123.5, 122.9, 121.7, 120.4, 42.4; IR(neat) 3328, 3021, 2968, 2874, 1663, 1528, 1436, 1392, 1326, 1243, 1147, 1038, 996, 772, 683, 654 cm$^{-1}$; HRMS m/z calcd for [M+H]$^+$ C$_{27}$H$_{23}$O$_2$N$_2$ 407.1754, found 407.1738.

N-Cinnamyl-4-fluoro-2-(4-(trifluoromethyl)benzamido)benzamide, 3ba

This compound was prepared according to the representative procedure for 3a using N-Allyl-4-fluoro-2-(4-(trifluoromethyl)benzamido)benzamide 1i, iodobenzene, Pd(OAc)$_2$, and triethylamine, giving 3ba as a white solid (0.11 g, 91%); mp 168-169 °C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 12.64 (1H, s), 8.69 (1H, dd, $J = 11.4$, 2.3 Hz), 8.16 (2H, d, $J = 8.0$ Hz), 7.78 (2H, d, $J = 8.2$ Hz), 7.58 (1H, dd, $J = 8.8$, 5.9 Hz), 7.40-7.25 (5H, m), 6.85 (1H, td, $J = 8.9$, 2.4 Hz), 6.64 (1H, d, $J = 15.8$ Hz), 6.37 (1H, s), 6.28 (1H, ddd, $J = 15.4$, 12.8, 6.3 Hz), 4.26 (2H, t, $J = 5.6$ Hz); $^{13}$C NMR (125 MHz, CDCl$_3$) $\delta$ 168.3, 166.1, 164.4, 142.1, 137.7, 136.1, 133.4, 128.7, 128.1, 127.9, 126.4, 125.9, 124.2, 115.9, 110.3, 110.2, 108.9, 108.7, 42.2; IR(neat) 3480, 3024, 2956, 2819, 1690, 1623, 1542, 1463, 1346, 1283, 1216, 1163, 1096, 1024, 983, 874, 741, 672 cm$^{-1}$; HRMS m/z calcd for [M+H]$^+$ C$_{24}$H$_{19}$O$_2$N$_2$F$_4$ 443.1372, found 443.1361.

2-Benzamido-N-cinnamyl-4-fluorobenzamide, 3bb

This compound was prepared according to the representative procedure for 3a using N-Allyl-2-benzamido-4-fluorobenzamide 1j, iodobenzene, Pd(OAc)$_2$, and triethylamine, giving 3bb as a white solid (0.11 g, 87%); mp 160-162 °C; $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 12.38 (1H, s), 8.68 (1H, dd, $J = 11.7$, 2.0 Hz), 8.04 (2H, d, $J = 7.4$ Hz), 7.58-7.48 (4H, m), 7.37 (2H, d, $J = 7.3$ Hz), 7.31 (2H, t, $J = 7.1$ Hz), 7.25 (1H, d, $J = 6.1$ Hz), 6.73 (1H, td, $J = 8.9$, 1.4 Hz), 6.63 (1H, d, $J = 15.8$ Hz), 6.44 (1H, s), 6.28 (1H, ddd, $J = 15.4$, 12.8, 6.4 Hz), 4.25 (2H, t, $J = 5.8$ Hz); $^{13}$C NMR (125 MHz, CDCl$_3$) $\delta$ 168.0, 165.8, 164.0, 142.3, 136.2, 134.4, 133.2, 132.1, 128.9, 128.7, 128.6, 128.4, 127.4, 126.4, 124.4, 116.1, 109.9, 109.7, 108.9, 108.6, 42.2; IR(neat) 3248, 3019, 2863, 1710, 1643, 1526, 1438, 1215, 1128, 928, 741, 667, 627 cm$^{-1}$; HRMS m/z calcd for [M+H]$^+$ C$_{23}$H$_{20}$O$_2$N$_2$F 375.1506, found 375.1508.

N-Cinnamyl-4-fluoro-2-(4-methoxybenzamido)benzamide, 3bc
This compound was prepared according to the representative procedure for 3a using N-Allyl-4-fluoro-2-(4-methoxybenzamido)benzamide 1k, iodobenzene, Pd(OAc)$_2$, and triethylamine giving 3bc as a white solid (0.115 g, 93%); mp 173-175 °C; $^1$H NMR (500 MHz, CDCl$_3$) δ 12.25 (1H, s), 8.51 (1H, d, $J = 8.2$ Hz), 7.51 (2H, dd, $J = 8.2, 5.3$ Hz), 7.32-7.27 (5H, m), 6.96 (2H, d, $J = 7.8$ Hz), 6.63 (1H, s), 6.58 (1H, d, $J = 15.6$ Hz), 6.27 (1H, ddd, $J = 15.6, 12.2, 6.1$ Hz), 4.21 (2H, t, $J = 5.2$ Hz), 3.84 (3H, s); $^{13}$C NMR (125 MHz, CDCl$_3$) δ 168.5, 165.4, 164.0, 162.7, 142.4, 136.3, 133.4, 133.0, 129.4, 128.6, 127.9, 126.4, 124.5, 114.0, 109.6, 109.4, 108.7, 108.4, 55.5, 42.1; IR(neat) 3340, 3017, 2924, 2843, 1646, 1605, 1510, 1442, 1310, 1255, 1215, 1178, 1032, 987, 742, 667, 626 cm$^{-1}$; HRMS m/z calcd for [M+Na]$^+$ C$_{24}$H$_{21}$O$_3$N$_2$FNa 427.1610, found 427.1603.

2-Benzamido-3-bromo-N-cinnamyl-5-methylbenzamide, 3ca

This compound was prepared according to the representative procedure for 3a using N-Allyl-2-benzamido-3-bromo-5-methylbenzamide 1l, iodobenzene, Pd(OAc)$_2$, and triethylamine giving 3ca as a white solid (0.095 g, 79%); mp 139-141 °C; $^1$H NMR (500 MHz, CDCl$_3$) δ 9.47 (1H, s), 7.99 (1H, d, $J = 7.3$ Hz), 7.47 (1H, t, $J = 7.6$ Hz), 7.41 (1H, t, $J = 7.7$ Hz), 7.35 (3H, t, $J = 7.6$ Hz), 7.23-7.16 (4H, m), 7.06 (2H, d, $J = 7.6$ Hz), 6.99 (1H, s), 6.38 (1H, d, $J = 15.7$ Hz), 5.95 (1H, ddd, $J = 15.6, 12.6, 6.4$ Hz), 4.39 (2H, t, $J = 5.9$ Hz), 2.24 (3H, s); $^{13}$C NMR (125 MHz, CDCl$_3$) δ 167.9, 166.5, 138.7, 137.0, 136.5, 135.9, 134.9, 132.1, 131.8, 128.6, 128.4, 128.0, 127.9, 127.6, 127.5, 126.3, 125.7, 124.8, 42.0, 20.7; IR(neat) 3346, 3018, 2942, 2834, 1743, 1583, 1509, 1474, 1326, 1304, 1276, 1257, 1248, 420.2, 20.7; HRMS m/z calcd for [M+H]$^+$ C$_{24}$H$_{21}$O$_2$N$_2$Br 451.1382, found 451.1389.

2-(2-Benzamidophenyl)-6-phenyl-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4a

This compound was prepared according to the representative procedure for 2a using 2-benzamido-N-cinnamylbenzamide 3a and PhI(OAc)$_2$, HF.py giving 4a as a white solid (0.095 g, 81%); mp 149-151 °C; $^1$H NMR (400 MHz, CDCl$_3$) δ 13.72 (1H, s), 8.99 (1H, d, $J = 8.4$ Hz), 8.12 (1H, d, $J = 8.0$, 1.5 Hz), 8.01 (2H, d, $J = 7.9$, 1.1 Hz), 7.56-7.44 (4H, m), 7.44-7.34 (5H, m), 7.13 (1H, td, $J = 8.1$, 1.1 Hz), 5.54 (1H, d, $J = 7.2$, Hz), 5.25 (1H, q, $J = 3.6$ Hz), 3.74 (2H, d, $J = 8.3$ Hz), 2.10 (3H, s); $^{13}$C NMR (125 MHz, CDCl$_3$) δ 170.5, 166.0, 156.1, 140.6, 137.1, 135.8, 132.3, 131.6, 129.1, 128.7, 128.6, 128.4, 127.5, 125.2, 122.3, 120.3, 114.4, 77.8, 67.5, 43.1, 21.1; IR(neat) 3029, 2911, 1743,
(2-(2-Benzamidophenyl)-6-(p-tolyl)-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4ab)

This compound was prepared according to the representative procedure for 2a using (E)-2-Benzamido-N-(3-(p-tolyl)allyl)benzamide 3ab and PhI(OAc)_2, HF.py giving 4ab as a white solid (0.09 g, 77%); mp 179-181 °C; ¹H NMR (500 MHz, CDCl₃) δ 13.73 (1H, s), 8.98 (1H, dd, J = 8.3, 1.0 Hz), 8.11 (1H, dd, J = 7.9, 1.5 Hz), 8.01 (2H, dd, J = 7.0, 1.5 Hz), 7.55-7.45 (4H, m), 7.31 (1H, d, J = 8.2 Hz), 7.21 (3H, d, J = 7.5 Hz), 7.12 (1H, td, J = 8.2, 1.0 Hz), 5.50 (1H, d, J = 7.0 Hz), 5.23 (1H, q, J = 3.6 Hz), 3.74 (2H, dd, J = 9.8, 3.8 Hz), 2.36 (3H, s), 2.1 (3H, s); ¹³C NMR (100 MHz, CDCl₃) δ 170.6, 166.0, 163.6, 140.3, 138.3, 137.5, 135.2, 132.9, 131.7, 129.5, 128.6, 127.7, 126.8, 125.2, 124.7, 122.5, 113.3, 79.4, 67.5, 43.1, 21.1, 20.7; IR(neat) 3429, 3048, 2930, 1741, 1680, 1609, 1530, 1447, 1320, 1169, 1130, 1080, 1019, 974, 856, 657, 628 cm⁻¹; HRMS m/z calcd for [M+H]^+ C_{26}H_{23}O,N_4 429.1808, found 429.1782.

2-(2-Benzamidophenyl)-6-(4-fluorophenyl)-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4ac

This compound was prepared according to the representative procedure for 2a using (E)-2-Benzamido-N-(3-(4-fluorophenyl)allyl)benzamide 3ac and PhI(OAc)_2, HF.py giving 4ac as a white solid (0.095 g, 82%); mp 139-142 °C; ¹H NMR (500 MHz, CDCl₃) δ 13.64 (1H, s), 8.98 (1H, d, J = 8.3 Hz), 8.08 (1H, dd, J = 7.9, 1.2 Hz), 8.00 (2H, d, J = 7.1 Hz), 7.56-7.4 (4H, m), 7.33 (2H, dd, J = 8.3, 5.1 Hz), 7.12 (3H, dd, J = 16.3, 7.7 Hz), 5.48 (1H, d, J = 5.8 Hz), 5.20 (1H, q, J = 3.8 Hz), 3.76 (2H, dd, J = 9.7, 3.9 Hz), 2.09 (3H, s); ¹³C NMR (125MHz, CDCl₃) δ 170.4, 166.0, 156.0, 140.5, 135.7, 132.7, 132.4, 131.6, 128.6, 128.3, 127.3, 127.2, 122.3, 120.3, 117.2, 116.2, 67.3, 43.3, 21.0; IR(neat) 3438, 3080, 2960, 1741, 1689, 1630, 1506, 1438, 1326, 1223, 1186, 1050, 1029, 986, 841, 756, 683 cm⁻¹; HRMS m/z calcd for [M+H]^+ C_{25}H_{22}O,N,F 433.1243, found 433.1240.

(2-(2-Benzamidophenyl)-6-(4-methoxyphenyl)-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4ad)
This compound was prepared according to the representative procedure for 2a using (E)-2-Benzoamido-N-(3-(4-methoxyphenyl)allyl)benzamide 3ad and PhI(OAc)₂, HF·py giving 4ad as a white solid (0.092 g, 80%); mp 174-176 ºC; ¹H NMR (400 MHz, CDCl₃) δ 12.04 (1H, s), 8.79 (1H, d, J = 8.3 Hz), 8.01 (2H, d, J = 6.6, Hz), 7.57-7.48 (4H, m), 7.44-7.37 (3H, m), 7.07 (1H, t, J = 7.5 Hz), 6.90 (2H, d, J = 8.6 Hz), 6.13 (1H, d, J = 7.0 Hz), 5.60 (1H, q, J = 3.7 Hz), 3.77 (3H, s), 3.73 (1H, dd, J = 14.5, 7.3 Hz), 3.52 (1H, dt, J = 8.8, 4.4 Hz), 2.03 (3H, s); ¹³C NMR (125 MHz, CDCl₃) δ 170.9, 165.6, 164.3, 160.2, 140.0, 134.8, 133.4, 132.9, 131.8, 131.8, 129.7, 128.7, 128.6, 127.7, 127.4, 126.6, 122.9, 121.5, 119.7, 114.4, 75.6, 73.4, 55.3, 40.6, 20.9; IR(neat) 3442, 3017, 2902, 2864, 1742, 1632, 1654, 1560, 1439, 1348, 1273, 1130, 1034, 947, 771, 682 cm⁻¹; HRMS m/z calcd for [M+H]+ C₂₆H₂₅O₅N₂ 445.1843, found 445.1840.

2-(2-Benzamidophenyl)-6-(2-chlorophenyl)-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4ae

This compound was prepared according to the representative procedure for 2a using (E)-2-Benzamido-N-(3-(2-chlorophenyl)allyl)benzamide 3ae and PhI(OAc)₂, HF·py giving 4ae as a white solid (0.09 g, 78%); mp 158-160 ºC; ¹H NMR (400 MHz, CDCl₃) δ 13.66 (1H, s), 8.99 (1H, d, J = 8.3 Hz), 8.07 (1H, dd, J = 7.9, 0.9 Hz), 8.01 (2H, d, J = 7.0 Hz), 7.57-7.42 (5H, m), 7.36-7.27 (3H, m), 7.12 (1H, t, J = 7.7 Hz), 5.84 (1H, d, J = 5.1 Hz), 5.40 (1H, q, J = 3.5 Hz), 3.81 (1H, dd, J = 5.2, 2.3 Hz), 3.73 (1H, dd, J = 17.3, 3.6 Hz), 2.10 (3H, s); ¹³C NMR (125 MHz, CDCl₃) δ 170.0, 165.9, 156.3, 140.6, 135.6, 134.5, 132.4, 131.9, 131.6, 130.1, 128.6, 128.4, 127.6, 127.5, 126.8, 122.3, 120.4, 117.2, 75.9, 65.3, 43.2, 21.0; IR(neat) 3418, 2984, 2938, 1742, 1650, 1544, 1480, 1350, 1259, 1206, 1153, 1014, 916, 744, 681 cm⁻¹; HRMS m/z calcd for [M+H]+ C₂₅H₂₂O₄N₂Cl 449.1262, found 449.1233.

2-(2-Benzamidophenyl)-6-(naphthalen-2-yl)-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4af

This compound was prepared according to the representative procedure for 2a using (E)-2-Benzamido-N-(3-(naphthalen-2-yl)allyl)benzamide 3af and PhI(OAc)₂, HF·py giving 4af as a white solid (0.08 g, 70%); mp 143-145 ºC; ¹H NMR (500 MHz, CDCl₃) δ 13.71 (1H, s), 9.00 (1H, d, J = 8.3 Hz), 8.07 (1H, dd, J = 7.9, 0.9 Hz), 8.01 (2H, d, J = 7.0 Hz), 7.54-7.44 (7H, m), 7.16 (1H, t, J = 7.1 Hz), 5.71 (1H, d, J = 7.9 Hz), 5.36 (1H, q, J = 3.5 Hz), 3.77 (2H, d, J = 8.0, 3.6 Hz), 2.11 (3H, s); ¹³C NMR (125 MHz, CDCl₃) δ 170.6, 166.0, 165.6, 133.1, 132.4, 131.8, 131.6, 129.3, 129.1, 128.7, 128.6, 128.1, 127.8, 127.7, 127.4, 126.7, 126.6, 124.6, 122.9, 121.5, 119.9, 78.0, 67.3, 43.1, 21.1; IR(neat) 3418, 3014, 2875, 1745, 1692, 1626, 1542, 1433, 1364, 1246, 1124, 1086, 1034, 927, 784, 729, 684 cm⁻¹; HRMS m/z calcd for [M+H]+ C₂₉H₂₅O₆N₂Cl 499.1262, found 499.1233.

2-(2-Benzamidophenyl)-6-(naphthalen-2-yl)-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4af

This compound was prepared according to the representative procedure for 2a using (E)-2-Benzamido-N-(3-(naphthalen-2-yl)allyl)benzamide 3af and PhI(OAc)₂, HF·py giving 4af as a white solid (0.08 g, 70%); mp 143-145 ºC; ¹H NMR (500 MHz, CDCl₃) δ 13.71 (1H, s), 9.00 (1H, d, J = 8.3 Hz), 8.07 (1H, dd, J = 7.9, 0.9 Hz), 8.01 (2H, d, J = 7.0 Hz), 7.54-7.44 (7H, m), 7.16 (1H, t, J = 7.1 Hz), 5.71 (1H, d, J = 7.9 Hz), 5.36 (1H, q, J = 3.5 Hz), 3.77 (2H, d, J = 8.0, 3.6 Hz), 2.11 (3H, s); ¹³C NMR (125 MHz, CDCl₃) δ 170.6, 166.0, 165.6, 133.1, 132.4, 131.8, 131.6, 129.3, 129.1, 128.7, 128.6, 128.1, 127.8, 127.7, 127.4, 126.7, 126.6, 124.6, 122.9, 121.5, 119.9, 78.0, 67.3, 43.1, 21.1; IR(neat) 3374, 3014, 2875, 1745, 1692, 1626, 1542, 1433, 1364, 1246, 1124, 1086, 1034, 927, 784, 729, 684 cm⁻¹; HRMS m/z calcd for [M+H]+ C₂₉H₂₅O₆N₂Cl 449.1262, found 449.1233.
2-(4-Fluoro-2-(4-(trifluoromethyl)benzamido)phenyl)-6-phenyl-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4ba

This compound was prepared according to the representative procedure for 2a using N-Cinnamyl-4-fluoro-2-(4-(trifluoromethyl)benzamido)benzamide 3ba and PhI(OAc)₂, HF.py giving 4ba as a white solid (0.096 g, 84%); mp 152-155 °C; ¹H NMR (400 MHz, CDCl₃) δ 14.07 (s, 1H), 8.78 (1H, dd, J = 11.8, 2.6 Hz), 8.15-8.07 (3H, m), 7.73 (2H, d, J = 8.3 Hz), 7.45-7.31 (5H, m), 6.83 (1H, td, J = 9.0, 2.5 Hz), 5.54 (1H, d, J = 2.9 Hz), 5.26 (1H, q, J = 3.7 Hz), 3.73 (2H, dd, J = 9.1, 4.0 Hz), 2.11(3H, s); ¹³C NMR (100 MHz, CDCl₃) δ 170.4, 166.0, 164.7, 163.5, 155.9, 142.2, 142.0, 138.6, 136.8, 130.5, 130.3, 129.1, 128.9, 125.6, 125.3, 113.6, 109.8, 109.6, 107.7, 107.4, 78.0, 67.3, 43.1, 20.0; IR(neat) 3218, 2925, 2854, 1741, 1688, 1649, 1547, 1434, 1328, 1267, 1219, 1133, 1065, 879, 771, 687 cm⁻¹; HRMS m/z calcd for [M+H]⁺ C₂₆H₂₁O₄N₂F₄ 501.1351, found 501.1365.

2-(2-Benzamido-4-fluorophenyl)-6-phenyl-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4bb

This compound was prepared according to the representative procedure for 2a using 2-Benzamido-N-cinnamyl-4-fluorobenzamide 3bb and PhI(OAc)₂, HF.py giving 4bb as a white solid (0.097 g, 84%); mp 135-138 °C; ¹H NMR (500 MHz, CDCl₃) δ 13.89 (s, 1H), 8.82 (1H, dd, J = 12.0, 2.5 Hz), 8.10 (1H, dd, J = 8.8, 6.5 Hz), 8.0 (2H, d, J = 7.1 Hz), 7.53 (1H, dt, J = 8.3, 1.2 Hz), 7.48 (2H, t, J = 7.6 Hz), 7.44-7.31 (5H, m), 6.81 (1H, td, J = 9.0, 2.7 Hz), 5.53 (1H, d, J = 2.2 Hz), 5.25 (1H, q, J = 3.6 Hz), 3.72 (2H, dd, J = 7.0, 3.6 Hz ), 2.11 (3H, s); ¹³C NMR (125 MHz, CDCl₃) δ 170.5, 166.1, 165.7, 155.7, 142.5, 137.0, 135.3, 131.8, 130.3, 130.2, 129.1, 128.7, 128.6, 127.5, 125.2, 113.5, 109.4, 109.2, 107.6, 107.4, 77.9, 67.4, 43.0, 21.1; IR(neat) 3426, 3078, 2840, 1741, 1676, 1649, 1534, 1431, 1368, 1267, 1216, 1133, 1075, 1051, 982, 867, 771, 680 cm⁻¹; HRMS m/z calcd for [M+H]⁺ C₂₅H₂₂O₄N₂F 433.1243, found 433.1241.

2-(4-Fluoro-2-(4-methoxybenzamido)phenyl)-6-phenyl-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4bc

This compound was prepared according to the representative procedure for 2a using N-Cinnamyl-4-fluoro-2-(4-methoxybenzamido)benzamide 3bc and PhI(OAc)₂, HF.py giving 4bc as a white solid
(0.088 g, 76%); mp 164-167 °C; 'H NMR (400 MHz, CDCl₃) δ 13.76 (1H, s), 8.80 (1H, dd, J = 12.1, 2.6 Hz), 8.09 (1H, dd, J = 8.9, 6.4 Hz), 7.96 (2H, d, J = 8.9 Hz), 7.44-7.31 (5H, m), 6.96 (2H, d, J = 8.9 Hz), 6.79 (1H, td, J = 9.0, 2.6 Hz), 5.53 (1H, d, J = 7.1 Hz), 5.24 (1H, q, J = 3.6 Hz), 3.86 (3H, s), 3.74 (2H, dd, J = 9.3, 3.7 Hz), 2.11 (3H, s); 'C NMR (100 MHz, CDCl₃) δ 170.5, 166.0, 165.7, 162.5, 155.7, 142.8, 142.7, 137.0, 130.3, 129.4, 129.1, 128.7, 127.6, 125.2, 113.9, 109.2, 108.9, 107.5, 107.3, 77.3, 67.4, 55.4, 43.0, 21.1; IR(neat) 3407, 3015, 2930, 1744, 1664, 1608, 1560, 1430, 1318, 1266, 1180, 1082, 1030, 932, 764, 678 cm⁻¹; HRMS m/z calcd for [M+Na]+ C₂₆H₂₃O₅N₂FNa 485.0523, found 485.0525.

2-(2-Benzamido-3-bromo-5-methylphenyl)-6-phenyl-5,6-dihydro-4H-1,3-oxazin-5-yl acetate, 4ca

![2-(2-Benzamido-3-bromo-5-methylphenyl)-6-phenyl-5,6-dihydro-4H-1,3-oxazin-5-yl acetate](image)

This compound was prepared according to the representative procedure for 2a using 2-Benzamido-3-bromo-N-cinnamyl-5-methylbenzamide 3ca and Phl(OAc)₂, HF.py giving 4ca as a white solid (0.074 g, 65%); mp 163-164 °C; 'H NMR (500 MHz, CDCl₃) δ 12.75 (1H, s), 8.94 (1H, d, J = 8.3 Hz), 8.04 (2H, d, J = 7.3 Hz), 7.86 (1H, d, J = 8.5 Hz), 7.56-7.45 (3H, m), 7.27 (2H, d, J = 8.0 Hz), 7.16 (2H, d, J = 7.7 Hz), 7.12 (1H, t, J = 7.7 Hz), 6.05 (1H, d, J = 7.0, Hz), 4.96 (1H, q, J = 3.9 Hz), 4.16 (2H, d, J = 8.5 Hz), 2.32 (3H, s), 2.06 (3H, s); 'C NMR (125 MHz, CDCl₃) δ 169.8, 166.0, 164.2, 140.1, 138.6, 135.2, 132.8, 132.3, 131.7, 129.4, 129.3, 128.5, 127.7, 126.8, 122.5, 119.9, 113.2, 79.4, 74.8, 55.8, 21.2, 20.0; IR(neat) 3316, 3018, 2852, 1741, 1644, 1519, 1483, 1224, 1193, 1119, 1064, 1037, 843, 741, 652, 603 cm⁻¹; HRMS m/z calcd for [M+H]+ C₂₆H₂₅O₄N₂Br 509.1840, found 509.1846.
$^1$H NMR of compound 2a (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 2a (100 MHz, CDCl$_3$)
**H NMR of compound 2b (400 MHz, CDCl₃)**

**13C NMR of compound 2b (125 MHz, CDCl₃)**
$^1$H NMR of compound 2c (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 2c (100 MHz, CDCl$_3$)
$^1$H NMR of compound 2d (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 2d (100 MHz, CDCl$_3$)
\[ \text{H NMR of compound } 2e (400 \text{ MHz, CDCl}_3) \]

\[ \text{\[^1H\] NMR of compound } 2e \text{ (400 MHz, CDCl}_3) \]

\[ \text{\[^13C\] NMR of compound } 2e \text{ (125 MHz, CDCl}_3) \]
$^1$H NMR of compound 2f (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 2f (125 MHz, CDCl$_3$)
$^1$H NMR of compound 2g (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 2g (125 MHz, CDCl$_3$)
$^1$H NMR of compound 2h (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 2h (100 MHz, CDCl$_3$)
$^1$H NMR of compound 2i (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 2i (100 MHz, CDCl$_3$)
$^1$H NMR of compound 2j (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 2j (100 MHz, CDCl$_3$)
$^1$H NMR of compound 3a (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 3a (125 MHz, CDCl$_3$)
$^1$H NMR of compound 3ab (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 3ab (125 MHz, CDCl$_3$)
$^1$H NMR of compound 3ac (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 3ac (125 MHz, CDCl$_3$)
$^{1}$H NMR of compound 3ad (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 3ad (125 MHz, CDCl$_3$)
$^1$H NMR of compound 3ae (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 3ae (100 MHz, CDCl$_3$)
$^1$H NMR of compound 3af (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 3af (125 MHz, CDCl$_3$)
$^1$H NMR of compound 3ba (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 3ba (125 MHz, CDCl$_3$)
$^1$H NMR of compound 3bb (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 3bb (125 MHz, CDCl$_3$)
$^1$H NMR of compound 3bc (500 MHz, CDCl₃)

$^{13}$C NMR of compound 3bc (125 MHz, CDCl₃)
$^1$H NMR of compound 3ca (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 3ca (125 MHz, CDCl$_3$)
$^1$H NMR of compound 4a (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 4a (125 MHz, CDCl$_3$)
$^1$H NMR of compound 4ab (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 4ab (100 MHz, CDCl$_3$)
$^1$H NMR of compound 4ac (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 4ac (100 MHz, CDCl$_3$)
$^1$H NMR of compound 4ad (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 4ad (125 MHz, CDCl$_3$)
$^1$H NMR of compound 4ae (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 4ae (125 MHz, CDCl$_3$)
\[ ^1H \text{NMR of compound 4af (500 MHz, CDCl}_3) \]

\[ ^{13}C \text{NMR of compound 4af (100 MHz, CDCl}_3) \]
\(^1\)H NMR of compound 4ba (400 MHz, CDCl\(_3\))

\(^1\)C NMR of compound 4ba (100 MHz, CDCl\(_3\))
§$H NMR of compound 4bb (500 MHz, CDCl$_3$)

$^{13}C NMR of compound 4bb (125 MHz, CDCl$_3$)
$^1$H NMR of compound 4bc (400 MHz, CDCl$_3$)

$^{13}$C NMR of compound 4bc (100 MHz, CDCl$_3$)
$^1$H NMR of compound 4ca (500 MHz, CDCl$_3$)

$^{13}$C NMR of compound 4ca (125 MHz, CDCl$_3$)
X-ray Crystallography data.

X-ray data for the compound 4ba was collected at room temperature using a Bruker Smart Apex CCD diffractometer with graphite monochromated MoKα radiation (λ=0.71073Å) with ω-scan method. Data for the compound 2a was collected at 100K on a Bruker D8 QUEST instrument with an IμS Mo microsource (λ = 0.7107 Å) and a PHOTON-100 detector.

Integration and scaling of intensity data of 4ba was accomplished using SAINT program [1]. The structure was solved by direct methods using SHELXS [2] and refinement was carried out by full-matrix least-squares technique using SHELXL [2]. The raw data frames of 2a were reduced and corrected for absorption effects using the Bruker Apex 3 software suite programs [3]. The structure was solved using intrinsic phasing method [2] and further refined with the SHELXL [2] program and expanded using Fourier techniques. Anisotropic displacement parameters were included for all non-hydrogen atoms. All C bound H atoms of 2a and C and N bound H atoms of 4ba were positioned geometrically and treated as riding on their parent C atoms [C-H = 0.93-0.97 Å, N-H = 0.86 Å and Uiso(H) = 1.5Ueq(C) for methyl H or 1.2Ueq(C and N) for other H atoms]. N bound H atoms of 2a were located in difference Fourier maps and their positions and isotropic displacement parameters were refined. The methyl groups were allowed to rotate but not to tip. The fluorine atoms (F2B./F3B/F4B) of CF3 group of 4ba were disordered over two sites (F2B./F3B/F4B and F2D./F3D/F4D) and their site-occupancy factors were refined to 0.619(8) and 0.381(8), respectively.

Crystal Data for 4ba: C26H20N2O4F4 (M =500.44): triclinic, space group P-1 (no. 2), a = 9.7279(17) Å, b = 11.657(2) Å, c = 22.965(4) Å, α = 76.436(3)°, β = 80.414(3)°, γ = 70.405(3)°, V = 2373.8(7) Å3, Z = 4, T = 294.15 K, μ(MoKα) = 0.116 mm-1, Dcalc = 1.400 g/mm3, 23019 reflections measured (3.666 ≤ 2Θ ≤ 50), 8336 unique (Rint = 0.0286) which were used in all calculations. The final R1 was 0.0717 (I > 2σ(I)) and wR2 was 0.2363 (all data). CCDC 1505772 contains supplementary Crystallographic data for the structure.

Crystal Data for 2a: C19H18N2O4 (M =338.37): triclinic, space group P-1 (no. 2), a = 7.3604(4) Å, b = 9.3854(6) Å, c = 12.8395(10) Å, α = 95.461(4)°, β = 101.655(4)°, γ = 105.055(3)°, V = 828.57(10) Å³, Z = 2, T = 99.64 K, μ(Mo) = 0.096 mm-1, Dcalc = 1.3561 g/mm3, 13694 reflections measured (5.18 ≤ 2Θ ≤ 50), 2911 unique (Rint = 0.0182) which were used in all calculations. The final R1 was 0.0723 (I>2σ(I)) and wR2 was 0.1697 (all data). CCDC 1505773 contains supplementary Crystallographic data for the structure. These data can be obtained free of charge at www.ccdc.cam.ac.uk/conts/retrieving.html [or from the Cambridge Crystallographic Data Centre (CCDC), 12 Union Road, Cambridge CB2 1EZ, UK; fax: +44(0) 1223 336 033; email: deposit@ccdc.cam.ac.uk].