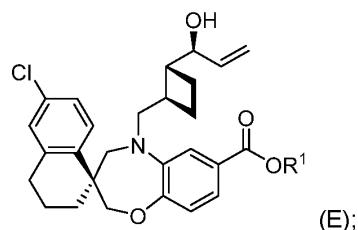
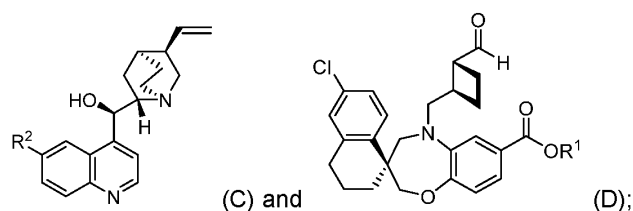


What is Claimed is:

1. A process for synthesizing compound E, or a salt or solvate thereof:



comprising admixing compound C, compound D, $\text{CH}_2=\text{CHX}^1$, and $\text{Zn}(\text{X}^3)_2$ in an organic solvent to form compound E:



wherein

R^1 is C_{1-6} alkyl;

R^2 is H or C_{1-3} alkoxy;

X^1 is MgCl , MgBr , MgI , Li , CuLi , ZnX^2 , In(I) , $\text{In}(\text{X}^2)_2$;

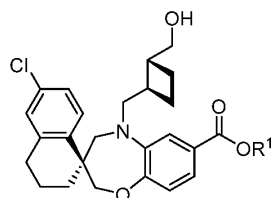
each X^2 independently is Cl, Br, or I; and

each X^3 independently is Cl, Br, I, OTf, OTs, OAc, or acac.

2. The process of claim 1, wherein R^1 is methyl, ethyl, propyl, *n*-butyl, or *tert*-butyl.
3. The process of claim 2, wherein R^1 is methyl, ethyl, or *tert*-butyl.
4. The process of any one of claims 1-3, wherein R^2 is H.
5. The process of any one of claims 1-3, wherein R^2 is C_{1-3} alkoxy.
6. The process of claim 5, wherein R^2 is methoxy.
7. The process of any one of claims 1-6, wherein X^1 is MgCl .
8. The process of any one of claims 1-6, wherein X^1 is MgBr or MgI .
9. The process of any one of claims 1-6, wherein X^1 is Li.
10. The process of any one of claims 1-6, wherein X^1 is CuLi .
11. The process of any one of claims 1-6, wherein X^1 is In(I) or $\text{In}(\text{X}^2)_2$.
12. The process of any one of claims 1-6, wherein X^1 is ZnCl or ZnBr .
13. The process of any one of claims 1-12, wherein $\text{Zn}(\text{X}^3)_2$ is ZnCl_2 .
14. The process of any one of claims 1-12, wherein $\text{Zn}(\text{X}^3)_2$ is ZnBr_2 .
15. The process of any one of claims 1-12, wherein $\text{Zn}(\text{X}^3)_2$ is ZnI_2 .
16. The process of any one of claims 1-12, wherein $\text{Zn}(\text{X}^3)_2$ is $\text{Zn}(\text{OTf})_2$ or $\text{Zn}(\text{OTs})_2$.

17. The process of any one of claims 1-12, wherein $\text{Zn}(\text{X}^3)_2$ is $\text{Zn}(\text{OAc})_2$ or $\text{Zn}(\text{acac})_2$.
18. The process of any one of claims 1-17, wherein the organic solvent is degassed prior to the admixing.
19. The process of any one of claims 1-18, wherein the organic solvent comprises an ether solvent or acetonitrile.
20. The process of claim 19, wherein the organic solvent is selected from the group consisting of tetrahydrofuran (THF), 2-methyltetrahydrofuran (2-MeTHF), diethyl ether, acetonitrile, 1,2-dimethoxyethane (1,2-DME), methyl tert-butyl ether (MTBE), cyclopentyl methyl ether (CPME), and a combination thereof.
21. The process of claim 20, wherein the organic solvent is acetonitrile.
22. The process of any one of claims 1-21, wherein the admixing is performed at a temperature of 10 °C to 35 °C.
23. The process of any one of claims 1-22, wherein the admixing comprises
 - (a) admixing compound C and $\text{Zn}(\text{X}^3)_2$ in the organic solvent to form a suspension;
 - (b) adding $\text{CH}_2=\text{CHX}^1$ to the suspension to form a solution; and
 - (c) adding compound D to the solution to form compound E.
24. The process of claim 23, wherein the suspension of step (a) is cooled to a temperature of -15 °C to -5 °C prior to adding $\text{CH}_2=\text{CHX}^1$.
25. The process of claim 23 or 24, wherein $\text{CH}_2=\text{CHX}^1$ is added to the suspension as a solution in an ether solvent.
26. The process of claim 25, wherein the ether solvent is THF.
27. The process of any one of claims 23-26, wherein $\text{CH}_2=\text{CHX}^1$ is added to the suspension at a temperature of -10 °C to 0 °C.
28. The process of any one of claims 23-27, wherein the solution of step (b) is brought to a temperature of 10 °C to 35 °C prior to adding compound D.
29. The process of any one of claims 23-28, wherein compound D is added as a solution in an organic solvent selected from the group consisting of THF, 2-MeTHF, diethyl ether, acetonitrile, 1,2-DME, MTBE, CPME, and a combination thereof.
30. The process of claim 29, wherein the organic solvent comprises acetonitrile.
31. The process of any one of claims 1-30, wherein compound D and $\text{CH}_2=\text{CHX}^1$ are present in a molar ratio of 1:2.5 to 1:4.5.
32. The process of claim 31, wherein the molar ratio of compound D to $\text{CH}_2=\text{CHX}^1$ is 1:3.2.
33. The process of any one of claims 1-32, wherein compound D and $\text{Zn}(\text{X}^3)_2$ are present in a molar ratio of 1:2.5 to 1:4.0.
34. The process of claim 33, wherein the molar ratio of compound D to $\text{Zn}(\text{X}^3)_2$ is 1:3.1.

35. The process of any one of claims 1-34, wherein compound D and compound C are present in a molar ratio of 1:1 to 1:2.
36. The process of claim 35, wherein the molar ratio of compound D to compound C is 1:1.4.
37. The process of any one of claims 1-36, wherein compound D is prepared by oxidizing



compound B: (B) in the presence of an oxidizing agent and an organic solvent.

38. The process of claim 37, wherein the oxidizing occurs under an inert atmosphere.
39. The process of claim 37 or 38, wherein compound B is provided as a solution in an organic solvent selected from the group consisting of dimethyl sulfoxide (DMSO), dichloromethane (DCM), dimethylformamide (DMF), THF, 2-MeTHF, acetonitrile toluene, 1,2-DME, MTBE, 1,2-dichloroethane (DCE), chloroform, and a combination thereof.
40. The process of claim 39, wherein the organic solvent is DCM.
41. The process of any one of claims 37-40, wherein the oxidizing agent is selected from the group consisting of oxalyl chloride, bleach, SO_3 /pyridine, iodobenzenediacetate, trifluoroacetic anhydride, N-chlorosuccinimide (NCS), 2-iodoxybenzoic acid (IBX), N-methylmorpholine N-oxide (NMO), ceric ammonium nitrate (CAN), Dess-Martin periodinane, pyridinium chlorochromate (PCC), pyridinium dichromate (PDC), tetrapropylammonium perruthenate (TPAP)/NMO, NCS/dimethylsulfide, NCS/dodecyl sulfide, and a combination thereof.
42. The process of claim 41, wherein the oxidizing agent is oxalyl chloride.
43. The process of any one of claims 37-42, wherein the oxidizing is performed in the presence of a base selected from the group consisting of triethylamine, diisopropylethanolamine, N-methylpyrrolidine, N-ethylpiperidine, pyridine, 2,2,6,6-tetramethylpiperidine (TMP), pempidine, 2,6-lutidine, and a combination thereof.
44. The process of claim 43, wherein the base is triethylamine.
45. The process of any one of claims 37-44, wherein compound B and the oxidizing agent are present in a molar ratio of 1:1 to 1:3.
46. The process of claim 45, wherein the molar ratio of compound B to the oxidizing agent is 1:1.5.
47. The process of any one of claims 43-46, wherein compound B and the base are present in a molar ratio of 1:3 to 1:10.
48. The process of claim 47, wherein the molar ratio of compound B to the base is 1:5.
49. The process of any one of claims 37-48, wherein the oxidizing occurs in an organic solvent selected from the group consisting of dimethyl sulfoxide (DMSO), dichloromethane

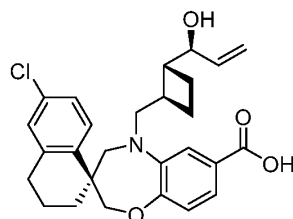
(DCM), dimethylformamide (DMF), THF, 2-MeTHF, acetonitrile, MTBE, 1,2-DME, toluene, DCE, CPME, and a combination thereof.

50. The process of claim 49, wherein the organic solvent is DMSO.

51. The process of any one of claims 37-50, wherein the oxidizing occurs at a temperature of -80 °C to -20 °C.

52. The process of claim 51, wherein the oxidizing occurs at a temperature of -40 °C.

53. The process of any one of claims 1-52, further comprising hydrolyzing compound E to



form compound F: (F), or a salt thereof.

54. The process of claim 53, wherein the hydrolyzing comprises:

admixing a solution of compound E in an organic solvent and a hydroxide base in water to form compound F.

55. The process of claim 54, wherein the hydroxide base is selected from the group consisting of NaOH, KOH, LiOH, potassium trimethylsilanolate (TMSOK), and a combination thereof.

56. The process of claim 54 or 55, wherein compound E and the hydroxide base are present in a molar ratio of 1:1 to 1:100.

57. The process of claim 56, wherein the molar ratio of compound E to the hydroxide base is 1:3.

58. The process of any one of claims 54-57, wherein the organic solvent is selected from the group consisting of methanol, ethanol, propanol, isopropanol, butanol, THF, diethyl ether, acetone, acetonitrile, 2-MeTHF, sec-butanol, and a combination thereof.

59. The process of claim 58, wherein the organic solvent is ethanol.

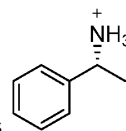
60. The process of any one of claims 54-59, wherein the hydrolyzing occurs at a temperature of 20 °C to 60 °F.

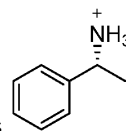
61. The process of any one of claims 53-60, wherein compound F is in salt form.

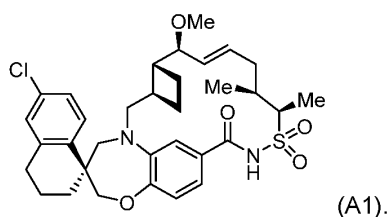
62. The process of claim 61, wherein the salt of compound F comprises an ammonium cation or an alkali metal cation.

63. The process of claim 62, wherein the ammonium cation is selected from the group consisting of benzylammonium, methylbenzylammonium, trimethylammonium, triethylammonium, morpholinium, pyridinium, piperidinium, picolinium, dicyclohexylammonium, protonated N,N'-dibenzylethylenediamine, 2-hydroxyethylammonium, bis-(2-hydroxyethyl)ammonium, tri-(2-hydroxyethyl)ammonium, protonated procaine, dibenzylpiperidium, dehydroabietyl ammonium, N,N-bisdehydroabietyl ammonium, protonated

glucamine, protonated N-methylglucamine, protonated collidine, protonated quinine, protonated quinoline, protonated lysine, protonated arginine, protonated 1,4-diazabicyclo[2.2.2]octane (DABCO), N,N-diisopropylethylammonium, and a combination thereof.



64. The process of claim 63, wherein the ammonium cation is .
65. The process of claim 62, wherein the alkali metal cation is selected from the group consisting of lithium, sodium, potassium, and a combination thereof.
66. The process of any one of claims 62-65, wherein the salt of compound F is prepared by admixing compound F, as its free acid form (compound F free acid), with an amine base or an alkali metal base in a nonpolar organic solvent to form the salt of compound F.
67. The process of claim 66, wherein compound F free acid and amine base or alkali metal base are present in a molar ratio of 1:1 to 1:2.
68. The process of claim 67, wherein the molar ratio of compound F free acid to amine base or alkali metal base is 1:1.2.
69. The process of any one of claims 66-68, wherein the nonpolar organic solvent is selected from the group consisting of ethyl acetate, toluene, isopropyl acetate, MTBE, and a combination thereof.
70. The process of claim 69, wherein the nonpolar organic solvent is ethyl acetate.
71. The process of any one of claims 66-70, wherein the admixing occurs at a temperature of 50 °C to 60 °C.
72. The process of any one of claims 61-71, wherein the admixing occurs in an inert atmosphere.
73. The process of any one of claims 1-72, further comprising synthesizing compound A1 or a salt or solvate thereof using compound E:



74. The process of any one of claims 1-72, further comprising synthesizing compound A2 or a salt or solvate thereof using compound E:

