Electronic supplementary information for

Borderline metal-catalyzed carboarylation of alkynylarenes with N,O-acetals

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General. Nuclear magnetic resonance spectra were taken on JEOL EX-270 (^{1}H NMR: 270.05 MHz; ^{13}C NMR: 67.8 MHz) spectrometer, JEOL Lambda-400 (^{1}H NMR: 395.75 MHz; ^{13}C NMR: 99.5 MHz) spectrometer, Varian-400 (^{1}H NMR: 399.823 MHz; ^{13}C NMR: 125.68 MHz) spectrometer, or Varian-500 (^{1}H NMR: 499.824 MHz; ^{13}C NMR: 125.68 MHz) using residual chloroform (for ^{1}H NMR, 7.26 ppm) and $CDCl_3$ (for ^{13}C NMR, 100.54 ppm) as an internal standard. High-resolution mass experiments (HRMS) were performed on JEOL-SX102A at the Natural Science Center for Basic Research and Development (N-BARD) of Hiroshima University. Melting points were recorded on YANAKO micro melting point apparatus, and uncorrected. Flash column chromatography was performed with silica gel 60 (KANTO, 40-50 m). TLC monitoring was carried out with silica gel aluminum sheets (Merck, type 60 F_{254}). DCE was distilled from CaH_2. Catalysts were purchased except for $Fe(OTf)_3$[1]. Alkynylarenes (**1h**-**j**, **1o**-**p**, **1w**, **1y**)[2] and *N,O*-acetals (**2a**-**d**)[3] were prepared by based on the literature. Other substrates were synthesized by the similar procedure. Unless otherwise noted, commercially available reagents were used without further purification.

Representative procedure for synthesis of alkynylarenes 1g. PPh_3 (47.2 mg, 180 μmol), CuI (24.4 mg, 128 μmol), and $PdCl_2(PPh_3)_2$ (33.3 mg, 47.4 μmol) were placed in 50 mL 2-necked round bottom flask, piperidine (9.5 mL), 2-(4-bromophenoxy)prop-1yne (1.0 g, 4.74 mmol), iodobenzene (1.26 g, 6.16 mmol) were successively added. The reaction mixture was stirred for 4 h at room temperature under N_2 atmosphere. After the complete, water (30 mL) was poured into the mixture. The aqueous phase was extracted with ether, the combined ethereal solution was washed with brine, and then dried over anhydrous magnesium sulfate. Filtration and evaporation afforded the crude product. A purification by a column chromatography (Hexane:EtOAc = 50:1) provided the title compound **1g** (980 mg, 72% yield).

Analytical Data of substrates.

2-(4-Bromophenoxy)-1-phenylprop-1-yne (1g) [154884-64-7]. 72% isolated as a white solid (Mp.: 82.4-83.4 °C); R_f (Hexane:EtOAc = 50:1) = 0.31; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 4.89 (2H, s), 6.92 (2H, d, J = 8.9 Hz) 6.95-7.44 (7H, m), 11H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 56.8, 83.3, 87.5, 113.6,

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116.8, 122.0, 128.3, 128.8, 131.8, 132.2, 156.8, 11C.

2-(4-Methoxycarbonylphenoxy)-1-phenylprop-1-yne (1b). 81% isolated as a white solid (Mp.: 60.0-61.0 ºC); R_f (Hexane:EtOAc = 10:1) = 0.26; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 3.89 (3H, s), 4.97 (2H, s), 7.06 (2H, d, *J* = 8.9 Hz), 7.28-7.45 (5H, m), 8.02 (2H, d, *J* = 8.9 Hz), 14H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 51.9, 56.7, 83.0, 87.7, 114.5, 121.9, 123.2, 128.3, 128.8, 131.5, 131.8, 161.4, 166.8, 13C. HRMS Calculated for $C_{17}H_{14}O_3$: 266.0943, found: 266.0941.

2-(4-Methoxycarbonylphenoxy)-1-(4-methylphenyl)prop-1-yne (1c). 49% isolated as a white solid (Mp.: 118.5-119.5 ºC); R_f (Hexane:EtOAc = 10:1) = 0.25; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.29 (3H, s), 3.84 (3H, s), 4.92 (2H, s), 7.01 (2H, dd *J* = 7.1, 2.3 Hz), 7.06 (2H, d, *J* = 8.1 Hz), 7.28 (2H, d, *J* = 8.1 Hz), 7.97 (2H, dd, *J* = 7.1, 2.3 Hz), 16H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.5, 51.9, 56.7, 82.3, 87.9, 114.5, 118.9, 123.2, 129.1, 131.5, 131.7, 139.1, 161.4, 166.8, 14C. HRMS Calculated for $C_{18}H_{16}O_3$: 280.1099, found: 280.1085.

2-(4-Benzoylphenoxy)-1-(4-methylphenyl)prop-1-yne (1d). 76% isolated as yellow solid (Mp.: 106.1-107.1 ºC); R_f (Hexane:EtOAc = 10:1) = 0.15; ^{1}H NMR ($CDCl_3$, 395.75 MHz) δ 2.35 (3H, s), 4.99 (2H, s), 7.09-7.13 (4H, m), 7.34 (2H, d, *J* = 7.5 Hz), 7.48 (2H, dd, *J* = 7.5, 7.5 Hz), 7.57 (1H, dd, *J* = 7.5, 7.5 Hz), 7.77 (2H, d, *J* = 6.8 Hz), 7.85 (2H, d, *J* = 8.7 Hz), 18H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.5, 56.8, 82.3, 88.0, 114.4, 118.9, 128.2, 129.1, 129.8, 130.7, 131.7, 132.0, 132.5, 138.2, 139.1, 161.3, 17C. HRMS Calculated for $C_{23}H_{18}O_2$: 326.1307, found: 326.1311.

2-(4-Cyanophenoxy)-1-phenylprop-1-yne (1e). 56% isolated as a brown solid (Mp.: 90.8-91.8 ºC); R_f (Hexane:EtOAc = 10:1) = 0.23; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 4.90 (2H, s), 7.01-7.57 (9H, m), 11H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 56.8, 82.4, 88.1, 104.7, 115.7, 119.1, 121.7, 128.4, 129.0, 131.8 134.0, 160.9, 12C. HRMS Calculated for $C_{16}H_{11}O_2$: 233.0841, found: 233.0840.

2-(4-Fluorophenoxy)-1-(4-methylphenyl)prop-1-yne (1f). 49% isolated as a white solid (Mp.: 104.2-105.2 °C); R_f (Hexane) = 0.38; ^{1}H NMR ($CDCl_3$, 270.05MHz) δ 2.34 (3H, s), 4.87 (2H, s), 6.98-7.00 (4H, m), 7.11 (2H, d, *J* = 7.9 Hz), 7.32 (2H, d, *J* = 7.9 Hz), 13H; ^{13}C NMR ($CDCl_3$, 99.45 MHz) δ 21.5, 57.4, 83.0, 87.4, 115.8 (d, $^2J_{CF}$ = 22.9 Hz), 116.2 (d, $^3J_{CF}$ = 8.2 Hz), 119.0, 129.1, 131.7, 138.9, 155.2 (d, $^1J_{CF}$ =255.7 Hz), 158.8, 12C. HRMS Calculated for $C_{16}H_{13}FO$: 240.0950, found: 240.0645.

2-(2-Nitrophenoxy)-1-(4-methylphenyl)prop-1-yne (1k). 50% isolated as brown solid (Mp.: 55.2-56.2 ºC); R_f (Hexane:EtOAc = 10:1) = 0.16; ^{1}H NMR ($CDCl_3$, 395.75 MHz) δ 2.34 (3H, s), 5.07 (2H, s), 7.06-7.12 (3H, m), 7.31(2H, d, *J* = 7.8 Hz), 7.35 (1H, d, *J* = 7.3 Hz), 7.56 (1H, dd, *J* = 7.3, 7.3 Hz), 7.87 (1H, d, *J* = 7.7 Hz), 13H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.5, 58.2, 81.7, 88.8, 115.7, 118.7, 121.1, 125.7, 129.0, 131.7, 133.9, 139.2, 151.1, 14C. HRMS Calculated for $C_{16}H_{13}NO_3$: 267.0895, found: 267.0890.

2-(2-Nitrophenoxy)-1-(4-methylphenyl)prop-1-yne (1l). 46% isolated as yellow oil; R_f (Hexane:EtOAc = 10:1) = 0.16; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.30 (3H, s), 5.01 (2H, s), 7.01 (1H, dd, *J* = 7.6, 7.6 Hz), 7.07 (2H, d, *J* = 7.9 Hz), 7.18-7.22 (1H, m), 7.27 (2H, d, *J* = 7.9 Hz), 7.50-7.56 (2H, m), 13H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.5, 57.4, 81.8, 88.5, 102.4, 113.0, 116.3, 118.7, 121.4, 129.1, 131.7, 133.8, 134.1, 139.2, 159.4, 15C. HRMS Calculated for $C_{17}H_{13}NO$: 247.0997, found: 247.0953.

2-(2-Fluorophenoxy)-1-(4-methylphenyl)prop-1-yne (1m). 81% isolated as white solid (Mp.: 64.0-65.0 ºC); R_f (Hexane:EtOAc = 10:1) = 0.19; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.30 (3H, s), 4.94 (2H, s), 6.88-7.22 (6H, m), 7.28 (2H, d, J = 8.2 Hz), 13H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.5, 58.1, 82.7, 87.9, 116.1 (d, $^2J_{CF}$ = 13.1 Hz), 119.0, 122.0 (d, $^3J_{CF}$ = 6.6 Hz), 124.2 (d, $^4J_{CF}$ = 4.1 Hz), 129.0, 131.6, 133.7 (d, $^2J_{CF}$ = 19.7 Hz), 138.9, 145.7 (d, $^3J_{CF}$ = 10.7 Hz), 152.9 (d, $^1J_{CF}$ = 244.8 Hz), 14C. HRMS Calculated for $C_{16}H_{13}FO$: 240.0950, found: 240.0945.

2-(2-Bromophenoxy)-1-phenylprop-1-yne (1n). 66% isolated as a white solid (Mp.: 34.2-35.2 ºC); R_f (Hexane) = 0.19; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 4.94 (2H, s), 6.80-7.52 (9H, m), 11H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 57.7, 83.3, 87.7, 112.4, 114.4, 122.1, 122.7, 128.28, 128.34, 128.7, 131.8, 133.5, 154.2, 13C. HRMS Calculated for $C_{15}H_{11}BrO$: 285.9993, found: 285.9990.

2-(3-Nitrophenoxy)-1-phenylprop-1-yne (1q). 71% isolated as yellow solid (Mp.: 68.8-69.8 ºC); R_f (Hexane:EtOAc = 10:1) = 0.42; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 4.93 (2H, s), 7.19-7.42 (7H, m), 7.79-7.86 (2H, m), 11H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 57.1, 82.4, 88.2, 109.5, 116.4, 12.7, 122.0, 128.3, 129.0, 130.0, 131.8, 149.1, 158.1, 13C. HRMS Calculated for $C_{15}H_{11}NO_3$: 253.0739, found: 253.0729.

2-(3-Nitrophenoxy)-1-(4-methylphenyl)prop-1-yne (1r). 63% isolated as yellow solid (Mp.: 70.7-71.7 ºC); R_f (Hexane:EtOAc = 10:1) = 0.32; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.29 (3H, s), 4.94 (2H, s), 7.06 (2H, d, J = 7.9 Hz), 7.26-7.7.32 (3H, m), 7.41 (1H, dd, J = 8.1, 8.1 Hz), 7.81-7.87 (2H, m), 13H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.5, 57.2, 81.8, 88.5, 106.6, 109.5, 116.4, 118.6, 122.1, 129.1, 130.0, 131.8, 139.2, 158.2, 14C. HRMS Calculated for $C_{16}H_{13}NO_3$: 267.0895, found: 267.0897.

2-(3-Benzoylphenoxy)-1-(4-methylphenyl)prop-1-yne (1s). 69% isolated as a white solid (Mp.: 81.9-82.9 ºC); ^{1}H NMR ($CDCl_3$, 395.75 MHz) δ 2.33 (3H, s), 3.92 (3H, s), 4.94 (2H, s), 7.10 (2H, d, J = 7.7 Hz), 7.21-7.72 (6H, m), 16H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.4, 52.1, 56.7, 82.6, 87.6, 115.2, 118.9, 120.1, 122.5, 128.9, 129.3, 131.3, 131.6, 138.8, 157.6, 166.7, 16C. HRMS Calculated for $C_{18}H_{16}O_3$: 280.1099, found: 280.1097.

2-(3-Fluorophenoxy)-1-(4-methylphenyl)prop-1-yne (1t). 74% isolated as white solid (Mp.: 55.1-56.1 ºC); R_f (Hexane:EtOAc = 10/1) = 0.49; ^{1}H NMR ($CDCl_3$, 395.75 MHz) δ 2.35 (3H, s), 4.89 (2H, s), 6.71-6.83 (3H, m), 7.12 (2H, d, J = 7.7 Hz), 7.22-7.28 (1H, m), 7.33 (2H, d, J = 7.7 Hz), 13H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.5, 56.9, 82.6, 87.7, 100.5, 102.8 (d, $^2J_{CF}$ = 25.1 Hz), 108.2 (d, $^2J_{CF}$ = 21.2 Hz), 110.7 (d, $^4J_{CF}$ = 2.8 Hz), 118.9, 129.1, 130.2 (d, $^3J_{CF}$ = 10.0 Hz), 131.7, 139.0, 159.1 (d, $^3J_{CF}$ = 11.2 Hz), 163.5 (d, $^1J_{CF}$ = 244.8 Hz), 14C. HRMS Calculated for $C_{16}H_{13}FO$: 240.0950, found: 240.0945.

2-(3-Bromophenoxy)-1-(4-methylphenyl)prop-1-yne (1u). 72% isolated as colorless oil; R_f (Hexane) = 0.36; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.35 (3H, s), 4.89 (2H, s), 6.94-7.35 (8H, m), 13H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.5, 56.9, 82.5, 87.8, 113.9, 118.3, 118.9, 122.7, 124.4, 129.0, 130.5, 131.7, 139.0, 158.5, 14C. HRMS Calculated for $C_{16}H_{13}BrO$: 300.0150, found: 300.0147.

2-Phenyl-2-(3-phenyl-prop-2-ynyl)-malonic acid diethyl ester (1x). 57% isolated as light brown oil; R_f (Hexane:EtOAc = 20:1) = 0.27; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 1.28 (6H, t, J = 6.8 Hz), 3.40 (2H, s), 4.20-4.35 (4H, m), 7.24-7.41 (8H, m), 7.52-7.56 (2H, m), 22H.

2,2,5-Triphenyl-pent-4-yn-1-ol (4a). 86% isolated as light yellow solid; R_f (Hexane:EtOAc = 5:1) =

0.29; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 3.28 (2H, s), 4.36 (2H, d, *J* = 6.8 Hz), 7.26-7.36 (15H, m), 19H; HRMS Calculated for $C_{16}H_{13}FO$: 312.1514, found: 312.1510.

2,2,5-Triphenyl-pent-4-ynyl-N-tosylamine (4c). 80% isolated as a white solid; R_f (Hexane:EtOAc = 1:1) = 0.79; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.36 (3H, s), 3.18 (2H, s), 3.77 (2H, d, *J* = 6.4 Hz), 4.05 (1H, t, *J* = 6.4 Hz), 7.14-7.30 (17H, m), 7.67 (2H, d, *J* = 8.2 Hz), 27H.

2-Phenyl-2-(3-phenylprop-2-ynyl)-propane-1,3-diol (4b). 57% isolated as light brown oil; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.11 (2H, brs), 2.93 (2H, s), 4.06-4.21 (4H, m), 7.24-7.32 (6H, m), 7.38-7.50 (4H, m), 18H; HRMS Calculated for $C_{18}H_{18}O_2$, 266.1307, found 266.1317.

Representative procedure for the carboarylation. Reactions were carried out under N_2 atmosphere. The alkynylarene **1** (or **4**) and the catalyst were placed in an oven-dried 20 mL-Schlenk tube. A solution of **2** in DCE (0.2M) was added into the Schlenk tube. After stirring at 80 ºC for the appropriate time, the reaction mixture was cooled, passed through a short silica-gel column with ether as an eluent, and then removed solvent. The crude product was purified by flash column chromatography to afford the carboarylated product.

Analytical data of carboarylated products

3-(*N*-Benzylisoindolin-1-onyl)-4-phenyl-1,2-dihydronaphthalene (3aa). Isolated as a white solid (Mp.: 209.0-210.0 ºC); R_f (Hexane:AcOH = 5:1) = 0.26; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 1.67 (1H, ddd, *J* = 16.5, 10.0, 7.0 Hz), 1.86 (1H, dt, *J* = 16.5, 7.0 Hz), 2.54-2.61 (2H, m), 4.20 (1H, d, *J* = 15.0 Hz), 5.21 (1H, d, *J* = 15.5 Hz), 5.24 (1H, s), 6.65 (1H, d, *J* = 8.0 Hz), 6.88 (1H, br s), 7.06 (1H, dt, *J* = 7.5, 1.0 Hz), 7.11-7.15 (6H, m), 7.20-7.22 (3H, m), 7.25-7.28 (1H, m), 7.33 (1H, br d, *J* = 7.5Hz), 7.38 (1H, d, *J* = 7.5 Hz), 7.47 (1H, t, *J* = 7.0 Hz), 7.51 (1H, dt, *J*=7.0, 1.5 Hz), 7.89 (1H, d, *J* = 7.0 Hz), 25H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 21.2, 28.0, 44.4, 61.8, 122.6, 123.7, 126.4, 126.6, 127.2, 127.3, 127.5, 127.6, 128.4, 128.5, 128.6, 129.7, 130.2, 131.7, 131.8, 132.6, 135.7, 135.8, 137.3, 137.5, 140.9, 144.4, 169.1, 27C; HRMS Calculated for $C_{30}H_{23}NO_2$: 427.1936, Found: 427.1930.

Methyl 3-(*N*-benzylisoindolin-1-onyl)-4-phenyl-*2H*-chromene-6-carboxylate (3ba). Isolated as a white solid (Mp.: 195.0-196.0 ºC); R_f(Hexane:EtOAc = 5:1) = 0.25; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 3.79 (3H, s), 4.11 (1H, d, *J* = 14.1 Hz), 4.17 (1H, d, *J* = 15.4 Hz), 4.28 (1H, d, *J* = 14.1 Hz), 5.23 (1H, s), 5.27 (1H, d, *J* = 15.3 Hz), 6.86 (1H, d, *J* = 8.4 Hz), 6.95(1H, d, *J* = 7.3 Hz), 7.09-7.10 (2H, m), 7.18-7.21 (4H, m), 7.32-7.35 (2H, m), 7.40-7.42 (3H, m), 7.51 (1H, t, *J* = 7.3 Hz), 7.56 (1H, t, *J* = 7.2 Hz), 7.86 (1H, dd, *J* = 8.4, 2.1 Hz), 7.90 (1H, d, *J* = 7.5 Hz), 25H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 44.4, 51.9, 59,5, 59.6, 63.6, 116.0, 122.7, 123.5, 124.0, 124.9, 127.6, 127.7, 128.4, 128.6, 128.9, 129.0, 129.3, 129.5, 129.7, 131.5, 132.1, 134.1, 136.7, 137.9, 142.7,157.9, 166.5, 168.7, 28C; HRMS Calculated for $C_{32}H_{25}NO_4$: 487.1784, Found: 487.1778.

Methyl 3-(*N*-benzylisoindolin-1-onyl)-4-tolyl-*2H*-chromene-6-carboxylate (3ca). Isolated as a white solid (Mp.: 194.0-195.0 °C); R_f (Hexane:AcOH = 5:1) = 0.25; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 2.38 (3H, s), 3.81 (3H, s, CO_2Me), 4.10 (1H, d, *J* = 14.0 Hz), 4.17 (1H, d, *J* = 15.0 Hz), 4.26 (1H, d, *J* = 14.0 Hz), 5.25 (1H, d, *J* = 15.0 Hz), 5.28 (1H, s), 6.85 (2H, d, *J* = 8.5 Hz), 7.10-7.58 (12H, m), 7.85 (1H, dd, *J* = 6.0, 2.0 Hz), 7.91(1H, d, *J* = 7.0 Hz), 27H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 21.2, 44.4, 51.9, 59.5, 63.6, 115.9, 122.7, 123.4, 124.0, 124.2, 124.7, 127.4, 127.8, 128.5, 128.6, 128.9, 129.2, 129.6, 131.0, 131.4, 132.1, 132.2, 136.8, 137.9, 138.1, 142.8, 158.0, 166.5, 168.7, 29C; HRMS Calculated for $C_{33}H_{27}NO_4$: 501.1940, Found: 501.1934.

Methyl 3-(*N*-Benzylisoindolin-1-onyl)-4-(bromophenyl)-*2H*-chromene-6-carboxylate (3da). Isolated as a white solid (Mp.: 185.0-186.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.23; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 3.80 (3H, s), 4.11 (2H, d, *J* = 14.2 Hz), 4.28 (1H, d, *J* = 14.2 Hz), 5.18 (1H, s), 5.34 (1H, d, *J* = 15.5 Hz), 6.70 (1H, d, *J* = 7.9 Hz), 6.86 (1H, d, *J* = 8.4 Hz), 7.07 (2H, d, *J* = 7.0 Hz), 7.18-7.27 (5H, m), 7.35-7.36 (2H, m), 7.50-7.58 (3H, m), 7.86 (1H, dd, *J* = 8.4, 2.1 Hz), 7.92 (1H, d, *J* = 7.2 Hz), 24H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 44.3, 52.0, 59.2, 63.5, 116.1, 122.5, 122.6, 123.6, 124.2, 125.4, 127.4, 127.7, 128.1, 128.2, 128.4, 128.8, 130.9, 131.3, 131.8, 132.1, 132.2, 133.0, 136.6, 136.7, 142.4, 157.9, 166.3, 168.6, 28C; HRMS Calculated for $C_{32}H_{24}BrNO_4$: 565.0889, Found: 565.0883.

6-Benzoyl-3-(*N*-Benzylisoindolin-1-onyl)-4-tolyl-*2H*-chromene (3ea). Isolated as a white solid (Mp.: 175.0-176.0 °C); R_f (Hexane:AcOH = 5:1) = 0.26; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 2.33 (3H, s), 4.13 (1H, d, *J* = 14.1 Hz), 4.19 (1H, d, *J* =15.3 Hz), 4.29 (1H, d, *J* =14.1 Hz), 5.26 (1H, d, *J* =15.3 Hz), 5.31 (1H, s), 6.87 (2H, d, *J* = 8.0 Hz), 6.99 (1H, d, *J* =7.3 Hz, Ar), 7.11-7.13 (2H, m), 7.18-7.24 (5H, m), 7.33 (1H, d, *J* = 2.2 Hz), 7.39-7.43 (3H, m), 7.49-7.60 (3H, m), 7.61 (1H, dd, *J* = 8.3, 2.1 Hz), 7.68-7.69 (2H, m), 7.91 (1H, d, *J* =7.3 Hz, Ar), 29 H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 21.2, 44.4, 59.5, 63.7, 115.5, 122.6, 122.7, 124.0, 124.4, 124.7, 127.4, 127.7, 128.4, 128.6, 128.7, 128.9, 129.2, 129.6, 129.7, 130.8, 130.9, 132.0, 132.1, 132.2, 132.5, 136.7, 137.6, 138.1, 142.7, 157.8, 168.6, 195.1, 32 C; HRMS Calculated for $C_{38}H_{29}NO_3$: 547.2147, Found: 547.2141.

3-(*N*-Benzylisoindolin-1-onyl)-6-cyano-4-phenyl-*2H*-chromene (3fa). Isolated as a white solid (Mp.: 211.0-212.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.24; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 4.14 (1H, d, *J* = 14.3 Hz), 4.18 (1H, d, *J* = 15.4 Hz), 4.31 (1H, d, *J* = 14.3 Hz), 5.22 (1H, s), 5.26 (1H, d, *J* = 15.4 Hz), 6.86 (1H, d, *J* = 8.3 Hz), 6.91 (1H, d, *J* = 7.5 Hz), 6.95 (1H, d, *J* = 2.0 Hz), 7.09-7.11 (2H, m), 7.19-7.24 (4H, m), 7.29-7.32 (1H, m), 7.36 (1H, t, *J* = 7.6 Hz), 7.40-7.47 (3H, m), 7.52 (1H, t, *J* = 7.4 Hz), 7.57 (1H, t, *J* = 6.9 Hz), 7.91 (1H, d, *J* = 7.5 Hz), 22H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 44.4, 59.4, 63.7, 104.8, 116.4, 118.8, 124.0, 124.1, 125.0, 126.0, 127.7, 128.3, 128.6, 129.1, 129.4, 130.8, 132.0, 132.1, 132.3, 132.9, 133.3, 133.6, 134.0, 136.7, 142.3, 157.4, 168.7, 27C; HRMS Calculated for $C_{31}H_{22}N_2O_2$: 454.1681, Found: 454.1675.

3-(*N*-Benzylisoindolin-1-onyl)-6-fluoro-4-tolyl-*2H*-chromene (3ga). Isolated as a white solid (Mp.: 207.0-208.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.24; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 2.35(3H, s), 4.03 (1H, d, *J* = 14.1 Hz), 4.15 (1H, d, *J* = 15.3 Hz), 4.18 (1H, d, *J* = 14.1 Hz), 5.27 (1H, s), 5.30 (1H, d, *J* = 15.3 Hz), 6.45 (1H, dd, *J* = 9.3, 2.8 Hz), 6.77 (1H, dd, *J* = 8.8, 4.8 Hz), 6.84 (2H, td, *J* = 8.2, 2.9 Hz), 7.01 (1H, d, *J* = 7.3 Hz), 7.09-7.11 (2H, m), 7.18-7.21 (5H, m), 7.41 (1H, d, *J* = 7.5 Hz), 7.50 (1H, t, *J* = 7.4 Hz), 7.54 (1H, t, *J* = 7.5 Hz), 7.91 (1H, d, *J* = 7.5 Hz), 24 H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) dC 21.1, 44.3, 59.4, 63.3, 113.2, 115.7, 115.9, 116.7, 122.7, 124.0, 125.7, 125.8, 127.3, 128.5, 129.2, 129.5, 129.6, 131.2, 132.2, 136.8, 137.8, 138.1, 142.8, 149.9, 156.4, 158.3, 168.7, 27 C; HRMS Calculated for $C_{31}H_{24}FNO_2$: 461.1791, Found: 461.1785.

3-(*N*-Benzylisoindolin-1-onyl)-6-bromo-4-phenyl-*2H*-chromene (3ha). Isolated as a white solid (Mp.: 163.0-164.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.24; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 4.05 (1H, d, *J* = 14.1 Hz), 4.13 (1H, d, *J* = 15.3 Hz), 4.22 (1H, d, *J* = 14.1 Hz), 5.20 (1H, s), 5.30 (1H, d, *J* = 15.3 Hz), 6.73 (1H, d, *J* = 8.6 Hz), 6.79 (1H, d, *J* = 2.3 Hz), 6.90 (1H, d, *J* = 7.5 Hz), 7.09-7.10 (2H, m), 7.18-7.25 (5H, m), 7.32 (2H, t, *J* = 7.4 Hz), 7.40-7.42 (2H, m), 7.51 (1H, t, *J* = 7.4 Hz), 7.56 (1H, t, *J* = 7.4 Hz), 7.91 (1H, d, *J* = 7.5 Hz), 22 H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 44.3, 59.4, 63.3, 113.7, 117.8, 122.7, 124.0, 125.7, 126.4, 127.4, 127.6, 128.3, 128.6, 128.9, 129.2, 129.3, 129.7, 132.1, 132.2, 132.3, 134.0, 136.7, 137.4, 142.7, 153.0, 168.7, 26C; HRMS Calculated for $C_{30}H_{22}BrNO_2$: 507.0834, Found: 507.0828.

3-(*N*-Benzylisoindolin-1-onyl)-6-methoxy-4-tolyl-*2H*-chromene (3ia). Isolated as a white solid (Mp.: 174.0-175.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.23; ^{1}H NMR ($CDCl_3$, 399.823 MHz) δ 3.63 (3H, s), 4.00 (1H, d, *J* = 13.9 Hz), 4.12 (1H, d, *J* = 15.4 Hz), 4.18 (1H, d, *J* = 13.9 Hz), 5.22 (1H, s), 5.33 (1H, d, *J* = 15.4 Hz), 6.26 (1H, d, *J* = 2.6 Hz), 6.73 (1H, dd, *J* = 8.8, 2.9 Hz), 6.80 (1H, d, *J* = 8.8 Hz), 6.93 (1H, d, *J* = 7.2 Hz), 7.08-7.10 (2H, m), 7.15-7.20 (3H, m), 7.27-7.42 (5H, m), 7.50 (1H, t, *J* = 7.2 Hz), 7.55 (1H, td, *J* = 7.5, 1.2 Hz), 7.90(1H, d, *J* = 7.2 Hz), 24H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 44.3, 55.7, 59.5, 63.3, 112.4, 114.4, 116.4, 122.8, 124.0, 125.4, 127.4, 127.7, 128.0, 128.6, 128.7, 128.9, 129.4, 129.8, 132.1, 132.2, 134.7, 136.9, 138.5, 143.0, 148.0, 154.1, 168.7, 27C; HRMS Calculated for $C_{31}H_{25}NO_3$: 459.1834, Found: 459.1829.

3-(*N*-Benzylisoindolin-1-onyl)-6-methyl-4-tolyl-*2H*-chromene (3ja). Isolated as colorless oil; R_f (Hexane:EtOAc = 5:1) = 0.23; ^{1}H NMR ($CDCl_3$, 399.823 MHz) δ 2.16 (3H, s), 4.03 (1H, d, *J* = 13.9 Hz), 4.13 (1H, d, *J* = 15.3 Hz), 4.21 (1H, d, *J* = 13.9 Hz), 5.21 (1H, s), 5.34 (1H, d, *J* = 15.3 Hz), 6.50 (1H, d, *J* = 2.2 Hz), 6.76 (1H, d, *J* = 8.2 Hz), 6.93 (1H, d, *J* = 7.3 Hz), 6.98 (1H, dd, *J* = 8.1, 2.2 Hz), 7.09-7.11 (2H, m), 7.17-7.22 (4H, m), 7.29-7.42 (4H, m), 7.50 (1H, t, *J* = 7.1 Hz), 7.54 (1H, td, *J* = 7.5, 1.3 Hz), 7.90 (1H, d, J = 7.3), 25H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 20.6, 44.2, 59.5, 63.2, 115.6, 115.7, 122.7, 123.9, 124.0, 124.3, 127.1, 127.3, 127.7, 127.9, 128.5, 128.8, 129.3, 129.8, 130.2, 130.8, 132.0, 135.0, 137.0, 138.6, 143.2, 151.9, 168.7, 27C; HRMS Calculated for $C_{31}H_{25}NO_2$: 443.1885, found: 443.1880.

3-(*N*-Benzylisoindolin-1-onyl)-6-bromo-4-butyl-*2H*-chromene (3ka). Isolated as colorless oil; R_f (Hexane:EtOAc = 5:1) = 0.24; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 0.89 (3H, t, *J* = 7.3 Hz), 1.36-1.42 (2H, m), 1.46-1.52 (2H, m), 2.23 (2H, tt, *J* = 7.0, 2.2 Hz), 3.79 (1H, d, *J* = 14.7 Hz), 4.66 (2H, t, *J* = 2.2 Hz), 5.33 (1H, d, *J* = 14.7 Hz), 5.88 (1H, s), 6.70 (1H, d, *J* = 8.7 Hz), 6.84 (1H, dd, *J* = 8.7, 2.6 Hz), 7.19-7.21(2H, m), 7.23-7.30 (5H, m), 7.43-7.45(2H, m), 7.90-7.92 (1H, m), 26H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 13.5, 18.4, 21.8, 30.3, 43.9, 56.8, 61.5, 89.2, 115.6, 119.3, 122.9, 124.3, 127.5, 127.6, 128.3, 128.4, 128.5, 128.6, 128.7, 128.7, 131.1, 131.6, 136.7, 146.2, 158.1, 168.7, 26C; HRMS Calculated for $C_{28}H_{26}BrNO_2$: 487.1147, found: 487.1142.

3-(*N*-Benzylisoindolin-1-onyl)-8-nitro-4-tolyl-*2H*-chromene (3la). Isolated as a yellow solid (Mp.: 256.0-257.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.21; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 2.35 (3H, s), 4.12 (1H, d, *J* = 15.5 Hz), 4.19 (1H, d, *J* = 14.2 Hz), 4.35 (1H, d, *J* = 14.2 Hz), 5.26 (1H, s), 5.27 (1H, d, *J* = 15.5 Hz), 6.81 (1H, d, *J* = 6.1 Hz), 6.88 (1H, t, *J* = 7.9 Hz), 6.95 (1H, d, *J* = 7.6 Hz), 7.01 (1H, d, *J* = 6.0 Hz), 7.09-7.11 (2H, m), 7.20-7.29 (5H, m), 7.39 (1H, d, *J* = 7.3 Hz), 7.51 (1H, t, *J* = 7.3 Hz), 7.55 (1H, t, *J* = 7.3 Hz), 7.73 (1H, d, *J* = 8.1 Hz), 7.90 (1H, d, *J* = 7.2 Hz); 24 H
^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 21.2, 44.4, 59.3, 64.2, 120.6, 122.7, 124.0, 126.4, 127.3, 127.5, 127.7, 128.4, 128.6, 128.8, 129.2, 129.6, 129.7, 130.8, 131.3, 131.9, 132.1, 132.3, 137.0, 138.6, 142.3, 148.1, 168.6, 27 C; HRMS Calculated for $C_{31}H_{24}N_2O_4$: 488.1736, found: 488.1733.

3-(*N*-Benzylisoindolin-1-onyl)-8-cyano-4-tolyl-*2H*-chromene (3ma). Isolated as a white solid (Mp.: 268.0-269.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.22; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 2.35 (3H, s), 4.18(1H, d, *J* = 15.3 Hz), 4.21 (1H, d. *J* = 14.2 Hz), 4.37 (1H, d, *J* = 14.2 Hz), 5.23 (1H, d, *J* = 15.3 Hz), 5.25(1H, s), 6.80 (1H, d, *J* = 7.6 Hz), 6.86 (1H, t, *J* = 7.7 Hz), 6.91 (1H, dd, *J* = 7.8, 1.7 Hz), 7.00 (1H, d, *J* = 7.7 Hz), 7.10-7.12 (2H, m), 7.19-7.23 (5H, m), 7.37-7.40 (2H, m), 7.51 (1H, t, *J* = 7.0 Hz), 7.56 (1H, td, *J* = 7.3, 1.2 Hz), 7.91 (1H, d, *J* = 7.3 Hz), 24 H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 21.2, 44.5, 59.5, 64.3, 100.6, 115.7, 121.4, 122.6, 124.2, 125.2, 125.8, 127.5, 127.7, 128.6, 129.1, 129.2, 129.6, 130.6, 131.0, 132.1, 132.2, 132.7, 136.7, 136.9, 138.4, 142.4, 156.3, 168.7, 28C; HRMS Calculated for $C_{32}H_{24}N_2O_2$: 468.1838, found: 468.1832.

3-(*N*-Benzylisoindolin-1-onyl)-8-flioro-4-tolyl-*2H*-chromene (3na). Isolated as a white solid (Mp.: 230.0-231.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.24; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 2.35 (3H, s), 4.11 (1H, d, *J* = 13.8 Hz), 4.17 (1H, d, *J* = 15.3 Hz), 4.27 (1H, d, *J* = 13.8 Hz), 5.28 (1H, s), 5.29 (1H, d, *J* = 15.3 Hz), 6.52 (1H, d, *J* = 7.8 Hz), 6.75 (1H, td, *J* = 8.1, 4.9 Hz), 6.83 (1H, d, *J* = 7.6 Hz), 6.99-7.00 (2H, m), 7.10-7.12 (2H, m), 7.18-7.22 (5H, m), 7.41 (1H, d, *J* = 7.3 Hz), 7.50 (1H, t, *J* = 7.3 Hz), 7.55 (1H, t, *J* = 7.3 Hz), 7.91 (1H, *J* = 7.5 Hz), 24 H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 21.1, 44.3, 59.5, 63.5, 116.4, 120.8, 122.1, 122.7, 124.0, 125.1, 128.5, 127.0, 127.4, 127.7, 128.9, 129.2, 129.4, 129.6, 131.4, 132.2, 136.8, 138.0, 141.7, 142.8, 149.9, 151.9, 168.7, 27 C; HRMS Calculated for $C_{31}H_{24}FNO_2$: 461.5262, found: 461.1784.

3-(*N*-Benzylisoindolin-1-onyl)-8-bromo-4-phenyl-*2H*-chromene (3oa). Isolated as a white solid (Mp.: 221.0-222.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.26; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 4.12 (1H, d, *J* = 15.4 Hz), 4.18 (1H, d, *J* = 14.1 Hz), 4.37 (1H, d, *J* = 14.1 Hz), 5.22 (1H, s), 5.34 (1H, d, *J* = 15.4 Hz), 6.64 (1H, dd, *J* = 7.7, 1.5 Hz), 6.71 (1H, t, *J* = 7.8 Hz), 6.91 (1H, d, *J* = 7.5 Hz), 7.09-7.11 (2H, m), 7.16-7.21 (4H, m), 731 (2H, t, *J* = 7.5 Hz), 7.38 (1H, dd, *J* = 7.9, 1.6 Hz), 7.39 (1H, brs), 7.41 (1H, d, *J* = 7.2 Hz), 7.50 (1H, t, *J* = 7.3 Hz), 7.55 (1H, td, *J* = 7.3, 1.1 Hz), 7.90 (1H, d, *J* = 7.3 Hz), 22 H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) dC 44.3, 59.3, 63.9, 110.1, 122.2, 122.7, 124.0, 125.2, 125.98, 126.03, 127.4, 127.6, 128.2, 128.5, 128.8, 129.0, 129.3, 129.7, 132.1, 133.2, 134.4, 136.7, 137.9, 142.6, 150.7, 168.6, 26 C; HRMS Calculated for $C_{30}H_{22}BrNO_2$: 507.0834, found: 507.0828.

3-(*N*-Benzylisoindolin-1-onyl)-8-methoxy-4-phenyl-*2H*-chromene (3pa). Isolated as a yellow solid (Mp.: 47.0-48.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.25; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 3.86 (3H, s), 4.10 (1H, d, *J* = 13.5 Hz), 4.13 (1H, d, *J* = 15.0 Hz), 4.29 (1H, d, *J* = 13.5 Hz), 5.22 (1H, s), 5.33 (1H, d, *J* = 15.0 Hz), 6.34 (1H, dd, *J* = 1.5, 6.0 Hz), 6.77-6.92 (2H, m), 6.91 (1H, d, *J* = 7.5 Hz), 7.08-7.53 (12H, m), 7.89 (1H, d, *J* = 7.0 Hz), 25 H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 43.8, 55.9, 59.6, 63.4, 112.4, 118.7, 121.0, 123.7, 124.4, 125.4, 127.4, 128.0, 128.2, 128.3, 128.4, 128.5, 128.6, 128.6, 129.8, 132.1, 132.2, 135.0, 136.9, 138.5, 143.1, 147.8, 168.7, 27 C; HRMS Calculated for $C_{31}H_{25}NO_3$: 459.1834, found: 459.1829.

3-(*N*-Benzylisoindolin-1-onyl)-8-methyl-4-phenyl-*2H*-chromene (3qa). Isolated as colorless oil; R_f (Hexane:EtOAc = 5:1) = 0.23; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 2.17 (3H, s), 4.09 (1H, d, *J* = 13.8 Hz), 4.12 (1H, d, *J* = 15.4 Hz), 4.27 (1H, d, *J* = 13.8 Hz), 5.22 (1H, s), 5.34 (1H, d, *J* = 15.4 Hz), 6.54 (1H, dd, *J* = 7.7, 1.6 Hz), 6.73 (1H, dd, *J* = 7.6, 7.0 Hz), 6.93 (1H, d, *J* = 7.3 Hz), 7.04 (1H, d, *J* = 7.0 Hz), 7.08-7.10 (2H, m), 7.18-7.20 (3H, m), 7.29 (1H, tt, *J* = 7.3, 1.3 Hz), 7.32-7.36 (2H, m), 7.38 (1H, d, *J* = 5.7 Hz), 7.41 (1H, dd, *J* = 7.6, 1.5 Hz), 7.49 (1H, t, *J* = 7.2 Hz), 7.54 (1H, td, *J* = 7.5, 1.2 Hz), 7.90 (1H, d, *J* = 7.3 Hz), 25H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 15.6, 44.2, 59.5, 63.2, 120.8, 122.8, 124.0, 124.1, 124.6, 125.4, 127.3, 127.7, 128.4, 128.6, 128.7, 128.8, 129.5, 130.0, 131.3, 132.3, 134.2, 135.2, 136.9, 138.8, 143.2, 152.1, 168.7, 27C; HRMS Calculated for $C_{31}H_{25}NO_2$: 443.1885, found: 443.1880.

3-(*N*-Benzylisoindolin-1-onyl)-5-nitro-4-phenyl-*2H*-chromene (3ra-1). Isolated as a yellow solid (Mp.: 227.0-228.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.23; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 3.98 (1H, d, *J* = 13.1 Hz), 4.05 (1H, d, *J* = 13.1 Hz), 4.13 (1H, d, *J* = 15.0 Hz), 5.23 (1H, d, *J* = 15.0 Hz), 5.49 (1H, s), 6.87 (1H br s), 7.01 (2H, dd, *J* = 7.9, 1.8 Hz), 7.12-7.33 (10H, m), 7.35 (1H, d, *J* = 7.0 Hz), 7.52 (1H, t, *J* = 7.1 Hz), 7.56 (1H, td, *J* = 7.5, 1.3 Hz), 7.92(1H, d, *J* = 6.8 Hz), 22H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) dC 44.6, 58.5, 63.3, 117.9, 119.5, 120.3, 122.9, 124.1, 127.5, 127.8, 128.0, 128.4, 128.6, 128.8, 129.1, 129.4, 129.5, 132.27, 132.32, 133.6, 135.1, 136.6, 142.7, 149.2, 157.0, 168.6, 26C; HRMS Calculated for $C_{30}H_{22}N_2O_4$: 474.1580, found: 474.1573.

3-(*N*-Benzylisoindolin-1-onyl)-7-nitro-4-phenyl-*2H*-chromene (3ra-2). Isolated as a yellow solid

(Mp.: 228.0-229.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.24; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 4.13 (1H, d, *J* = 14.4 Hz), 4.18 (1H, d, *J* = 15.4 Hz), 4.31 (1H, d, *J* = 14.4 Hz), 5.24 (1H, s), 5.28 (1H, d, *J* = 15.4 Hz), 6.80 (1H, d, *J* = 8.3 Hz), 6.92 (1H, d, *J* = 7.5 Hz), 7.10-7.12 (2H, m), 7.19-7.23 (4H, m), 7.31-7.37 (2H, m), 7.41-7.48 (2H, m), 7.53 (1H, t, *J* = 7.1 Hz), 7.57 (1H, td, *J* = 7.5, 1.2 Hz), 7.65-7.67 (2H, m), 7.92(1H, d, *J* = 7.5 Hz), 22H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 44.5, 59.4, 63.7, 111.4, 116.5, 122.6, 124.2, 127.1, 127.57, 127.62, 128.60, 128.64, 128.8, 129.1, 129.2, 129.7, 130.1, 132.2, 132.3, 133.6, 136.6, 137.0, 142.2, 148.1, 154.2, 168.6, 26C; HRMS Calculated for $C_{30}H_{22}N_2O_4$: 474.5180, found: 474.1573.

3-(*N*-Benzylisoindolin-1-onyl)-5-nitro-4-tolyl-*2H*-chromene (3sa-1). Isolated as a yellow solid (Mp.:.: 100.0-101.0 ºC); Rf(Hexane:EtOAc=5:1) = 0.22; ^{1}H NMR ($CDCl_3$, 399.823 MHz) δ 2.31 (3H, s), 3.97 (1H, d, *J* = 13.1 Hz), 4.03 (1H, d, *J* = 13.1 Hz), 4.10 (1H, d, *J* = 15.0 Hz), 5.21 (1H, d, *J* = 15.0 Hz), 5.51 (1H, s), 6.75 (1H, br s), 6.99-7.18 (8H, m), 7.28-7.34 (3H, m), 7.38 (1H, d, *J* = 7.3 Hz), 7.51 (1H, t, *J* = 7.3 Hz), 7.55 (1H, td, *J* = 7.5, 1.5 Hz), 7.91 (1H, d, *J* = 6.6 Hz), 24H; ^{13}C NMR ($CDCl_3$, 100.54 MHz) dC 21.2, 44.6, 58.5, 63.3, 117.9, 119.7, 120.3, 122.9, 124.1, 127.4, 127.6, 128.1, 128.5, 129.09, 129.15, 129.3, 129.7, 130.7, 132.2, 132.3, 135.1, 136.6, 138.3, 142.8, 149.2, 157.0, 168.6, 27C; HRMS Calculated for $C_{31}H_{24}N_2O_4$: 488.1736, found: 488.1729.

3-(*N*-Benzylisoindolin-1-onyl)-7-nitro-4-tolyl-*2H*-chromene (3sa-2). Isolated as a yellow solid (Mp.:.: 229.0-230.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.23; ^{1}H NMR ($CDCl_3$, 399.823 MHz) δ 2.36 (3H, s), 4.12 (1H, d, *J* = 14.3 Hz), 4.18 (1H, d, *J* = 15.4 Hz), 4.28 (1H, d, *J* = 14.3 Hz), 5.24 (1H, d, *J* = 15.4 Hz), 5.28 (1H, s), 6.81 (1H, d, *J* = 7.4 Hz), 6.83 (1H, d, *J* = 8.4 Hz), 7.02 (1H, d, *J* = 7.4 Hz), 7.10-7.12 (2H, m), 7.18-7.25 (5H, m), 7.40 (1H, d, *J* = 7.3 Hz), 7.52 (1H, t, *J* = 7.3 Hz), 7.57 (1H td, *J* = 7.3, 1.4 Hz), 7.63-7.67 (2H, m), 7.91 (1H, d, *J* = 6.8 Hz), 24H; ^{13}C NMR ($CDCl_3$, 100.54 MHz) δ 21.2, 44.6, 59.4, 63.7, 111.4, 116.5, 122.6, 124.2, 127.2, 127.5, 127.7, 128.6, 129.1, 129.2, 129.6, 129.7, 130.3, 130.6, 132.2, 132.3, 136.6, 137.0, 138.5, 142.2, 148.0, 154.2, 168.7, 27C; HRMS Calculated for $C_{31}H_{24}N_2O_4$: 488.1736, found: 488.1729.

Methyl 3-(*N*-benzylisoindolin-1-onyl)-4-tolyl-*2H*-chromene-5-carboxylate (3ta-1). Isolated as a white solid (Mp.:.: 207.0-208.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.20; ^{1}H NMR ($CDCl_3$, 399.823 MHz) δ 2.32 (3H, s), 3.23 (3H, s), 3.97 (1H, d, *J* = 13.0 Hz), 4.04 (1H, d, *J* = 13.0 Hz), 4.07 (1H, d, *J* = 15.1 Hz), 5.28 (1H, d, *J* = 15.1 Hz), 5.53 (1H, s), 6.75 (1H, brs), 7.00 (3H, d, *J* = 6.7 Hz), 7.04 (1H, dd, *J* = 8.0, 1.4 Hz), 7.11-7.18 (6H, m), 7.25-7.28 (1H, m), 7.40 (1H, d, *J* = 7.3 Hz), 7.50-7.53 (1H, m), 7.54 (1H, td, *J* = 7.3, 1.3 Hz), 7.91 (1H, dd, *J* = 6.6, 1.4 Hz), 27 H; ^{13}C NMR ($CDCl_3$, 100.54 MHz) δ 21.1, 44.4, 51.7, 58.8, 63.0, 118.8, 122.8, 122.9, 124.0, 124.1, 25.2, 127.2, 128.0, 128.4, 128.8, 128.9, 129.3, 129.5, 130.2, 132.1, 132.4, 132.8, 136.8, 137.6, 137.7, 143.2, 156.3, 168.6, 28C; HRMS Calculated for $C_{33}H_{27}NO_4$: 501.1940, found: 501.1934.

Methyl 3-(*N*-benzylisoindolin-1-onyl)-4-phenyl-*2H*-chromene-7-carboxylate (3ta-2). Isolated as a white solid (Mp.: 159.0-160.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.21; ^{1}H NMR ($CDCl_3$, 399.823 MHz) δ 2.35(3H, s), 3.88 (3H, s), 4.07 (1H, d, *J* = 14.1 Hz), 4.16 (1H, d, *J* = 15.4 Hz), 4.23 (1H, d, *J* = 14.1 Hz), 5.27 (1H, d, *J* = 15.4 Hz), 5.28 (1H, s), 6.78 (1H, d, *J* = 8.0 Hz), 6.82 (1H, d, *J* = 7.1 Hz), 7.00 (1H, d, *J* = 7.3 Hz), 7.09-7.11 (2H, m), 7.18-7.29 (5H, m), 7.40 (1H, d, *J* = 6.9 Hz), 7.47-7.52 (3H, m), 7.53 (1H, td, *J* = 7.3, 1.5 Hz), 7.90 (1H, d, *J* = 6.8 Hz), 27 H; ^{13}C NMR ($CDCl_3$, 100.54 MHz) δ 21.2, 44.4, 52.2, 59.4, 63.3, 117.0, 122.6, 122.7, 124.0, 126.7, 127.0, 127.4, 127.7, 128.5, 129.0, 129.2, 129.5, 129.7, 131.0, 131.2, 132.1, 132.2, 136.8, 137.8, 138.1, 142.7, 153.8, 166.4, 168.7, 29C; HRMS Calculated for $C_{31}H_{25}NO_2$: 501.1940, found: 501.1934.

3-(*N*-Benzylisoindolin-1-onyl)-5-fluoro-4-tolyl-*2H*-chromene (3ua-1). Isolated as a white solid (Mp.: 195.0-196.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.21; ^{1}H NMR ($CDCl_3$, 399.823 MHz) δ 2.33 (3H, s),

3.94 (1H, d, *J* = 13.5 Hz), 4.07 (1H, d, *J* = 13.5 Hz), 4.12 (1H, d, *J* = 15.2 Hz), 5.27 (1H, d, *J* = 15.2 Hz), 5.37 (1H, s), 6.57 (1H, ddd, *J* = 10.8, 8.4, 1.0 Hz), 6.71 (1H, d, *J* =8.1 Hz), 6.87 (1H br s), 6.97 (1H br s), 7.07 (2H, dd, *J* = 7.2, 1.8 Hz), 7.13 (1H, ddd, *J* = 8.1, 8.1, 5.9 Hz), 7.17-7.22 (5H, m), 7.40 (1H, d, *J* = 7.5 Hz), 7.50 (1H, t, *J* = 7.3 Hz), 7.54 (1H, td, *J* = 7.3, 1.3 Hz), 7.90 (1H, d, *J* = 6.9 Hz), 24H; ^{13}C NMR ($CDCl_3$, 100.54 MHz) δ 21.2, 44.4, 58.7, 63.2, 109.6 (d, *J* = 22.1 Hz), 112.0 (d, *J* = 2.2 Hz), 113.8 (d, *J* = 12.0 Hz), 122.9, 124.0, 126.0, 127.3, 127.8, 128.5, 128.9, 129.1, 130.1 (d, *J* = 10.5 Hz), 132.1, 132.3, 133.4, 134.9, 136.8, 137.4, 143.1, 156.1 (d, *J* = 5.2 Hz), 159.0 (d, *J* = 253.6 Hz), 168.8; HRMS Calculated for $C_{31}H_{24}FNO_2$: 461.1791, found: 461.1785.

3-(*N*-Benzylisoindolin-1-onyl)-7-fluoro-4-tolyl-*2H*-chromene (3ua-2). Isolated as a white solid (Mp.: 198.0-199.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.20; ^{1}H NMR ($CDCl_3$, 399.823 MHz): δ 2.34 (3H, s), 4.05 (1H, d, *J* = 13.9 Hz), 4.15 (1H, d, *J* = 15.4 Hz), 4.20 (1H, d, *J* = 13.9 Hz), 5.25 (1H, s), 5.27 (1H, d, *J* = 15.4 Hz), 6.50 (1H, dd, *J* = 8.4, 2.5 Hz), 6.54 (1H, dd, *J* = 9.6, 2.4 Hz), 6.69 (1H, dd, *J* = 8.5, 6.5 Hz), 6.69 (1H, dd, *J* = 1.6, 6.4 Hz), 6.81 (1H, d, *J* = 4.0 Hz), 6.97 (1H, d, *J* = 4.0 Hz), 7.09-7.21 (7H, m), 7.40 (1H, d, *J* = 7.2 Hz), 7.53 (2H, m, Ar), 7.90 (1H, d, *J* = 6.8 Hz), 24H; ^{13}C NMR ($CDCl_3$, 100.54 MHz) δ 21.2, 44.3, 59.5, 63.6, 103.7 (d, *J* = 25.1 Hz), 108.2 (d, *J* = 22.1 Hz), 121.0 (d, *J* = 2.6 Hz), 122.7, 122.8, 124.0, 127.3, 127.7, 128.5, 128.1 (d, *J* = 10.1 Hz), 128.9, 129.2, 129.4, 129.7, 131.6, 132.1, 132.2, 136.9, 137.8, 138.0, 143.0, 155.4 (d, *J* = 12.0 Hz), 163.0 (d, *J* = 248.7 Hz), 168.7, 27C; HRMS Calculated for $C_{30}H_{22}FNO_2$: 461.1791, found: 461.1785.

3-(*N*-Benzylisoindolin-1-onyl)-5-bromo-4-tolyl-*2H*-chromene (3va-1). Isolated as a white solid (Mp.: 188.0-189.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.23; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 2.34 (3H, s, $PHCH_3$), 3.86 (1H, d, J = 13.1 Hz), 3.96 (1H, d, *J* = 13.1 Hz), 4.08 (1H, d, *J* = 15.1 Hz), 5.27 (1H, d, *J* = 15.1 Hz), 5.52 (1H, s), 6.78 (1H, d, *J* = 7.7 Hz), 6.90 (1H, dd, *J* = 8.0, 1.1 Hz), 6.97 (1H, d, *J* = 7.7 Hz), 7.01-7.04 (4H, m), 7.12-7.21 (5H, m), 7.38 (1H, d, *J* = 7.2 Hz), 7.49 (1H, t, *J* = 7.3H), 7.53 (1H, td, *J* = 7.3, 1.2 Hz), 7.90 (1H, d, *J* = 7.1 Hz), 24H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 21.2, 44.4, 59.5, 63.6, 119.2, 122.7, 123.7, 124.0, 124.4, 124.5, 127.4, 127.7, 128.0, 128.5, 128.9, 129.2, 129.5, 129.7, 131.3, 132.1, 132.3, 136.8, 137.8, 138.1, 142.8, 154.7, 168.7, 27C; HRMS Calculated for $C_{31}H_{24}BrNO_2$: 4521.0990, found: 521.0985.

3-(*N*-Benzylisoindolin-1-onyl)-7-bromo-4-tolyl-*2H*-chromene (3va-2). Isolated as a white solid (Mp.: 215.0-216.0 ºC); R_f (Hexane:EtOAc = 5:1) = 0.24; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 2.34 (3H, s), 4.03 (1H, d, *J* = 13.9 Hz), 4.15 (1H, d, *J* = 15.4 Hz), 4.18 (1H, d, *J* = 13.9 Hz), 5.25 (1H, s), 5.26 (1H, d, *J* = 15.4 Hz), 6.57 (1H, d, *J* = 8.3 Hz), 6.81 (1H, d, *J* = 7.3 Hz), 6.95 (1H, dd, *J* = 8.2, 2.0 Hz), 6.98 (1H, br s), 6.99 (1H, d, *J* = 2.0 Hz), 7.10 (2H, dd, *J* = 7.2, 1.6 Hz), 7.17-7.22 (5H, m), 7.39 (1H, d, *J* = 7.2 Hz), 7.50 (1H, t, *J* = 7.1 Hz), 7.54 (1H, td, *J* = 7.5, 1.2 Hz), 7.89 (1H, d, *J* = 7.3 Hz), 24H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) δ 21.2, 44.4, 59.5, 63.6, 119.2, 122.7, 123.7, 124.0, 124.4, 124.5, 127.4, 127.7, 128.0, 128.5, 128.9, 129.2, 129.5, 129.7, 131.3, 132.1, 132.3, 136.8, 137.8, 138.1, 142.8, 154.7, 168.7, 27C, HRMS Calculated for $C_{31}H_{24}BrNO_2$: 521.0990, found: 521.0985.

3-(*N*-Benzylisoindolin-1-onyl)-4-phenyl-1-tosyl-1,2-dihydroquinoline (3wb). Isolated as a yellow solid (Mp.: 111.0-112.0 ºC); R_f (Hexane:EtOAc = 2:1) = 0.27; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.50 (3H, s), 2.81 (3H, s), 3.79 (1H, t, *J* = 17.5 Hz), 3.91 (1H, t, *J* = 17.5 Hz), 4.96 (1H, s), 6.72 (1H, dd, *J* = 7.7, 1.5 Hz), 7.03-7.55 (14H, m), 7.67 (1H, dd, *J* = 8.2, 1.0 Hz), 7.84-7.87 (1H, m), 26H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 21.5, 27.6, 43.3, 62.1, 122.9, 123.8, 125.0, 126.0, 127.0, 127.2, 128.2, 128.6, 128.85, 128.92, 129.1, 129.4, 130.8, 131.5, 132.7, 134.7, 135.6, 136.6, 139.2, 141.9, 143.7, 168.6, (one carbon was obscured), 26C; HRMS Calculated for $C_{31}H_{26}N_2O_3S$: 506.1664; found 506.1678.

Diethyl 3-(*N*-Benzylisoindolin-1-onyl)-4-phenylnaphthalene-1,1-(*2H*)-dicarboxylate (3xb).

Isolated as a white solid (Mp.: 216.0-216.5 ºC); R_f (Hexane:EtOAc = 2:1) = 0.19; ^{1}H NMR ($CDCl_3$, 395.75 MHz) δ 1.06 (3H, t, *J* = 7.2 Hz), 1.27 (3H, t, *J* = 7.2 Hz), 2.39 (1H, d, *J* = 16.9 Hz), 2.65 (1H, d, *J* = 16.9 Hz), 2.99 (3H, s), 3.82 (1H, dq, *J* = 10.6, 7.2 Hz), 4.14 (1H, dq, *J* = 10.6, 7.2 Hz), 4.19-4.32 (2H, m), 5.15 (1H, s), 6.78 (1H, d, *J* = 7.7 Hz), 7.19-7.52 (11H, m), 7.84 (1H, d, *J* = 6.8 Hz), 29H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 13.7, 13.9, 27.6, 28.6, 58.5, 61.9, 62.1, 63.1, 122.59, 123.5, 126.6, 127.2, 127.9, 128.1, 128.2, 128.5, 129.0, 129.5, 130.4, 131.2, 131.3, 132.9, 135.3, 137.3, 140.9, 143.2, 168.7, 170.3, 170.4, 29C; HRMS Calculated for $C_{31}H_{29}NO_5$: 495.2046; found 495.2034.

1-Cyano-1-phenyl-3-(*N*-methylisoindolin-1-onyl)-4-phenyl-1,2-dihydronaphthalene (3ya). Isolated as a colorless oil; R_f (Hexane:EtOAc = 3:1) = 0.23; ^{1}H NMR ($CDCl_3$, 395.75 MHz) major (Clearly distinguishable signal only): δ 2.08 (3H,s), 2.38 (1H, d, *J* = 16.4 Hz), 2.56 (1H, d, *J* = 16.4 Hz), 4.99 (1H, s), 7.83 (1H, d, *J* = 7.7 Hz); minor (Clearly distinguishable signal only): δ 2.22 (1H, d, *J* = 15.9 Hz), 2.7q4 (1H, d, *J* = 15.9 Hz), 3.10 (1H, s), 4.97 (1H, s), 7.75 (1H, d, *J* = 7.7 Hz); indistinguishable signal: δ 6.90-6.96 (4H, m), 7.05-7.06 (34H, m); ^{13}C NMR ($CDCl_3$, 67.80 MHz) major (Clearly distinguishable signal only): δ 26.4, 36.0, 45.6, 63.0, 168.4; minor (Clearly distinguishable signal only): δ 27.8, 35.6, 45.7, 62.5, 168.7; indistinguishable signal: δ 121.8, 122.4, 122.5, 122.7, 123.3, 123.6, 127.0, 127.2, 127.4, 127.5, 127.66, 127.73, 127.8, 128.1, 128.16, 128.22, 128.6, 128.7, 128.9, 129.0, 129.05, 129.09, 129.2, 129.5, 130.3, 131.4, 131.6, 131.7, 132.3, 133.0, 135.3, 135.4, 136.5, 136.7, 137.9, 138.2, 141.1, 141.5, 142.1, 142.3; HRMS Calculated for $C_{32}H_{24}NO_2$: 452.1889; found 452.1886.

3-Phthalimidylmethyl-4-phenyl-1,2-dihydronaphthalene (3ac). Isolated as a white solid (Mp.: 220.3-221.0 ºC); R_f (Hexane:EtOAc = 10:1) = 0.30; ^{1}H NMR ($CDCl_3$, 399.823 MHz) δ 2.31 (2H, t, *J* = 8.0 Hz), 2.86 (2H, t, *J* = 8.0 Hz), 4.36 (2H, s), 6.62 (1H, d, *J* = 7.6 Hz), 7.00-7.13 (3H, m), 7.32-7.46 (5H, m), 7.70 (2H, dd, *J* = 5.4, 3.0 Hz), 7.81 (2H, dd, *J* = 5.4, 3.0 Hz), 19 H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) dC 24.8, 28.0, 41.0, 123.2, 126.0, 126.2, 126.8, 127.0, 127.1, 128.4, 130.2, 130.5, 132.0, 133.9, 135.1, 136.2, 136.8, 138.4, 168.3, 19C; HRMS Calculated for $C_{25}H_{19}NO_2$: 365.1416, found: 365.1411.

3-Benzyl-3,3a,4,5-tetrahydro-1*H*-benzo[*e*]naphtho[1,2-*g*]indol-2(13b*H*)-one (3ad). Isolated as colorless oil; R_f (Hexane:EtOAc = 10:1) = 0.28; ^{1}H NMR ($CDCl_3$, 499.824 MHz) δ 1.82 (1H, dt, *J* = 15.5, 5.4 Hz), 2.10-2.30 (4H, m), 2.57 (1H, dt, *J* = 14.5, 5.6 Hz), 2.74 (1H, ddd, *J* = 17.1, 9.7, 7.1 Hz), 2.84 (1H, ddd, *J* = 17.4, 9.9, 6.2 Hz), 3.63 (1H, d, *J* = 14.6 Hz), 4.47 (1H, d, *J* = 14.6 Hz), 6.98 (2H, d, *J* = 7.3 Hz), 7.05 (2H, t, *J* = 7.5 Hz), 7.10 (1H, t, *J* = 7.1 Hz), 7.14-7.19 (3H, m), 7.23 (1H, t, *J* = 7.3 Hz), 7.31 (1H, t, *J* = 7.5 Hz), 7.37 (1H, td, *J* = 7.3, 1.2 Hz), 7.84 (2H, t, *J* = 7.84 Hz), 23H; ^{13}C NMR ($CDCl_3$, 125.68 MHz) dC 20.7, 27.9, 28.1, 30.4, 44.3, 74.6, 120.8, 122.6, 123.3, 125.7, 126.4, 127.1, 127.5, 127.9, 128.0, 128.5, 128.8, 131.4, 135.3, 136.7, 137.7, 140.6, 147.16, 147.21, 176.1, 25C; HRMS Calculated for $C_{27}H_{23}NO$: 377.1780, found: 377.1778.

2-Methyl-3-(2,2,5-triphenyl-pent-4-ynyloxy)-2,3-dihydro-isoindol-1-one (5) . Isolated as a white solid (Mp.: 168.0-169.0 ºC); R_f (Hexane:EtOAc = 3:1) = 0.19; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.85 (3H, s), 3.32 (1H, d, *J* = 16.3 Hz), 3.38 (1H, d, *J* = 16.3 Hz), 3.70 (1H, d, *J* = 8.6 Hz), 3.90 (1H, d, *J* = 8.6 Hz), 5.72 (1H, s), 7.08-7.47 (18H, m), 7.80 (1H, d, *J* = 7.6 Hz), 27H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 26.3, 28.4, 50.1, 66.6, 83.5, 87.0, 88.0, 123.2, 123.4, 123.5, 126.4, 126.5, 127.6, 127.7, 127.8, 128.0, 128.1, 129.8, 131.3, 131.8, 132.8, 140.2, 144.8, 144.9, 167.6, (7 carbons were obscured), 25C; HRMS Calculated for $C_{32}H_{27}NO_2$, 457.2042; found 457.2040.

3-[(4,4-Diphenyl-dihydro-furan-2-ylidene)-phenyl-methyl]-2-methyl-2,3-dihydro-isoindol-1-one (7ab). Isolated as a white solid (Mp.: 187.0-188.0 ºC); R_f (Hexane:EtOAc = 2:1) = 0.20; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 2.94 (3H, s), 3.25 (2H, s), 4.83 (2H, s), 5.89 (1H, s), 6.61-6.58 (2H, m), 7.03-7.06 (2H, m), 7.17-7.42 (14H, m), 7.40 (1H, d, *J* = 6.6 Hz), 27H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 27.5, 41.8, 54.2, 61.0, 79.2, 106.5, 122.9, 123.0, 126.8, 126.9, 126.95, 126.97, 127.7, 128.1, 128.6, 129.0,

130.9, 132.9, 136.1, 144.2, 145.1, 158.2, 168.6, (3 carbons were obscured), 23C; HRMS Calculated for $C_{32}H_{27}NO_2$, 457.2042; found 457.2032.

1-Hydroxylmethyl-1-phenyl-3-(*N*-methylisoindolin-1-onyl)-4-phenyl-1,2-dihydronaphthalene (7ab). Isolated as a white solid; {Mp.: 286.0-287.0 ºC (*cis*); 254.0-255.0 ºC (*trans*)}; R_f ($CHCl_3$:EtOAc = 10:1) = 0.11 (*cis*), 0.19 (*trans*); ^{1}H NMR ($CDCl_3$, 270.05 MHz) (***cis***): δ 1.62 (1H, dd, *J* = 8.7, 3.8 Hz), 1.80 (1H, d, *J* = 16.3 Hz), 2.55 (1H, d, *J* = 16.3 Hz), 3.06 (3H, s), 3.98 (1H, dd, *J* = 11.5, 8.7 Hz), 4.14 (1H, dd, *J* = 11.5, 3.8 Hz), 4.96 (1H, s), 6.27 (1H, d, *J* = 7.6 Hz), 6.57 (2H, d, *J* = 7.3 Hz), 6.85 (1H, dd, *J* = 7.9, 1.3 Hz), 7.01-7.50 (13H, m), 7.75 (1H, d, *J* = 7.6 Hz), 27H; (*trans*): δ 1.41 (1H, dd, *J* = 8.9, 3.8 Hz), 1.96 (1H, d, *J* = 16.5 Hz), 2.08 (3H, s), 2.30 (1H, d, *J* = 16.5 Hz), 3.95 (1H, dd, *J* = 11.9, 8.9 Hz), 4.10 (1H, dd, *J* = 11.9, 3.8 Hz), 4.97 (1H, s), 6.84 (1H, dd, *J* = 7.6, 1.3 Hz), 7.00-7.07 (3H, m), 7.20-7.56 (13H, m), 7.83 (1H, dm, *J* = 6.6 Hz), 27H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) (*cis*): δ 27.7, 31.4, 47.9, 63.5, 67.7, 122.4, 123.0, 126.4, 126.6, 127.1, 127.3, 127.5, 127.6, 127.7, 128.3, 128.9, 129.2, 129.6, 130.1, 131.5, 132.3, 137.1, 137.5, 137.9, 140.2, 142.8, 142.9, 169.0, 28C; (*trans*): 26.7, 32.0, 48.0, 63.0, 67.5, 122.3, 122.7, 126.6, 127.1, 127.3, 127.4, 127.8, 127.9, 128.4, 128.55, 128.58, 128.8, 129.1, 129.2, 129.4, 130.5, 131.5, 133.4, 137.1, 137.6, 137.7, 140.4, 143.2, 143.4, 168.5, 30C; HRMS Calculated for $C_{32}H_{27}NO_2$: 457.2042; found 457.2037.

1,1-Di(hydroxylmethyl)-3-(*N*-methylisoindolin-1-onyl)-4-phenyl-1,2-dihydronaphthalene (7bb). Isolated as a white solid (Mp.: 296-297 ºC); R_f (Hexane:EtOAc = 2:3) = 0.10; ^{1}H NMR ($CDCl_3$, 270.05 MHz) δ 1.64 (1H, d, *J* = 17.0 Hz), 1.74 (1H, brs), 2.04 (1H, d, *J* = 17.0 Hz), 3.05 (3H, s), 3.60 (1H, d, *J* = 11.4 Hz), 3.75 (1H, d, *J* = 11.4 Hz), 3.81 (1H, d, *J* = 10.9 Hz), 3.89 (1H, d, *J* = 10.9 Hz), 5.16 (1H, s), 6.75 (1H, dd, *J* = 7.9, 1.3 Hz), 6.75 (1H, ddd, *J* = 7.6, 7.6, 1.3 Hz), 7.23-7.55 (11H, m), 7.84 (1H, d, *J* = 6.9 Hz), 25H; ^{13}C NMR ($CDCl_3$, 67.80 MHz) δ 25.2, 27.6, 43.0, 63.8, 66.4, 122.1, 123.8, 125.6, 127.2, 127.7, 127.8, 128.3, 128.7, 129.1, 129.2, 129.3, 129.6, 130.3, 131.6, 133.0, 135.6, 136.6, 137.8, 140.1, 143.6, 169.0, 26C; HRMS Calculated for $C_{27}H_{25}NO_3$: 411.1834; found 411.1831.

1-Tosylaminomethyl-1-phenyl-3-(*N*-methylisoindolin-1-onyl)-4-phenyl-1,2-dihydronaphthalene (7cb). Isolated as a white solid; R_f (Hexane:EtOAc = 1:1) = 0.43; ^{1}H NMR ($CDCl_3$, 395.75 MHz) major (Clearly distinguishable signal only): δ 1.84 (1H, d, *J* = 16.4 Hz), 2.00 (3H, s), 2.25 (1H, d, *J* = 16.4 Hz), 2.45 (3H, s), 3.20 (1H, dd, *J* = 12.6, 2.9 Hz), 3.46 (1H, dd, *J* = 12.6, 9.7 Hz), 4.20 (1H, dd, *J* = 9.7, 2.9 Hz), 4.90 (1H, s); minor (Clearly distinguishable signal only): δ 1.68 (1H, d, *J* = 16.4 Hz), 2.45 (1H, d, *J* = 16.4 Hz), 2.47 (3H, s), 2.96 (3H, s), 3.30 (1H, dd, *J* = 12.6, 2.9 Hz), 3.48 (1H, dd, *J* = 12.6, 8.7 Hz), 4.25 (1H, dd, *J* = 8.7, 2.9 Hz), 4.89 (1H, s); indistinguishable signal: δ 6.17 (1H, d, *J* = 7.6 Hz), 6.42 (2H, d, *J* = 7.9 Hz), 6.80-6.84 (4H, m), 6.96-7.82 (48H, m); ^{13}C NMR ($CDCl_3$, 67.80 MHz) major (Clearly distinguishable signal only): δ 21.58, 26.5, 33.5, 45.9, 49.1, 62.8, 168.5; minor (Clearly distinguishable signal only): δ 21.58, 27.7, 33.0, 46.0, 49.3, 63.3, 168.9; indistinguishable signal: δ 122.2, 122.4, 123.0, 123.6, 126.27, 126.3, 126.6, 126.8, 127.0, 127.12, 127.13, 127.5, 127.7, 127.8, 128.1, 128.4, 128.5, 128.56, 128.61, 128.7, 128.8, 128.9, 129.1, 129.2, 129.3, 129.8, 129.9, 130.4, 131.5, 131.6, 132.1, 133.2, 135.5, 135.7, 136.1, 136.2, 136.97, 137.0, 137.35, 137.58, 140.2, 140.9, 142.46, 142.53, 142.8, 142.9, 143.7, 143.8; HRMS Calculated for $C_{39}H_{34}N_2O_3S$: 610.2290; found 610.2285.