CLAIMS

1. A crystal form of 4-[3-(cyclopropylmethoxy)-4-(difluoromethoxy)phenethyl]pyridin-2(1H)-one.

2. The crystal form according to claim 1, wherein an X-ray powder diffraction (XRPD) pattern of the crystal form obtained using Cu Kα radiation comprises peaks at 2θ (°) of about 12.6±0.3, 20.3±0.3, 20.9±0.3, 22.0±0.3, and 23.1±0.3;

optionally, wherein the XRPD pattern further comprises peaks at 2θ (°) of about 4.0±0.3, 22.5±0.3, 24.1±0.3, 25.2±0.3, and 26.2±0.3;

optionally, wherein the XRPD pattern further comprises peaks at 2θ (°) of about 8.4±0.3, 11.3±0.3, 15.3±0.3, 16.9±0.3, and 26.7±0.3;

or, wherein the XRPD pattern comprises peaks at the following 2θ (°) positions of about: 4.0±0.3, 8.4±0.3, 11.3±0.3, 11.9±0.3, 12.6±0.3, 14.0±0.3, 15.3±0.3, 16.9±0.3, 18.3±0.3, 18.9±0.3, 19.9±0.3, 20.3±0.3, 20.9±0.3, 21.2±0.3, 22.0±0.3, 22.5±0.3, 23.1±0.3, 24.1±0.3, 24.7±0.3, 25.2±0.3, 25.8±0.3, 26.2±0.3, 26.7±0.3, 27.9±0.3, 29.1±0.3, 29.5±0.3, 29.8±0.3, 30.4±0.3, 31.3±0.3, 31.6±0.3, 38.2±0.3, and 40.3±0.3.

3. The crystal form according to claim 2, wherein the XRPD pattern comprises peaks at the following positions of about:

Angle (2θ°±0.3°)	Relative intensity (I%)
4.0	35.0
8.4	15.5
11.3	14.4
11.9	1.8
12.6	66.3
14.0	2.1
15.3	15.9
16.9	13.6
18.3	10.3
18.9	8.5
19.9	2.2
20.3	91.0

20.9	41.8
21.2	7.3
22.0	51.3
22.5	24.1
23.1	100.0
24.1	19.0
24.7	5.7
25.2	23.5
25.8	4.5
26.2	34.7
26.7	16.8
27.9	10.3
29.1	5.6
29.5	4.1
29.8	4.7
30.4	3.9
31.3	3.1
31.6	2.3
38.2	4.4
40.3	4.5.

4. The crystal form according to claim 2, wherein the crystal form has an XRPD pattern substantially the same as that shown in FIG. 1.

5. The crystal form according to any one of claims 2-4, wherein a differential scanning calorimetry (DSC) pattern of the crystal form comprises endothermic peaks at 96±3 °C and 129±3 °C;

and/or, wherein the crystal form has a thermogravimetric analysis (TGA) pattern, and the TGA pattern shows that the crystal form has no significant weight loss before being heated to the melting point;

optionally, wherein the crystal form has a DSC-TGA pattern substantially the same as that shown in FIG. 2.

6. A method for preparing the crystal form according to any one of claims 2-5, comprising:

Method I: comprising the following steps:

1) adding 4-[3-(cyclopropylmethoxy)-4-(difluoromethoxy)phenethyl]pyridin-2(1H)-one to a good solvent to obtain a solution; and

2) adding an anti-solvent to the solution obtained in step 1), and stirring to obtain the crystal form; or

Method II: comprising the following step:

adding 4-[3-(cyclopropylmethoxy)-4-(difluoromethoxy)phenethyl]pyridin-2(1H)-one to an anti-solvent to obtain a suspension, and stirring to obtain the crystal form.

7. The method according to claim 6, wherein step 1) of Method I or Method II is performed at room temperature or under heating conditions, wherein the heating is heating to 30-70 °C, preferably heating to 50 °C;

and/or, wherein the stirring in step 2) of Method I is performed at room temperature or under cooling conditions, wherein the cooling is cooling to 0-10 °C, preferably cooling to 5 °C.

8. The method according to claim 6 or 7, wherein the good solvent is selected from the group consisting of an ether solvent having 3-10 carbon atoms and a ketone solvent having 3-10 carbon atoms;

optionally, wherein the ether solvent is a 3- to 6-membered cyclic ether containing 1-2 oxygen atoms and is preferably selected from the group consisting of tetrahydrofuran, 2-methyltetrahydrofuran, and dioxane; the ketone solvent is a chain hydrocarbon ketone with 3-6 carbon atoms and is preferably selected from the group consisting of acetone and butanone;

and/or,

wherein the anti-solvents in Method I and Method II are each an alkane having 5-10 carbon atoms, a halogenated alkane having 5-10 carbon atoms, an alkene having 5-10 carbon atoms, an alkyne having 5-10 carbon atoms, an aromatic hydrocarbon having 6-10 carbon atoms, an ether having 2-6 carbon atoms, an ester having 4-10 carbon atoms, an alcohol having 3-8 carbon atoms, and water; preferably, the anti-solvents are an alkane containing 5-8 carbon atoms;

optionally, wherein the anti-solvent is selected from the group consisting of n-hexane, n-heptane, ethyl acetate, isopropanol, toluene, diethyl ether, diisopropyl ether, methyl tert-butyl ether, and water.

9. The method according to any one of claims 6-8, wherein a weight-to-volume ratio (g/mL) of 4-[3-(cyclopropylmethoxy)-4-(difluoromethoxy)phenethyl]pyridin-2(1H)-one to the good solvent is about 1:(1-50), preferably about 1:(5-30), preferably 1:10 or 1:30, more preferably 1:(5-10), and preferably 1:5, 1:6, 1:7, 1:8, or 1:9;

and/or, wherein a volume ratio of the good solvent to the anti-solvent is about 1:1 to 1:10.

10. The crystal form according to claim 1, wherein an X-ray powder diffraction (XRPD) pattern of the crystal form obtained using Cu Kα radiation comprises peaks at 2θ (°) of about 12.5±0.3, 17.3±0.3, 20.6±0.3, and 23.2±0.3;

optionally, wherein the XRPD pattern further comprises peaks at 2θ (°) of about 4.1±0.3, 8.3±0.3, 21.0±0.3, 23.5±0.3, and 26.5±0.3;

optionally, wherein the XRPD pattern further comprises peaks at 2θ (°) of about 10.9±0.3, 19.0±0.3, and 19.5±0.3;

or, wherein the XRPD pattern comprises peaks at the following 2θ (°) positions of about: 4.1±0.3, 8.3±0.3, 10.9±0.3, 11.5±0.3, 12.0±0.3, 12.5±0.3, 13.4±0.3, 16.1±0.3, 16.7±0.3, 17.3±0.3, 19.0±0.3, 19.5±0.3, 20.6±0.3, 21.0±0.3, 21.3±0.3, 21.5±0.3, 22.1±0.3, 23.2±0.3, 23.5±0.3, 24.4±0.3, 24.6±0.3, 25.4±0.3, 25.7±0.3, 26.5±0.3, 27.7±0.3, 28.2±0.3, and 29.7±0.3.

11. The crystal form according to claim 10, wherein the XRPD pattern comprises peaks at the following positions of about:

Angle (2θ°±0.3°)	**Relative intensity (I%)**
4.1	31.1
8.3	30.8
10.9	12.4
11.5	0.5
12.0	4.0
12.5	100.0
13.4	9.2
16.1	2.8
16.7	5.5
17.3	38.1
19.0	11.8
19.5	15.6
20.6	57.8

21.0	29.0
21.3	4.2
21.5	2.6
22.1	8.9
23.2	70.7
23.5	20.6
24.4	3.9
24.6	5.4
25.4	7.7
25.7	9.1
26.5	21.4
27.7	3.4
28.2	8.0
29.7	8.0.

12. The crystal form according to claim 10, wherein the crystal form has an XRPD pattern substantially the same as that shown in FIG. 4.

13. The crystal form according to any one of claims 10-12, wherein a differential scanning calorimetry (DSC) pattern of the crystal form comprises endothermic peaks at about 108±3 °C and 128±3 °C and an exothermic peak at about 270±3 °C;

and/or, wherein the crystal form has a thermogravimetric analysis (TGA) pattern, and the TGA pattern shows that the crystal form has no significant weight loss before being heated to the melting point;

optionally, wherein the crystal form has a DSC-TGA pattern substantially the same as that shown in FIG. 5.

14. A method for preparing the crystal form according to any one of claims 10-13, comprising

Method I: comprising the following step:

suspending 4-[3-(cyclopropylmethoxy)-4-(difluoromethoxy)phenethyl]pyridin-2(1H)-one or the crystal form according to any one of claims 2-5 in a solvent system at room temperature or under heating conditions to obtain the crystal form; or Method II, comprising the following steps:

1) adding 4-[3-(cyclopropylmethoxy)-4-(difluoromethoxy)phenethyl]pyridin-2(1H)-one or the crystal form

according to any one of claims 2-5 to a good solvent to obtain a solution; and

2) adding an anti-solvent to the solution obtained in step 1), and stirring at room temperature or under heating conditions to obtain the crystal form.

15. The method according to claim 14, wherein the heating in Method I or step 2) of Method II is heating to 30-70 °C, preferably 50 °C;

and/or, wherein the solvent system is a two-solvent system formed by mixing a good solvent system and an anti-solvent system.

16. The method according to claim 14 or 15, wherein the good solvent is selected from the group consisting of an ether solvent having 3-10 carbon atoms and a ketone solvent having 3-10 carbon atoms;

optionally, wherein the ether solvent is a 3- to 6-membered cyclic ether containing 1-2 oxygen atoms and is preferably selected from the group consisting of tetrahydrofuran, 2-methyltetrahydrofuran, and dioxane; the ketone solvent is a chain hydrocarbon ketone with 3-6 carbon atoms and is preferably selected from the group consisting of acetone and butanone;

and/or,

wherein the anti-solvent is an alkane having 5-10 carbon atoms, a halogenated alkane having 5-10 carbon atoms, an alkene having 5-10 carbon atoms, an alkyne having 5-10 carbon atoms, an aromatic hydrocarbon having 6-10 carbon atoms, an ether having 2-6 carbon atoms, an ester having 4-10 carbon atoms, an alcohol having 3-8 carbon atoms, and water; preferably, the anti-solvent is an alkane containing 5-8 carbon atoms;

optionally, wherein the anti-solvent is selected from the group consisting of n-hexane, n-heptane, ethyl acetate, isopropanol, toluene, diethyl ether, diisopropyl ether, methyl tert-butyl ether, and water.

17. The method according to any one of claims 14-16, wherein a weight-to-volume ratio (g/mL) of 4-[3-(cyclopropylmethoxy)-4-(difluoromethoxy)phenethyl]pyridin-2(1H)-one to the good solvent is about 1:(1-50), preferably about 1:(5-30), preferably 1:10 or 1:30, more preferably 1:(5-10), and preferably 1:5, 1:6, 1:7, 1:8, or 1:9;

and/or, wherein a volume ratio of the good solvent to the anti-solvent is about 1:1 to 1:10.

18. A composition, comprising the crystal form according to any one of claims 1-5 and 8-11 and a pharmaceutically acceptable carrier or excipient.

19. Use of the crystal form according to any one of claims 1-5 and 10-13 or the composition according to claim 18 for preparing a medicament for preventing and/or treating a phosphodiesterase-related disease; optionally, wherein the phosphodiesterase-related disease is chronic obstructive pulmonary disease (COPD) and/or asthma.