

Supplementary information

(Z)-1,2-Bis(phenylthio)-1-hexene (2a): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.41-7.20 (m, 10H), 6.54 (s, 1H), 2.23 (t, $J = 7.4$ Hz, 2H), 1.50-1.42 (m, 2H), 1.26-1.20 (m, 2H), 0.82 (t, $J = 7.4$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 135.9, 134.3, 133.8, 130.5, 129.7, 129.1, 129.0, 128.9, 126.8, 126.7, 36.8, 30.7, 21.9, 13.8; IR (neat) ν (cm^{-1}) 3059, 2957, 2928, 1582, 1478, 1439, 1024, 739, 690; MS (EI): m/z 300 (M^+ , 97), 167 (73), 147 (100), 135 (71), 109 (53); Anal. Calcd for $\text{C}_{18}\text{H}_{20}\text{S}_2$: C, 71.95; H, 6.71. Found: C, 71.67; H, 6.63.

(Z)-1,2-Bis[(4-methylphenyl)thio]-1-hexene (2b): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.33-7.27 (m, 4H), 7.14-7.09 (m, 4H), 6.46 (s, 1H), 2.34 (s, 3H), 2.33 (s, 3H), 2.20 (t, $J = 7.4$ Hz, 2H), 1.51-1.41 (m, 2H), 1.25-1.19 (m, 2H), 0.83 (t, $J = 7.2$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 136.9, 134.2, 132.4, 131.1, 130.2, 130.1, 129.9, 129.7, 128.7, 36.6, 30.7, 22.0, 21.2, 21.1, 13.9; IR (neat) ν (cm^{-1}) 3020, 2956, 2928, 1564, 1491, 1453, 1401, 1091, 1018, 805; MS (EI): m/z 328 (M^+ , 65), 195 (100), 161 (57), 149 (81), 91 (54); Anal. Calcd for $\text{C}_{20}\text{H}_{24}\text{S}_2$: C, 73.12; H, 7.36. Found: C, 72.86; H, 7.15.

(Z)-1,2-Bis(phenylthio)-3-hydroxy-1-propene (2c): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.44-7.21 (m, 10H), 7.03 (s, 1H), 4.14 (s, 2H), 2.01 (br, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 134.8, 134.7, 133.2, 130.5, 129.9, 129.3, 129.2, 127.5, 127.0, 65.5; IR (neat) ν (cm^{-1}) 3382, 3057, 1716, 1581, 1478, 1439, 1091, 1024, 740, 690; MS (EI): m/z 274 (M^+ , 47), 167 (48), 163 (73), 147 (75), 135 (100); Anal. Calcd for $\text{C}_{15}\text{H}_{14}\text{OS}_2$: C, 65.66; H, 5.14. Found: C, 65.39; H, 5.25.

(Z)-1,2-Bis[(4-methylphenyl)thio]-3-hydroxy-1-propene (2d): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.34-7.28 (m, 4H), 7.14-7.09 (m, 4H), 6.89 (s, 1H), 4.09 (s, 2H), 2.33 (s, 3H), 2.30 (s, 3H), 1.98 (br, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 137.6, 137.3, 134.3, 131.4, 130.8, 130.6, 130.1, 130.0, 129.4, 65.4, 21.1; IR (neat) ν (cm^{-1}) 3391, 3020, 1714, 1564, 1491, 1091, 1017, 805; MS (EI): m/z 302 (M^+ , 98), 246 (64), 163 (72), 161 (84), 149 (93), 123 (92), 91 (100); Anal. Calcd for $\text{C}_{17}\text{H}_{18}\text{OS}_2$: C, 67.51; H, 6.00. Found: C, 67.33; H, 6.05.

(Z)-1,2-Bis[(4-methylphenyl)thio]-3-methoxy-1-propene (2e): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.36-7.30 (m, 4H), 7.16-7.10 (m, 4H), 6.86 (s, 1H), 3.90 (s, 2H), 3.27 (s, 3H), 2.34 (s, 3H), 2.33 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 137.5, 137.1, 134.1, 131.6, 130.8, 130.7, 129.9, 129.8, 129.6, 127.3, 74.4, 58.0, 21.1; IR (neat) ν (cm^{-1}) 3021, 1714, 1564, 1491, 1119, 1091, 1017, 806; MS (EI): m/z 316 (M^+ , 59), 177 (43), 161 (100), 91 (39); Anal. Calcd for $\text{C}_{18}\text{H}_{20}\text{OS}_2$: C, 68.31; H, 6.37. Found: C, 68.38; H, 6.29.

(Z)-1,2-Bis[(4-methylphenyl)thio]styrene (2f): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.54-6.97 (m, 14H), 2.35 (s, 3H), 2.23 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 138.9, 137.7, 136.8, 135.8, 131.8, 131.1, 131.0, 130.0, 129.6, 129.2, 128.6, 128.3, 127.4, 126.8, 21.1, 21.0; IR (neat) ν (cm^{-1}) 3020, 1714, 1539, 1490, 1091, 1017, 803; MS (EI): m/z 348 (M^+ , 47), 246 (93), 123 (100), 91 (84), 77 (72); Anal. Calcd for $\text{C}_{22}\text{H}_{20}\text{S}_2$: C, 75.82; H, 5.78. Found: C, 75.57; H, 5.63.

(Z)-1,2-Bis[(4-methylphenyl)thio]-1-octene (2g): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.33-7.26 (m, 4H), 7.14-7.09 (m, 4H), 6.44 (s, 1H), 2.33 (s, 3H), 2.32 (s, 3H), 2.19 (t, $J = 7.4$ Hz, 2H), 1.50-1.43 (m, 2H), 1.26-1.15 (m, 6H), 0.84 (t, $J = 7.2$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 136.9, 134.4, 132.5, 131.2, 130.1, 129.9, 129.8, 129.7, 128.5, 36.9, 31.5, 28.5, 22.5, 21.1, 21.0, 14.1; IR (neat) ν (cm^{-1}) 3020, 2956, 2926, 1563, 1492, 1455, 1400, 1091, 1017, 806; MS (EI): m/z 356 (M^+ , 35), 233 (23), 195 (100), 161 (39), 149 (50); Anal. Calcd for $\text{C}_{22}\text{H}_{28}\text{S}_2$: C, 74.10; H, 7.92. Found: C, 73.89; H, 7.78.

(Z)-1,2-Bis(phenylthio)-3-amino-1-propene (2h): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.46-7.22 (m, 10H), 6.87 (s, 1H), 3.38 (s, 2H), 1.40 (s, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ 135.2, 133.7, 133.2, 132.1, 130.3, 130.0, 129.2, 129.1, 127.3, 126.9, 47.7; IR (neat) ν (cm^{-1}) 3374, 3055, 1654, 1582, 1478, 816, 745, 691; MS (EI): m/z 273 (M^+ , 100), 167 (41), 147 (69), 134 (80); Anal. Calcd for $\text{C}_{15}\text{H}_{15}\text{NS}_2$: C, 65.89; H, 5.53; N, 5.12. Found: C, 65.64; H, 5.61; N, 4.82.

(Z)-1,2-Bis(phenylthio)-1-octene (2i): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.42-7.19 (m, 10H), 6.56 (s, 1H), 2.24 (t, $J = 7.4$ Hz, 2H), 1.51-1.45 (m, 2H), 1.26-1.21 (m, 6H), 0.85 (t, $J = 7.2$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 136.0, 134.5, 133.9, 130.5,

129.7, 129.1, 129.0, 128.9, 126.8, 126.7, 37.2, 31.5, 28.6, 28.5, 22.6, 14.1; IR (neat) ν (cm^{-1}) 3073, 2955, 2927, 1582, 1478, 1439, 1092, 1024, 740, 690; MS (EI): m/z 328 (M^+ , 95), 167 (71), 147 (100), 135 (37), 109 (68); Anal. Calcd for $\text{C}_{20}\text{H}_{24}\text{S}_2$: C, 73.12; H, 7.36. Found: C, 73.24; H, 7.29.

(Z)-1,2-Bis(phenylseleno)-1-hexene (3a): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.56-7.51 (m, 4H), 7.32-7.23 (m, 6H), 6.93 (s, 1H), 2.28 (t, $J = 7.4$ Hz, 2H), 1.51-1.43 (m, 2H), 1.27-1.20 (m, 2H), 0.82 (t, $J = 7.2$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 136.3, 132.9, 132.7, 131.3, 129.6, 129.3, 129.2, 127.9, 127.4, 127.3, 39.7, 31.1, 21.9, 13.9; IR (neat) ν (cm^{-1}) 3057, 2955, 2927, 1577, 1476, 1437, 1022, 735, 690; MS (EI): m/z 396 (M^+ , 95), 394 (86), 183 (57), 157 (100), 77 (66); Anal. Calcd for $\text{C}_{18}\text{H}_{20}\text{Se}_2$: C, 54.83; H, 5.11. Found: C, 54.61; H, 5.20.

(Z)-1,2-Bis[(4-chlorophenyl)seleno]-1-hexene (3b): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.49-7.42 (m, 4H), 7.29-7.23 (m, 4H), 6.88 (s, 1H), 2.27 (t, $J = 7.4$ Hz, 2H), 1.50-1.42 (m, 2H), 1.27-1.21 (m, 2H), 0.83 (t, $J = 7.2$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 136.7, 134.1, 134.0, 133.8, 133.7, 129.5, 129.4, 129.2, 128.0, 127.6, 39.7, 31.1, 21.9, 13.8; IR (neat) ν (cm^{-1}) 2955, 2927, 1712, 1570, 1473, 1387, 1090, 1011, 813, 730; MS (EI): m/z 464 (M^+ , ^{35}Cl , 5.2), 217 (100), 191 (33), 156 (57), 57 (38); Anal. Calcd for $\text{C}_{18}\text{H}_{18}\text{Cl}_2\text{Se}_2$: C, 46.68; H, 3.92. Found: C, 46.42; H, 3.75.

(Z)-1,2-Bis(phenylseleno)-3-hydroxy-1-propene (3c): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.59-7.53 (m, 4H), 7.40 (s, 1H), 7.33-7.28 (m, 6H), 4.15 (s, 2H), 1.93 (br, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 133.4, 133.2, 132.4, 132.2, 130.3, 129.4, 129.3, 128.6, 127.8, 127.6, 67.6; IR (neat) ν (cm^{-1}) 3388, 3057, 1668, 1575, 1475, 1437, 1070, 1021, 735, 690; MS (EI): m/z 370 (M^+ , 29), 183 (53), 157 (77), 77 (100); Anal. Calcd for $\text{C}_{15}\text{H}_{14}\text{OSe}_2$: C, 48.93; H, 3.83. Found: C, 48.71; H, 3.95.

(Z)-1,2-Bis[(4-methylphenyl)seleno]-3-hydroxy-1-propene (3d): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.48-7.43 (m, 4H), 7.28 (s, 1H), 7.13-7.08 (m, 4H), 4.09 (s, 2H), 2.34 (s, 3H), 2.32 (s, 3H), 1.86 (br, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 137.9, 137.8, 133.5, 133.0, 132.9, 132.3, 130.2, 130.1, 126.7, 124.7, 67.5, 21.2; IR (neat) ν (cm^{-1}) 3377, 3018, 1709, 1574, 1488, 1447, 1072, 1015, 801; MS (EI): m/z 398 (M^+ , 46), 226 (48), 197 (63), 171 (75), 91 (100); Anal. Calcd for $\text{C}_{17}\text{H}_{18}\text{OSe}_2$: C, 51.53; H, 4.58.

Found: C, 51.31; H, 4.36.

(Z)-1,2-Bis[(4-methylphenyl)seleno]-3-methoxy-1-propene (3e): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.48-7.44 (m, 4H), 7.25 (s, 1H), 7.13-7.08 (m, 4H), 3.91 (s, 2H), 3.25 (s, 3H), 2.34 (s, 3H), 2.33 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 137.8, 137.6, 133.4, 133.2, 132.9, 130.1, 130.0, 129.1, 126.9, 125.0, 76.6, 57.9, 21.2; IR (neat) ν (cm^{-1}) 3018, 1697, 1573, 1488, 1101, 1015, 802; MS (EI): m/z 412 (M^+ , 37), 171 (69), 91 (100); Anal. Calcd for $\text{C}_{18}\text{H}_{20}\text{OSe}_2$: C, 52.69; H, 4.91. Found: C, 52.44; H, 5.05.

(Z)-1,2-Bis[(4-methylphenyl)seleno]styrene (3f): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.52-6.97 (m, 14H), 2.35 (s, 3H), 2.24 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 140.7, 138.0, 136.6, 136.3, 133.5, 132.3, 131.4, 131.2, 130.2, 129.9, 128.2, 127.4, 127.3, 126.5, 21.1, 21.0; IR (neat) ν (cm^{-1}) 3014, 2965, 1592, 1487, 1441, 1015, 801; MS (EI): m/z 444 (M^+ , 95), 171 (58), 91 (100); Anal. Calcd for $\text{C}_{22}\text{H}_{20}\text{Se}_2$: C, 59.74; H, 4.56. Found: C, 59.51; H, 4.35.

(Z)-1,2-Bis[(4-methylphenyl)seleno]-1-octene (3g): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.45-7.41 (m, 4H), 7.10-7.06 (m, 4H), 6.83 (s, 1H), 2.32 (s, 3H), 2.31 (s, 3H), 2.22 (t, $J = 7.2$ Hz, 2H), 1.48-1.42 (m, 2H), 1.26-1.14 (m, 6H), 0.83 (t, $J = 7.2$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 137.4, 136.5, 133.5, 133.0, 130.1, 130.0, 128.5, 127.6, 127.3, 125.8, 39.7, 31.6, 28.9, 28.5, 22.6, 21.2, 14.2; IR (neat) ν (cm^{-1}) 3017, 2955, 2925, 1574, 1488, 1453, 1015, 802; MS (EI): m/z 452 (M^+ , 18), 262 (88), 183 (100), 91 (63); Anal. Calcd for $\text{C}_{22}\text{H}_{28}\text{Se}_2$: C, 58.67; H, 6.27. Found: C, 58.38; H, 6.20.

(Z)-1,2-Bis(phenylseleno)-3-amino-1-propene (3h): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.61-7.50 (m, 4H), 7.33-7.26 (m, 6H), 7.22 (s, 1H), 3.38 (br, 2H), 1.43 (br, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ 133.1, 132.5, 130.8, 130.6, 129.4, 129.3, 128.9, 127.7, 127.5, 50.3; IR (neat) ν (cm^{-1}) 3370, 3053, 1578, 1477, 841, 735; MS (EI): m/z 369 (M^+ , 11), 183 (58), 157 (76), 77 (100); Anal. Calcd for $\text{C}_{15}\text{H}_{15}\text{NSe}_2$: C, 49.06; H, 4.12; N, 3.81. Found: C, 49.29; H, 4.28; N, 3.99.

(Z)-1,2-Bis(phenylseleno)-1-octene (3i): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.57-7.51 (m, 4H), 7.32-7.24 (m, 6H), 6.93 (s, 1H), 2.28 (t, $J = 7.4$ Hz, 2H), 1.50-1.45 (m, 2H), 1.27-1.17 (m, 6H), 0.84 (t, $J = 6.8$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 136.5, 132.9, 132.6, 131.3, 129.5, 129.3, 129.2, 127.8, 127.4, 127.3, 40.0, 31.5, 28.9,

28.4, 22.5, 14.1; IR (neat) ν (cm^{-1}) 3057, 2956, 2926, 1710, 1577, 1476, 1438, 1071, 1022, 735, 690; MS (EI): m/z 424 (M^+ , 35), 183 (88), 115 (100), 77 (76); Anal. Calcd for $\text{C}_{20}\text{H}_{24}\text{Se}_2$: C, 56.88; H, 5.73. Found: C, 56.59; H, 5.75.

(Z)-1,2-Bis[(4-chlorophenyl)seleno]-1-octene (3j): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.48-7.42 (m, 4H), 7.28-7.24 (m, 4H), 6.87 (s, 1H), 2.26 (t, $J = 7.4$ Hz, 2H), 1.49-1.42 (m, 2H), 1.27-1.18 (m, 6H), 0.85 (t, $J = 6.8$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 136.9, 134.2, 134.0, 133.8, 133.7, 129.5, 129.4, 129.2, 127.8, 127.6, 40.0, 31.5, 28.9, 28.4, 22.5, 14.0; IR (neat) ν (cm^{-1}) 2957, 2928, 1637, 1574, 1473, 1387, 1089, 1011, 812; MS (EI): m/z 492 (M^+ , ^{35}Cl , 45), 193 (58), 191 (100), 156 (72), 112 (68), 109 (94), 67 (81); Anal. Calcd for $\text{C}_{20}\text{H}_{22}\text{Cl}_2\text{Se}_2$: C, 48.90; H, 4.51. Found: C, 48.63; H, 4.45.

(Z)-1,2-Bis[(4-chlorophenyl)seleno]styrene (3k): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.56-7.12 (m, 14H); ^{13}C NMR (100 MHz, CDCl_3) δ 140.1, 135.4, 134.6, 134.4, 133.0, 132.4, 132.1, 129.6, 129.3, 129.0, 128.5, 128.4, 127.9, 127.3; IR (neat) ν (cm^{-1}) 3056, 1709, 1544, 1472, 1387, 1089, 1011, 810; MS (EI): m/z 484 (M^+ , 35), 293 (38), 258 (100), 191 (99), 156 (60), 112 (42); Anal. Calcd for $\text{C}_{20}\text{H}_{14}\text{Cl}_2\text{Se}_2$: C, 49.72; H, 2.92. Found: C, 49.93; H, 3.05.

(Z)-1,2-Bis(phenylseleno)-3-methoxy-1-propene (3l): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.59-7.54 (m, 4H), 7.36 (s, 1H), 7.35-7.24 (m, 6H), 3.95 (s, 2H), 3.27 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 133.4, 133.1, 132.6, 130.5, 129.4, 129.3, 129.1, 128.9, 127.7, 127.5, 76.7, 58.0; IR (neat) ν (cm^{-1}) 3055, 1692, 1577, 1475, 1098, 1021, 800, 738, 690; MS (EI): m/z 384 (M^+ , 65), 195 (100), 147 (97), 115 (98), 77 (96); Anal. Calcd for $\text{C}_{16}\text{H}_{16}\text{OSe}_2$: C, 50.28; H, 4.22. Found: C, 50.35; H, 4.29.

(Z)-1,2-Bis[(4-chlorophenyl)seleno]-3-methoxy-1-propene (3m): Oil; ^1H NMR (400 MHz, CDCl_3) δ 7.51-7.45 (m, 4H), 7.30-7.25 (m, 5H), 3.94 (s, 2H), 3.28 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 134.5, 134.2, 134.0, 133.8, 133.4, 133.3, 129.6, 129.5, 128.5, 127.0, 77.2, 58.1; IR (neat) ν (cm^{-1}) 3076, 1696, 1572, 1473, 1089, 1011, 812; MS (EI): m/z 452 (M^+ , ^{35}Cl , 28), 229 (80), 181 (100), 156 (52), 112 (22); Anal. Calcd for $\text{C}_{16}\text{H}_{14}\text{OCl}_2\text{Se}_2$: C, 42.60; H, 3.13. Found: C, 42.41; H, 3.20.