In a **first aspect**, the present disclosure refers to a protein composition produced by a method comprising:

(a) adding an aqueous solution to a source protein composition to form a solution of solubilized protein;

(b) optionally removing solids from the solution of solubilized protein;

(c) heating the solution of solubilized protein at a temperature of 85 °C to 95 °C;

(d) optionally adjusting the pH of the solution of solubilized protein to 4.0 to 9.0;

(e) optionally cooling the solution of solubilized protein to 0 °C to 10 °C;

(f) adding an organic solvent to the solution of solubilized protein to form a solid phase and a liquid phase;

(g) separating the solid phase from the liquid phase to form the protein composition;

(h) optionally washing the protein composition with a wash solvent; and

(i) optionally treating the protein composition,

wherein the protein composition comprises at least 50% by dry weight of a plurality of plant proteins, fungal proteins, algal proteins, bacterial proteins, protozoan proteins, invertebrate proteins, or a combination thereof.

In a **second aspect**, the present disclosure refers to a food product comprising the protein composition of the first aspect.

In a **third aspect**, the present disclosure refers to a method for producing a protein composition, the method comprising:

(a) adding an aqueous solution to a source protein composition to form a solution of solubilized protein;

(b) optionally removing solids from the solution of solubilized protein;

(c) heating the solution of solubilized protein at a temperature of 85 °C to 95 °C;

(d) optionally adjusting the pH of the solution of solubilized protein to 4.0 to 9.0;

(e) optionally cooling the solution of solubilized protein to 0 °C to 10 °C;

(f) adding an organic solvent to the solution of solubilized protein to form a solid phase and a liquid phase;

(g) separating the solid phase from the liquid phase to form the protein composition;

(h) optionally washing the protein composition with a wash solvent; and

(i) optionally resolubilizing the protein composition,

wherein the protein composition comprises at least 50% by dry weight of a plurality of plant proteins, fungal proteins, algal proteins, bacterial proteins, protozoan proteins, invertebrate proteins.

In a **fourth aspect**, the present disclosure refers to a food product comprising a protein composition produced by the method of the third aspect.

In a **fifth aspect**, the present disclosure refers to a food product comprising:

a fat;

optionally one or more flavor precursor compounds; and

at least 10% by dry weight of a protein composition, wherein the protein composition is the protein composition of the first aspect.

In a **sixth aspect**, the present disclosure refers to a food product comprising:

a fat;

optionally one or more flavor precursor compounds; and

at least 10% by dry weight of a protein composition, wherein the protein composition is a protein composition produced by the method of the third aspect.

In a **seventh aspect**, the present disclosure refers to a method for preparing a food product, the method comprising:

combining a fat, one or more optional flavor precursor compounds, and a protein composition, wherein the protein composition is the protein composition of the first aspect.

In an **eighth aspect**, the present disclosure refers to a method for preparing a food product, the method comprising:

combining a fat, one or more optional flavor precursor compounds, and a protein composition, the protein composition produced by the method by the method of the third aspect.

In a **ninth aspect**, the present disclosure refers to a method for reducing perceived protein source flavor in a food product, the method comprising:

combining a fat, one or more flavor precursor compounds and a protein composition, the protein composition produced by the method of the third aspect,

wherein at least 5% by weight of the protein content of the food product comprises the protein composition, thereby reducing perceived protein source flavor in a food product, as

compared to a food product having a similar protein content but lacking the protein composition.

In a **tenth aspect**, the present disclosure refers to a milk replica comprising:

an emulsion of a fat, water, and the protein composition of the first aspect.

In one example, low flavor protein compositions are provided. Such low flavor protein compositions generally include at least 50% by dry weight of a plurality of plant proteins, fungal proteins, algal proteins, bacterial proteins, protozoan proteins, invertebrate proteins, or a combination thereof; wherein the plurality of plant proteins, fungal proteins, algal proteins, bacterial proteins, protozoan proteins, invertebrate proteins, or combination thereof are substantially aggregated, denatured, or both.

In some examples, the low flavor protein composition has a luminance of at least 86 on a scale from 0 (black control value) to 100 (white control value). In some examples, the low flavor protein composition has a luminance of at least 88 on a scale from 0 (black control value) to 100 (white control value). In some examples, the low flavor protein composition has a luminance of at least 90 on a scale from 0 (black control value) to 100 (white control value).

In some examples, the low flavor protein composition has a chroma value of less than 14. In some examples, the low flavor protein composition has a chroma value of less than 12. In some examples, the low flavor protein composition has a chroma value of less than 10. In some examples, the low flavor protein composition has a chroma value of less than 8. In some examples, the low flavor protein composition has a chroma value of less than 6.

In some examples, the low flavor protein composition comprises less than about 1.2% by dry weight lipids (e.g., less than about 1.0% or less than about 0.5% by dry weight lipids).

In some examples, the lipids comprise one or more of a fatty acid, a wax, a sterol, a monoglyceride, a diglyceride, a triglyceride, a sphingolipid, or a phospholipid.

In some examples, the plurality of plant proteins, fungal proteins, algal proteins, bacterial proteins, protozoan proteins, invertebrate proteins, or a combination thereof is at least 90% by dry weight soy proteins.

In some examples, a low flavor protein composition further includes at least one of a preservative, an antioxidant, or a shelf life extender.

In some examples, the preservative, antioxidant, or shelf life extender comprises at least one of 4-hexylresorcinol, acetic acid, ascorbic acid, ascorbyl palmitate, ascorbyl stearate, benzoic acid, butylated hydroxyanisole (a mixture of 2-tertiarybutyl-4-hydroxyanisole and 3-

WHAT IS CLAIMED IS:

1. A protein composition produced by a method comprising:

(a) adding an aqueous solution to a source protein composition to form a solution of solubilized protein;

(b) optionally removing solids from the solution of solubilized protein;

(c) heating the solution of solubilized protein at a temperature of 85 °C to 95 °C;

(d) optionally adjusting the pH of the solution of solubilized protein to 4.0 to 9.0;

(e) optionally cooling the solution of solubilized protein to 0 °C to 10 °C;

(f) adding an organic solvent to the solution of solubilized protein to form a solid phase and a liquid phase;

(g) separating the solid phase from the liquid phase to form the protein composition;

(h) optionally washing the protein composition with a wash solvent; and

(i) optionally treating the protein composition,

wherein the protein composition comprises at least 50% by dry weight of a plurality of plant proteins, fungal proteins, algal proteins, bacterial proteins, protozoan proteins, invertebrate proteins, or a combination thereof.

2. The protein composition of claim 1, wherein the protein composition has an isoflavone content of less than 125 ppm, a saponin content of less than 75 ppm, or a phospholipid content of less than 500 ppm.

3. The protein composition of claim 1 or 2, wherein the protein composition comprises less than 8% by dry weight of insoluble carbohydrates and/or less than 0.8% by dry weight of lipids.

4. The protein composition of any one of claims 1-3, wherein the protein composition has a luminance of at least 86 on a scale from 0 (black control value) to 100 (white control value), or wherein the protein composition has a chroma value of less than 14.

5. The protein composition of any one of claims 1-4, wherein the protein composition is in the form of a solution, suspension, emulsion, a solid, or a powder.

6. A food product comprising the protein composition of any one of claims 1-5.

7. A method for producing a protein composition, the method comprising:

(a) adding an aqueous solution to a source protein composition to form a solution of solubilized protein;

(b) optionally removing solids from the solution of solubilized protein;

(c) heating the solution of solubilized protein at a temperature of 85 °C to 95 °C;

(d) optionally adjusting the pH of the solution of solubilized protein to 4.0 to 9.0;

(e) optionally cooling the solution of solubilized protein to 0 °C to 10 °C;

(f) adding an organic solvent to the solution of solubilized protein to form a solid phase and a liquid phase;

(g) separating the solid phase from the liquid phase to form the protein composition;

(h) optionally washing the protein composition with a wash solvent; and

(i) optionally resolubilizing the protein composition,

wherein the protein composition comprises at least 50% by dry weight of a plurality of plant proteins, fungal proteins, algal proteins, bacterial proteins, protozoan proteins, invertebrate proteins.

8. The method of claim 7, wherein step (a) is performed at a pH of 7.0 to 10.0.

9. The method of claim 7 or 8, wherein step (d) comprises adjusting the pH of the solution of solubilized protein to 6.0 to 7.0.

10. The method of any one of claims 7-9, wherein step (f) comprises adding the organic solvent to a final concentration of 40% to 70% (v/v), optionally wherein at the beginning of step (f), the organic solvent has a temperature of -20 °C to 10 °C.

11. The method of any one of claims 7-10, wherein step (e) comprises cooling the solution of solubilized protein to a temperature of 0 °C to 4 °C.

12. The method of any one of claims 7-11, wherein the organic solvent is selected from the group consisting of ethanol, methanol, propanol, isopropyl alcohol, and acetone.

13. The method of any one of claims 7-12, wherein the protein composition has a saponin content that is less than 50% of the saponin content of the source protein composition, an isoflavone content that is less than 50% of the isoflavone content of the source protein composition, a phospholipid content that is less than 50% of the phospholipid content of the source protein composition, a lipid content that is less than 50% of the lipid content of the source protein composition, a phenolic acid content that is less than 50% of the phenolic acid content of the source protein composition, or a combination thereof.

14. A food product comprising a protein composition produced by the method of any one of claims 7-13.

15. A food product comprising:

a fat;

optionally one or more flavor precursor compounds; and

at least 10% by dry weight of a protein composition, wherein the protein composition is the protein composition of any one of claims 1-5.

16. A food product comprising:

a fat;

optionally one or more flavor precursor compounds; and

at least 10% by dry weight of a protein composition, wherein the protein composition is a protein composition produced by the method of any one of claims 7-13.

17. A method for preparing a food product, the method comprising:

combining a fat, one or more optional flavor precursor compounds, and a protein composition, wherein the protein composition is the protein composition of any one of claims 1-5.

18. A method for preparing a food product, the method comprising:

combining a fat, one or more optional flavor precursor compounds, and a protein composition, the protein composition produced by the method by the method of any one of claims 7-13.

19. A method for reducing perceived protein source flavor in a food product, the method comprising:

combining a fat, one or more flavor precursor compounds and a protein composition, the protein composition produced by the method of any one of claims 7-13,

wherein at least 5% by weight of the protein content of the food product comprises the protein composition, thereby reducing perceived protein source flavor in a food product, as compared to a food product having a similar protein content but lacking the protein composition.

20. A milk replica comprising:

an emulsion of a fat, water, and the protein composition of any one of claims 1-5.