CLAIMS

What is claimed is:

1. A food product comprising (i) a protein and (ii) an additional agent; wherein the (i) and said (ii) comprise a plurality of phenol-based rings;
   wherein said (i) and said (ii) are covalently cross-linked via said plurality of phenol-based rings;
   and wherein a molar ratio between glutamine and glutamic acid residues within said protein is at most 1:10.

2. The food product of claim 1, wherein a dry weight percentage of said protein within said food product is between 60 and 90%; wherein the protein comprises a modified plant protein; and wherein the weight ratio between the protein and said additional agent is between 10:1 and 3:1; and wherein a weight ratio between the protein and said additional agent is between 10:1 and 1:10.

3. The food product of claim 1 or 2, wherein said modified plant protein is a hydrolyzed plant protein characterized by a degree of hydrolysis between 5 and 40%; and wherein the hydrolyzed plant protein is characterized by at least one of: (i) alpha helix content of at least 50%; (ii) average MW below 80kDa.

4. A food product comprising (i) a hydrolyzed protein and (ii) an additional agent; wherein said (i) and said (ii) comprise plurality of phenol-based rings;
   wherein said (i) and said (ii) are covalently cross-linked via said plurality of phenol-based ring;
   said hydrolyzed protein is characterized by a hydrolysis degree between 5 and 40%.

5. The food product of claim 4, wherein said hydrolyzed protein comprises a plurality of peptides characterized by alpha helix content of at least 50% and further characterized by an average MW below 80kDa; and wherein the proteolytic enzyme comprises pepsin, trypsin, chymotrypsin, papain, endoprotease, exoprotease, carboxypeptidase, aminopeptidase, or any combination thereof; wherein said

hydrolyzed protein is a hydrolyzed plant protein; and wherein the hydrolyzed plant protein is characterized by at least 50% improved water solubility compared to the same non-hydrolyzed plant protein.

6. The food product of any one of claims 1 to 5, wherein said additional agent is a phenolic lipid, or is a biopolymer comprising a polysaccharide, a polyphenol, a protein, a lignin, or a combination thereof; wherein said food product is a solid at a temperature below 100ºC and is characterized by a gel content of between 5 and 50%; wherein said food product is characterized by a water content between 0.1 and 70% w/w; and wherein in a hydrated state said food product is characterized by a water content between about 30 and about 70% w/w.

7. The food product of claim 6, wherein said polysaccharide is a hydroxycinnamic acid substituted polysaccharide; and wherein the hydroxycinnamic acid substituted polysaccharide comprises a feruloylated polysaccharide, a pectic polysaccharide or both; optionally wherein said polysaccharide is derived from psyllium husk, psyllium seeds powder, chia husk, chia seeds powder, apple, bamboo and sugar cane fibers powder, or any combination thereof.

8. The food product of any one of claims 1 to 7, wherein said food product is a plant-based meat substitute and wherein said food product is shapeable, spreadable or both; and wherein said food product maintains its shape under heating at a temperature up to 250°C.

9. The food product of any of claims 1 to 8, wherein said food product is characterized by at least one of: a hardness between 5 and 10N, a chewiness between 1 and 3N, and a gumminess between 0.5 and 2N, determined by Texture Profile Analyzer; wherein said food product is in a denatured state and characterized by at least one of: a hardness between 5 and 50N, a chewiness between 4 and 25N, and a gumminess between 4 and 30N, determined by Texture Profile Analyzer; and wherein said food product is provided in the denatured state by thermal processing.

10. A method for manufacturing said food product of any one of claims 1 to 3, comprising:

    (i) contacting a protein with a first enzyme having deamidase catalytic activity under conditions appropriate for converting at least glutamine residues of said protein into glutamic acid residues, thereby obtaining a glutamic acid protein (GAP); wherein a molar ratio between glutamine and glutamic acid within said GAP is at most 1:10;

    (ii) contacting said GAP with an oxidase and with an additional agent under conditions appropriate for crosslinking said GAP and said additional agent, thereby obtaining said food product;

    wherein the protein and the additional agent comprise a plurality of phenol-based rings.

11. The method of claim 10, wherein the oxidase comprises any one of laccase, peroxidase, tyrosinases, or any combination thereof; and wherein the first enzyme comprises any one of: amidohydrolase, deamidase, protein glutaminase, or any combination thereof; wherein said deamidase catalytic activity comprises glutamine to glutamate transformation activity, asparagine to aspartate transformation activity or both; optionally wherein the first enzyme further comprises protease activity.

12. The method of claim 10 or 11, further comprising performing a termination step thereby substantially arresting enzymatic activity of said first enzyme, wherein said termination step is performed prior to said step (ii).

13. The method of any one of claims 10 to 12, wherein the step (i) further comprising contacting the protein or the GAP with a second enzyme having a proteolytic activity; wherein said step (ii) comprises mixing at a temperature between 10 and 70 °C for a period of time sufficient for forming said food product with a crosslinking degree of at least 20-90%; and wherein said protein comprises a plant

protein; and wherein the GAP is characterized by at least 50% improved water solubility compared to the plant protein.

14. A method for manufacturing said food product of any one of claims 4 to 9, comprising:

    (i) contacting a protein with a proteolytic enzyme under conditions suitable for hydrolysis of said protein, thereby obtaining a composition comprising a hydrolyzed protein (HPP);

    (ii) contacting said composition with an oxidase and the additional agent under conditions appropriate for crosslinking said HPP and said additional agent, thereby obtaining said food product.

15. The method of claim 14, wherein the HPP is characterized by a degree of hydrolysis of between about 5 and about 40%.

16. The method of claim 14 or 15, wherein said conditions suitable for hydrolysis comprise mixing at a temperature between 10 and 70°C; and wherein the method further comprising performing a termination step, wherein said termination step is performed prior to said step (ii).

17. The method of claim 16, wherein said termination step comprises any of: (i) providing said composition to a temperature of at least 90°C; (ii) adding an inhibitor of said proteolytic enzyme to said composition; (iii) exposing said composition to a pH below 4 or above 9, or a combination of (i)-(iii).

18. The method of any claims 14 to 17, wherein said conditions appropriate for crosslinking comprise providing said composition to a temperature between 10 and 70 °C for a period of time sufficient for forming said food product with a gel content of at least 5%.

19. The method of any one of claims 14 to 18, wherein said protein comprises a plant protein and wherein the HPP is characterized by at least 50% improved water solubility compared to the plant protein wherein the proteolytic enzyme comprises

any one of pepsin, trypsin, chymotrypsin, papain, endoprotease, exoprotease, carboxypeptidase, aminopeptidase, or any combination thereof.

20. The method of any one of claims 10 to 19, wherein the method further comprises a preliminary step of adding one or more additional food ingredient; and wherein said preliminary step is performed before the step (ii).