SUMMARY OF THE DISCLOSURE

[0009] The present disclosure relates to a crystalline salt selected from crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine fumarate and crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride, methods of preparing them, and uses thereof for treating mood disorders. In addition, the present disclosure relates to polymorphs of the aforementioned salts. The present disclosure relates to a solid substantially comprising crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine fumarate, crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride, or mixtures thereof, methods of preparing them, and uses thereof for treating mood disorders. Further, the present disclosure relates to an oil or amorphous solid form of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine, methods of preparing the same, and uses thereof for treating mood disorders.

[0009a] In one aspect, the present disclosure relates to a composition comprising at least 90% by weight of one crystalline polymorph of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride.

[0009b] In another aspect, the present disclosure relates to a crystalline salt of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine comprising crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine fumarate.

[0009c] In another aspect, the present disclosure relates to a mixture comprising at least two of the following crystalline salts: crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine monofumarate Form 1, crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine monofumarate Form 2, crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hemifumarate Form 1, and crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hemifumarate Form 2.

[0009d] In another aspect, the present disclosure relates to a solid form of *N*-ethyl-2-(5-fluoro-1H-indol-3-yl)-*N*-methylethan-1-amine comprising any one or more of the crystalline forms of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine fumarate.

[0009e] In another aspect, the present disclosure relates to a pharmaceutical composition comprising one or more of the crystalline salts of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine fumarate as described herein and a pharmaceutically acceptable carrier.

[0009f] In another aspect, the present disclosure relates to the composition as described herein or the pharmaceutical composition as described herein for use in therapy.

[0009g] In another aspect, the present disclosure relates to use of the composition as described herein or the pharmaceutical composition as described herein in the manufacture of a medicament for treating a mood disorder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The objects, features, and advantages of the present disclosure will become apparent to one of ordinary skill in the art, in view of the following detailed description taken in combination with the attached drawings, in which:

[0011] FIG. 1 depicts an XRPD diffractogram of the Form 1 polymorph of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride.

[0012] FIG. 2 depicts an ^{1}H NMR spectrum (300 MHz, DMSO-d_6) of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 1.

[0013] FIG. 3 depicts a DSC thermogram of the Form 1 polymorph of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride.

[0014] FIG. 4 depicts an XRPD diffractogram of the Form 2 polymorph of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride.

[0015] FIG. 5 depicts a DSC thermogram of the Form 2 polymorph of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride.

[0016] FIG. 6 depicts an XRPD diffractogram of a first metastable polymorph of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride identified herein as Form 3.

WHAT IS CLAIMED IS:

1. A composition comprising at least 90% by weight of one crystalline polymorph of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride.

2. The composition of claim 1 comprising at least 95% by weight of the crystalline polymorph.

3. The composition of claim 1 wherein the crystalline polymorph is *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 1.

4. The composition of claim 3 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 1 is characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 11.10±0.50, 15.18±0.50, 16.56 ±0.50, 19.94±0.50, and 25.20±0.50 degrees 2θ.

5. The composition of claim 3 or 4 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 1 is characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 11.10±0.50, 15.18 ±0.50, 16.28±0.50, 16.56±0.50, 18.23±0.50, 18.66 ±0.50, 19.94±0.50, 23.82±0.50, 25.20±0.50, and 27.91±0.50 degrees 2θ.

6. The composition of any one of claims 3-5 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 1 is characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 8.26±0.50, 10.42±0.50, 11.10±0.50, 13.11±0.50, 14.30±0.50, 14.64±0.50, 15.18±0.50, 16.28±0.50, 16.56±0.50, 17.10±0.50, 18.23±0.50, 18.66±0.50, 19.72±0.50, 19.94±0.50, 20.32±0.50, 21.14±0.50, 21.83±0.50, 22.28±0.50, 23.82±0.50, 24.54±0.50, 24.81±0.50, 25.20±0.50, 25.44±0.50, 25.89±0.50, 26.37±0.50, 26.84±0.50, 27.20±0.50, 27.91±0.50, 29.33±0.50, 30.01±0.50, 31.53±0.50, 32.08±0.50, 32.71±0.50, 32.92±0.50, and 33.87±0.50 degrees 2θ.

7. The composition of any one of claims 3-6 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 1 has an X-ray powder diffraction pattern measured using Cu K-alpha radiation substantially as depicted in FIG. 1.

8. The composition of any one of claims 3-7 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 1 is characterized by a DSC thermogram having at least one endotherm with a peak temperature of about 147 °C.

9. The composition of any one of claims 3-8 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 1 is characterized by a DSC thermogram substantially as depicted in FIG. 3.

10. The composition of any one of claims 3-9, which additionally comprises no more than 10% by weight crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2.

11. The composition of claim 1 wherein the crystalline polymorph is *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2.

12. The composition of claim 11 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2 is characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 16.57±0.50, 17.12±0.50, 19.70±0.50, 26.31±0.50, and 31.21±0.50 degrees 2θ.

13. The composition of claim 11 or 12 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2 is characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 15.47±0.50, 16.57±0.50, 17.12±0.50, 18.76±0.50, 19.06±0.50, 19.70 ±0.50, 22.50±0.50, 24.48±0.50, 26.31±0.50, and 31.21±0.50 degrees 2θ.

14. The composition of any one of claims 11-13 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2 is characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 9.09±0.50, 9.50±0.50, 14.22±0.50, 15.21±0.50, 15.47±0.50, 16.57±0.50, 17.12±0.50, 18.21±0.50, 18.31±0.50, 18.76±0.50, 19.06±0.50, 19.70±0.50, 21.71±0.50, 21.96±0.50, 22.50±0.50, 22.69±0.50, 23.21±0.50, 23.76±0.50, 24.11±0.50, 24.48±0.50, 24.91±0.50, 25.18±0.50, 25.65±0.50, 26.16±0.50, 26.31±0.50, 26.99±0.50, 27.34±0.50, 27.50±0.50, 28.19±0.50, 28.41±0.50, 28.73±0.50, 28.95±0.50, 30.16±0.50, 30.67±0.50, 31.21±0.50, 31.60±0.50, 32.02±0.50, 33.11±0.50, 33.81±0.50, 34.46±0.50, 36.24±0.50, 36.49±0.50, 36.85±0.50, 37.13±0.50, 37.36±0.50, 38.16±0.50, 38.40±0.50, 38.65±0.50, 38.94±0.50, and 39.57±0.50 degrees 2θ.

15. The composition of any one of claims 11-14 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2 has an X-ray powder diffraction pattern measured using Cu K-alpha radiation substantially as depicted in FIG. 4.

16. The composition of any one of claims 11-15 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2 is characterized by a DSC thermogram having at least one peak temperature selected from the group consisting of about 142 °C, about 146 °C, and about 150°C.

17. The composition of any one of claims 11-16 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2 is characterized by a DSC thermogram having at least two peak temperatures selected from the group consisting of about 142 °C, about 146 °C, and about 150°C.

18. The composition of any one of claims 11-17 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2 is characterized by a DSC thermogram having peak temperatures of about 142 °C, about 146 °C, and about 150ºC.

19. The composition of any one of claims 11-18 wherein the *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 2 is characterized by a DSC thermogram substantially as depicted in FIG. 5.

20. The composition of any one of claims 11-19, which additionally comprises no more than 5% by weight crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hydrochloride Form 1.

21. The composition of any one of claims 1-20, which is a pharmaceutical composition that additionally comprises a pharmaceutically acceptable carrier.

22. The composition of claim 21 in solid dosage form.

23. A crystalline salt of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine comprising crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine fumarate.

24. The crystalline salt of claim 23, which is crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine monofumarate Form 1.

25. The crystalline salt of claim 24 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 17.03±0.50, 17.46±0.50, 19.97±0.50, 21.47±0.50, and 23.18±0.50 degrees 2θ.

26. The crystalline salt of claim 24 or 25 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 17.03±0.50, 17.46±0.50, 18.30±0.50, 19.97±0.50, 21.09±0.50, 21.47±0.50, 22.22±0.50, 23.18±0.50, 23.75±0.50, and 28.67±0.50 degrees 2θ.

27. The crystalline salt of any one of claims 24-26 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation substantially as depicted in FIG. 8.

28. The crystalline salt of any one of claims 24-27 characterized by a DSC thermogram having at least one endotherm with a peak temperature of about 126 °C.

29. The crystalline salt of any one of claims 24-28 characterized by a DSC thermogram substantially as depicted in FIG. 10.

30. The crystalline salt of claim 23, which is crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine monofumarate Form 2.

31. The crystalline salt of claim 30 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 7.09±0.50, 11.24±0.50, 21.12±0.50, 23.12 ±0.50, and 28.25±0.50 degrees 2θ.

32. The crystalline salt of claim 30 or 31 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 7.09±0.50, 11.05±0.50, 11.24±0.50, 11.80±0.50, 17.43±0.50, 21.12 ±0.50, 23.12 ±0.50, 23.73±0.50, 25.12 ±0.50, and 28.25±0.50 degrees 2θ.

33. The crystalline salt of any one of claims 30-32 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation substantially as depicted in FIG. 11.

34. The crystalline salt of any one of claims 30-33 characterized by a DSC thermogram having at least one peak temperature selected from the group consisting of about 92 °C, about 101 °C, and about 126 °C.

35. The crystalline salt of any one of claims 30-34 characterized by a DSC thermogram substantially as depicted in FIG. 13.

36. The crystalline salt of claim 23, which is crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hemifumarate Form 1.

37. The crystalline salt of claim 36 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 5.79±0.50, 11.55 ±0.50, 17.96±0.50, 18.49±0.50, and 22.48±0.50 degrees 2θ.

38. The crystalline salt of claim 36 or 37 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 5.79±0.50, 11.55±0.50, 16.28±0.50, 17.35±0.50, 17.96±0.50, 18.49±0.50, 19.23±0.50, 21.58±0.50, 22.48±0.50, and 23.59±0.50 degrees 2θ.

39. The crystalline salt of any one of claims 36-38 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation substantially as depicted in FIG. 14.

40. The crystalline salt of any one of claims 36-39 characterized by a DSC thermogram having at least one peak temperature selected from the group consisting of about 152 °C, about 154 °C, and about 161 °C.

41. The crystalline salt of any one of claims 36-40 characterized by a DSC thermogram substantially as depicted in FIG. 16.

42. The crystalline salt of claim 23, which is crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hemifumarate Form 2.

43. The crystalline salt of claim 42 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 7.54±0.50, 17.04±0.50, 19.78±0.50, 20.46±0.50, and 23.43±0.50 degrees 2θ.

44. The crystalline salt of claim 42 or 43 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation comprising peaks at 7.54±0.50, 12.86±0.50, 13.05±0.50, 16.74 ±0.50, 17.04±0.50, 19.78±0.50, 20.27±0.50, 20.46±0.50, 21.66±0.50, and 23.43±0.50 degrees 2θ.

45. The crystalline salt of any one of claims 42-44 characterized by an X-ray powder diffraction pattern measured using Cu K-alpha radiation substantially as depicted in FIG. 17.

46. A mixture comprising at least two of the following crystalline salts: crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine monofumarate Form 1, crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine monofumarate Form 2, crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hemifumarate Form 1, and crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine hemifumarate Form 2.

47. A solid form of *N*-ethyl-2-(5-fluoro-1H-indol-3-yl)-*N*-methylethan-1-amine comprising any one or more of the crystalline forms of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine fumarate.

48. The solid form of claim 47 comprising (a) crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine monofumarate Form 1, crystalline *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine monofumarate Form 2, or a mixture thereof or (b) crystalline *N*-ethyl-2-(5-fluoro-1H-indol-3-yl)-*N*-methylethan-1-amine hemifumarate Form 1, crystalline *N*-ethyl-2-(5-fluoro-1H-indol-3-yl)-*N*-methylethan-1-amine hemifumarate Form 2, or a mixture thereof.

49. The solid form of claim 47 comprising at least 50% by weight of the crystalline *N*-ethyl-2-(5-fluoro-1H-indol-3-yl)-*N*-methylethan-1-amine fumarate.

50. The solid form of claim 47 or 49 comprising at least 90% by weight of the crystalline *N*-ethyl-2-(5-fluoro-1H-indol-3-yl)-*N*-methylethan-1-amine fumarate.

51. A pharmaceutical composition comprising one or more of the crystalline salts of *N*-ethyl-2-(5-fluoro-1*H*-indol-3-yl)-*N*-methylethan-1-amine fumarate of any one of claims 23-45 and a pharmaceutically acceptable carrier.

52. The composition of claim 21 or 22 or the pharmaceutical composition of claim 51 for use in therapy.

53. Use of the composition of claim 21 or 22 or the pharmaceutical composition of claim 51 in the manufacture of a medicament for treating a mood disorder.