CLAIMS

We Claim:

1. A hydrothermally treated polysaccharide mixture comprising:
at least one hydrothermally treated starch-containing material; and
at least one hydrothermally treated non-starch polysaccharide;
wherein the hydrothermally treated polysaccharide mixture is obtained by hydrothermally heating a polysaccharide mixture slurry comprising at least one starch-containing material, at least one non-starch polysaccharide and from 50 wt% to 90 wt% of water to a temperature of no less than 50 °C.

2. The hydrothermally treated polysaccharide mixture of claim 1, wherein the hydrothermally treated polysaccharide mixture comprises 99.99 wt. % to 0.5 wt. % of the at least one starch-containing material and 0.01 wt. % to 99.5 wt. % of the at least one non-starch polysaccharide on a dry weight basis.

3. The hydrothermally treated polysaccharide mixture of claim 1 or 2, wherein the hydrothermally treated polysaccharide mixture comprises 99.99 wt. % to 50.0 wt. % of the at least one starch-containing material and 0.01 wt. % to 50.0 wt. % of the at least one non-starch polysaccharide on a dry weight basis.

4. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture comprises 99.5 wt. % to 90.0 wt. % of the at least one starch-containing material and 0.5 wt. % to 10.0 wt. % of the at least one non-starch polysaccharide on a dry weight basis.

5. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture comprises 99.5 wt. % to 95.0 wt. % of the at least one starch-containing material and 0.5 wt. % to 5.0 wt. % of the at least one non-starch polysaccharide on a dry weight basis.

6. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the at least one starch-containing material is selected from the group consisting of starch, starch-containing particles, pure starch, potato starch, wheat starch, maize starch, corn starch, rice starch, cassava starch, acorn starch, arrowroot starch, arracacha starch, banana starch, barley starch, breadfruit starch, buckwheat starch, canna starch, colacasia starch, katakuri starch, kudzu starch, malanga starch, millet starch, oat starch, oca starch, polynesian arrowroot starch, sago starch, sorghum starch, sweet potato starch, rye starch, taro starch, chestnut starch, water chestnut starch, yam starch, bean starch, favas starch, lentil starch, chickpea starch, mung bean starch, tapioca starch, soy starch, potatoes, wheat, maize, corn, rice, cassava, acorns, arrowroots, arracacha, bananas, barley, breadfruit, buckwheat, canna, colacasia, katakuri, kudzu, malanga, millet, oats, oca, polynesian arrowroots, sago, sorghum, sweet potatoes, rye, taro, beans, favas, lentils, peas, chickpeas, mung beans, tapioca, starch granules, flour granules, dough made from flour, a slurry made from flour, starch-containing grains, a starch-containing food, a derivative thereof and a combination thereof.

7. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the non-starch polysaccharide is selected from the group consisting of a hydrocolloid, cellulose, a hemicellulose, a gum, a pectin, a xylan, a mannan, a glucan, a mucilage, an alginate, an arabinoxylan, a beta-glucan, a chitin, carrageenan, gellan, guar, inulin, lignin, xanthan, chitosan, a derivative thereof and a combination thereof.

8. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the at least one non-starch polysaccharide comprises at least one gelling non-starch polysaccharide, wherein the at least one gelling non-starch polysaccharide is selected from the group consisting of an alginate, carrageenan, pectin, a derivative thereof and a combination thereof.

9. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the at least one non-starch polysaccharide comprises at least one non-gelling non-starch polysaccharide, wherein the at least one non-gelling non-starch

polysaccharide is selected from the group consisting of xanthan gum, guar gum, chitosan, a derivative thereof and a combination thereof.

10. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture comprises cross-linking ions selected from the group consisting of calcium cations, magnesium cations, sodium cations, potassium cations and a combination thereof.

11. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture comprises cross-linking ions in an amount of 0.01 wt. % to 5 wt. % on a dry weight basis.

12. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the at least one hydrothermally treated starch-containing material is at least partially gelatinized.

13. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture comprises a peak viscosity higher than that of the at least one starch-containing material that has been treated in the same manner as the hydrothermally treated polysaccharide mixture but without the addition of the at least one non-starch polysaccharide by at least 5%, at least 15%, or at least 30% when tested using a standard Rapid Visco Analyzer (RVA) test.

14. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture comprises a final viscosity higher than that of the at least one starch-containing material that has been treated in the same manner as the hydrothermally treated polysaccharide mixture but without the addition of the at least one non-starch polysaccharide by at least 5%, at least 15% or at least 30% when tested using a standard Rapid Visco Analyzer (RVA) test.

15. The hydrothermally treated polysaccharide mixture any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture comprises a peak viscosity higher than that of the at least one starch-containing material that has been treated in the same manner as the hydrothermally treated polysaccharide mixture but without the addition of the at least one non-starch polysaccharide by at least 5%, at least 15% or at least 30% when testing using RVA at a constant testing temperature between the range of 20-40°C.

16. The hydrothermally treated polysaccharide mixture any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture comprises a final viscosity higher than that of the at least one starch-containing material that has been treated in the same manner as the hydrothermally treated polysaccharide mixture but without the addition of the at least one non-starch polysaccharide by at least 5%, at least 15% or at least 30% when testing using RVA at a constant testing temperature between the range of 20-40°C.

17. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture comprises a pasting temperature that is lower than that of the at least one starch-containing material that has been treated in the same manner as the hydrothermally treated polysaccharide mixture but without the addition of the at least one non-starch polysaccharide by at least 1°C when tested using RVA.

18. The hydrothermally treated polysaccharide mixture of any one of the preceding claims, wherein the hydrothermally treated polysaccharide mixture is selected from the group consisting of a food ingredient, thickener, gelling material, stabilizer, emulsifier and a combination thereof.

19. A method of preparing a hydrothermally treated polysaccharide mixture, the method comprising:

hydrothermally heating a polysaccharide mixture slurry comprising at least one starch-containing material, at least one non-starch polysaccharide and from 50 wt% to 90 wt% of water to a temperature of no less than 50 °C to obtain the hydrothermally treated polysaccharide mixture.

20. The method of claim 19, the method further comprising:

mixing at least one starch-containing material and at least one non-starch polysaccharide; and

adding water to the mixture of the at least one starch-containing material and the at least one non-starch polysaccharide to form the polysaccharide mixture slurry.

21. The method of claim 20, wherein the adding of the water and the hydrothermal heating are performed concurrently.

22. The method of claim 20 or 21, wherein the at least one starch-containing material and the at least one non-starch polysaccharide are non-hydrated before the mixing step.

23. The method of any one of claims 19-22, wherein the hydrothermal heating step comprises hydrothermally heating the polysaccharide mixture slurry to a temperature above the gelatinization temperature of the at least one starch-containing material, and wherein the polysaccharide mixture slurry is held at the temperature above the gelatinization temperature.

24. The method of claim 23, wherein the temperature above the gelatinization temperature of the at least one starch-containing material is 50°C to 400°C.

25. The method of claim 23 or 24, wherein the temperature above the gelatinization temperature of the at least one starch-containing material is 50°C to 95°C.

26. The method of any one of claims 19-25, the method further comprising: at least partially gelatinizing the at least one starch-containing material.

27. The method of claim 26, wherein the at least one starch-containing material is 1% to 99% gelatinized.

28. The method of any one of claims 19-27, wherein no chemical modification steps are used and wherein the hydrothermally treated polysaccharide mixture is physically functionalized.

29. The method of any one of claims 19-28, wherein the hydrothermal heating step comprises hydrothermally heating the polysaccharide mixture slurry using a heating apparatus selected from the group consisting of a jacketed vessel, Stephan mixer, extruder, jet steamer, high pressure processor and a combination thereof.

30. The method of any one of claims 19-29, the method further comprising drying the hydrothermally treated polysaccharide mixture to form a dried hydrothermally treated polysaccharide mixture selected from the group consisting of a concentrated solution, paste and powder.

31. The method of claim 30, wherein the drying step is performed using a drying method selected the group consisting of spray drying, microwave drying, tray drying, drum drying and a combination thereof.

32. The method of claim 30 or 31, wherein the dried hydrothermally treated polysaccharide mixture comprises an amount of water selected from the group consisting of 0.1 wt. % to 50 wt. % of water, 1 wt. % to 30 wt. % of water, 10 wt. % to 25 wt. % of water, and 3 wt. % to 10 wt. % of water.

33. The method of any one of claims 30 - 32, wherein the hydrothermal heating step and drying step can be combined as a single step.

34. The method of claim 19, the method further comprising:

adding at least one non-starch polysaccharide to a mixture of at least one starch-containing material and water to form the polysaccharide mixture slurry,

wherein the adding of the at least one non-starch polysaccharide and the hydrothermal heating are performed concurrently.

35. The method of claim 19, the method further comprising:

adding at least one starch-containing material to a mixture of at least one non-starch polysaccharide and water to form the polysaccharide mixture slurry,

wherein the adding of the at least one starch-containing material and the hydrothermal heating are performed concurrently.

36. A food ingredient comprising: the hydrothermally treated polysaccharide mixture of any one of claims 1-18.

37. A food product comprising the hydrothermally treated polysaccharide mixture of any one of claims 1-18.