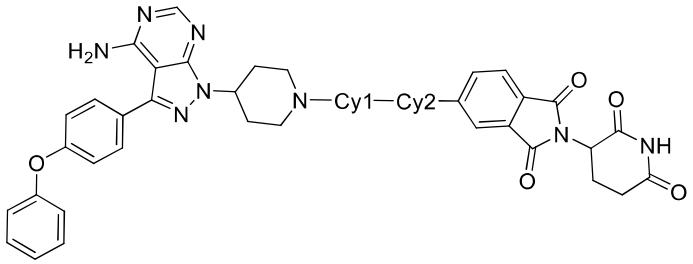
CLAIMS

1. A pharmaceutical salt of a compound as shown in formula (I),



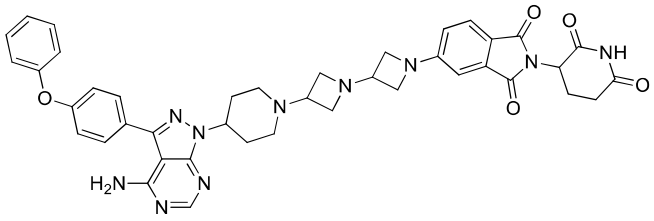
(I)

wherein

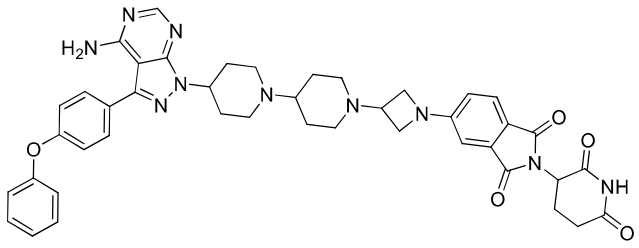
Cy1 or Cy2 is each independently selected from piperidyl or azacyclobutyl; and

the pharmaceutical salt is selected from maleate, fumarate, halogen acid salt (preferably hydrobromide and hydrochloride), sulfate, phosphate, L-tartrate, citrate, L-malate, hippurate, D-glucuronate, glycollate, mucate, succinate, lactate, orotate, pamoate, glycinate, alanine salt, arginine salt, cinnamate, benzoate, benzenesulfonate, p-toluenesulfonate, acetate, propionate, valerianate, triphenyl acetate, L-proline salt, ferulate, 2-hydroxyethanesulfonate, mandelate, nitrate, mesylate, malonate, gentisate, salicylate, oxalate or glutarate.

2. The pharmaceutical salt according to claim 1, wherein the compound as shown in formula (I) is selected from a compound as shown in formula (Ia) or (Ib),



(Ia)



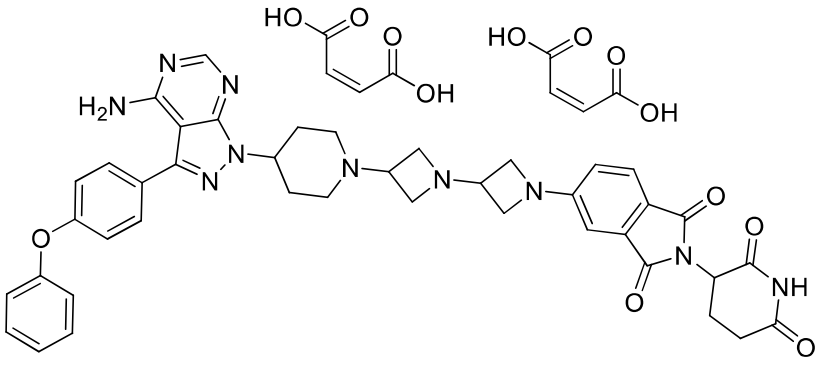
(Ib)

and the pharmaceutical salt is selected from maleate, fumarate, halogen acid salt (preferably hydrobromide and hydrochloride), sulfate, phosphate, L-tartrate, citrate, L-malate, hippurate, D-glucuronate, glycollate, mucate, succinate, lactate, orotate, pamoate, glycinate, alanine salt, arginine salt, cinnamate, benzoate, benzenesulfonate,

p-toluenesulfonate, acetate, propionate, valerianate, triphenyl acetate, L-proline salt, ferulate, 2-hydroxyethanesulfonate, mandelate, nitrate, mesylate, malonate, gentisate, salicylate, oxalate or glutarate.

3. The pharmaceutical salt according to claim 2, wherein the pharmaceutical salt is selected from maleate, fumarate, L-tartrate, citrate, L-malate, salicylate or oxalate.

4. The pharmaceutical salt according to claim 1, wherein the pharmaceutical salt of the compound as shown in formula (I) is selected from a compound as shown in formula (II),



(II).

5. A crystal form I of the compound as shown in formula (II), wherein the crystal form I has an X-ray powder diffraction pattern comprising characteristic diffraction peaks at 5.96° ± 0.2°, 9.30° ± 0.2°, 11.86° ± 0.2°, 15.80° ± 0.2°, 21.75° ± 0.2° and 23.93° ± 0.2° 2θ, as determined by using Cu-Kα radiation.

6. The crystal form I of the compound as shown in formula (II) according to claim 5, wherein the crystal form I has an X-ray powder diffraction pattern further comprising characteristic diffraction peaks at 3.98° ± 0.2°, 7.65° ± 0.2°, 10.87° ± 0.2°, 16.88° ± 0.2°, 17.89° ± 0.2° and 26.21° ± 0.2° 2θ, as determined by using Cu-Kα radiation.

7. The crystal form I of the compound as shown in formula (II) according to claim 6, wherein the crystal form I has an X-ray powder diffraction pattern further comprising characteristic diffraction peaks at 15.29° ± 0.2°, 17.33° ± 0.2°, 18.55° ±

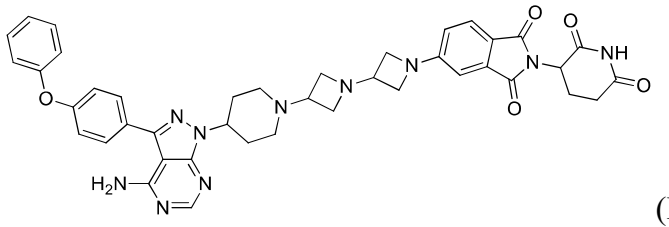
0.2°, 19.21° ± 0.2°, 19.91° ± 0.2° and 22.41° ± 0.2° 2θ, as determined by using Cu-Kα radiation.

8. The crystal form I of the compound as shown in formula (II) according to claim 7, wherein the crystal form I has an X-ray powder diffraction pattern further comprising characteristic diffraction peaks at 4.72° ± 0.2°, 9.58° ± 0.2°, 9.92° ± 0.2°, 12.85° ± 0.2°, 13.37° ± 0.2°, 13.75° ± 0.2°, 14.45° ± 0.2°, 27.37° ± 0.2°, 28.43° ± 0.2°, 30.27° ± 0.2°, 31.51° ± 0.2° and 34.21° ± 0.2° 2θ, as determined by using Cu-Kα radiation.

9. The crystal form I of the compound as shown in formula (II) according to claim 8, wherein the crystal form I, as determined by using Cu-Kα radiation, has an X-ray powder diffraction pattern as shown in Figure 28.

10. The crystal form I of the compound as shown in formula (II) according to claim 8, wherein the crystal form I has a differential scanning calorimetry curve as shown in Figure 29 or a thermogravimetric analysis curve as shown in Figure 30.

11. A crystal form III of the compound as shown in formula (Ia), wherein the crystal form III has an X-ray powder diffraction pattern comprising characteristic diffraction peaks at 5.02° ± 0.2°, 8.04° ± 0.2°, 16.91° ± 0.2°, 17.23° ± 0.2°, 18.19° ± 0.2°, 19.41° ± 0.2° and 20.03° ± 0.2° 2θ, as determined by using Cu-Kα radiation,



(Ia).

12. The crystal form III of the compound as shown in formula (Ia) according to claim 11, wherein the crystal form III has an X-ray powder diffraction pattern further comprising characteristic diffraction peaks at 12.36° ± 0.2°, 14.60° ± 0.2°, 15.03° ± 0.2°, 15.73° ± 0.2°, 20.57° ± 0.2°, 21.31° ± 0.2° and 25.45° ± 0.2° 2θ, as determined by using Cu-Kα radiation.

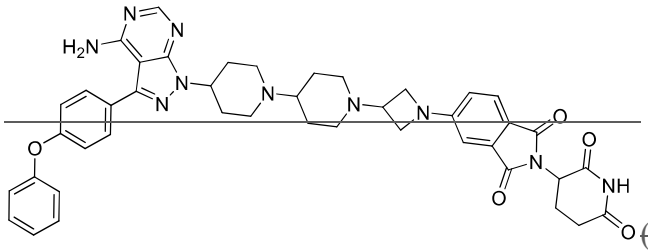
13. The crystal form III of the compound as shown in formula (Ia) according to claim 12, wherein the crystal form III has an X-ray powder diffraction pattern further comprising characteristic diffraction peaks at 5.19° ± 0.2°, 16.32° ± 0.2°, 18.75° ± 0.2°, 19.73° ± 0.2°, 21.91° ± 0.2°, 22.41° ± 0.2°, 23.48° ± 0.2°, 23.95° ± 0.2° and 26.33° ± 0.2° 2θ, as determined by using Cu-Kα radiation.

14. The crystal form III of the compound as shown in formula (Ia) according to claim 13, wherein the crystal form III has an X-ray powder diffraction pattern further comprising characteristic diffraction peaks at 10.34° ± 0.2°, 24.85° ± 0.2°, 26.93° ± 0.2°, 27.57° ± 0.2°, 28.41° ± 0.2°, 29.59° ± 0.2°, 30.19° ± 0.2°, 31.77° ± 0.2°, 33.13° ± 0.2° and 35.75° ± 0.2° 2θ, as determined by using Cu-Kα radiation.

15. The crystal form III of the compound as shown in formula (Ia) according to claim 14, wherein the crystal form III, as determined by using Cu-Kα radiation, has an X-ray powder diffraction pattern as shown in Figure 10.

16. The crystal form III of the compound as shown in formula (Ia) according to claim 14, wherein the crystal form III has a differential scanning calorimetry curve as shown in Figure 11 or a thermogravimetric analysis curve as shown in Figure 12.

~~17. A crystal form I of the compound as shown in formula (Ib), wherein the crystal form I has an X-ray powder diffraction pattern comprising characteristic diffraction peaks at 4.38° ± 0.2°, 8.66° ± 0.2°, 13.06° ± 0.2°, 14.34° ± 0.2°, 18.18° ± 0.2°, 20.28° ± 0.2° and 21.82° ± 0.2° 2θ, as determined by using Cu-Kα radiation,~~



~~(Ib).~~

~~18. The crystal form I of the compound as shown in formula (Ib) according to claim 17, wherein the crystal form I has an X-ray powder diffraction pattern further comprising characteristic diffraction peaks at 11.92° ± 0.2°, 12.74° ± 0.2° and 17.44° ± 0.2° 2θ, as determined by using Cu-Kα radiation.~~

~~19. The crystal form I of the compound as shown in formula (Ib) according to claim 18, wherein the crystal form I has an X-ray powder diffraction pattern further comprising characteristic diffraction peaks at 9.76° ± 0.2°, 11.26° ± 0.2°, 14.14° ± 0.2°, 17.04° ± 0.2°, 23.23° ± 0.2°, 24.06 ± 0.2°, 25.26° ± 0.2° and 26.42 ± 0.2° 2θ, as determined by using Cu-Kα radiation.~~

~~20. The crystal form I of the compound as shown in formula (Ib) according to claim 19, wherein the crystal form I, as determined by using Cu-Kα radiation, has an X-ray powder diffraction pattern substantially as shown in Figure 13-1 and/or Figure 13-2.~~

~~21. The crystal form I of the compound as shown in formula (Ib) according to claim 19, wherein the crystal form I has a differential scanning calorimetry (DSC) curve as shown in Figure 14 or a thermogravimetric analysis curve as shown in Figure 15.~~

~~22. A method for preparing the pharmaceutical salt according to claim 1, wherein the method comprises: a step of allowing the compound as shown in formula (I) and an acid to form a salt.~~

~~23. The method according to claim 22, wherein a solvent used therein is selected from one or more of a C_{1-6} halogenated alkane solvent, a C_{2-6} ester solvent, a C_{2-6} ether solvent, a C_{1-6} alcohol solvent or water.~~

~~24. The method according to claim 23, wherein the solvent used therein is selected from one or more of dichloromethane, 1,2-dichloroethane, ethyl acetate, methanol, ethanol, isopropanol, diethyl ether, tetrahydrofuran and water.~~

~~25. The method according to claim 24, wherein the solvent used therein is selected from one or more of dichloromethane, methanol, ethanol and water.~~

~~26. The method according to claim 23, wherein the method comprises: preparing the compound as shown in formula (II) by using the compound as shown in formula (Ia) and maleic acid as raw materials.~~

~~27. A method for preparing the crystal form of the compound as shown in formula (Ia), (Ib) or (II), wherein the method comprises a step of preparing the compound as shown in formula (II), (Ia) or (Ib) in any crystal form or the compound as shown in formula (II), (Ia) or (Ib) in an amorphous form by means of recrystallization or slurrying, wherein a solvent for the recrystallization or slurrying is selected from one of or a mixed solvent of two or more of a C_{2-6} ester solvent, a C_{2-6} ether solvent, a C_{1-6} alcohol solvent, a C_{1-6} nitrile solvent, an alkane solvent and water.~~

~~28. The method according to claim 27, wherein the solvent for the recrystallization or slurrying is selected from one of or a mixed solvent of two or more of ethyl acetate, isopropyl acetate, n-heptane, acetonitrile, tetrahydrofuran, trifluoroethanol, methanol, ethanol and water.~~

~~29. The method according to claim 27, wherein the recrystallization or slurrying is performed at a temperature of 4°C to 100°C, preferably room temperature to 90°C, more preferably 40°C to 90°C.~~

~~30. The method according to claim 29, wherein the crystal form is the crystal form I of the compound as shown in formula (II), and the method comprises steps of mixing the compound as shown in formula (II) with a suitable solvent to form a suspension, heating, stirring and slurrying the mixture, leaving the resulting product to stand for crystallization, and performing filtering and separation, wherein the solvent is selected from ethanol.~~

~~31. The method according to claim 29, wherein the crystal form is the crystal form III of the compound as shown in formula (Ia), and the method comprises a step of mixing the compound as shown in formula (Ia) in an amorphous form with a suitable solvent, heating, stirring and slurrying the mixture, and performing filtering and separation, wherein the solvent is selected from an acetonitrile/water mixed solvent.~~

~~32~~17. A pharmaceutical composition, wherein the pharmaceutical composition contains a therapeutically effective amount of the pharmaceutical salt of the compound

according to any one of claims 1 to 4~~ or the crystal form according to any one of claims 5 to 21~~, and a pharmaceutically acceptable excipient.

~~33~~18. Use of the pharmaceutical salt of the compound according to any one of claims 1 to 4 ~~the crystal form according to claim 5, 11 or 17 or the pharmaceutical composition according to claim 32~~ in the preparation of a drug for treating and/or preventing tumor or cancer.