SUMMARY

[0007] The present disclosure refers to a process for solubilizing a protein, comprising the step of:

subjecting a dispersion of an untreated protein to a pressure in the range of 250 MPa to 650 MPa and a pH in the range of 1 to 3 or 9 to 14 to solubilize the untreated protein to form the solubilized protein.

[0007a] In one aspect, the present disclosure refers to a process for solubilizing a protein comprising the step of:

subjecting a dispersion of an untreated protein to a pressure in the range of 250 MPa to 650 MPa and a pH in the range of 1 to 3 or 9 to 14 to solubilize the untreated protein to form the solubilized protein,

wherein the untreated protein is an insoluble protein.

[0008] Advantageously, the process transforms insoluble, aggregated, denatured and poorly-functional plant-based proteins into soluble and functional plant-based proteins. The process may not start from native proteins, which is advantageous over conventional processes that irreversibly denature proteins to improve functional properties.

[0009] Further advantageously, subjecting the dispersion of the untreated protein to the combined parameters of pressure and pH leads to an improvement in the solubilized protein as compared to the comparative treatment of untreated protein subjected to pressure only or pH only treatment.

[0010] In another aspect, the present disclosure refers to a process to form a food composition comprising the step of:

mixing a solubilized protein prepared according to the process as described herein with food ingredients to form the food composition.

DEFINITIONS

[0011] The term “function” or “functional”, when used to refer to a protein in this disclosure, may be defined or interpreted to refer to the protein’s ability to give form and function to a food system. Therefore, the function may include, but is not limited to the protein’s ability to be soluble, to form a foam, to form a gel, to thicken, to emulsify, or to provide texture in the food system.

[0012] The term “insoluble, aggregated or poorly functional protein” as used herein may be defined or interpreted to refer to a protein obtained during the protein industry isolation process, whereby after a typical alkaline extraction-isoelectric precipitation, the protein-rich precipitates are redispersed in water and separated by decantation to obtain soluble and insoluble protein fractions, where the insoluble protein fractions is regarded as the “insoluble, aggregated or poorly-functional protein”.

CLAIMS

1. A process for solubilizing a protein comprising the step of:

   subjecting a dispersion of an untreated protein to a pressure in the range of 250 MPa to 650 MPa and a pH in the range of 1 to 3 or 9 to 14 to solubilize the untreated protein to form the solubilized protein,

   wherein the untreated protein is an insoluble protein.

2. The process of claim 1, wherein the subjecting step comprises the steps of:

   adjusting the pH of the dispersion to the range of 1 to 3 or 9 to 14; and

   applying the pressure in the range of 250 MPa to 650 MPa to the pH adjusted dispersion.

3. The process of claim 1 or 2, wherein the untreated protein is a plant protein or a protein obtained from a plant or a plant part.

4. The process of claim 3, wherein the plant protein is selected from the group consisting of albumin, globulin, prolamin, glutelin, legumin, vicilin, glutenin, oryzenin, zein and any combination thereof.

5. The process of claim 3, wherein the plant or the plant part is selected from the group consisting of legumes, pea, mung bean, lentil, chickpea, faba bean, soy, corn, broccoli, nuts, seeds, tubers, roots, potatoes, rhizomes, grains, quinoa, seaweed, spinach, leafy vegetables, cruciferous vegetables, marrows, allium and any combination thereof.

6. The process of any one of the preceding claims, further comprising, before the subjecting step, the step of dispersing the dispersion in a liquid medium.

7. The process of claim 6, wherein the dispersion of the untreated protein in the liquid medium comprises up to 70% (w/w) solids, based on the weight of the dispersion.

8. The process of any one of the preceding claims, wherein the subjecting step comprises the step of holding the pressure at a pressure hold time in the range of 30 seconds to 60 minutes.

9. The process of claim 8, further comprising, after the holding step, the step of releasing the pressure at a rate of 0.5 MPa/s to 60 MPa/s.

10. The process of any one of the preceding claims, wherein the subjecting step is undertaken at a temperature in the range of 2 °C to 50 °C.

11. The process of any one of the preceding claims, further comprising, after the subjecting step, the step of dehydrating the solubilized protein.

12. The process of claim 11, wherein the dehydrated solubilized protein is in the form of a powder or granules.
13. The process of any one of claims 1 to 10, wherein the solubilized protein is in the form of a paste, a gel, or a liquid.
14. The process of any one of the preceding claims, wherein the pH is in the range of pH 2 to pH 3.
15. The process of any one of claims 1 to 13, wherein the pH is in the range of pH 10 to pH 12.
16. A process of forming a food composition comprising the step of:

    mixing the solubilized protein prepared according to any one of claims 1 to 15 with food ingredients to form the food composition.
17. The process of claim 16, wherein the food ingredients is selected from the group consisting of food colouring, food flavourings, food preservatives, food lipids, hydrocolloids, sugars, gums, polysaccharides, salts, acids, vitamins, minerals and any combination thereof.
18. The process of claim 16 or 17, wherein the mixing step is undertaken at a temperature in the range of -30 °C to 60 °C.
19. The process of any one of claims 16 to 18, wherein the mixing step is undertaken for a duration of 1 minute to 240 minutes.