Supporting Information

A General and Efficient FeCl₃-Catalyzed Nucleophilic Substitution of Propargylic Alcohols

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S2-S15 Experimental and Spectral data of compounds **3aa-3eh**

S16-S21 Copies of ¹H and ¹³C NMR spectra of new compounds

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Experimental

General methods and materials. Melting points are uncorrected. NMR spectra were in CDCl₃ (¹H at 400 MHz and ¹³C at 100 MHz). Column chromatography was performed on silica gel (300-400 mesh). Unless otherwise noted, all reagents were obtained commercially and used without further purification. Acetonitrile was distilled over Phosphorus pentoxide.

General procedure for Nucleophilic Substitution of Propargylic Alcohols catalyzed by 5mol% FeCl₃: To a 5-mL flask, 1.0 mmol propargylic alcohol, 3.0 mmol nucleophile, 2 mL CH₃CN and 0.05 mmol FeCl₃ were successively added, the reaction mixture was stirred at room temperature or at 60°C, and monitored periodically by TLC. Upon completion, the solvent was concentrated under reduced pressure by an aspirator, and then the residue was purified by silica gel column chromatography (EtOAc/hexane) to afford the substitution products described below.

1-(dec-1-en-5-yn-4-yl)benzene (3aa)¹: Yield 90%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 0.91 (t, 3H, *J* = 7.2 Hz), 1.37-1.55 (m, 4H), 2.23 (td, 2H, *J* = 7.2 and 2.4 Hz), 2.45 (dd, apparent t, 2H, *J* = 7.2 and 7.2 Hz), 3.65 (tt, 1H, *J* = 7.2 and 2.4 Hz), 4.98-5.06 (m, 2H), 5.82 (ddt, 1H, *J* = 17.2, 10.4 and 7.2 Hz), 7.16-7.23 (m, 1H), 7.26-7.36 (m, 4H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 14.1, 18.9, 22.3, 31.5, 38.3, 43.3, 81.0, 83.7, 116.3, 126.2, 127.1, 127.9, 135.4, 141.6 ppm; IR (film): 3062, 3029, 2204, 1644, 1599, 1581, 1494 cm⁻¹; MS (FAB) *m/z* 213 (M+H⁺).

Data are in accordance with previously reported results.¹

4,6-diphenylhex-1-en-5-yne (3ba)²: Yield 95%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 2.61 (dd, apparent t, 2H, *J* = 7.2 and 7.2 Hz), 3.93 (t, 1H, *J* = 7.2 Hz), 5.06-5.16 (m, 2H), 5.93 (ddt, 1H, *J* = 17.1, 10.2 and 7.2 Hz), 7.23-7.51 (m, 10H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 38.8, 43.0, 83.7, 90.8,

116.8, 123.3, 126.4, 127.2, 127.4, 127.8, 128.1, 131.2, 135.0, 140.8 ppm; **IR** (film): 3062, 3029, 2199, 1641, 1598, 1490 cm^{-1} ; **HRMS** (FAB) m/z calc. for $\text{C}_{18}\text{H}_{17}$ $[\text{M}+\text{H}^+]$: 233.1330, Found: 233.1332.
Data are in accordance with previously reported results.²

trimethyl(3-phenylhex-5-en-1-ynyl)silane (3ca)¹ : Yield 86%. A colorless oil. **¹H NMR** (CDCl_3 , 400 MHz): δ 0.23 (s, 9H), 2.52 (dd, apparent t, 2H, $J = 7.2$ and 7.2 Hz), 3.74 (t, 1H, $J = 7.2$ Hz), 5.04-5.11 (m, 2H), 5.87 (ddt, 1H, $J = 17.0$, 10.2 and 7.2 Hz), 7.20-7.41 (m, 5H)ppm; **¹³C NMR** (CDCl_3 , 100 MHz): δ 0.7, 39.2, 43.1, 87.6, 107.4, 116.7, 126.3, 127.1, 128.0, 134.8, 140.5ppm; **IR** (film): 3064, 3029, 2174, 1641, 1602, 1494 cm^{-1} ; **ESI-MS**: m/z (%) = 229 (100) $[\text{M}+\text{H}^+]$.

Data are in accordance with previously reported results.¹

1-(3,3-dimethylhex-5-en-1-ynyl)benzene (3da)¹ : Yield 61%. A pale yellow oil. **¹H NMR** (CDCl_3 , 400 MHz): δ 1.28 (s, 6H), 2.26 (d, 2H, $J = 7.2$ Hz) 5.10 (d, 1H, $J = 16.8$ Hz), 5.11 (d, 1H, $J = 10.0$ Hz), 6.01 (ddt, 1H, $J = 16.4$, 10.8 and 7.2 Hz), 7.24-7.29 (m, 3H), 7.36-7.40 (m, 2H) ppm; **¹³C NMR** (CDCl_3 , 100 MHz): δ 28.9, 31.5, 47.8, 80.7, 96.9, 117.4, 124.1, 127.5, 128.3, 131.6, 135.3 ppm; **IR** (film): 3078, 3061, 2229, 1641, 1598, 1488, 1443 cm^{-1} ; **ESI-MS**: m/z (%) = 185(100) $[\text{M}+\text{H}^+]$.

Data are in accordance with previously reported results.¹

1-(hex-5-en-1-yn-3-yl)benzene (3ea)² : Yield 70%. A colorless oil. **¹H NMR** (CDCl_3 , 400 MHz): δ 2.30 (d, 1H, $J = 2.4$ Hz), 2.52 (dd, apparent t, 2H, $J = 7.1$ and 7.1 Hz), 3.71 (td, 1H, $J = 7.1$ and 2.4 Hz), 5.06 (d, 1H, $J = 9.3$ Hz), 5.08 (d, 1H, $J = 18.0$ Hz), 5.85 (ddt, 1H, $J = 17.1$, 10.2 and 7.0 Hz), 7.20-7.40 (m, 5H) ppm; **¹³C NMR** (CDCl_3 , 100 MHz): δ 37.7, 42.4, 71.4, 85.4, 117.2, 126.9, 127.5, 128.5, 135.2, 140.8 ppm; **IR** (film): 3311, 3087, 3023, 2116, 1635, 1599, 1497 cm^{-1} ; **MS** [APCI(-)] m/z 155 (M-1)⁻.

Data are in accordance with previously reported results.²

1-(3-methylhex-5-en-1-ynyl)benzene (3fa)¹ : Yield 15%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 1.26 (d, 3H, *J* = 7.0 Hz), 2.22-2.38 (m, 2H), 2.67-2.78 (m, 1H), 5.06-5.16 (m, 2H), 5.95 (ddt, 1H, *J* = 16.4, 10.8 and 7.2 Hz), 7.23-7.30 (m, 3H), 7.38-7.41 (m, 2H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 20.5, 26.5, 41.1, 81.1, 94.0, 116.7, 123.9, 127.5, 128.1, 131.6, 136.0 ppm; IR (film): 3080, 3060, 2230, 1641, 1599, 1489, 1445 cm⁻¹; ESI-MS: *m/z* (%) = 193(100) [M+Na⁺].

Data are in accordance with previously reported results.¹

1-(dec-1-en-5-yn-4-yl)-2-methoxybenzene (3ga): Yield 83%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 0.92 (t, 3H, *J* = 7.2 Hz), 1.38-1.55 (m, 4H), 2.23 (td, 2H, *J* = 6.9 and 2.1 Hz), 2.27-2.51 (m, 2H), 3.81(s, 3H), 4.13 (tt, 1H, *J* = 6.5 and 2.1 Hz), 5.01 (d, 1H, *J* = 9.6 Hz), 5.02 (d, 1H, *J* = 18.0 Hz), 5.89 (ddt, 1H, *J* = 17.0, 10.2 and 7.0 Hz), 6.83 (d, 1H, *J* = 8.2 Hz), 6.95 (apparent t, 1H, *J* = 7.5 Hz), 7.20 (apparent t, 1H, *J* = 8.2 Hz), 7.53 (apparent d, 1H, *J* = 7.6 Hz) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 13.6, 18.5, 21.9, 31.1, 31.2, 41.0, 55.2, 81.3, 83.0, 110.2, 116.1, 120.4, 127.6, 128.6, 130.4, 136.3, 156.1 ppm; IR (film): 3073, 3004, 1634, 1602, 1494, 1240 cm⁻¹; MS [APCI(+)] *m/z* 243 (M+1)⁺; Anal calcd for C₁₇H₂₂O: C, 84.25; H, 9.15. Found: C, 84.51; H, 9.01.

1-bromo-4-(dec-1-en-5-yn-4-yl)benzene (3ha): Yield 90%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 0.91 (t, 3H, *J* = 7.2 Hz), 1.37-1.54 (m, 4H), 2.23 (td, 2H, *J* = 7.0 and 2.2 Hz), 2.43 (t, 2H, *J* = 7.0 Hz), 3.63 (tt, 1H, *J* = 7.0 and 2.2 Hz), 4.98-5.04 (m, 2H), 5.75-5.86 (m, 1H), 7.23 (apparent d, 2H, *J* = 8.4 Hz), 7.43 (apparent d, 2H, *J* = 8.4 Hz) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 13.7, 18.5, 22.0, 31.2, 37.6, 42.9, 80.6, 84.2, 117.1, 120.4, 129.3, 131.4, 135.3, 141.2 ppm; IR (film): 3077, 2217, 1641, 1590, 1489 cm⁻¹; MS [APCI(+)] *m/z* 291/293 (M+1)⁺; Anal calcd for C₁₆H₁₉Br: C, 65.99; H, 6.58. Found: C, 65.76; H, 6.65.

4-(dec-1-en-5-yn-4-yl)benzonitrile (3ia): Yield 85%. A pale yellow oil. $^1\text{H NMR}$ (CDCl_3 , 400 MHz): δ 0.92 (t, 3H, $J = 7.2$ Hz), 1.37-1.59 (m, 4H), 2.24 (td, 2H, $J = 7.2$ and 2.4 Hz), 2.46 (dd, apparent t, 2H, $J = 7.0$ and 7.0 Hz), 3.73 (tt, 1H, $J = 6.8$ and 2.0 Hz), 4.98- 5.07 (m, 2H), 5.79 (ddt, 1H, $J = 17.2$, 10.4 and 7.2 Hz), 7.46 (apparent d, 2H, $J = 8.2$ Hz), 7.61 (apparent d, 2H, $J = 8.2$ Hz) ppm; $^{13}\text{C NMR}$ (CDCl_3 , 100 MHz): δ 13.5, 18.3, 21.8, 30.9, 37.9, 42.5, 79.4, 84.8, 110.4, 117.4, 118.8, 128.3, 132.0, 134.6, 147.4 ppm; **IR** (film): 3073, 2230, 1693, 1607, 1502, 1462 cm^{-1} ; **ESI-MS**: m/z (%) = 238(86) $[\text{M}+\text{H}^+]$, 260(92) $[\text{M}+\text{Na}^+]$, 276(100) $[\text{M}+\text{K}^+]$; **Anal** calcd for $\text{C}_{17}\text{H}_{19}\text{N}$: C, 86.03; H, 8.07; N, 5.90. Found: C, 85.55; H, 8.55; N, 5.45.

1-(1-(3-chloropropoxy)hept-2-ynyl)benzene (3ab)³: Yield 84%. A colorless oil. $^1\text{H NMR}$ (CDCl_3 , 400 MHz): δ 0.92 (t, 3H, $J = 7.2$ Hz), 1.38-1.48 (m, 2H), 1.49-1.58 (m, 2H), 2.06 (quintet, 2H, $J = 6.1$ Hz), 2.29 (td, 2H, $J = 7.0$ and 2.0 Hz), 3.61 (dt, 1H, $J = 9.5$ and 5.8 Hz), 3.65 (t, 2H, $J = 6.5$ Hz), 3.78 (dt, 1H, $J = 9.5$ and 5.8 Hz), 5.16 (t, 1H, $J = 2.0$ Hz), 7.28-7.39 (m, 3H), 7.48-7.52 (m, 2H) ppm; $^{13}\text{C NMR}$ (CDCl_3 , 100 MHz): δ 13.5, 18.5, 21.9, 30.6, 32.7, 42.0, 64.4, 71.9, 77.7, 88.6, 127.3, 128.1, 128.3, 139.2 ppm; **IR** (film): 3069, 3031, 2228, 1602, 1579, 1501, 1112 cm^{-1} ; **ESI-MS**: m/z (%) = 287 (100) $[\text{M}+\text{Na}^+]$. Data are in accordance with previously reported results.³

3-(but-3-enyloxy)-1,3-diphenylprop-1-yne (3bb)³: Yield 92%. A yellow oil. $^1\text{H NMR}$ (CDCl_3 , 400 MHz): δ 2.39-2.46 (m, 2H), 3.63 (dt, 1H, $J = 9.2$ and 6.8 Hz), 3.78 (dt, 1H, $J = 9.2$ and 6.8 Hz), 5.02-5.15 (m, 2H), 5.42 (s, 1H), 5.86 (ddt, 1H, $J = 17.2$, 10.4 and 6.8 Hz), 7.28-7.41 (m, 6H), 7.45-7.50 (m, 2H), 7.56-7.60 (m, 2H) ppm; $^{13}\text{C NMR}$ (CDCl_3 , 100 MHz): δ 34.1, 67.6, 72.0, 87.1, 87.5, 116.4, 122.6, 127.4, 128.2, 128.3, 128.4, 131.8, 135.1, 138.8 ppm; **IR** (film): 3064, 3032, 1601, 1490, 1451 cm^{-1} ; **ESI-MS**: m/z (%) = 285(100) $[\text{M}+\text{Na}^+]$.

Data are in accordance with previously reported results.³

(3-(3-chloropropoxy)-3-phenylprop-1-ynyl)trimethylsilane (3cb)³ : Yield 83%. A colorless oil. ¹H NMR (CDCl₃, 400 MHz): δ 0.21 (s, 9H), 2.06 (quintet, 2H, *J* = 6.4 Hz), 3.61-3.68 (m, 3H), 3.81 (dt, 1H, *J* = 9.6 and 6.0 Hz), 5.17 (s, 1H), 7.30-7.40 (m, 3H), 7.48-7.52 (m, 2H)ppm; ¹³C NMR (CDCl₃, 100 MHz): δ -0.17, 32.7, 41.9, 64.5, 72.1, 92.7, 102.8, 127.4, 128.3, 128.4, 138.2 ppm; **IR** (film): 3064, 3031, 2171, 1603, 1494, 1452, 1250, 1071, 843 cm⁻¹; **ESI-MS**: *m/z* (%) = 303(100) [M+Na⁺], 319 (14) [M+K⁺]. Data are in accordance with previously reported results.³

(3-(but-3-enyloxy)-3-phenylprop-1-ynyl)trimethylsilane (3cc)³ : Yield 82%. A colorless oil. ¹H NMR (CDCl₃, 400 MHz): δ 0.20 (s, 9H), 2.35-2.42 (m, 2H), 3.51 (dt, 1H, *J* = 8.8 and 6.8 Hz), 3.70 (dt, 1H, *J* = 8.8 and 6.8 Hz), 5.01-5.14 (m, 2H), 5.19 (s, 1H), 5.84 (ddt, 1H, *J* = 17.2, 10.4 and 6.8 Hz), 7.27-7.39 (m, 3H), 7.48-7.54 (m, 2H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ -0.13, 34.0, 67.4, 71.8, 92.5, 103.1, 116.3, 127.4, 128.2, 128.4, 135.1, 138.4 ppm; **IR** (film): 3066, 3031, 2171, 1642, 1602, 1494, 1452, 1251 cm⁻¹; **ESI-MS**: *m/z* (%) = 259(100) [M+H⁺].

Data are in accordance with previously reported results.³

1-(3-(3-chloropropoxy)-3-methylbut-1-ynyl)benzene (3db)³ : Yield 64%. A colorless oil. ¹H NMR (CDCl₃, 400 MHz): δ 1.54 (s, 6H), 2.05 (quintet, 2H, *J* = 6.4 Hz), 3.68 (t, 2H, *J* = 6.4 Hz), 3.77 (t, 2H, *J* = 6.0 Hz), 7.28-7.32 (m, 3H), 7.40-7.45 (m, 2H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 28.7, 33.2, 42.1, 60.4, 70.5, 84.0, 91.3, 122.8, 128.1, 128.2, 131.6 ppm; **IR** (film): 3081, 3057, 2233, 1598, 1489, 1443, 1154, 1069, 756 cm⁻¹; **ESI-MS**: *m/z* (%) = 259(100) [M+Na⁺].

Data are in accordance with previously reported results.³

1-(1-isopropoxyhept-2-ynyl)benzene (3ac)⁴: Yield 77%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 0.90 (t, 3H, *J* = 7.2 Hz), 1.19 (d, 3H, *J* = 6.0 Hz), 1.23 (d, 3H, *J* = 6.0 Hz), 1.35-1.46 (m, 2H), 1.47-1.56 (m, 2H), 2.26 (td, 2H, *J* = 7.2 and 2.0 Hz), 3.95 (septet, 1H, *J* = 6.0 Hz), 5.17 (t, 1H, *J* = 2.0 Hz), 7.25-7.37 (m, 3H), 7.47-7.52 (m, 2H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 13.6, 18.5, 21.7, 21.9, 22.7, 30.7, 69.0, 69.2, 78.8, 87.4, 127.3, 127.9, 128.3, 140.2 ppm; IR (film): 3064, 3032, 1603, 1493, 1452 cm⁻¹; ESI-MS: *m/z* (%) = 231(18) [M+H⁺], 253 (100) [M+Na⁺].

Data are in accordance with previously reported results.⁴

3-(benzyloxy)-1,3-diphenylprop-1-yne (3bc)⁴: Yield 91%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 4.73 (AB, d, 1H, *J* = 11.8 Hz), 4.78 (AB, d, 1H, *J* = 11.8 Hz), 5.44 (s, 1H), 7.21-7.44 (m, 11H), 7.47-7.52 (m, 2H), 7.58-7.62 (m, 2H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 70.0, 70.9, 86.9, 87.8, 122.6, 127.6, 127.8, 128.1, 128.3, 128.4(2), 128.5(2), 131.8, 137.8, 138.7 ppm; IR (film): 3062, 3031, 2227, 1598, 1490, 1453 cm⁻¹; ESI-MS: *m/z* (%) = 321(100) [M+Na⁺], 337(87) [M+K⁺].

Data are in accordance with previously reported results.⁴

1-(1-ethoxyhept-2-ynyl)benzene (3ad)⁴: Yield 90%. A colorless oil. ¹H NMR (CDCl₃, 400 MHz): δ 0.91 (t, 3H, *J* = 7.2 Hz), 1.23 (t, 3H, *J* = 7.0 Hz), 1.37-1.58 (m, 4H), 2.28 (td, 2H, *J* = 7.2 and 2.0 Hz), 3.52 (dq, 1H, *J* = 9.2 and 6.8 Hz), 3.69 (dq, 1H, *J* = 9.2 and 6.8 Hz), 5.14 (t, 1H, *J* = 2.0 Hz), 7.25-7.52 (m, 5H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 13.6, 15.2, 18.6, 22.0, 30.8, 63.6, 71.7, 78.2, 88.1, 127.4, 128.1, 128.4, 139.6 ppm; IR (film): 3062, 3023, 2925, 2856, 2229, 1599, 1486, 1065 cm⁻¹; ESI-MS: *m/z* (%) = 239 (100) [M+Na⁺].

Data are in accordance with previously reported results.⁴

1-(1-ethoxyprop-2-ynyl)benzene (3eb)⁵: Yield 85%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 1.25 (t, 3H, *J* = 7.2 Hz), 2.62 (d, 1H, *J* = 2.4 Hz), 3.55 (dq, 1H, *J* = 9.2 and 7.2 Hz), 3.73 (dq, 1H, *J* = 9.2

and 7.2 Hz), 5.15 (d, 1H, $J = 2.0$ Hz), 7.29-7.39 (m, 3H), 7.49-7.53 (m, 2H) ppm; ^{13}C NMR (CDCl_3 , 100 MHz): δ 15.2, 64.0, 71.2, 75.4, 81.9, 127.3, 128.4, 128.5, 138.5 ppm; IR (film): 3290, 3032, 2113, 1591, 1493, 1452 cm^{-1} ; ESI-MS: m/z (%) = 161(100) $[\text{M}+\text{H}^+]$.

Data are in accordance with previously reported results.⁵

1-(3-ethoxy-3-methylbut-1-ynyl)benzene (3dc)⁶ : Yield 82%. A colorless oil. ^1H NMR (CDCl_3 , 400 MHz): δ 1.24 (t, 3H, $J = 7.1$ Hz), 1.55 (s, 6H), 3.69 (q, 2H, $J = 7.1$ Hz), 7.28-7.45 (m, 5H) ppm; ^{13}C NMR (CDCl_3 , 100 MHz): δ 15.8, 28.9, 59.5, 70.3, 83.7, 91.7, 122.9, 128.1, 128.2, 131.6 ppm; IR (film): 3085, 3054, 2980, 2930, 2871, 2225, 1595, 1494, 1167 cm^{-1} ; ESI-MS: m/z (%) = 211 (100) $[\text{M}+\text{Na}^+]$.

Data are in accordance with previously reported results.⁶

1-(1,3-diphenylprop-2-ynyl)-4-methoxybenzene (3bd)⁷ : Yield 81%. A clear oil. ^1H NMR (CDCl_3 , 400 MHz): δ 3.78 (s, 3H), 5.16 (s, 1H), 6.85 (d, 2H, $J = 8.8$ Hz), 7.19-7.48 (m, 12 H) ppm; ^{13}C NMR (CDCl_3 , 100 MHz): δ 43.1, 55.4, 84.6, 90.4, 113.7, 123.2, 126.4, 127.4, 127.5, 127.8, 128.2, 128.5, 131.2, 133.5, 141.5, 157.8 ppm; IR (film): 3060, 3029, 3002, 2954, 2835, 1608, 1584, 1509, 1251 cm^{-1} ; HRMS (FAB) m/z calc. for $\text{C}_{22}\text{H}_{19}\text{O}$ $[\text{M}+\text{H}^+]$: 299.1358, Found: 299.1359.

Data are in accordance with previously reported results.⁷

(3-(2,4-dimethoxyphenyl)-3-phenylprop-1-ynyl)trimethylsilane (3cd)⁸ : Yield 76%. A colorless solid. (m.p. 82-84°C). ^1H NMR (CDCl_3 , 400 MHz): δ 0.19 (s, 9H), 3.77 (s, 3H), 3.78 (s, 3H), 5.40 (s, 1H), 6.41 (d, 1H, $J = 2.4$ Hz), 6.48 (dd, 1H, $J = 8.4$ and 2.4 Hz), 7.13-7.19 (m, 1H), 7.22-7.28 (m, 2H), 7.35-7.40 (m,

2H), 7.42 (d, 1H, $J = 8.4$ Hz) ppm; ^{13}C NMR (CDCl_3 , 100 MHz): δ 0.19, 36.5, 55.4, 55.5, 87.4, 98.6, 104.5, 107.8, 122.7, 126.4, 127.7, 128.2, 129.4, 141.9, 157.0, 159.9 ppm; **IR** (film): 3027, 2998, 2169, 1612, 1588, 1503, 1452, 1249, 1036 cm^{-1} ; **ESI-MS**: m/z (%) = 347(100) $[\text{M}+\text{Na}^+]$.

Data are in accordance with previously reported results.⁸

4-(1,3-diphenylprop-2-ynyl)phenol (3be)⁷ : Yield 91%. A yellow solid. (m.p. 82-86°C). ^1H NMR (CDCl_3 , 400 MHz): δ 4.91 (brs, 1H), 5.14 (s, 1H), 6.76 (apparent d, 2H, $J = 8.5$ Hz), 7.20-7.34 (m, 8H), 7.39-7.49 (m, 4H) ppm; ^{13}C NMR (CDCl_3 , 100 MHz): δ 42.8, 84.7, 90.4, 115.4, 123.4, 126.8, 127.7, 127.9, 128.2, 128.6, 129.1, 131.6, 134.0, 141.9, 154.2 ppm; **IR** (film): 3353, 3058, 3027, 2921, 2848, 2216, 1618, 1602, 1509, 1490 cm^{-1} ; **MS** [APCI(-)] m/z 283 ($\text{M}-1$)⁻.

Data are in accordance with previously reported results.⁷

2-(1,3-diphenylprop-2-ynyl)furan (3bf)⁷ : Yield 82%. A yellow oil. ^1H NMR (CDCl_3 , 400 MHz): δ 5.26 (s, 1H), 6.28 (apparent d, 1H, $J = 3.0$ Hz), 6.30-6.33 (m, 1H), 7.23-7.39 (m, 7H), 7.45-7.51 (m, 4H) ppm; ^{13}C NMR (CDCl_3 , 100 MHz): δ 37.8, 83.9, 87.4, 106.6, 110.3, 123.1, 127.3, 127.8, 128.1, 128.2, 128.6, 131.7, 138.8, 142.2, 153.7 ppm; **IR** (film): 3117, 3061, 3030, 1598, 1501, 1491, 1453, 1071 cm^{-1} ; **ESI-MS**: m/z (%) = 259 (24) $[\text{M}+\text{H}^+]$, 281(24) $[\text{M}+\text{Na}^+]$, 297 (100) $[\text{M}+\text{K}^+]$.

Data are in accordance with previously reported results.⁷

2-(1-phenylprop-2-ynyl)furan (3ec)⁹ : Yield 55%. A pale yellow oil. **¹H NMR** (CDCl₃, 400 MHz): δ 2.44 (d, 1H, J = 2.5 Hz), 5.06 (d, 1H, J = 2.5 Hz), 6.21-6.24 (m, 1H), 6.29-6.32 (m, 1H), 7.24-7.44 (m, 6H) ppm; **¹³C NMR** (CDCl₃, 100 MHz): δ 37.0, 72.0, 81.9, 106.7, 110.3, 127.5, 127.7, 128.6, 138.2, 142.3, 153.1 ppm; **IR** (film): 3293, 3063, 3030, 2122, 1599, 1503, 1453 cm⁻¹; **ESI-MS**: m/z (%) = 183(100) [M+H⁺].

Data are in accordance with previously reported results.⁹

2-(1,3-diphenylprop-2-ynyl)-1H-pyrrole (3bg)¹⁰ : Yield 61%. A brown solid. (m.p. 68-71°C). **¹H NMR** (CDCl₃, 400 MHz): δ 5.28 (s, 1H), 6.02-6.06 (m, 1H), 6.15 (dd, 1H, J = 6.0 and 2.8 Hz), 6.68-6.71 (m, 1H), 7.23-7.37 (m, 6H), 7.42-7.49 (m, 4H), 8.16 (brs, 1H) ppm; **¹³C NMR** (CDCl₃, 100 MHz): δ 37.3, 84.2, 88.6, 106.6, 108.7, 117.4, 123.2, 127.3, 127.8, 128.2, 128.3, 128.8, 130.6, 131.8, 140.2 ppm; **IR** (film): 3431, 1597, 1489, 1452 cm⁻¹; **ESI-MS**: m/z (%) = 258 (100) [M+H⁺].

Data are in accordance with previously reported results.¹⁰

1-(1,3-diphenylprop-2-ynyl)naphthalen-2-ol (3bh)⁷ : Yield 95%. A pale yellow oil. **¹H NMR** (CDCl₃, 400 MHz): δ 6.27 (s, 1H), 6.38 (s, 1H), 7.16 (d, 1H, J = 8.9 Hz), 7.20-7.50 (m, 12H), 7.75 (d, 1H, J = 8.9 Hz), 7.80 (d, 1H, J = 8.0 Hz), 8.03 (d, 1H, J = 8.6 Hz) ppm; **¹³C NMR** (CDCl₃, 100 MHz): δ 33.7, 86.0, 88.3, 117.6, 119.1, 122.5, 123.0, 123.3, 126.8, 127.0, 127.2, 128.3, 128.5, 128.7, 128.8, 129.6, 129.8, 131.8, 132.3, 139.5, 152.3 ppm; **IR** (film): 3420, 3054, 3027, 2918, 2848, 2217, 1631, 1595, 1520, 1490 cm⁻¹; **MS** [APCI(-)] m/z 333 (M-1)⁻.

Data are in accordance with previously reported results.⁷

1-(1,3-diphenylprop-2-ynyl)-2-methoxynaphthalene (3bi)¹⁰ : Yield 90%. A white solid, (m.p. 110-111°C). ¹H NMR (CDCl₃, 400 MHz): δ 3.88 (s, 3H), 6.52 (s, 1H), 7.10-7.29 (m, 9H), 7.39-7.43 (m, 2H), 7.48-7.51 (m, 2H), 7.71 (apparent d, 1H, *J* = 8.8 Hz), 7.75 (d, 1H, *J* = 8.8 Hz), 8.15 (apparent d, 1H, *J* = 8.7 Hz) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 32.9, 57.1, 84.3, 90.7, 113.6, 122.1, 123.6, 124.1, 125.7, 126.2, 126.4, 127.3, 128.1, 128.4, 128.5, 128.6, 129.9, 130.2, 131.9, 132.2, 141.1, 154.3 ppm; **IR** (film): 3054, 3023, 2995, 2853, 2162, 1634, 1596, 1523, 1490, 1235 cm⁻¹; **ESI-MS**: *m/z* (%) = 349(13) [M+H⁺], 371(100) [M+Na⁺].

Data are in accordance with previously reported results.¹⁰

1-(1-phenylprop-2-ynyl)naphthalen-2-ol (3ed): Yield 56%. A colorless oil. ¹H NMR (CDCl₃, 400 MHz): δ 2.60 (d, 1H, *J* = 3.9 Hz), 6.08 (s, 1H), 6.14 (d, 1H, *J* = 3.9 Hz), 7.12 (d, 1H, *J* = 8.8 Hz), 7.18-7.43 (m, 7H), 7.72 (d, 1H, *J* = 8.8 Hz), 7.77 (d, 1H, *J* = 8.0 Hz), 7.93 (d, 1H, *J* = 8.6 Hz) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 32.9, 73.9, 83.4, 117.3, 119.1, 123.1, 123.4, 126.9, 127.1, 128.7, 128.9, 129.7, 130.0, 132.3, 138.9, 152.1 ppm; **IR** (film): 3455, 3284, 3058, 3027, 2926, 2840, 2112, 1630, 1599, 1520, 1490 cm⁻¹; **MS** [APCI(-)] *m/z* 257 (M-1)⁻; **Anal** calcd for C₁₉H₁₄O: C, 88.34; H, 5.46. Found: C, 88.51; H, 5.40.

ethyl 2-(1,3-diphenylprop-2-ynylthio)acetate (3bj): Yield 92%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 1.28 (t, 3H, *J* = 7.2 Hz), 3.30 (d, 1H, *J* = 15.2 Hz), 3.58 (d, 1H, *J* = 15.2 Hz), 4.18 (q, 2H, *J* = 7.2 Hz), 5.26 (s, 1H), 7.24-7.62 (m, 10H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 14.5, 33.9, 40.0, 61.5, 86.0, 86.3, 122.2, 127.6, 127.7, 127.8, 128.0, 128.2, 131.3, 136.8, 169.3 ppm; **IR** (film): 3061, 3030, 2199, 1732, 1598, 1491, 1450 cm⁻¹; **HRMS** (FAB) *m/z* calc. for C₁₉H₁₉O₂S [M+H⁺]: 311.1106, Found: 311.1100.

Phenyl 1,3-diphenyl-2-propynyl sulfide (3bk)¹¹: Yield 94%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 5.22 (s, 1H), 7.26-7.35 (m, 9H), 7.37-7.40 (m, 2H), 7.43-7.49 (m, 4H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 44.2, 86.8, 87.3, 122.8, 127.8, 128.0, 128.2, 128.3, 128.36, 128.41, 128.6, 131.6, 133.3, 134.4, 138.0 ppm; IR (film): 3054, 3023, 2930, 2202, 1598, 1583, 1490 cm⁻¹; MS [APCI(+)] *m/z* 301 (M+1)⁺.

Data are in accordance with previously reported results.¹¹

phenyl(1-phenylprop-2-ynyl)sulfane (3ee)¹¹: Yield 38%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 2.58 (d, 1H, *J* = 2.4 Hz), 4.98 (d, 1H, *J* = 2.4 Hz), 7.24-7.32 (m, 6H), 7.35-7.43 (m, 4H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 43.2, 74.7, 82.0, 128.0, 128.1, 128.4, 128.5, 128.8, 133.3, 134.0, 137.4 ppm; IR (film): 3292, 3059, 3029, 1583, 1491, 1453 cm⁻¹; MS [APCI(+)] *m/z* 225 (M+1)⁺.

Data are in accordance with previously reported results.¹¹

2-Hydroxyethyl 1,3-diphenyl-2-propynyl sulfide (3bl)¹¹: Yield 93%. A pale yellow oil. ¹H NMR (CDCl₃, 400 MHz): δ 2.06 (brs, 1H), 2.86 (dt, 1H, *J* = 13.9 and 6.0 Hz), 3.00 (dt, 1H, *J* = 13.9 and 6.0 Hz), 3.75-3.82 (m, 2H), 5.05 (s, 1H), 7.27-7.40 (m, 6H), 7.47-7.51 (m, 2H), 7.55-7.60 (m, 2H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 34.7, 39.1, 60.8, 86.1, 87.0, 122.5, 127.8(2), 128.2, 128.3, 128.5, 131.6, 138.0 ppm; IR (film): 3389, 3050, 3038, 2914, 2875, 2209, 1598, 1490 cm⁻¹; MS [APCI(+)] *m/z* 269 (M+1)⁺.

Data are in accordance with previously reported results.¹¹

2-(1-phenylhept-2-ynylthio)ethanol (3ae): Yield 90%. A pale yellow oil. $^1\text{H NMR}$ (CDCl_3 , 400 MHz): δ 0.92 (t, 3H, $J = 7.5$ Hz), 1.37-1.48 (m, 2H), 1.49-1.59 (m, 2H), 2.22 (brs, 1H), 2.30 (td, 2H, $J = 7.2$ and 2.0 Hz), 2.76 (dt, 1H, $J = 14.0$ and 6.0 Hz), 2.90 (dt, 1H, $J = 14.0$ and 6.0 Hz), 3.67-3.75 (m, 2H), 4.81 (t, 1H, $J = 2.0$ Hz), 7.23-7.36 (m, 3H), 7.47-7.52 (m, 2H) ppm; $^{13}\text{C NMR}$ (CDCl_3 , 100 MHz): δ 13.6, 18.6, 22.0, 30.9, 34.9, 38.9, 60.8, 76.8, 87.1, 127.8, 127.9, 128.6, 138.9 ppm; **IR** (film): 3405, 3061, 3028, 2871, 1598, 1493, 1453 cm^{-1} ; **ESI-MS**: m/z (%) = 271(100) [$\text{M}+\text{Na}^+$]; **Anal** calcd for $\text{C}_{15}\text{H}_{20}\text{OS}$: C, 72.53; H, 8.12; S, 12.91. Found: C, 72.84; H, 8.31; S, 12.61.

Phenylmethyl 1-phenyl-2-propynyl sulfide (3ef)¹¹ : Yield 41%. A pale yellow oil. $^1\text{H NMR}$ (CDCl_3 , 400 MHz): δ 2.65 (d, 1H, $J = 2.4$ Hz), 3.77 (d, 1H, $J = 13.3$ Hz), 3.99 (d, 1H, $J = 13.3$ Hz), 4.54 (d, 1H, $J = 2.4$ Hz), 7.23-7.37 (m, 8H), 7.43-7.47 (m, 2H) ppm; $^{13}\text{C NMR}$ (CDCl_3 , 100 MHz): δ 36.4, 37.9, 74.1, 81.7, 127.1, 127.8, 127.9, 128.49, 128.52, 129.0, 137.1, 137.4 ppm; **IR** (film): 3284, 3058, 3023, 2921, 2848, 2112, 1598, 1485 cm^{-1} ; **MS** [APCI(+)] m/z 239 ($\text{M}+1$)⁺.

Data are in accordance with previously reported results.¹¹

N-(1,3-diphenylprop-2-ynyl)benzamide (3bm)¹² : Yield 73%. A white solid. (m.p. 167-168 °C). $^1\text{H NMR}$ (CDCl_3 , 400 MHz): δ 6.48 (d, 1H, $J = 8.4$ Hz), 6.74 (d, 1H, $J = 8.4$ Hz), 7.30-7.51 (m, 11H), 7.63-7.67 (m, 2H), 7.80-7.84 (m, 2H) ppm; $^{13}\text{C NMR}$ (CDCl_3 , 100 MHz): δ 45.6, 85.1, 86.9, 122.4, 127.1, 127.2, 128.2, 128.3, 128.6, 128.8, 131.8, 133.8, 139.0, 166.2 ppm; **IR** (film): 3288, 3030, 2228, 1634, 1594, 1504, 1445, 1326 cm^{-1} ; **ESI-MS**: m/z (%) = 312 (100) [$\text{M}+\text{H}^+$].

Data are in accordance with previously reported results.¹²

***N*-(1-phenylhept-2-ynyl)benzamide (3af)**¹² : Yield 62%. A white solid. (m.p. 133-135 °C). ¹H NMR (CDCl₃, 400 MHz): δ 0.91 (t, 3H, *J* = 7.2 Hz), 1.37-1.47 (m, 2H), 1.48-1.57 (m, 2H), 2.25 (td, 2H, *J* = 7.2 and 2.4 Hz), 6.21 (d, 1H, *J* = 8.4 Hz), 6.74 (brs, 1H), 7.23-7.40 (m, 5H), 7.43-7.48 (m, 1H), 7.54-7.59 (m, 2H), 7.75-7.79 (m, 2H) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 13.6, 18.5, 22.0, 30.7, 45.3, 77.8, 85.8, 127.1, 127.2, 127.9, 128.5, 128.6, 131.7, 134.0, 139.8, 166.2 ppm; IR (film): 3296, 3030, 1638, 1602, 1489, 1454, 1322 cm⁻¹; ESI-MS: *m/z* (%) = 292 (75) [M+H⁺], 314 (100) [M+Na⁺].

Data are in accordance with previously reported results.¹²

4-chloro-*N*-(1-phenylprop-2-ynyl)benzamide (3eg)⁵ : Yield 56%. A white solid. (m.p. 138-139 °C). ¹H NMR (CDCl₃, 400 MHz): δ 2.54 (d, 1H, *J* = 2.4 Hz), 6.19 (dd, 1H, *J* = 8.4 and 2.4 Hz), 6.83 (brs, 1H), 7.30-7.39 (m, 5H), 7.56 (apparent d, 2H, *J* = 7.2 Hz), 7.71 (apparent d, 2H, *J* = 8.8 Hz) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 45.0, 73.4, 81.4, 127.1, 128.4, 128.6, 128.8, 131.9, 137.9, 138.1, 165.2 ppm; IR (film): 3296, 3027, 2120, 1640, 1595, 1484, 1451, 1330 cm⁻¹; ESI-MS: *m/z* (%) = 270 (75) [M+H⁺], 292 (100) [M+Na⁺].

Data are in accordance with previously reported results.⁵

1,3-diphenyl-*N*-tosylprop-2-yn-1-amine (3bn)¹² : Yield 82%. A white solid. (m.p. 186-188 °C). ¹H NMR (CDCl₃, 400 MHz): δ 2.32 (s, 3H), 4.90 (brs, 1H), 5.56 (d, 1H, *J* = 9.2 Hz), 7.10-7.14 (m, 2H), 7.22-7.38 (m, 8H), 7.56 (apparent d, 2H, *J* = 7.2 Hz), 7.82 (apparent d, 2H, *J* = 8.4 Hz) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 21.5, 49.8, 85.4, 86.7, 122.0, 127.4, 127.6, 128.1, 128.5, 128.6, 128.8, 129.6, 131.6, 137.4, 143.6 ppm; IR (film): 3267, 3062, 2221, 1597, 1490, 1450, 1331, 1156 cm⁻¹; ESI-MS: *m/z* (%) = 362 (8) [M+H⁺], 384 (100) [M+Na⁺].

Data are in accordance with previously reported results.¹²

1-phenyl-N-tosylprop-2-yn-1-amine (3eh)⁵ : Yield 78%. A white solid. (m.p. 131-132 °C). ¹H NMR (CDCl₃, 400 MHz): δ 2.31 (d, 1H, *J* = 2.0 Hz), 2.42 (s, 3H), 5.09 (d, 1H, *J* = 8.8 Hz), 5.31 (dd, 1H, *J* = 8.8 and 2.4 Hz), 7.25-7.33 (m, 5H), 7.42-7.47 (m, 2H), 7.76 (apparent d, 2H, *J* = 8.4 Hz) ppm; ¹³C NMR (CDCl₃, 100 MHz): δ 21.6, 49.0, 74.8, 80.4, 127.2, 127.5, 128.5, 128.7, 129.5, 137.0, 137.3, 143.6 ppm; IR (film): 3279, 3032, 2121, 1598, 1494, 1452, 1329, 1160 cm⁻¹; ESI-MS: *m/z* (%) = 286 (12) [M+H⁺], 308 (100) [M+Na⁺].

Data are in accordance with previously reported results.⁵

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