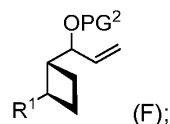


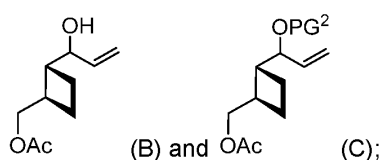
What is Claimed is:

1. A process for synthesizing compound F or a salt thereof:

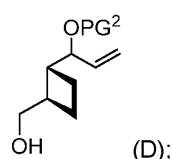


wherein OPG² is a secondary alcohol protecting group and R¹ is a protected aldehyde; comprising:

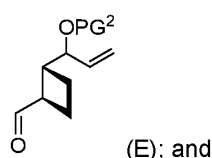
- (a) protecting a secondary alcohol of compound B, or a salt thereof, by reacting compound B, or salt thereof, with an alcohol protecting group reagent to form compound C, or a salt thereof:



- (b) removing compound C's acetyl group to form a primary alcohol of compound D, or a salt thereof:



- (c) oxidizing the primary alcohol of compound D, or salt thereof, to form an aldehyde of compound E, or a salt thereof:



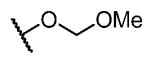
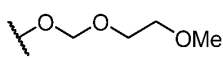
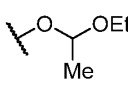
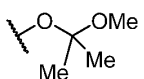
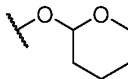
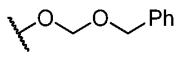
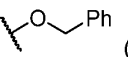
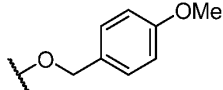
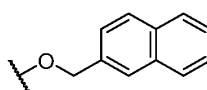
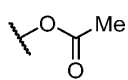
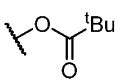
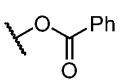
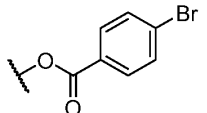
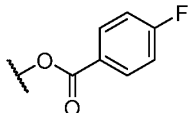
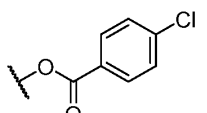
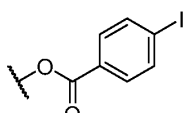
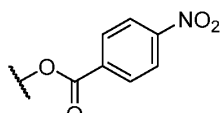
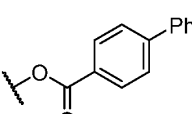
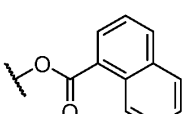
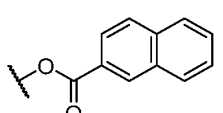
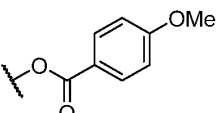
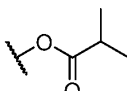
- (d) protecting the aldehyde of compound E, or salt thereof, to form a protected aldehyde of compound F, or a salt thereof.

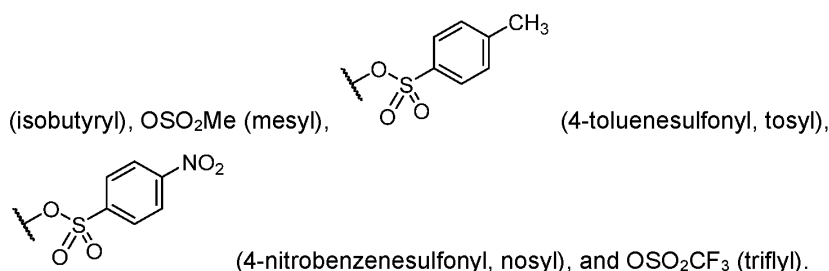
2. The process of claim 1, wherein OPG² comprises an acyl protecting group, an ether protecting group, acetal or ketal protecting group, a sulfonyl protecting group, and a silyl ether protecting group.

3. The process of claim 2, wherein the acyl protecting group is selected from the group consisting of acetyl, pivaloyl, benzoyl, 4-bromobenzoyl, 4-fluorobenzoyl, 4-chlorobenzoyl, 4-iodobenzoyl, 4-nitrobenzoyl, 4-phenylbenzoyl, 1-naphthoyl, 2-naphthoyl, 4-methoxybenzoyl, and isobutyryl.

4. The process of claim 3, wherein the acyl protecting group is 4-bromobenzoyl.

5. The process of any one of claims 2-4, wherein the alcohol protecting group reagent of step (a) is an acyl chloride or an acyl anhydride.
6. The process of any one of claims 1-5, wherein compound B and the alcohol protecting group reagent are present in a molar ratio of 1:1 to 1:2.
7. The process of claim 6, wherein the molar ratio of compound B to alcohol protecting group reagent is 1:1.3.

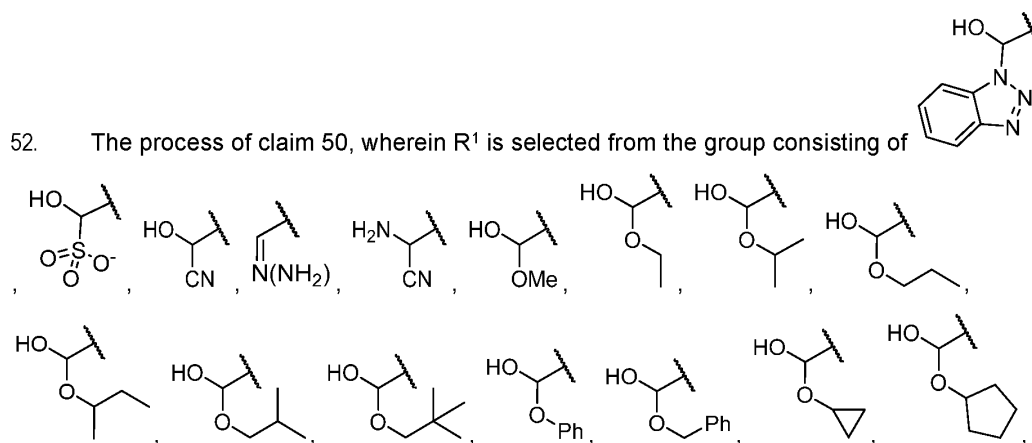
8. The process of claim 2, wherein OPG² is selected from the group consisting of  (methoxy),  (tert-butyl ether),  (methoxymethyl acetal, MOM),  (2-methoxyethoxymethyl ether, MEM),  (ethoxyethyl acetal, "EE"),  (methoxypropyl acetal, MOP),  (tetrahydropyranyl acetal, "THP"),  (benzyloxymethyl acetal, BOM),  (benzyl ether, Bn),  (4-methoxybenzyl ether, PMB),  (2-naphthylmethyl ether, Nap),  (acetyl, Ac),  pivaloyl (Piv),  (benzoyl, Bz),  (4-bromobenzoyl, Br-Bz),  (4-fluorobenzoyl),  (4-chlorobenzoyl),  (4-iodobenzoyl),  (4-nitrobenzoyl),  (4-phenylbenzoyl),  (1-naphthoyl ester),  (2-naphthoyl ester),  (4-methoxybenzoyl),  (isobutyryl).

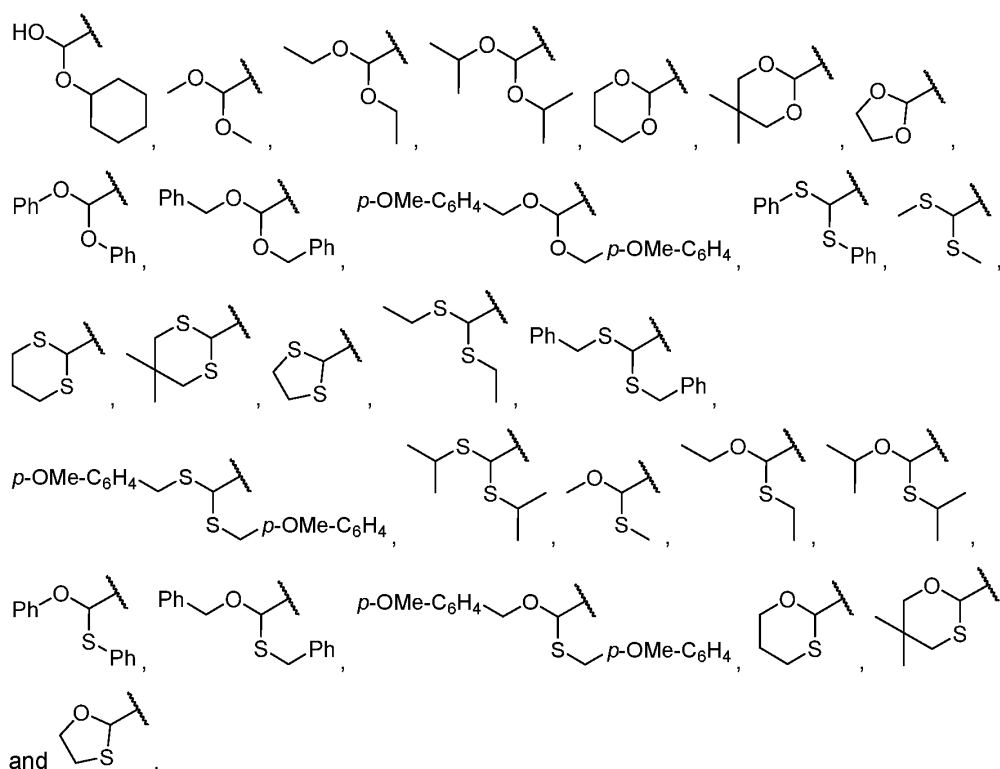


9. The process of claim 2, wherein the silyl ether protecting group is selected from the group consisting of OSiEt_3 (triethylsilyl ether, TES), $\text{OSi}(\text{Pr})_3$ (triisopropylsilyl ether, TIPS), OSiMe_3 (trimethylsilyl ether, TMS), OSiMe_2tBu (*tert*-butyldimethylsilyl ether, TBS), and OSiPh_2tBu (*tert*-butyldiphenylsilyl ether TBDPS).
10. The process of any one of claims 2-9, wherein step (a) comprises admixing compound B, or salt thereof, the alcohol protecting group reagent, and a nucleophilic catalyst.
11. The process of claim 10, wherein the nucleophilic catalyst comprises pyridine, 4-dimethylaminopyridine, or a combination thereof.
12. The process of claim 10 or 11, wherein compound B and the nucleophilic catalyst are present in a molar ratio of 1:1 to 1:5.
13. The process of claim 12, wherein the molar ratio of compound B to the nucleophilic catalyst is 1:2.
14. The process of any one of claims 1-13, wherein step (a) occurs in an organic solvent selected from the group consisting of a nonpolar aromatic solvent, an ether solvent, a chlorinated solvent, acetonitrile, dimethylformamide (DMF), methyl isobutyl ketone (MIBK), 2-butanone, acetone, isopropyl acetate (IPAc), ethyl acetate, and a combination thereof.
15. The process of claim 14, wherein the organic solvent is selected from the group consisting of toluene, benzene, xylene, tetrahydrofuran (THF), tetrahydropyran, diethyl ether, dibutyl ether, diisopropyl ether, dimethoxymethane, 1,2-dimethoxyethane, 1,4-dioxane, dichloromethane (DCM), carbon tetrachloride, chloroform, 1,2-dichloroethane, 2-methyltetrahydrofuran (2-MeTHF), methyl *tert*-butyl ether (MTBE), cyclopentyl methyl ether (CPME), and a combination thereof.
16. The process of claim 15, wherein the organic solvent is toluene, THF, DCM, or a combination thereof.
17. The process of any one of claims 1-16, wherein step (a) occurs at a temperature of 20 °C to 100 °C.
18. The process of claim 17, wherein step (a) occurs at a temperature of 60 °C.
19. The process of any one of claims 1-18, wherein removing the acetyl protecting group in step (b) comprises admixing compound C, or salt thereof, with a deprotecting agent.
20. The process of claim 19, wherein the deprotecting agent comprises acetyl chloride, an enzyme, an acid, a base, a metal hydride, or a combination thereof.

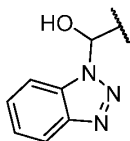
21. The process of claim 20, wherein the deprotecting agent comprises acetyl chloride and an alcohol.
22. The process of claim 21, wherein the alcohol is selected from the group consisting of methanol, ethanol, propanol, isopropanol, butanol, and a combination thereof.
23. The process of claim 22, wherein the alcohol is methanol.
24. The process of claim 20, wherein the deprotecting agent is magnesium methoxide.
25. The process of claim 20, wherein the deprotecting agent is an enzyme selected from the group consisting of an ester hydrolase, a lipase, and a combination thereof.
26. The process of claim 20, wherein the deprotecting agent is an acid selected from the group consisting of hydrochloric acid, sulfuric acid, phosphoric acid, and a combination thereof.
27. The process of claim 20, wherein the deprotecting agent is zirconium hydride.
28. The process of any one of claims 19-27, wherein compound C and the deprotecting agent are present in a molar ratio of 1:0.2 to 1:2.
29. The process of claim 28, wherein the molar ratio of compound C to the deprotecting agent is 1:0.5.
30. The process of any one of claims 1-29, wherein step (b) occurs at a temperature of -15 °C to 25 °C.
31. The process of claim 30, wherein step (b) occurs at a temperature of 10 °C.
32. The process of any one of claims 1-31, wherein oxidizing of step (c) comprises admixing compound D, or salt or solvate thereof, and an oxidizing agent, with an organic solvent, and optionally water.
33. The process of claim 32, wherein the oxidizing agent is selected from the group consisting of oxalyl chloride/DMSO, bleach, SO₃/pyridine, iodobenzenediacetate, and any combination thereof.
34. The process of claim 33, wherein the oxidizing agent is iodobenzenediacetate.
35. The process of any one of claims 32-34, wherein compound D and the oxidizing agent are present in a molar ratio of 1:1.1 to 1:2.
36. The process of claim 35, wherein the molar ratio of compound D to the oxidizing agent is 1:1.1.
37. The process of any one of claims 32-36, further comprising admixing compound D and the oxidizing reagent with an oxidation catalyst.
38. The process of claim 37, wherein the oxidation catalyst is selected from the group consisting of 2,2,6,6-tetramethylpiperidin-1-yl)oxidanyl (TEMPO), tetrapropylammonium perruthenate (TPAP)/N-methylmorpholine-N-oxide (NMO), Cu/9-azabicyclo[3.3.1]nonane N-oxyl (ABNO), Fe/ABNO, and a combination thereof.
39. The process of claim 38, wherein the oxidation catalyst is TEMPO.
40. The process of any one of claims 37-39, wherein compound D and the oxidation catalyst are present in a molar ratio of 1:0.01 to 1:1.

41. The process of claim 40, wherein the molar ratio of compound D to the oxidation catalyst is 1:0.04.
42. The process of any one of claims 32-41, wherein the organic solvent is selected from the group consisting of a nonpolar aromatic solvent, an ether solvent, a chlorinated solvent, methyl isobutyl ketone (MIBK), 2-butanone, acetone, isopropyl acetate, ethyl acetate, and a combination thereof.
43. The process of claim 42, wherein the organic solvent is selected from the group consisting of toluene, benzene, xylene, tetrahydrofuran (THF), tetrahydropyran, diethyl ether, dibutyl ether, diisopropyl ether, dimethoxymethane, 1,2-dimethoxyethane, 1,4-dioxane, dichloromethane (DCM), carbon tetrachloride, chloroform, 1,2-dichloroethane, 2-methyltetrahydrofuran (2-MeTHF), methyl tert-butyl ether (MTBE), cyclopentyl methyl ether (CPME), and a combination thereof.
44. The process of claim 43, wherein the organic solvent is toluene.
45. The process of any one of claims 32-44, wherein step (c) occurs in the presence of water.
46. The process of claim 45, wherein compound D and water are present in a molar ratio of 1:1 to 1:2.
47. The process of claim 46, wherein the molar ratio of compound D to water is 1:1.1.
48. The process of any one of claims 1-47, wherein step (c) occurs at a temperature of 5 °C to 45 °C.
49. The process of claim 48, wherein step (c) occurs at a temperature of 20 °C.
50. The process of any one of claims 1-49, wherein protecting the aldehyde of compound E, or salt thereof, in step (d) comprises admixing compound E, or salt thereof, and an aldehyde protecting group reagent with a solvent.
51. The process of claim 50, wherein the aldehyde protecting group reagent is selected from the group consisting of benzotriazole, a bisulfite salt, a cyanide salt, hydrogen cyanide, a thiol or dithiol, an alcohol or diol, hydrazine, ammonia, and a combination thereof.

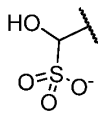




53. The process of claim 52, wherein R¹ is

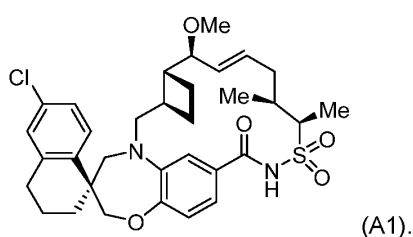


54. The process of claim 52, wherein R¹ is

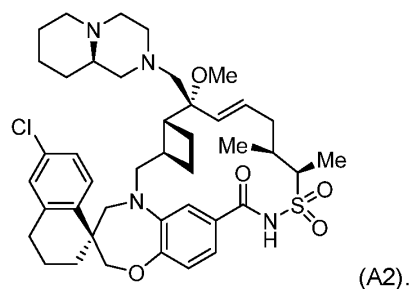


55. The process of any one of claims 50-54, wherein compound E and the aldehyde protecting group reagent are present in a molar ratio of 1:1 to 1:1.5.
56. The process of claim 55, wherein the molar ratio of compound E to the aldehyde protecting group reagent is 1:1.
57. The process of any one of claims 50-56, wherein the solvent is selected from the group consisting of toluene, heptane, acetonitrile, water, methyl tert-butyl ether (MTBE), and a combination thereof.
58. The process of claim 57, wherein the solvent is selected from the group consisting of toluene/heptane, acetonitrile/water, and methyl tert-butyl ether (MTBE).
59. The process of claim 58, wherein the solvent is toluene/heptane.
60. The process of claim 59, wherein toluene and heptane are present in the solvent as a volume ratio of 4:7.

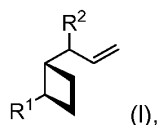
61. The process of any one of claims 1-60, wherein step (d) occurs at a temperature of 20 °C to 50 °C.
62. The process of any one of claims 1-61, further comprising:
(e) crystallizing compound F.
63. The process of claim 62, wherein crystallizing comprises admixing compound F with a crystallizing solvent to form crystalline compound F.
64. The process of claim 63, wherein the crystallizing solvent comprises heptane, toluene, methyl tert-butyl ether (MTBE), cyclopentyl methyl ether (CPME), methyl isobutyl ketone (MIBK), acetonitrile, isopropyl alcohol, isopropyl acetate, water, or a combination thereof.
65. The process of any one of claims 1-64, further comprising synthesizing compound A1, or a salt or solvate thereof, using compound F:



66. The process of any one of claims 1-64, further comprising synthesizing compound A2, or a salt or solvate thereof, using compound F:



67. A compound having the structure of Formula (I):



wherein

R^1 is , , or a protected aldehyde;
 R^2 is OH or OPG²; and
 OPG² is a secondary alcohol protecting group,

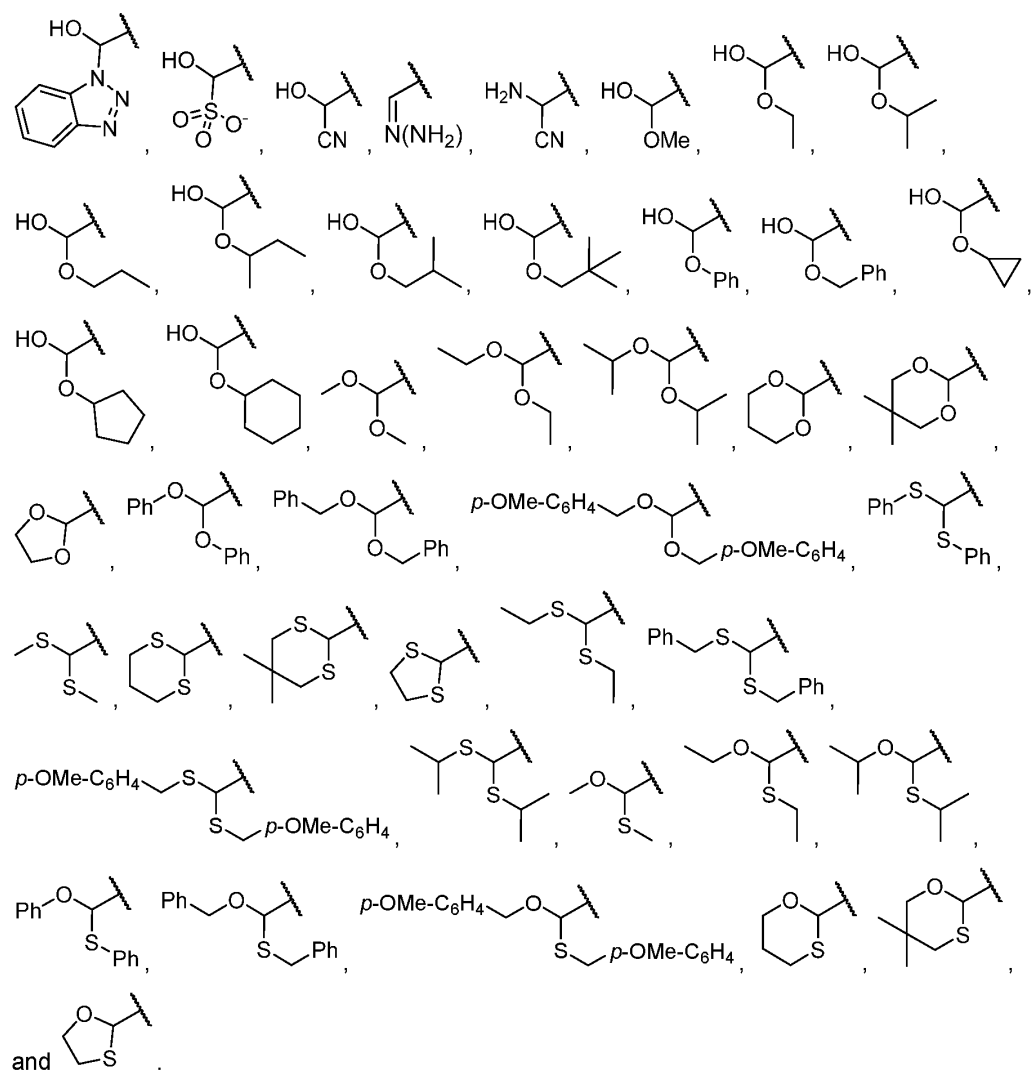
with the proviso that if R² is OH, then R¹ is .

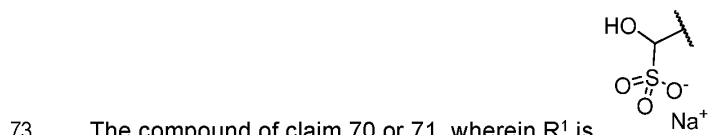
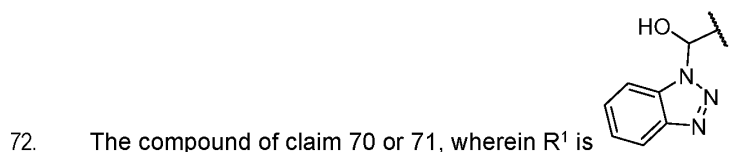
68. The compound of claim 67, wherein R¹ is .

69. The compound of claim 67, wherein R¹ is .

70. The compound of claim 67, wherein R¹ is a protected aldehyde.

71. The compound of claim 70, wherein R¹ is selected from the group consisting of





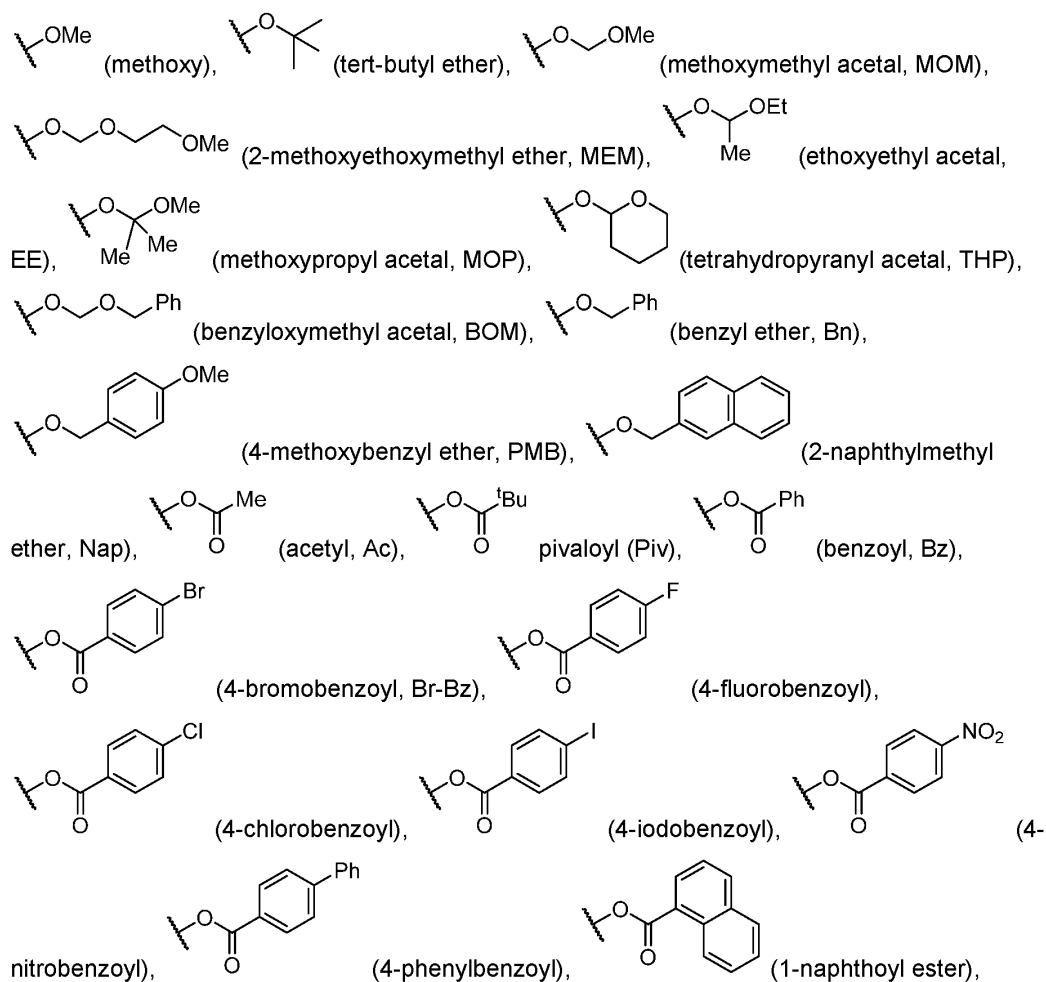
74. The compound of claim 70 or 71, wherein R¹ is

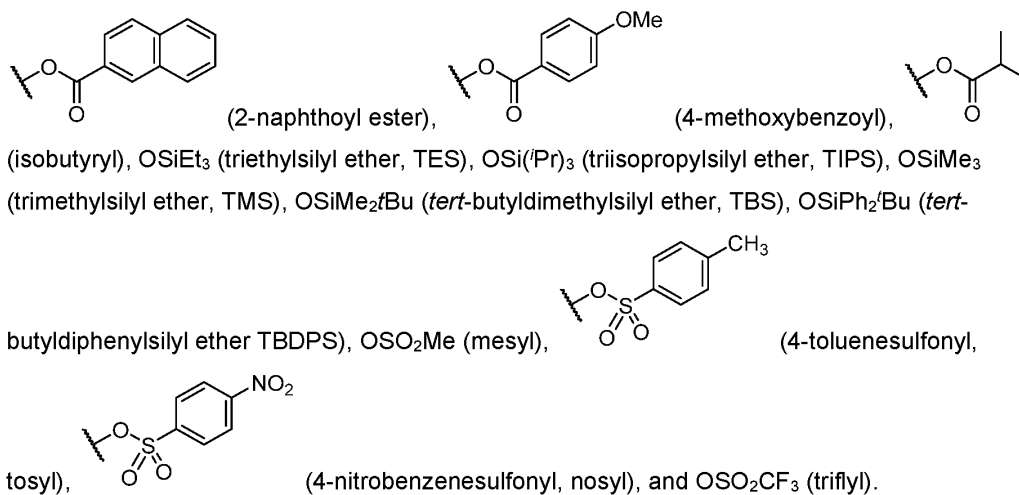
75. The compound of any one of claims 67-73, wherein R² is OPG².

76. The compound of claim 75, wherein OPG² selected from the group consisting of an

ether, an acetal or ketal, an acyl, a sulfonyl, and a silyl ether.

77. The compound of claim 76, wherein OPG² is selected from the group consisting of





78. The compound of claim 77, wherein OPG² is 4-bromobenzoyl.

79. The compound of claim 67, wherein the compound is selected from the group consisting

