General. Unless stated otherwise, all reactions were carried out under Argon in flame-dried glassware. The solvents were purified by distillation over the indicated drying agents and were transferred under Argon: THF, Et$_2$O (Mg/anthracene), CH$_2$Cl$_2$, CH$_3$CN (CaH$_2$), hexane, toluene (Na/K), EtOH, MeOH (Mg). Flash chromatography: Merck silica gel 60 (40-63 μm).

MS (EI): Finnigan MAT 8200 (70 eV), ESI-MS: EQ 3000 (Bruker). Accurate mass determinations: Bruker APEX III FT-MS (7 T magnet) or MAT 95 (Finnigan).

NMR spectra were recorded on Bruker DPX 300, AV VIII 300, 400, 500 or 600 spectrometers in the solvents indicated; chemical shifts (δ) are given in ppm relative to TMS, coupling constants (J) in Hz. The solvent signals were used as references and the chemical shifts converted to the TMS scale (CDCl$_3$: δ$_C$ = 77.16 ppm; residual CHCl$_3$ in CDCl$_3$: δ$_H$ = 7.26 ppm; CD$_2$Cl$_2$: δ$_C$ = 54.0 ppm; residual CHDCl$_2$ in CD$_2$Cl$_2$: δ$_H$ = 5.32 ppm); proton and carbon assignments were established using NOESY, HSQC, and HMBC experiments.

For clarity, Sn–H couplings of the vinylic protons were omitted in the multiplet analysis, but are given in brackets (averaged over $^{117/119}$Sn).

$^{119}$Sn NMR spectra were recorded on a Bruker AV VIII 300 or Bruker AV VIII 500 spectrometer using Me$_4$Sn as external standard.

Unless stated otherwise, all commercially available compounds were used as received. [Cp*Ru(CH$_3$CN)$_3$]PF$_6$, [(Cp*RuCl)$_n$], and [(Cp*RuCl)$_4$] were prepared according to literature procedures and were stored under Argon. [Cp*Ru(cod)Cl] was purchased from Strem and stored under Ar. Commercial Bu$_3$SnH is stabilized with 0.05% of 3,5-di-tert-butyl-4-hydroxytoluene, which was not removed in any of the reactions described herein.

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[a] unless stated otherwise, all reactions were performed on 0.1-0.2 mmol scale by adding Bu3SnH (1.1 equiv.) over ~5 min to a solution of the substrate and the respective catalyst in CH2Cl2 (0.2 M) under Ar; [b] using either 5 mol% of 3 or 5, or 1.25 mol% of 7; [c] ratio is the crude product, as determined by 1H NMR; [d] ≥ 1 mmol scale; [e] conversion (1H NMR); [f] 2.1 mmol scale; [g] small amounts of the corresponding ketone were also found; [h] using 1.0 eq. of Bu3SnH; [i] the substrate was added over 1.5 h; [j] the yield refers to the pure Z-configured β-stannylated isomer obtained by flash chromatography; [k] 0.6 mmol scale
**Figure S-1.** Olefinic region of the $^1$H NMR spectrum of (Z)-tributyl(dec-5-en-5-yl)stannane prepared by trans-hydrostannation showing the characteristic satellites caused by coupling with the $^{117}$Sn/$^{119}$Sn nuclei; the (E)-configured isomer is marked “minor”; the Z:E ratio is $\geq 99:1$.

(Z)-Tributyl(dec-5-en-5-yl)stannane. Tributyltin hydride (0.99 mL, 3.68 mmol, 1.05 equiv) was added dropwise under Argon over 6 min to a stirred solution of 5-decyne (0.63 mL, 3.5 mmol) and [Cp*Ru(CH$_3$CN)$_3$]PF$_6$ (88.2 mg, 0.175 mmol, 0.05 equiv) in CH$_2$Cl$_2$ (17.5 mL, 0.2 M) at ambient temperature. Once the addition was complete, stirring was continued for 15 min before the solvent was evaporated. The residue was purified by filtration through a short pad of silica using hexane as the eluent. Evaporation of the product-containing fractions afforded (Z)-tributyl(dec-5-en-5-yl)stannane as a colorless oil (1.42 g, 94%) (Z/E $> 99:1$ (NMR)). $^1$H NMR (400 MHz, CDCl$_3$): $\delta$ = 5.98 (tt, $J$ = 7.1, 1.2, $J_{\text{Sn-H}}$ = 137.4 Hz, 1H), 2.25 – 2.05 (m, 2H), 2.03 – 1.91 (m, 2H), 1.59 – 1.39 (m, 6H), 1.39 – 1.22 (m, 14H), 1.00 – 0.80 (m, 21H); $^{13}$C NMR (101 MHz, CDCl$_3$): $\delta$ = 143.4, 140.8, 40.6, 34.9, 33.1, 32.8, 29.4, 27.6, 22.7, 22.4, 14.3, 14.2, 13.8, 10.4; $^{119}$Sn NMR (186 MHz, CDCl$_3$): $\delta = -53.3$ ppm; IR (film, cm$^{-1}$): $\tilde{\nu}$ = 2955, 2922, 2872, 2854, 1463, 1377, 1071.

(Z)-11-(Tributylstannyl)-1,8-dioxacyclotetradec-11-ene-2,7-dione. Prepared analogously (using 1.1 equiv. of Bu$_3$SnH) as a colorless oil (50.1 mg, 97%) (Z/E = 85:15 (NMR)). $^1$H NMR (400 MHz, CDCl$_3$): $\delta$ = 6.01 (tt, $J = 6.6, 1.3, J_{\text{Sn-H}} = 124.5$ Hz, 1H), 4.20 – 4.04 (m, 4H), 2.61 – 2.44 (m, 2H), 2.43 – 2.36 (m, 2H), 2.36 – 2.27 (m, 4H), 1.71 – 1.56 (m, 4H), 1.56 – 1.38 (m, 6H), 1.39 – 1.24 (m, 6H), 1.07 – 0.78 (m, 6H), 0.89 (t, $J = 7.3$ Hz, 9H); $^{13}$C NMR (101 MHz, CDCl$_3$): $\delta$ = 173.4, 173.2, 142.5, 140.0, 63.9, 63.4, 39.8, 35.2, 33.8, 29.3, 27.6, 24.9, 24.5, 13.8, 10.3; $^{119}$Sn NMR (112 MHz, CDCl$_3$): $\delta = -53.1$ ppm; IR (film, cm$^{-1}$): $\tilde{\nu}$ = 2954, 2923, 2871, 2853, 1731, 1458, 1378, 1338, 1266, 1144, 1068, 1047; ESI-MS calcd for C$_{24}$H$_{44}$O$_3$SnNa (M+Na$^+$) 539.21531; found 539.21566.
Figure S-2. Olefinic region of the $^1$H NMR spectrum of crude (Z)-11-(tributylstannyl)-1,8-dioacyclotetradec-11-ene-2,7-dione formed by hydrostannation in the presence of [Cp*Ru(MeCN)$_3$]$_2$PF$_6$. The fact that the $^3$J$_{Sn,H}$ of the major isomer is about twice as large as that of the minor isomer shows that the former derives from a trans-addition pathway, whereas the letter derives from cis-addition of Bu$_3$SnH across the triple bond.$^{4,5}$

(Z)-5-(Tributylstannyl)-3,4,7,8-tetrahydrobenzo[c][1,6]dioxacyclododecine-1,10-dione. Prepared analogously as a colorless oil (52.1 mg, 97%) (Z/E = 95:5 (NMR)). $^1$H NMR (400 MHz, CDCl$_3$): $\delta = 7.84 – 7.73$ (m, 1H), 7.60 – 7.51 (m, 1H), 7.55 – 7.44 (m, 2H), 6.16 (t, $J = 7.3$, $J_{Sn-H} = 127.1$ Hz, 1H), 4.47 (t, $J = 5.8$ Hz, 2H), 4.34 (t, $J = 5.9$ Hz, 2H), 2.74 – 2.52 (m, 2H), 2.43 (dt, $J = 7.1$, 5.6 Hz, 2H), 1.52 – 1.32 (m, 6H), 1.26 – 1.16 (m, 6H), 0.99 – 0.81 (m, 6H), 0.80 (t, $J = 7.3$ Hz, 9H); $^{13}$C NMR (101 MHz, CDCl$_3$): $\delta = 168.4$, 167.5, 141.4, 139.8, 133.8, 131.9, 131.1, 130.5, 129.5, 128.3, 64.2, 64.1, 38.5, 34.6, 29.2, 27.5, 13.7, 10.4; $^{119}$Sn NMR (112 MHz, CDCl$_3$): $\delta = -52.6$ ppm; IR (film, cm$^{-1}$): $\tilde{\nu} = 2954, 2922, 2870, 2851, 1730, 1462, 1376, 1282, 1072, 1039, 1017$; ESI-MS calcd for C$_{26}$H$_{40}$O$_4$SnNa (M+Na$^+$) 559.18401; found 559.18418.

(Z)-2-(Tributylstannyl)but-2-ene-1,4-diyli diacetate. Prepared analogously as a colorless oil (73.8 mg, 80%) (Z/E = 99:1 (NMR)). $^1$H NMR (400 MHz, CDCl$_3$): $\delta = 6.39$ (tt, $J = 6.9$, 1.6, $J_{Sn-H} = 106.9$ Hz, 1H), 4.74 – 4.63 (m, 2H), 4.56 – 4.47 (m, 2H), 2.07 (s, 3H), 2.06 (s, 3H), 1.57 – 1.39 (m, 2H), 1.38 – 1.25 (m, 6H), 1.03 – 0.93 (m, 6H), 0.89 (t, $J = 7.3$ Hz, 9H); $^{13}$C NMR (101 MHz, CDCl$_3$): $\delta = 170.8$, 170.6, 145.6, 135.6, 71.1, 65.7, 29.1, 27.4, 21.10, 21.08, 13.8, 10.6; $^{119}$Sn NMR (112 MHz, CDCl$_3$): $\delta = -48.5$ ppm; IR (film, cm$^{-1}$): $\tilde{\nu} = 2956, 2925, 2872, 2853, 1740, 1459, 1376, 1217, 1077, 1021$; ESI-MS calcd for C$_{20}$H$_{38}$O$_4$SnNa (M+Na$^+$) 485.16836; found 485.16855.

(Z)-3-(Tributylstannyl)hex-3-ene-1,6-diyli bis(4-methylbenzene-sulfonate). Prepared analogously as a colorless oil (69.6 mg, 98%) (Z/E = 99:1 (NMR)). $^1$H NMR (400 MHz, CDCl$_3$): $\delta = 7.77$ (dq, $J = 8.5$, 2.1 Hz, 4H), 7.39 – 7.31 (m, 4H), 5.85 (tt, $J = 7.1$, 1.3, $J_{Sn-H} = 118.0$ Hz, 1H), 3.95 (t, $J =

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6.9 Hz, 2H), 3.88 (t, J = 7.4 Hz, 2H), 2.52 – 2.38 (m, 8H), 2.32 (q, J = 7.0 Hz, 2H), 1.45 – 1.31 (m, 6H), 1.32 – 1.19 (m, 6H), 0.86 (t, J = 7.3 Hz, 9H), 0.84 – 0.79 (m, 6H); ^13C NMR (101 MHz, CDCl3): δ = 145.0, 144.9, 142.2, 137.8, 133.3, 133.2, 130.01, 129.99, 128.1, 128.0, 69.9, 69.6, 39.3, 34.5, 29.2, 27.4, 21.8, 13.8, 10.3; ^119Sn NMR (112 MHz, CDCl3): δ = –49.5 ppm; IR (film, cm^-1): v = 2955, 2924, 2871, 2853, 1598, 1463, 1360, 1188, 1174, 1097; ESI-MS calcd for C32H50O5S3SnNa (M+Na^-) 737.19623; found 737.19663.

(Z)-Tributyl[1,12-dibromododec-6-en-6-yl]stannane. Prepared analogously as a colorless oil (49.1 mg, 80%). (Z/E = 97:3 (NMR)); ^1H NMR (400 MHz, CDCl3): δ = 5.97 (tt, J = 7.2, 1.2, J_Sn-H = 134.3 Hz, 1H), 3.40 (td, J = 6.8, 3.3 Hz, 4H), 2.26 – 2.06 (m, 2H), 2.04 – 1.93 (m, 2H), 1.93 – 1.78 (m, 4H), 1.57 – 1.37 (m, 12H), 1.37 – 1.25 (m, 8H), 0.99 – 0.80 (m, 15H); ^13C NMR (101 MHz, CDCl3): δ = 143.6, 140.6, 40.6, 34.9, 34.1, 33.9, 33.0, 32.9, 29.9, 29.6, 29.4, 28.2, 27.9, 27.6, 26.7, 26.4, 13.8, 10.4; ^119Sn NMR (112 MHz, CDCl3): δ = –53.2 ppm; IR (film, cm^-1): v = 2955, 2924, 2870, 2853, 1459, 1264, 1071.

(Z)-Tributyl[1,12-diazidododec-6-en-6-yl]stannane. Prepared analogously as a yellow oil (30.2 mg, 56%) (Z/E = 98:2 (NMR)); ^1H NMR (400 MHz, CDCl3): δ = 5.97 (tt, J = 7.1, 1.3, J_Sn-H = 134.3 Hz, 1H), 3.31 – 3.22 (m, 4H), 2.27 – 2.05 (m, 2H), 2.05 – 1.91 (m, 2H), 1.67 – 1.54 (m, 4H), 1.53 – 1.42 (m, 6H), 1.42 – 1.36 (m, 4H), 1.36 – 1.25 (m, 10H), 0.99 – 0.80 (m, 15H); ^13C NMR (101 MHz, CDCl3): δ = 143.6, 140.6, 51.64, 51.57, 40.6, 34.9, 30.2, 30.0, 29.4, 29.0, 28.9, 27.6, 26.7, 26.4, 13.8, 10.4; ^119Sn NMR (112 MHz, CDCl3): δ = –53.1 ppm; IR (film, cm^-1): v = 2954, 2925, 2870, 2854, 2090, 1457, 1347, 1256, 1072.

(Z)-N^1,N^6-Dimethoxy-N^1,N^6-dimethyl-4-(tributylstannyl)oct-4-enediamide. Prepared analogously as a yellow oil (48.2 mg, 88%) (Z/E = 99:1 (NMR)); ^1H NMR (500 MHz, CDCl3): δ = 6.07 (t, J = 7.1, J_Sn-H = 128.4 Hz, 1H), 3.67 (s, 6H), 3.17 (s, 3H), 3.16 (s, 3H), 2.54 – 2.36 (m, 6H), 2.30 (dt, J = 9.4, 7.2 Hz, 2H), 1.57 – 1.39 (m, 6H), 1.37 – 1.25 (m, 6H), 1.01 – 0.86 (m, 6H), 0.87 (t, J = 7.3 Hz, 9H); ^13C NMR (126 MHz, CDCl3): δ = 174.2, 173.9, 143.5, 139.7, 61.3, 61.3, 33.1, 32.5, 32.3, 29.9, 29.4, 27.5, 13.8, 10.3; ^119Sn NMR (186 MHz, CDCl3): δ = –51.0 ppm; IR (film, cm^-1): v = 2955, 2924, 2871, 2853, 1665, 1462, 1413, 1380, 1176, 1115, 1073, 992; ESI-MS calcd for C32H42N2O6SnNa (M+Na^-) 571.25276; found 571.25288.

(Z)-7-(TributylstannyI)tetradec-7-ene-1,14-diol. Prepared analogously as a yellow oil (39.4 mg, 76%) (Z/E = 99:1 (NMR)); ^1H NMR (400 MHz, CDCl3): δ = 5.96 (tt, J = 7.0, 1.2, J_Sn-H = 136.3 Hz, 1H), 3.63 (tdd, J = 6.6, 4.6, 1.8 Hz, 4H), 2.24 – 2.05 (m, 2H), 2.03 – 1.90 (m, 2H), 1.63 – 1.53 (m, 4H), 1.53 – 1.40 (m, 6H), 1.40 – 1.23 (m, 20H), 0.97 – 0.79 (m, 6H), 0.89 (t, J = 7.2 Hz, 9H); ^13C NMR (101 MHz, CDCl3): δ = 143.5, 140.8, 63.22, 63.16, 40.7, 35.1, 33.0, 32.9, 30.7, 30.5, 29.43, 29.39, 29.1, 27.6, 25.9, 25.8, 13.8, 10.4; ^119Sn NMR (112 MHz, CDCl3): δ = –53.5 ppm; IR (film, cm^-1): v = 3318, 2953, 2923, 2870, 2852, 1461, 1376, 1071, 1055; ESI-MS calcd for C32H32O5Sn (M^-H^-) 517.0724; found 517.0758.

(Z)-2,2,3,3,20,20,21,21-Octamethyl-11-(tributylstannyI)-4,19-dioxa-3,20-disiladocos-11-ene. Prepared analogously as a yellow oil (66.3 mg, 89%) (Z/E = 99:1 (NMR)); ^1H NMR (400 MHz, CDCl3): δ = 5.97 (tt, J = 7.1, 1.2, J_Sn-H = 137.0 Hz, 1H), 3.60 (td, J = 6.6, 1.3 Hz, 4H), 2.26 – 2.03 (m, 2H), 1.96 (q, J = 6.9 Hz, 2H), 1.61 – 1.40 (m, 10H), 1.40 – 1.21 (m, 18H), 1.03 – 0.77 (m, 33H), 0.05 (s, 12H); ^13C NMR (101 MHz, CDCl3): δ = 143.5, 140.7, 63.5, 63.4, 40.9, 35.2,
In this particular case, the $3^J_{Sn,H}$ is significantly smaller than for most other products described herein; yet, it is in good agreement with the literature, which reports a $3^J_{Sn,H} = 83.5$ Hz for the $Z$-isomer and 50.0 Hz for the $E$-isomer, cf. ref. 4.

S-7
(Z)-3-(Tributylstannyl)pent-3-en-2-ol. Tributyltin hydride (1.1 mmol, 0.30 mL, 1.1 equiv) was added dropwise over 5 min to a stirred solution of [Cp*RuCl]4 (15.4 mg, 0.025 mmol, 0.025 equiv) and 3-pentyn-2-ol (93 μL, 1.0 mmol) in CH2Cl2 (5.0 mL, 0.2 M) under argon. The resulting mixture was stirred for 15 min before all volatile materials were evaporated. The residue was loaded on top of a flash column packed with SiO2 and the product eluted with hexane/EtOAc (50/1 → 30/1) to give the title compound as a pale yellow oil (329 mg, 88%, α/β isomer = 98/2). The Z/E ratio was found to be >99/1 for the α-isomer. 1H NMR (400 MHz, CDCl3): δ = 6.27 (qd, J = 6.7, 1.2, J_{Sn-H} = 125.5 Hz, 1H), 4.35 (qd, J = 6.3, 3.1 Hz, 1H), 1.76 – 1.69 (m, 3H), 1.60 – 1.40 (m, 6H), 1.39 – 1.28 (m, 7H), 1.21 (d, J = 6.3 Hz, 3H), 1.07 – 0.92 (m, 6H), 0.89 (t, J = 7.3 Hz, 9H); 13C NMR (101 MHz, CDCl3): δ = 150.5, 133.6, 75.8, 29.4, 27.5, 24.4, 19.3, 13.8, 11.0; 119Sn NMR (186 MHz, CDCl3): δ = −54.6 ppm; IR (film, cm⁻¹): ν = 3345, 2955, 2922, 2871, 2853, 1621, 1456, 1375, 1289, 1248, 1069; ESI-MS calcd for C17H35OSn (M–H⁻) 375.17147; found 375.17160.

Figure S-3. Olefinic region of the 1H NMR spectrum of the crude product formed by hydrostannation of 3-pentyn-2-ol in the presence of [Cp*Ru(MeCN)3]PF6 (3) (top, black) or [Cp*RuCl]4 (7) (bottom, red), respectively; although the reaction catalyzed by 3 is regio-unselective, both isomers obviously originate from a trans-addition process as evident from the characteristic J_{Sn,H} coupling constants (expressed in the satellites) which are of the same magnitude.

(Z)-2-(Tributylstannyl)pent-2-en-1-ol. Prepared analogously using [(Cp*RuCl)4] (1.25 mol%) as the catalyst; colorless oil (670 mg, 83%) (α/β = 95/5) (Z/E = 99:1 for the major isomer (NMR)); 1H NMR (400 MHz, CDCl3): δ = 6.21 (tt, J = 7.1, 1.4, J_{Sn-H} = 122.9 Hz, 1H), 4.25 – 4.08 (m, 2H), 2.10 – 1.98 (m, 2H), 1.59 – 1.39 (m, 6H), 1.38 – 1.25 (m, 6H), 1.20 (t, J = 5.9 Hz, 1H), 1.06 – 0.92 (m, 9H), 0.89 (t, J = 7.3 Hz, 9H); 13C NMR (101 MHz, CDCl3): δ = 143.6, 142.6, 70.6, 29.4, 27.9, 27.5, 24.4, 19.3, 13.8, 10.4; 119Sn NMR (112 MHz, CDCl3): δ = −52.3 ppm; IR (film, cm⁻¹): ν = 3316, 2956, 2923, 2871, 2851, 1622, 1459, 1418, 1376, 1291, 1148, 1080, 1000; ESI-MS calcd for C17H35OSn (M–H⁻) 375.17147; found 375.17155.
(Z)-3-(Tributylstannyl)hex-3-en-2-ol. Prepared analogously using [(Cp*RuCl)₄] (1.25 mol%) as the catalyst; colorless oil (65.5 mg, 84%) (α/β = 98:2) (Z/E = 99:1 for the major isomer (NMR)); ¹H NMR (400 MHz, CDCl₃): δ = 6.15 (td, J = 7.2, 1.1, J₁Sn-H = 125.7 Hz, 1H), 4.34 (qdd, J = 6.4, 3.4, 1.0 Hz, 1H), 2.09 – 1.94 (m, 2H), 1.59 – 1.39 (m, 6H), 1.38 – 1.26 (m, 7H), 1.22 (d, J = 6.3 Hz, 3H), 1.09 – 0.92 (m, 9H), 0.89 (t, J = 7.3 Hz, 9H); ¹³C NMR (101 MHz, CDCl₃): δ = 148.4, 141.2, 75.7, 29.4, 27.6, 27.5, 24.4, 14.6, 13.8, 11.2; ¹¹⁹Sn NMR (112 MHz, CDCl₃): δ = –53.8 ppm; IR (film, cm⁻¹): ν = 3354, 2957, 2923, 2871, 2853, 1619, 1458, 1376, 1287, 1247, 1149, 1115, 1070, 1005; ESI-MS calcd for C₁₃H₂₂OSn (M–H⁻) 389.18712; found 389.18728.

(Z)-3-(Tributylstannyl)hex-3-en-2-yl acetate. Prepared analogously using [(Cp*RuCl)₄] (1.25 mol%) as the catalyst; colorless oil (73.8 mg, 86%) (α/β = 75:25) (Z/E = 94:6 for the major isomer (NMR)); ¹H NMR (400 MHz, CDCl₃): δ = 6.18 (td, J = 7.2, 1.0, J₁Sn-H = 122.3 Hz, 1H), 5.49 – 5.28 (m, 1H), 2.08 – 1.94 (m, 2H), 2.00 (s, 3H), 1.59 – 1.38 (m, 6H), 1.38 – 1.27 (m, 6H), 1.25 (d, J = 6.4 Hz, 3H), 1.05 – 0.85 (m, 18H); ¹³C NMR (101 MHz, CDCl₃): δ = 170.2, 151.1, 143.5, 78.6, 29.3, 27.54, 27.50, 22.1, 21.7, 14.4, 13.8, 11.1; ¹¹⁹Sn NMR (112 MHz, CDCl₃): δ = –52.4 ppm; IR (film, cm⁻¹): ν = 2957, 2926, 2871, 2854, 1737, 1457, 1368, 1235, 1126, 1070, 1041, 1012; ESI-MS calcd for C₂₀H₄₀O₂SnNa (M+Na⁺) 455.19418; found 455.19459.

(2Z,7Z)-3-(Tributylstannyl)trideca-2,7-dien-4-ol. Prepared analogously using [(Cp*RuCl)₄] (1.25 mol%) as the catalyst; colorless oil (69.5 mg, 72%) (α/β = 98:2) (Z/E = 99:1 for the major isomer (NMR)); ¹H NMR (400 MHz, CDCl₃): δ = 6.25 (qd, J = 6.6, 1.1, J₁Sn-H = 125.5 Hz, 1H), 5.44 – 5.30 (m, 2H), 4.13 (td, J = 6.7, 3.1 Hz, 1H), 2.16 – 1.95 (m, 4H), 1.74 (d, J = 6.5 Hz, 3H), 1.60 – 1.42 (m, 8H), 1.41 (d, J = 3.2 Hz, 1H), 1.39 – 1.23 (m, 12H), 1.08 – 0.93 (m, 6H), 0.92 – 0.84 (m, 12H); ¹³C NMR (101 MHz, CDCl₃): δ = 149.3, 134.9, 130.7, 129.2, 80.0, 37.8, 31.7, 29.6, 29.4, 27.6, 27.4, 24.0, 22.8, 19.4, 14.2, 13.8, 11.1; ¹¹⁹Sn NMR (112 MHz, CDCl₃): δ = –55.6 ppm; IR (film, cm⁻¹): ν = 3466, 3004, 2955, 2922, 2871, 2854, 1620, 1457, 1376, 1290, 1070, 1003; ESI-MS calcd for C₂₅H₄₀OSnNa (M+Na⁺) 485.28102; found 485.28128.

(Z)-3-(Tributylstannyl)octa-2,7-dien-4-ol. Prepared analogously using [(Cp*RuCl)₄] (1.25 mol%) as the catalyst; colorless oil (31.9 mg, 77%) (α/β = 97:3) (Z/E = 99:1 for the major isomer (NMR)); ¹H NMR (400 MHz, CDCl₃): δ = 6.25 (qd, J = 6.7, 1.1, J₁Sn-H = 125.0 Hz, 1H), 5.83 (ddt, J = 16.9, 10.2, 6.2 Hz, 1H), 5.02 (dq, J = 17.1, 1.7 Hz, 1H), 4.96 (ddt, J = 10.2, 2.3, 1.3 Hz, 1H), 4.24 – 4.02 (m, 1H), 2.19 – 1.96 (m, 2H), 1.74 (d, J = 6.6 Hz, 3H), 1.66 – 1.42 (m, 8H), 1.41 (d, J = 3.1 Hz, 1H), 1.39 – 1.22 (m, 6H), 1.09 – 0.69 (m, 6H), 0.89 (t, J = 7.3 Hz, 9H); ¹³C NMR (101 MHz, CDCl₃): δ = 149.3, 138.7, 135.0, 114.8, 79.9, 36.9, 30.4, 29.4, 27.6, 19.4, 13.8, 11.1; IR (film, cm⁻¹): ν = 3429, 2956, 2922, 2871, 2853, 1641, 1620, 1456, 1376, 1260, 1071, 1046, 1016; ESI-MS calcd for C₂₀H₄₀OSnNa (M+N⁺) 439.19926; found 439.19957.

(Z)-1-(1-(Tributylstannyl)prop-1-en-1-yl)cyclohexan-1-ol. Prepared analogously using [(Cp*RuCl)₄] (1.25 mol%) as the catalyst; colorless oil (82.9 mg, 97%) (α/β = 99:1) (Z/E = 99:1 for the major isomer (NMR)); ¹H NMR (400 MHz, CDCl₃): δ = 6.24 (q, J = 6.7, J₁Sn-H = 137.8 Hz, 1H), 1.74 (d, J = 6.6 Hz, 3H), 1.69 – 1.53 (m, 6H), 1.53 – 1.38 (m, 9H), 1.38 – 1.27 (m, 6H), 1.26 (s, 1H), 1.22 – 1.07 (m, 1H), 1.06 – 0.86 (m, 6H), 0.89 (t, J = 7.3 Hz, 9H); ¹³C NMR (101 MHz, CDCl₃): δ = 155.3, 130.3, 75.7, 38.2,
29.4, 27.6, 25.7, 22.4, 19.3, 13.9, 12.4; $^{119}$Sn NMR (112 MHz, CDCl$_3$): δ = −55.7 ppm; IR (film, cm$^{-1}$): ν = 3449, 2953, 2923, 2870, 2852, 1448, 1375, 1340, 1293, 1253, 1149, 1071; ESI-MS calcd for C$_{27}$H$_{42}$OSnNa (M+Na$^+$) 453.21492; found 453.21520.

(Z)-3-(Tributylstannyl)pent-3-en-1-ol. Prepared analogously using [[Cp*RuCl$_4$]$_2$ (1.25 mol%) as the catalyst; colorless oil (61.0 mg, 81%) ($\alpha/\beta$ = 81:19) (Z/E = 95:5 for the major isomer (NMR)); Data of the major isomer: $^1$H NMR (400 MHz, CDCl$_3$): δ = 6.20 (qt, J = 6.6, 1.3, $J_{Sn-H}$ = 129.6 Hz, 1H), 3.53 (q, J = 6.1 Hz, 2H), 2.53 − 2.34 (m, 2H), 1.74 (dt, J = 6.6, 0.9 Hz, 3H), 1.60 − 1.37 (m, 7H), 1.37 − 1.25 (m, 6H), 1.03 − 0.84 (m, 6H), 0.89 (t, J = 7.3 Hz, 9H); $^{13}$C NMR (101 MHz, CDCl$_3$): δ = 140.7, 138.6, 61.8, 43.6, 29.3, 27.5, 20.2, 13.8, 10.3; $^{119}$Sn NMR (112 MHz, CDCl$_3$): δ = −52.6 ppm; IR (film, cm$^{-1}$): ν = 3319, 2955, 2922, 2871, 2852, 1620, 1462, 1418, 1376, 1291, 1181, 1040; ESI-MS calcd for C$_{17}$H$_{30}$OSn (M−H$^+$) 375.17147; found 375.17149.

(Z)-4-(Tributylstannyl)hex-4-en-1-ol. Prepared analogously using [[Cp*RuCl$_4$]$_2$ (1.25 mol%) as the catalyst; colorless oil (66.7 mg, 86%) ($\alpha/\beta$ = 83:17) (Z/E = 99:1 for the major isomer (NMR)); Data of the major isomer: $^1$H NMR (400 MHz, CDCl$_3$): δ = 6.12 (qt, J = 6.6, 1.3, $J_{Sn-H}$ = 132.7 Hz, 1H), 3.68 − 3.58 (m, 2H), 2.24 (ddt, J = 8.7, 6.3, 1.2 Hz, 2H), 1.70 (dt, J = 6.6, 1.0 Hz, 3H), 1.66 − 1.38 (m, 8H), 1.38 − 1.23 (m, 7H), 1.02 − 0.83 (m, 6H), 0.89 (t, J = 7.3 Hz, 9H); $^{13}$C NMR (101 MHz, CDCl$_3$): δ = 144.3, 135.0, 62.8, 37.1, 33.6, 29.4, 27.6, 20.0, 13.8, 10.3; $^{119}$Sn NMR (112 MHz, CDCl$_3$): δ = −53.0 ppm; IR (film, cm$^{-1}$): ν = 3318, 2955, 2923, 2871, 2852, 1456, 1376, 1291, 1180, 1071, 1052, 1002; ESI-MS calcd for C$_{18}$H$_{32}$SnO (M−H$^+$) 389.18712; found 389.18720.

(Z)-4-Methyl-N-(3-(tributylstannyl)hex-3-en-2-yl)benzenesulfonamide. Prepared analogously using

[[Cp*RuCl$_4$]$_2$ (1.25 mol%) as the catalyst; colorless oil (48.7 mg, 90%) ($\alpha/\beta$ = 99:1) (Z/E = 99:1 (NMR)); $^1$H NMR (400 MHz, CDCl$_3$): δ = 7.74 − 7.66 (m, 2H), 7.30 − 7.22 (m, 2H), 5.93 (td, J = 7.2, 1.0, $J_{Sn-H}$ = 120.7 Hz, 1H), 4.30 (d, J = 6.3 Hz, 1H), 4.04 − 3.81 (m, 1H), 2.41 (s, 3H), 1.94 − 1.79 (m, 2H), 1.53 − 1.32 (m, 6H), 1.37 − 1.22 (m, 6H), 1.14 (d, J = 6.7 Hz, 3H), 0.95 − 0.72 (m, 18H); $^{13}$C NMR (101 MHz, CDCl$_3$): δ = 144.4, 143.2, 142.6, 138.2, 129.6, 127.5, 58.5, 29.3, 27.7, 27.5, 23.9, 21.6, 14.3, 13.8, 11.0; $^{119}$Sn NMR (112 MHz, CDCl$_3$): δ = −52.9 ppm; IR (film, cm$^{-1}$): ν = 3268, 2956, 2924, 2871, 2853, 1456, 1417, 1374, 1325, 1160, 1094, 1071; ESI-MS calcd for C$_{25}$H$_{46}$NO$_2$SNa (M+Na$^+$) 566.20845; found 566.20883.

(Z)-Tributyl(1-(4-(trifluoromethyl)phenyl)prop-1-en-1-yl)stannane. Prepared analogously using

[[Cp*Ru(CH$_3$CN)$_3$]PF$_6$ as the catalyst; colorless oil (88.4 mg, 93%) ($\alpha/\beta$ = 65:35) (Z/E = 99:1, α-isomer (NMR)); Data of major α-isomer: $^1$H NMR (500 MHz, CD$_2$Cl$_2$): δ = 7.53 − 7.48 (m, 2H), 7.12 (d, J = 7.9 Hz, 2H), 6.32 (q, J = 6.7 Hz, 1H), 1.91 (d, J = 6.7 Hz, 3H), 1.51 − 1.40 (m, 6H), 1.32 − 1.24 (m, 6H), 1.05 − 0.89 (m, 6H), 0.86 (t, J = 7.3 Hz, 9H); $^{13}$C NMR (126 MHz, CD$_2$Cl$_2$, resolved signals): δ = 152.7, 146.2, 140.3, 127.7, 127.3, 125.4, 125.4, 125.4, 125.3, 29.6, 27.9, 20.8, 14.0, 11.4; $^{119}$Sn NMR (186 MHz, CD$_2$Cl$_2$): δ = −48.1 ppm; IR (film, cm$^{-1}$): ν = 2957, 2925, 2872, 2853, 1614, 1463, 1377, 1322, 1162, 1123, 1105, 1067, 1016.

(Z)-Tributyl(4-methylpent-2-en-3-yl)stannane. Prepared analogously using [[Cp*Ru(CH$_3$CN)$_3$]PF$_6$ as the catalyst; colorless oil (67.1 mg, 90%) ($\alpha/\beta$ = 79:21) (Z/E = 99:1, α-isomer; Z/E = 57:43, β-isomer (NMR)); α-isomer: $^1$H NMR (400 MHz, CDCl$_3$): δ = 6.10 (qd, J = 6.6, 1.2, $J_{Sn-H}$ = 139.8 Hz, 1H), 2.51
Prepared analogously using [(Cp*RuCl)_4] (1.25 mol%) as the catalyst and limiting the amount of Bu_3SnH to exactly 1 equivalent relative to the substrate; colorless oil (189 mg, 87%) ([α/β] = 90:10) (Z/E = 96:4 (NMR)); ^1^H NMR (500 MHz, CDCl_3): δ = 7.50 (t, J = 7.3 Hz, 1H), 2.17 (q, J = 7.4 Hz, 2H), 1.56 – 1.41 (m, 8H), 1.37 – 1.27 (m, 6H), 1.09 – 0.85 (m, 18H); ^13^C NMR (126 MHz, CDCl_3): δ = 177.5, 160.2, 135.8, 36.3, 29.2, 27.4, 22.5, 14.0, 13.8, 11.5; ^119^Sn NMR (186 MHz, CDCl_3): δ = –53.6 ppm; IR (film, cm⁻¹): ν = 2955, 2923, 2871, 2855, 1462, 1376, 1359, 1288, 1181, 1071, 1002; ESI-MS calcd for C_{18}H_{35}O_{2}Sn (M–H⁻) 403.16638; found 403.16671.

(Z)-4-(Tributylstannyl)hex-4-enoic acid. Prepared analogously using [(Cp*RuCl)_4] (1.25 mol%) as the catalyst and limiting the amount of Bu_3SnH to exactly 1 equivalent relative to the substrate; colorless oil (211 mg, 87%) ([α/β] = 93:7) (Z/E = 99:1 (NMR)). Data of the major isomer: ^1^H NMR (500 MHz, CDCl_3): δ = 6.14 (qt, J = 6.6, 1.4, J_{Sn-H} = 129.8 Hz, 1H), 2.56 – 2.40 (m, 2H), 2.40 – 2.28 (m, 2H), 1.69 (dt, J = 6.5, 1.0 Hz, 3H), 1.57 – 1.40 (m, 6H), 1.38 – 1.26 (m, 6H), 1.01 – 0.86 (m, 6H), 0.89 (t, J = 7.3 Hz, 9H); ^13^C NMR (126 MHz, CDCl_3): δ = 179.3, 142.3, 135.8, 35.3, 35.2, 29.4, 27.5, 20.1, 13.8, 10.2; ^119^Sn NMR (186 MHz, CDCl_3): δ = –51.5 ppm; IR (film, cm⁻¹): ν = 3025, 2956, 2921, 2872, 2853, 1708, 1455, 1416, 1376, 1291, 1210, 1071, 1021; ESI-MS calcd for C_{18}H_{35}O_{2}Sn (M–H⁻) 403.16639; found 403.16678.

Note: this product is prone to proto-destannation (ca. 10% after 24h, NMR)

Ethyl (Z)-2-(tributylstannyl)but-2-enoate and Ethyl (Z)-3-(tributylstannyl)but-2-enoate. Method A:

Prepared according to the standard procedure as a mixture of regioisomers (α/β = 1/1.5) using [Cp*Ru(CH_2CN)_2]PF_6 (5 mol%) as the catalyst; colorless oil (72.8 mg, 90%). The Z/E ratio (NMR) was found to be 99/1 for the β-isomer and >99/1 for the α-isomer. The regioisomers can be separated by flash chromatography (SiO_2) using hexanes/EtOAc (1/0 → 50/1 → 5/1) as the eluent. β-Isomer: ^1^H NMR (400 MHz, CDCl_3): δ = 6.41 (q, J = 1.7, J_{Sn-H} = 106.1 Hz, 1H), 4.17 (q, J = 7.1 Hz, 2H), 2.13 (d, J = 1.7 Hz, 3H), 1.54 – 1.37 (m, 6H), 1.36 – 1.23 (m, 9H), 1.07 – 0.91 (m, 6H), 0.88 (t, J = 7.3 Hz, 9H); ^13^C NMR (101 MHz, CDCl_3): δ = 171.7, 167.9, 129.4, 60.2, 29.4, 27.6, 27.5, 14.5, 13.9, 11.1; ^119^Sn NMR (112 MHz, CDCl_3): δ = –50.6 ppm; IR (film, cm⁻¹): ν = 2955, 2920, 2871, 2852, 1701, 1600, 1463, 1368, 1315, 1191, 1099, 1043; ESI-MS calcd for C_{18}H_{36}O_{2}SnNa (M+Na⁺) 427.16288; found 427.16337; Characteristic data of the α-Isomer: ^1^H NMR (400 MHz, CDCl_3): δ = 7.46 (q, J = 6.9 Hz, J_{Sn-H} = 106.1 Hz 1H), 4.15 (q, J = 7.1 Hz, 2H), 1.91 – 1.85 (m, 3H), 1.56 – 1.42 (m, 6H), 1.37 – 1.24 (m, 9H), 1.09 – 0.92 (m, 6H), 0.88 (t, J = 7.3 Hz, 9H); ^13^C NMR (101 MHz, CDCl_3): δ = 171.7, 152.3, 137.4, 60.5, 29.2, 27.4, 19.7, 14.5, 13.8, 11.5.

Method B: A solution of Bu_3SnH (0.22 mmol, 59 μL, 1.1 equiv) in CH_2Cl_2 (0.5 mL) was added via syringe pump over 1.5 h to a solution of ethyl 2-butynoate (23 μL, 0.20 mmol) and [(Cp*RuCl)_4] (2.7 mg, 2.5 μmol, 0.0125 equiv) in CH_2Cl_2 (1.0 mL) under Ar. Stirring was continued for 15 min once the addition was
Representative Procedure for the trans-Hydrostannation of Terminal Alkynes: Methyl 5-
(tributylstannyl)hex-5-enoate. A solution of methyl hex-5-ynoate (26 μL, 0.20 mmol) and
tributyltin hydride (0.22 mmol, 59 μL, 1.1 equiv) in CH₂Cl₂ (0.5 mL) was added dropwise
over 12 min to a stirred solution of [Cp*Ru(μ-CN)(μ-η^5-C₅H₅)(η^2-C₅H₅)]PF₆ (5.0 mg, 10 μmol, 0.05 equiv) in CH₂Cl₂ (0.5 mL)
under argon. Once the addition was complete, the mixture was stirred for another 15 min before all volatile
materials were evaporated. The residue was passed through a short plug of silica, eluting with
hexanes/EtOAc (20:1) to give the title compound as a mixture of regioisomers (terminal:internal = 3:97) as
a colorless oil (60.5 mg, 73%). Data of the major isomer: ¹H NMR (400 MHz, CDCl₃) δ = 5.67 (dt, J = 2.8, 1.5,
Jₜₛ−ₜₛ = 137.6 Hz, 1H), 5.14 (dt, J = 2.3, 1.0, Jₛₕ⁻ₛₙ = 62.9 Hz, 1H), 3.66 (s, 3H), 2.37 – 2.20 (m, 4H), 1.77 – 1.66
(m, 2H), 1.58 – 1.38 (m, 6H), 1.36 – 1.25 (m, 6H), 1.00 – 0.78 (m, 15H); ¹³C NMR (101 MHz, CDCl₃) δ = 174.1,
154.4, 125.9, 51.6, 40.6, 33.6, 29.3, 27.5, 24.7, 13.8, 9.7; ¹¹⁹Sn NMR (112 MHz, CDCl₃): δ = –45.2 ppm; IR
(film, cm⁻¹): ν = 2955, 2925, 2872, 2852, 1742, 1457, 1436, 1376, 1245, 1222, 1193, 1170, 1072; ESI-MS calcd for
C₁₉H₃₅O₂Sn (M+H⁺) 419.19713; found 419.19730

4-(Trimethylsilyl)but-3-yn-1-yl 4-(tributylstannyl)pent-4-enoate. Prepared analogously (using only 1.0
equiv. of Bu₃SnH) as a colorless oil (isomer ratio for stannylation at the terminal
versus the silylated triple bond = 93:7) (98.2 mg, 96%); ¹H NMR (400 MHz, CDCl₃):
δ = 5.70 (dt, J = 2.3, 1.6, Jₛₕ⁻ₛₙ = 133.2 Hz, 1H), 5.15 (dt, J = 2.3, 1.2, Jₛₕ⁻ₛₙ = 62.4 Hz,
1H), 4.16 (t, J = 7.1 Hz, 2H), 2.64 – 2.46 (m, 4H), 2.46 – 2.34 (m, 2H), 1.59 – 1.40 (m, 6H), 1.38 – 1.25 (m, 6H),
1.00 – 0.82 (m, 15H), 0.15 (s, 9H); ¹³C NMR (101 MHz, CDCl₃): δ = 173.0, 153.1, 125.6, 102.4, 86.6, 62.3,
35.8, 34.1, 29.2, 27.5, 20.5, 13.8, 9.7, 0.2; ¹¹⁹Sn NMR (112 MHz, CDCl₃): δ = –44.0 ppm; IR (film, cm⁻¹): ν =
2956, 2925, 2872, 2853, 2181, 1741, 1457, 1419, 1377, 1337, 1248, 1162, 1071, 1026; ESI-MS calcd for
C₂₇H₄₆O₃SiSnNa (M+N⁺) 537.21806; found 537.21852.

Pent-3-yn-1-yl 4-(tributylstannyl)pent-4-enoate. Prepared analogously (using only 1.0 equiv. of Bu₃SnH) as
colorless oil (isomer ratio for stannylation at the terminal versus the internal triple
bond = 76:24) (80.6 mg, 89%); ¹H NMR (400 MHz, CDCl₃): δ = 5.70 (dq, J = 3.5, 1.7,
Jₛₕ⁻ₛₙ = 135.0 Hz, 1H), 5.15 (dq, J = 2.0, 1.0, Jₛₕ⁻ₛₙ = 62.6 Hz, 1H), 4.13 (t, J = 7.0 Hz, 2H),
2.65 – 2.50 (m, 2H), 2.50 – 2.34 (m, 4H), 1.77 (t, J = 2.5 Hz, 3H), 1.63 – 1.38 (m, 6H), 1.37 – 1.23 (m, 6H),
1.01 – 0.82 (m, 6H), 0.89 (t, J = 7.3 Hz, 9H); ¹³C NMR (101 MHz, CDCl₃): δ = 173.1, 153.2, 125.5, 77.4, 74.9,
62.9, 35.8, 34.0, 29.2, 27.5, 19.4, 13.8, 9.7, 3.6; ¹¹⁹Sn NMR (112 MHz, CDCl₃): δ = –44.0 ppm; IR (film, cm⁻¹):
ν = 2955, 2922, 2871, 2852, 1739, 1457, 1419, 1377, 1340, 1245, 1165, 1072, 1002; ESI-MS calcd for
C₂₉H₄₅O₂SnNa (M+N⁺) 479.19418; found 479.19459.

(Z)-3-(Tributylstannyl)hexadec-2-en-14-yn-4-ol. Prepared according to the standard procedure but using
[[Cp*RuCl₂]₂ (1.25 mol%) as the catalyst and 1.05 equiv. of Bu₃SnH; purification by flash
chromatography (hexane/EtOAc, 100/1 → 20/1) allowed minor by-products to be
removed and gave the title compound as a colorless oil (57.7 mg, 55%). ¹H NMR (400
Z/E, 1458, 1376, 1235, 1071, 1003. 24H), 0.56 (q, 1H), 3.73 (t, CDCl₃ 28 MHz, CDCl₃ 28 MHz, CDCl₃ 28 MHz, CDCl₃) 549.30881; found 549.30917.

(Z)-4-(Tritylstannyl)-4-(trimethylsilyl)but-3-en-1-ol. Prepared according to the standard procedure as a mixture of regioisomers (α/β = 96/4); colorless oil (35.5 mg, 82%). The Z/E ratio (NMR) was found to be >99/1 for the α-isomer. ¹H NMR (400 MHz, CDCl₃): δ = 6.72 (t, J = 6.6, Jₛₛ-H = 170.6 Hz, 1H), 3.73 (t, J = 6.6 Hz, 2H), 2.42 (q, J = 6.6 Hz, 2H), 1.59 – 1.38 (m, 6H), 1.38 – 1.25 (m, 7H), 1.04 – 0.92 (m, 6H), 0.89 (t, J = 7.3 Hz, 9H), 0.05 (s, 9H); ¹³C NMR (101 MHz, CDCl₃): δ = 150.8, 148.0, 62.3, 42.5, 29.4, 27.6, 13.8, 11.5, −0.1; ¹¹¹Sn NMR (112 MHz, CDCl₃): δ = −53.7 ppm; IR (film, cm⁻¹): ν = 3310, 2954, 2923, 2871, 2854, 1571, 1463, 1376, 1245, 1046; ESI-MS calcd for C₁₈H₃₆OSnNa (M+Na⁺) 435.21045; found 435.21003.

(Z)-4-(Tritylstannyl)-4-(trimethylsilyl)but-3-en-1-yl 4-methoxybenzoate. Prepared according to the standard procedure as a mixture of regioisomers (α/β = 98/2); colorless oil (111.7 mg, 98%); The Z/E ratio (NMR) was found to be >99/1 for the α-isomer. ¹H NMR (400 MHz, CDCl₃) δ = 8.05 – 7.95 (m, 2H), 6.95 – 6.88 (m, 2H), 6.78 (t, J = 6.4, Jₛₛ-H = 169.6 Hz, 1H), 4.37 (t, J = 6.7 Hz, 2H), 3.86 (s, 3H), 2.65 – 2.52 (m, 2H), 1.57 – 1.38 (m, 6H), 1.38 – 1.25 (m, 6H), 1.06 – 0.92 (m, 6H), 0.88 (t, J = 7.3 Hz, 9H), 0.06 (s, 9H); ¹³C NMR (101 MHz, CDCl₃) δ = 166.4, 163.5, 150.3, 147.4, 131.7, 123.0, 113.7, 63.9, 55.6, 38.5, 29.4, 27.5, 13.8, 11.4, −0.1; ¹¹¹Sn NMR (112 MHz, CDCl₃): δ = −53.1 ppm; IR (film, cm⁻¹): ν = 2954, 2926, 2871, 2853, 1715, 1607, 1511, 1459, 1273, 1254, 1166, 1099, 1033; ESI-MS calcd for C₁₈H₃₆O₂SiSn (M+H⁺) 569.24723; found 569.24702.

(Z)-(5-Chloro-5-(tributylstannyl)pent-4-en-1-yl)triethyilsilane. Prepared according to the standard procedure; colorless oil (47.6 mg, 94%) (α/β = 99:1) (Z/E = 99:1 (NMR)); ¹H NMR (400 MHz, CDCl₃) δ = 6.65 (t, J = 6.6, Jₛₛ-H = 174.8 Hz, 1H), 3.55 (t, J = 6.7 Hz, 2H), 2.36 – 2.23 (m, 2H), 1.96 – 1.85 (m, 2H), 1.57 – 1.39 (m, 6H), 1.39 – 1.25 (m, 6H), 1.02 – 0.79 (m, 24H), 0.56 (q, J = 7.9 Hz, 6H); ¹³C NMR (101 MHz, CDCl₃) δ = 155.3, 141.6, 44.7, 36.9, 32.8, 29.4, 27.6, 13.8, 11.6, 7.7, 3.9; ¹¹¹Sn NMR (112 MHz, CDCl₃): δ = −54.7 ppm; IR (film, cm⁻¹): ν = 2953, 2927, 2872, 2854, 1570, 1458, 1376, 1235, 1071, 1003.
mixture of isomers
mixture of isomers
mixture of regioisomers
mixture of regioisomers
$^1$H NMR: 500 MHz, CDCl$_3$
mixture of isomers
mixture of regioisomers

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\text{SnBu}_3
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\text{mixture of regioisomers}
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