**General.** Unless otherwise noted, all reactions performed in organic solvents were conducted under an atmosphere of argon with oven dried glassware using standard syringe and septa technique. Analytical thin layer chromatography (TLC) was performed using Whatman silica gel $HF_{254}$ plates or Selecto Scientific alumina B $F_{254}$ plates and UV light, 12- molybdophosphoric acid (PMA stain), or potassium permanganate ($KMnO_4$ stain) for analysis of the developed plates. Flash column chromatography (FCC) was performed using silica gel 60 (230-400 mesh) or Brockmann I alumina gel (150 mesh). $H^1$-NMR spectra were recorded on a Bruker 500 MHz spectrometer in $CDCl_3$ or $C_6D_6$ and the chemical shifts were reported in parts per million (ppm) relative to the residue of the solvent, i.e $CD(H)Cl_3$ at 7.27 ppm or $C_6D(H)_6$ at 7.16 ppm. $^{13}$C-NMR spectra were recorded on a Bruker 125 MHz spectrometer in $CDCl_3$ or $C_6D_6$ and the chemical shifts were reported in parts per million (ppm) relative to the solvent peak, i.e. $CDCl_3$ at 77.23 ppm or $C_6D_6$ at 128.39 ppm. High resolution mass spectra (HRMS) were obtained on an Ultima Micromass Q-TOF Mass Spectrometer at the Mass Spectrometry Laboratory of Hunter college, CUNY.

**General procedure for cross metathesis**

A solution of olefin A (1.0 eq.) and olefin B (3.0 eq.) in anhydrous $CH_2Cl_2$ (0.02M) was degassed under $N_2$ for 30 min. Grubbs 2$^{nd}$ generation catalyst (10-12 mol%) was then added and refluxed under $N_2$ for 2-3 hrs. When reaction is complete, the reaction mixture was cooled to r.t. and was quenched by adding few drops of DMSO. The solvent was evaporated under reduced pressure and purified by FCC using Pet./ EtOAc

**Synthesis of 29 via Wittig olefination**

To a flask containing phosphonium salt **18** (1.82g, 3.00 mmol, *ca.* E/Z=4:1) suspended in THF (20 mL) at -78 $^{o}$C was dropwisely added sodium hexamethyldisilylamide (NaHMDS) (6.0mL, 0.6 M in toluene). The mixture was warmed up to room temperature for 30 min, cooled back to -78 $^{o}$C and was dropwisely added aldehyde **11** (1.17 g, 9.0 mmol in 10 mL THF). After 30 min at -78 $^{o}$C, the reaction mixture was warmed up to room temperature for 1 h. The reaction was dilute with $Et_2O$, quenched with saturated $NH_4Cl$ solution. The mixture was extracted with $Et_2O$ (3 x 100 mL) and the combined organic phase was washed with brine, water, dried with $Na_2SO_4$, filtered, concentrated *in vacuo* and purified by FCC to afford the diene **29** (0.758 g, 76%). (*ca.* E/Z= 4:1 as in **18**, newly formed double is pure Z). $R_f$ = 0.44 (1.5:8.5 EtOAc /pet. ether).

**General procedure for iodoetherification**

To a stirred solution of olefin (1.0 eq.) and freshly activated molecular sieves (4A$^{o}$) in anhydrous $CH_2Cl_2$ (0.008M) at r.t. was added IDCP (2.0 eq.) and stirring continued for 15 min. The reaction was then poured into sat. aq. solution of sod. thiosulfate and extracted with ether. The combined extracts was washed successively with water and brine and dried over $Na_2SO_4$. The solvent was evaporated under reduced pressure and purified by FCC using Pet. Ether/EtOAc.

**General procedure for spiroketalization**

AgOTf (4.0 eq.) was added to a stirred solution of cyclization product (1.0 eq.) and 2,4,6 Collidine (4-5 eq) in anhydrous $CH_2Cl_2$ (0.005M) at r.t.. When the reaction is complete (approx. 15 min.) reaction mixture was poured into sat. aq. solution of sod. thiosulfate and extracted with EtOAc. The combined extracts was washed successively with water and brine and dried over $Na_2SO_4$. The solvent was evaporated under reduced pressure and purified by FCC using Pet.Ether/ EtOAc.

**Physical data for iodoetherification precursors**

The iodoetherification precursors were obtained as inseparable mixtures of E/Z alkenes. $^1$H–NMR and $^{13}$C-NMR spectral charts for these compounds are provided in the appendix. The HRMS data is listed below.

**19**
HRMS [M+H] calcd. for $C_{22}H_{35}O_5$ 379.2479, found 379.2479.

**21**
HRMS [M+H] calcd. for $C_{31}H_{55}O_6Si$ 551.3762, found 551.3762

**23**
HRMS [M+Na] calcd. for $C_{31}H_{55}O_6SiNa$ 573.3581, found 573.3577

**24**
HRMS [M+Na] calcd. for $C_{37}H_{58}O_6SiNa$ 649.3894, found 649.3901

**25**
HRMS [M+Na] calcd. for $C_{26}H_{38}O_8Si$ 501.2458, found 501.2469

**26**
HRMS [M+Na] calcd. for $C_{31}H_{46}O_{10}Na$ 601.2983, found 601.2983

**28**
HRMS [M+Na] calcd. for $C_{35}H_{44}O_6Na$ 583.3030, found 583.3034

**30**
HRMS [M+Na] calcd. for $C_{22}H_{32}O_5Na$ 399.2141, found 399.2142

**Physical data for iodoetherification products and deprotected alcohol derivatives**
The iodoetherification products and their deprotected alcohol derivatives were obtained as inseparable mixtures of diastereomeric iodo-cyclic ethers. $^1$H–NMR and $^{13}$C-NMR spectral charts for these compounds are provided in the appendix. The HRMS data is listed below.

**31**
HRMS [M+Na] calcd. for $C_{22}H_{33}IO_5Na$ 527.1264, found 527.1268

**32**
HRMS [M+H] calcd. for $C_{31}H_{54}IO_6$ 677.2728, found 677.2727

**33**
HRMS [M+H] calcd. for $C_{31}H_{54}IO_6$ 677.2728, found 677.2732

**34**
HRMS [M+Na] calcd. for $C_{37}H_{57}IO_6Si$ 775.2861, found 775.2858

**35**
HRMS [M+H] calcd. for $C_{31}H_{44}IO_6$ 639.2177, found 639.2177

**36**
HRMS [M+Na] calcd. for $C_{26}H_{37}IO_8Na$ 627.1425, found 627.1422

**37**
HRMS [M+Na] calcd. for $C_{25}H_{35}IO_7Na$ 585.1319, found 585.1325

**38**
HRMS [M+Na] calcd. for $C_{31}H_{45}IO_{10}Na$ 727.1947, found 727.1948

**39**
HRMS [M+Na] calcd. for $C_{29}H_{43}IO_9Na$ 685.1844, found 685.1843

**42**
HRMS [M+Na] calcd. for $C_{22}H_{31}IO_5Na$ 525.1108, found 525.1108

**Physical data for spiroketal products and bis-THF 47**

$^1$H–NMR and $^{13}$C-NMR spectral charts for these compounds are provided in the appendix.

**43a**
$^1$H NMR 500 MHz ($CDCl_3$) 1.25 (s, 9H), 1.5 (m, 1H), 1.7-2.2 (m, 9H), 3.55 (m, 2H), 4.07 (dd, *J*= 11.0, 5.3 Hz, 1H), 4.15 (dd, *J*= 11.0, 6.3 Hz, 1H), 4.2 (m, 1H), 4.25 (m, 1H), 4.6 (m, 2H), 7.25 (m, 2H), 7.3 (m, 3H). $^{13}$C NMR125 MHz ($CDCl_3$) 27.2, 27.6, 30.3, 34.4, 35.6, 35.8, 38.8, 67.7, 73.0, 75.4, 76.7, 77.2, 114.9. 127.5, 127.6, 128.3, 128.4, 138.6, 178.4. HRMS [M+H] calcd. for $C_{22}H_{33}O_5$ 377.2332, found 377.2319. $R_f$ = 0.5 (4:1 Pet. Ether/ EtOAc)

**43b**
$^1$H NMR 500 MHz ($CDCl_3$) 1.7 (m, 1H), 1.85 (m, 2H), 1.95-2.12 (m, 6H), 2.18 (m, 1H), 3.6 (2H), 4.06 (dd, *J*= 11.5, 4.9 Hz, 1H), 4.11 (dd, *J*= 11.5, 4.55 Hz, 1H), 4.2 (m, 1H), 4.3 (m, 1H), 4.5 (m, 2H), 7.25 (2H), 7.3 (m, 3H). $^{13}$C NMR 125 MHz ($CDCl_3$) 26.7, 27.2, 30.7, 34.5, 35.7, 37.4, 38.8, 66.0, 67.7, 72.9, 75.3, 77.2, 115.0, 127.5, 127.6, 128.3, 138.7, 178.4.

HRMS [M+H] calcd. for $C_{22}H_{33}O_5$ 377.2332, found 377.2319. $R_f$ = 0.45 (4:1 Pet. Ether/ EtOAc)

**44a**

$^1$H NMR 500 MHz ($C_6D_6$) 1.05 (m, 21H), 1.37-1.47 (m, 3H), 1.5 (m, 1H), 1.67 (m, 2H), 1.73 (m, 2H), 1.8 (m, 1H), 1.88 (dd, *J*= 14.8, 3.8 Hz, 1H), 1.9-2.0 (m, 4H), 2.08 (s, 3H), 3.5 (t, *J*= 6.7 Hz, 2H), 3.6 (dd, *J*= 9.6, 6.3 Hz, 1H), 3.8 (dd, *J*= 9.6, 6.4 Hz, 1H), 4.08 (m, 1H), 4.22 (m, 1H), 4.5 (s, 2H), 5.08 (bt, *J*= 3.0Hz, 1H), 7.35 (m, 5H). $^{13}$C NMR125 MHz ($C_6D_6$) 12.0, 17.9, 21.0, 22.6, 27.1, 30.3, 35.0, 35.8, 36.1, 39.2, 64.9, 67.3, 68.6, 70.2, 72.7, 81.8, 105.2, 126.7- 128.2, 139.3, 169.9. HRMS [M+Na] calcd. for $C_{32}H_{54}O_5NaSi$ 571.3425, found 571.3424. $R_f$ = 0.6 (4:1 Pet. Ether/ EtOAc)

**44b**

$^1$H NMR 500 MHz ($C_6D_6$) 1.1 (m, 21H), 1.45 (m, 3H), 1.7 (m, 6H), 1.8 (s, 3H), 1.95 (m, 1H), 2.07 (dd, J= 11.2, 5.08 Hz, 1H), 2.2 (m, 2H), 2.3 (m, 1H), 3.3 (t, J= 6.2 Hz, 2H), 3.65 (m, 2H), 3.73 (m, 1H), 4.34 (s, 2H), 4.37 (m, 1H), 5.26 (m, 1H), 7.27 (m, 3H), 7.4 (m, 2H). $^{13}$C NMR125 MHz ($C_6D_6$) 12.1, 18.0, 20.6, 22.8, 26.4, 29.9, 34.8, 35.0, 35.8, 36.1, 38.2, 66.0, 68.0, 70.0, 70.2, 72.7, 78.8, 106.8, 126.8-128.3, 139.3, 169.0. HRMS [M+Na] calcd. for $C_{32}H_{54}O_5NaSi$ 571.3425, found 571.3424. $R_f$ = 0.7 (4:1 Pet. Ether/ EtOAc)

**45a**

$^1$H NMR 500 MHz ($CDCl_3$) 1.2 (m, 21H), 1.3 (qt, *J*= 11.6 Hz, 1H), 1.4 (m, 1H), 1.5 (m, 1H), 1.56 (m, 2H), 1.8 (m, 3H), 1.95 (m, 1H), 2.1 (s, 3H), 2.2 (ddd, *J*= 11.9, 4.7, 1.6 Hz, 1H), 3.5 (t, *J*= 6.3 Hz, 1H), 3.77 (dd, *J*= 9.4, 7.6 Hz, 1H),3.9 (m, 1H), 4.1 ((dd, *J*= 9.4, 5.5 Hz, 1H), 4.3 (m, 1H), 4.5 (m, 2H), 5.6 (m, 1H), 7.1 (t, *J*= 7.4 Hz, 1H), 7.2 (t, *J*= 7.4 Hz, 2H), 7.3 (d, *J*= 7.4 Hz, 2H). $^{13}$C NMR125 MHz ($C_6D_6$) 12.0, 18.0, 21.3, 22.4, 27.5, 29.9, 35.8, 37.0, 38.5, 39.3, 67.6, 68.2, 68.8, 70.3, 72.9, 81.4, 106.5, 127.5, 127.6, 128.3, 138.7, 170.3. HRMS [M+Na] calcd. for $C_{32}H_{54}O_5NaSi$ 571.3425, found 571.3427. $R_f$ = 0.7 (8.5:.5 Pet. Ether/ EtOAc)

**45b**

$^1$H NMR 500 MHz ($C_6D_6$) 1.1 (m, 21H), 1.22 (m, 1H), 1.3 (m, 1H), 1.55 (m, 6H), 1.7 (s, 3H),1.8 (m, 2H), 1.9 (m, 1H), 1.95 (m, 1H), 2.0 (t, *J*= 12Hz, 1H), 2.2 (m, 1H), 3.1 (m, 1H), 3.3 (t, *J*= 6.0Hz, 2H), 3.6 (m, 2H), 4.3 (m, 3H), 4.9 (m, 1H), 7.1 (m, 3H), 7.3 (bd, *J*= 7.0 Hz, 2H). $^{13}$C NMR 125 MHz ($CDCl_3$) 11.9, 17.9, 21.3, 22.3, 26.2, 29.6, 29.7, 32.2, 35.7, 37.1, 40.0, 65.2, 69.3, 70.3, 70.5, 72.9, 79.0, 107.5, 127.5, 127.6, 128.3, 138.7, 170.5. HRMS [M+H] calcd. for $C_{32}H_{55}O_5Si$ 549.3605, found 549.3606. $R_f$ = 0.6 (8.5:.5 Pet. Ether/ EtOAc

**47**

$^1$H NMR 500 MHz ($CDCl_3$) 1.2 (s, 9H), 1.4 (m, 2H), 1.6 (m, 1H), 1.9 (m, 6H), 2.05 (m, 1H), 3.55 (m, 2H), 3.75 (m, 1H), 3.9 (m, 1H), 3.95 (m, 1H), 4.1 (m, 4H), 4.55 (m, 4H), 7.27 (m, 10H). $^{13}$C NMR125 MHz ($CDCl_3$) 27.2, 27.6, 31.7, 31.8, 32.2, 35.9, 38.8, 67.0, 68.0, 70.2, 71.1, 77.2, 73.0, 74.6, 77,2, 80.4, 127.4-128.5, 138.5, 138.8, 178.3. HRMS [M+Na] calcd. for $C_{31}H_{42}O_6Na$ 533.2873, found 533.2870. $R_f$ = 0.7 (6.5:3.5 Pet. Ether/ EtOAc)

**48a**

$^{I}$H NMR 500 MHz ($C_6D_6$) 1.0 (s, 3H), 1.3 (m, 1H), 1.5 (s, 3H), 1.7 (m, 3H), 1.8-2.1 (m, 5H), 2.25 (m, 1H), 2.98 (s, 3H), 3.5 (t, *J*= 6.1 Hz, 2H), 4.2 (d, *J*= 10.5 Hz, 1H), 4.26 (m, 1H), 4.28 (s, 2H), 4.38 (m, 1H), 4.6 (d, *J*= 6.0 Hz, 1H), 5.0 (d, *J*= 6.0 Hz, 1H), 5.04 (s, 1H), 7.12 (m, 1H), 7.18 (m, 2H), 7.3 (t, *J*= 7.5 Hz, 1H). $^{13}$C NMR125 MHz ($C_6D_6$) 24.5, 26.4, 27.9, 30.5, 34.0, 34.5, 36.5, 54.1, 67.5, 72.7, 75.5, 77.7, 82.6, 85.5, 89.0, 109.7, 111.8, 115.4, 127.5-128.3, 139.1. HRMS [M+Na] calcd. for $C_{24}H_{34}O_7Na$ 457.2196, found 457.2202 $R_f$ = 0.7 (4:1 Pet. Ether/ EtOAc)

**48b**

$^{I}$H NMR 500 MHz ($C_6D_6$) 1.1 (s, 3H), 1.5 (s, 3H), 1.62 (m, 2H), 1.75 (m, 1H), 1.82 (m, 1H), 1.95 (m, 4H), 2.15 (m, 1H), 2.25 (m, 1H), 3.05 (s, 3H), 3.62 (m, 2H), 4.05 (m, 1H), 4.22 (m, 1H), 4.35 (s, 2H), 4.55 (d, *J*= 10.1 Hz, 1H), 4.65 (d, *J*= 6.0 Hz, 1H), 5.05 (d, *J*= 6.0 Hz, 1H), 5.06 (s, 1H), 7.1 (t, *J*= 8.0 Hz, 1H), 7.18 (m, 2H), 7.32 (d, *J*= 8.0 Hz, 1H). $^{13}$C NMR125 MHz ($C_6D_6$) 27.4, 26.4, 29.0, 31.0, 35.3, 35.7, 37.8, 54.2, 67.8, 72.6, 77.3, 79.1, 82.8, 85.6, 90.8, 109.7, 111.8, 114.8, 127.2-128.4, 139.7. . HRMS [M+Na] calcd. for $C_{24}H_{34}O_7Na$ 457.2196, found 457.2202. $R_f$ = 0.6 (4:1 Pet. Ether/ EtOAc)

**49a**

$^{I}$H NMR 500 MHz ($C_6D_6$) 1.18 (m, 4H), 1.25(s, 9H), 1.48 (m, 4H), 1.6 (m, 2H), 1.85 (m, 1H), 2.0 (dd, *J*= 12.1, 7.7 Hz, 1H), 2.07 (m, 1H), 2.2 (m, 1H), 2.98 (s, 3H), 3.9 (m, 1H), 4.0 (dd, *J*= 10.8, 2.3 Hz, 1H), 4.1 (m, 1H), 4.3 (m, 2H), 4.4 (d, *J*= 9.9 Hz, 1H), 4.95 (d, *J*= 6.0 Hz, 1H), 5.02 (s, 1H), 7.2 (m, 3H), 7.3 (d, *J*= 8.0 Hz, 2H). $^{13}$C NMR125 MHz ($C_6D_6$) 24.9, 26.8, 27.7, 28.4, 33.9, 38.9, 40.3, 54.8, 67.4, 70.0, 72.7, 80.7, 83.3, 86.0, 90.7, 107.6, 110.5, 112.4, 127.5-128.6, 139.8, 177.9. HRMS [M+Na] calcd. for $C_{29}H_{42}O_9Na$ 557.2721, found 557.2722. $R_f$ = 0.8 (4:1 Pet. Ether/ EtOAc)

**49b**

$^{I}$H NMR 500 MHz ($C_6D_6$) 1.25 (m, 5H), 1.5 (s, 3H), 1.66 (m, 2H), 1.85-1.95 (m, 3H), 2.05 (m, 1H), 3.0 (s, 3H), 3.2 (m, 1H), 3.3 (m, 1H), 4.06 (dd, *J*= 11.3, 4.1 Hz, 1H), 4.2 (m, 1H), 4.25-4,35 (m, 3H), 4.5 (d, *J*= 6.0 Hz, 1H), 4.95 (d, *J*= 6.0 Hz, 1H), 5.05 (s, 1H), 7.18 (m, 3H), 7.28 (d, *J*= 7.8 Hz, 2H). ). $^{13}$C NMR125 MHz ($C_6D_6$) 24.4, 26.3, 27.0, 27.4, 31.5, 33.7, 38.5, 40.6, 54.5, 66.5, 69.1, 69.3, 72.7, 77.8, 82.5, 85.5, 88.7, 107.6, 109.9, 111.8, 127.5-128.3, 139.0, 177.2. HRMS [M+Na] calcd. for $C_{29}H_{42}O_9Na$ 557.2721, found 557.2722. $R_f$ = 0.7 (4:1 Pet. Ether/ EtOAc)

**50a**

$^{1}$H NMR (500 MHz, $CDCl_3$) δ 1.50-1.47 (m, 1H), 1.71-1.58 (ovrlp m, 4H), 1.92-1.80 (ovrlp m, 3H), 2.03-1.98 (m, 1H), 2.10-2.06 (m, 2H), 2.27-3.24 (dd, *J* = 5.0, 12.5Hz, 1H), 3.62-3.59 (ovrlp m, 2H), 3.68-3.66(dd, *J* = 1.7, 10.7Hz, 1H), 3.80-3.75 (ovrlp m, 2H), 3.92-3.88 (ddd, *J* = 1.8, 4.1, 9.9 Hz, 1H), 4.08-4.05 (m, 1H), 4.71-4.52 (m, 5H), 4.95-4.93 (d, *J* = 11.1 Hz, 1H), 7.38-7.27 (m, 15H); $^{13}$C NMR (125 MHz, $CDCl_3$) δ 20.2, 25.1, 35.3, 35.9, 36.1, 40.4, 62.3, 69.2, 71.8, 72.1, 73.3, 75.0, 78.4, 79.0, 107.1, 107.2, 127.4, 127.5, 127.6, 127.7, 127.8, 128.0, 128.3, 128.4, 138.4, 138.6, 138.7, ESIHRMS $(M+Na)^+$ calculated for $C_{34}H_{40}O_6Na$ 567.2717, found 567.2723. $R_f$ = 0.3 (4:1 Pet. Ether/ EtOAc)

**50b**

$^{1}$H NMR (500 MHz, $CDCl_3$) δ 1.83-1.76 (ovrlp m, 3H),1.95-1.90 (m, 1H), 2.08-2.06 (m, 1H), 2.15-2.11 (m, 1H), 2.21-2.18 (m, 1H), 2.33-2.29 (m, 1H), 3.68-3.66 (m, 2H), 3.74-3.72(m, 1H), 3.86-3.84 (ovrlp m, 2H), 3.98 (m, 1H), 4.00 (m, 1H), 4.70-4.54 (m, 5H), 4.93-4.91 (d, $J$ = 11.1 Hz, 1H), 7.38-7.07(m, 15H); 13C NMR (125 MHz, CDCl3) δ 20.0, 25.1, 35.1, 36.7, 37.3, 40.6, 62.8, 69.1, 71.8, 73.3, 73.4, 75.0, 78.4, 78.8, 107.4, 107.6, 121.8, 127.5, 127.6, 127.7, 127.8, 128.0, 128.1, 128.3, 128.4, 138.8; ESIHRMS $(M+Na)^+$ calculated for $C_{34}H_{40}O_6Na$ 567.2717, found 567.2723. $R_f$ = 0.2 (4:1 Pet. Ether/ EtOAc)

**51a/b**

$^{1}$H NMR ($CDCl_3$) δ 1.20 (s, 9 H, major), 1.21 (s, 9H, minor), 1.66-1.77 (m, 2H), 1.88-1.95 (m, 2H), 2.02-2.13 (m 5H), 2.32 (tdd, J=2.9, 4.3, 17.3 Hz, 1H), 2.40 (qd, J=3.0, 17.3 Hz, 1H), 2.53 (tdd, J=2.5, 4.0, 17.6 Hz, 1H), 3.89-4.05 (m, 2H), 4.07-4.13 (m, 2H), 4.21 (dd, J= 6.1, 11.1 Hz, 1H), 4.29 (dd, J=7.3, 10.8 Hz, 1H), 4.43 (br. 1H), 5.67-5.73 (m, 2H), 5.84-5.94 (m, 2H). $^{13}$C NMR ($CDCl_3$) δ 23.8 (major), 24.0 (minor), 27.3 (major), 27.4 (minor), 33.0 (major), 33.3 (minor), 36.5 (minor), 37.4 (major), 38.0 (major + minor), 65.8, 66.6, 67.8, 67.9, 68.1, 71.4, 105.0 (major), 105.1 (minor), 124.6, 124.7, 124.9, 125.4, 178.5 (major + minor). HRMS [M+Na] calcd. for $C_{14}H_{22}O_4$ Na 277.1410, found 277.1413. $R_f$ = 0.4 (85:15 Pet. Ether/ EtOAc).