## SUMMARY

**[00029]** The present disclosure provides a coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate optionally as a solvate and additionally optionally as a hydrate thereof.

**[00030]** In certain embodiments, the coformer salt is in a substantially pure crystalline form.

**[00031]** In certain embodiments, the coformer salt is a [(1S)-endo]-(+)-3-bromo-10-camphor sulfonic acid salt of (2S,3S)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1H-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate.

**[00031a]** In one aspect of the present disclosure, there is provided a coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate or a solvate or a hydrate thereof, wherein the coformer salt is a [(1*S*)-*endo*]-(+)-3-bromo-10-camphor sulfonic acid salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate.

**[00032]** In certain embodiments, the coformer acid is [(1*S*)-*endo*]-(+)-3-bromo-10-camphor sulfonate.

**[00033]** In certain embodiments, the coformer salt is a crystalline form exhibiting at least one of a solid state $^{13}C$ NMR spectrum with peaks at 210.3, 25.3, 21.8, 20.8, 19.5, and 18.5 ppm ± 0.2 ppm; a differential scanning calorimetry thermogram having a broad endotherm between 25 °C and 90 °C and an endotherm with a maximum between about 135 °C and 147 °C; a thermogravimetric analysis thermogram indicative of a solvated material; or a X-ray powder diffraction pattern comprising peaks at 2θ angle degrees ± 0.2 2θ angle degrees of 6.7, 9.7, 18.5, 19.5, and 22.

**[00034]** In some embodiments, the coformer salt is in a crystalline form exhibiting at least one of a solid state $^{13}C$ NMR spectrum with peaks at 210.3, 25.3, 21.8, 20.8, 19.5, and 18.5 ppm ± 0.2 ppm; or a X-ray powder diffraction pattern comprising peaks at 2θ angle degrees ± 0.2 2θ angle degrees of 6.7, 9.7, 18.5, 19.5, and 22.

**[00035]** In some embodiments, the coformer salt is a (*S*)-1-phenylethanesulfonic acid salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate.

**[00036]** In some embodiments, the coformer acid is (1*S*)-phenylethanesulfonate.

**[00036a]** In another aspect provided herein is a method of preparing a coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate, wherein the coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate is a [(1*S*)-*endo*]-(+)-3-bromo-10-camphor sulfonic acid salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate; the method comprising:

(1) treating methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate with [(1*S*)-*endo*]-(+)-3-bromo-10-camphor sulfonic acid in one or more step 1a) solvent(s) at an elevated temperature to form a step 1a) solution;

wherein the step 1a) solvent(s) are selected from $C_{1-6}$ ketone, $C_{1-6}$ alcohol, ethyl acetate, tetrahydrofuran, toluene, acetonitrile, heptane, dioxane, and water;

(2) allowing the step 1a) solution to stand under conditions sufficient to precipitate the coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate in a solid form; and

(3) isolating the coformer of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate salt solid form.

**[00037]** Also provided herein is a method of preparing a coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate comprising (1) treating methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate with a coformer in one or more step 1a) solvent(s) selected from MIBK, MEK, ethanol, and water at an elevated temperature to form a step 1a) solution; (2) allowing the

**WE CLAIM**:

**1.** A coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate or a solvate or a hydrate thereof, wherein the coformer salt is a [(1*S*)-*endo*]-(+)-3-bromo-10-camphor sulfonic acid salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate.

**2.** The coformer salt of claim 1, wherein the coformer salt is in a substantially pure crystalline form.

**3.** The coformer salt of claim 1 or 2, wherein the coformer salt is a crystalline form exhibiting a solid state $^{13}C$ NMR spectrum with peaks at 210.3, 25.3, 21.8, 20.8, 19.5, and 18.5 ppm ± 0.2 ppm.

**4.** The coformer salt of any of claims 1-3, wherein the coformer salt is in a crystalline form exhibiting an X-ray powder diffraction pattern comprising peaks at 2θ angle degrees ± 0.2 2θ angle degrees of 6.7, 9.7, 18.5, 19.5, and 22.

**5.** A method of preparing a coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate, wherein the coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate is a [(1*S*)-*endo*]-(+)-3-bromo-10-camphor sulfonic acid salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate; the method comprising:

(1) treating methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate with [(1*S*)-*endo*]-(+)-3-bromo-10-camphor sulfonic acid in one or more step 1a) solvent(s) at an elevated temperature to form a step 1a) solution;

wherein the step 1a) solvent(s) are selected from $C_{1-6}$ ketone, $C_{1-6}$ alcohol, ethyl acetate, tetrahydrofuran, toluene, acetonitrile, heptane, dioxane, and water;

(2) allowing the step 1a) solution to stand under conditions sufficient to precipitate the coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate in a solid form; and

(3) isolating the coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate solid form.

**6.** The method of claim 5, wherein the step 1a) solvent(s) are selected from acetone, methylethylketone, methylisobutylketone, methanol, ethanol, propanol, isopropanol, and butanol.

**7.** The method of claim 5, wherein the step 1a) solvents are methylisobutylketone, water, and ethanol.

**8.** The method of claim 5 or 6, wherein the step 1a) solvents are methylisobutylketone and ethanol.

**9.** The method of any of claims 5-8, further comprising recrystallizing or reslurrying the coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate in one or more step 1b) solvent(s).

**10.** The method of any of claims 5-9, wherein the coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate is in crystalline form.

**11.** The method of any of claims 5-10, further comprising:

(4) suspending the coformer salt of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate in one or more step 2a) solvent(s) at room temperature or at elevated temperature, to

form a step 2a) solution and treating the step 2a) solution with a base selected from NaOH, aqueous $NH_3$, $NaCO_3$, NaOAc, and $NaHCO_3$;

wherein step 2a) solvent(s) are selected from $C_{1-6}$ ketone, $C_{1-6}$ alcohol, and water;

(5) allowing the step 2a) solution to stand under conditions sufficient to precipitate a solid form of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate; and

(6) isolating the solid form of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate.

**12.** The method of any of claim 11, wherein the step 2a) solvent(s) are selected from acetone, methylethylketone, methylisobutylketone, methanol, ethanol, propanol, and isopropanol; and the base is aqueous $NH_3$.

**13.** The method of claim 11 or 12, wherein the step 2a) solvents are acetone, methanol, and isopropanol; and the base is aqueous $NH_3$.

**14.** The method of any of claims 11-13, further comprising recrystallizing or reslurrying the solid form of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate in one or more step 2b) solvent(s).

**15.** The method of any of claims 11-14, wherein the solid form of (2*S*,3*S*)-methyl 7-fluoro-2-(4-fluorophenyl)-3-(1-methyl-1*H*-1,2,4-triazol-5-yl)-4-oxo-1,2,3,4-tetrahydroquinoline-5-carboxylate is in a crystalline form.