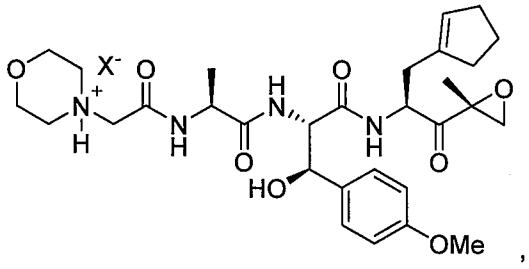
CLAIMS

1. A crystalline salt having a structure:



wherein X^- is a counterion.

2. The crystalline salt of claim 1, wherein X^- comprises maleate, fumarate, oxalate, malate, sulfate, methanesulfonate, 2-naphthalenesulfonate, phosphate, halide, tartrate, citrate, tosylate, propionate, or benzoate.

3. The crystalline salt of claim 1 or 2, as a salt hydrate.

4. The crystalline salt of claim 2 or 3, wherein X^- comprises maleate.

5. The crystalline salt of claim 4, wherein the crystalline salt is the monomaleate salt.

6. The crystalline salt of claim 4 or 5, having an X-ray powder diffraction ("XRPD") pattern comprising peaks at about:

(a) 6.9, 17.3, and 17.8 ± 0.2° 2θ using Cu Kα radiation ("Form A"); or

(b) 7.2, 18.4, and 22.0 ± 0.2° 2θ using Cu Kα radiation ("Form B"); or

(c) 7.4, 13.2, and 20.1 ± 0.2° 2θ using Cu Kα radiation ("Form C"); or

(d) 4.9, 7.7 10.9, 12.4, 13.6, and 15.3 ± 0.2° 2θ using Cu Kα radiation ("Form D"); or

(e) 6.4, 7.3, and 19.8 ± 0.2° 2θ using Cu Kα radiation ("Form E"); or

(f) 6.3, 19.0, and 19.6 ± 0.2° 2θ using Cu Kα radiation ("Form F").

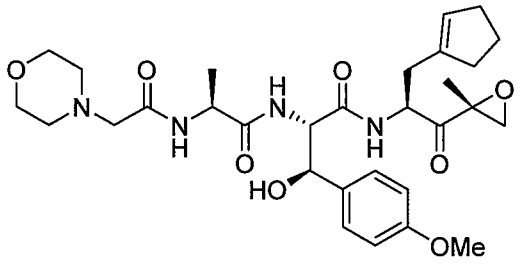
7. The crystalline salt of claim 2 or 3, wherein X^- comprises fumarate.

8. The crystalline salt of claim 7, wherein the crystalline salt is the monofumarate salt.

9. The crystalline salt of claim 7 or 8, having an XRPD pattern comprising peaks at about 6.4, 7.2, 13.8, 16.0, 17.4, 18.5, 18.7, 20.0, 20.9, 21.9, 24.5, and 25.8 ± 0.2° 2θ using Cu K*α* radiation ("Form G").

10. A method of preparing the crystalline salt of claim 4, comprising admixing:

(a) compound G:



(G),

(b) maleic acid, and

(c) a solvent

to form a suspension.

11. The method of claim 10, wherein the molar ratio of compound G to maleic acid is in a range of about 1:0.5 to 1:2.

12. The method of any one of claims 10-11, wherein the solvent is selected from the group consisting of methanol ("MeOH"), ethanol ("EtOH"), isopropanol ("IPA"), ethyl acetate ("EtOAc"), isopropyl acetate ("IPAc"), tetrahydrofuran ("THF"), methyl *tert*-butyl ether ("MTBE"), acetone/n-heptane, acetone, diethyl ether ("Et_2O")/EtOAc, hexane/EtOAc, MTBE/EtOAc, toluene, 1,4-dioxane, acetonitrile ("ACN"), 1-butanol, aqueous mixtures of the foregoing, and combinations thereof.

13. The method of any one of claims 10-12, further comprising cooling the suspension to 0 °C, optionally filtering the suspension to form a cake, optionally washing, drying or both washing and drying the cake, and optionally recrystallizing the cake.

14. A formulation comprising the crystalline salt of any one of claims 1 to 9 and one or more excipients.

15. The formulation of claim 14 as a liquid formulation.

16. The formulation of claim 14 as a lyophilized formulation, wherein the lyophilized formulation can be reconstituted to a liquid form.

17. The formulation of claim 15 or 16, wherein the crystalline salt is present at a concentration in a range of about 1 mg/ml to about 150 mg/ml in the liquid formulation or in a reconstituted lyophilized formulation, based on the weight of the free base of crystalline salt.

18. The crystalline salt of any one of claims 1-9 or formulation of any one of claims 14-17 for use in therapy.

19. Use of the crystalline salt of any one of claims 1-9 or formulation of any one of claims 14-17 in the manufacture of a medicament for inhibiting immunoproteasome of a cell, wherein the medicament is to be in contact with the cell.

20. The use of claim 19, wherein immunoproteasome LMP7 is inhibited.

21. Use of the crystalline salt of any one of claims 1-9 or formulation of any one of claims 14-17 in the manufacture of a medicament for the treatment of a disorder associated with aberrant immunoproteasome activity, wherein the medicament is to be administered to a subject.

22. The use of claim 20, wherein the disorder is an autoimmune disease or inflammation, wherein the disease optionally is:

(a) psoriasis, dermatitis, systemic scleroderma, sclerosis, Crohn's disease, ulcerative colitis; respiratory distress syndrome, meningitis; encephalitis; uveitis; colitis; glomerulonephritis; eczema, asthma, chronic inflammation; atherosclerosis; leukocyte adhesion deficiency; rheumatoid arthritis; systemic lupus erythematosus (SLE); diabetes mellitus; multiple sclerosis; Reynaud's syndrome; autoimmune thyroiditis; allergic encephalomyelitis; Sjogren's syndrome; juvenile onset diabetes; tuberculosis, sarcoidosis, polymyositis, granulomatosis, vasculitis; pernicious anemia (Addison's disease); a disease involving leukocyte diapedesis; central nervous system (CNS) inflammatory disorder; multiple organ injury syndrome; hemolytic

anemia; myasthenia gravis; antigen-antibody complex mediated disease; anti-glomerular basement membrane disease; antiphospholipid syndrome; allergic neuritis; Graves' disease; Lambert-Eaton myasthenic syndrome; pemphigoid bullous; pemphigus; autoimmune polyendocrinopathies; Reiter's disease; stiff-man syndrome; Beheet disease; giant cell arteritis; immune complex nephritis; IgA nephropathy; IgM polyneuropathies; immune thrombocytopenic purpura (ITP) or autoimmune thrombocytopenia; or

(b) lupus, lupus nephritis, rheumatoid arthritis, diabetes, scleroderma, ankylosing spondylitis, psoriasis, multiple sclerosis, Hashimoto's disease, meningitis, or inflammatory bowel disease.