

CLAIMS

We claim:

[Claim 1]. A structured food product, comprising a protein product from a microorganism.

~~[Claim 2]. A dough composition for production of a structured food product, comprising a protein product from a microorganism.~~

[Claim 32]. The structured food product according to claim 1 or the dough composition according to claim 2, wherein the microorganism comprises a chemoautotrophically grown microorganism, optionally:-

~~3. The structured food product according to claim 2, wherein the chemoautotrophically grown microorganism comprises a *Cupriavidus*, *Rhodococcus*, *Hydrogenovibrio*, *Rhodopseudomonas*, *Hydrogenobacter*, *Gordonia*, *Arthrobacter*, *Streptomyces*, *Rhodobacter*, and/or *Xanthobacter* microorganism.~~

[Claim 4]. The structured food product according to claim 1, wherein the microorganism is a first microorganism grown on a nutritional source that comprises a protein product from a second microorganism, optionally wherein:-

~~5. The structured food product according to claim 4, wherein (a) the second microorganism comprises a *Cupriavidus*, *Rhodococcus*, *Hydrogenovibrio*, *Rhodopseudomonas*, *Hydrogenobacter*, *Gordonia*, *Arthrobacter*, *Streptomyces*, *Rhodobacter*, and/or *Xanthobacter* microorganism; or-~~

~~6. The structured food product according to claim 4, wherein (b) the first microorganism is a generally recognized as safe (GRAS) microorganism.~~

[Claim 57]. The structured food product according to claim 1, wherein:
(a) the microorganism is a non-genetically modified organism (non-GMO); or:-

~~8. The structured food product according to claim 1, wherein (b) the food product does not contain animal-derived biomolecules.~~

[Claim 69]. The structured food product according to claim 1 or the dough composition according to claim 2, wherein the protein product comprises one or more of single cell

protein, cell lysate, protein isolate, protein extract, protein hydrolysate, free amino acids, peptides, oligopeptides, or combinations thereof.

[Claim 740]. The structured food product according to claim 1, comprising about 5% -to about 50% protein by weight from the microorganism protein product.

[Claim 844]. The structured food product according to claim 1, wherein the food product is a structured meat analogue product, optionally wherein:-

~~12. The structured food product according to claim 11, wherein (a) the structured meat analogue product is a structured beef, poultry, pork, fish, or seafood analogue product; or, -~~

~~13. The structured food product according to claim 11, wherein (b) the structured meat analogue product reproduces a texture and/or organoleptic characteristic of natural meat; or, -~~

~~14. The structured food product according to claim 11, wherein (c) the meat analogue product mimics the structure of ground or muscle meat; or, -~~

~~15. The structured food product according to claim 11, wherein (d) the structured meat analogue product comprises a flavohemoprotein flavorant, optionally, -~~

~~16. The structured food product according to claim 15, wherein the flavohemoprotein flavorant is produced by the microorganism, further optionally, -~~

~~17. The structured food product according to claim 16, wherein the microorganism is a chemoautotrophically grown microorganism, even further optionally, -~~

~~18. The structured food product according to claim 17, wherein the chemoautotrophically grown microorganism is a *Cupriavidus*, *Rhodococcus*, *Hydrogenovibrio*, *Rhodopseudomonas*, *Hydrogenobacter*, *Gordonia*, *Arthrobacter*, *Streptomyces*, *Rhodobacter*, and/or *Xanthobacter* microorganism.~~

[Claim 919]. The structured food product according to claim 1, wherein the structured food product is supplemented with vitamins and/or nutrients, optionally wherein: -

~~20. The structured food product according to claim 19, (a) wherein the supplemental vitamins and/or nutrients comprise at least one of amino acids, lipids, oils, fatty acids, vitamin B12, biotin, antioxidants, minerals, surfactants, and emulsifiers; or, -~~

~~21. The structured food product according to claim 19 wherein (b) the structured food product is a structured meat analogue product.~~

~~22. A dough composition for production of a structured food product, comprising a protein product from a microorganism.~~

~~23. The dough composition according to claim 22, wherein the microorganism comprises a chemoautotrophically grown microorganism.~~

~~24. The dough composition according to claim 23, wherein the chemoautotrophically grown microorganism comprises a *Cupriavidus* microorganism.~~

~~25. The dough composition according to claim 22, wherein the protein product comprises one or more of single cell protein, cell lysate, protein isolate, protein extract, protein hydrolysate, free amino acids, peptides, oligopeptides, or combinations thereof.~~

[Claim 1026]. The dough composition according to claim 225, wherein the protein product comprises a protein hydrolysate, optionally wherein:-

~~27. The dough composition according to claim 26, wherein (a) the average molecular weight of proteins in the hydrolysate is about 5 kD to about 10 kD; or,-~~

~~28. The dough composition according to claim 26, wherein (b) the protein hydrolysate is produced under conditions that retain undenatured globular protein, optionally -~~

~~29. The dough composition according to claim 28, wherein the conditions that retain undenatured globular protein comprise mild cell lysis and physical separation of soluble components from cell debris; or,-~~

~~30. The dough composition according to claim 26, wherein (c) partially or fully hydrolyzed protein product is added to a second protein product to promote structuring and/or fiber formation, optionally -~~

~~31. The dough composition according to claim 30, wherein the second protein product comprises one or more of wheat gluten, soy, pea, wheat, milk, algae, and other non-animal proteins.~~

[Claim 1132]. The dough composition according to claim 222, wherein:
(a) the water content of the dough is about 40% (w/w) to about 80% (w/w); or,-

~~33. The dough composition according to claim 22, wherein (b) the shear strength of the dough is greater than about 1000 psig.~~

[Claim 1234]. A method for producing a structured food product, comprising:

(a) culturing a microorganism in the presence of a carbon source, thereby producing biomass that comprises protein;

- (b) converting the biomass into a protein product; and
- (c) processing the protein product into a structured food composition.

[Claim 1335]. The method according to claim 1234, wherein:

(a) step (a) comprises chemoautotrophic culture conditions, optionally wherein the microorganism comprises a *Cupriavidus*, *Rhodococcus*, *Hydrogenovibrio*, *Rhodopseudomonas*, *Hydrogenobacter*, *Gordonia*, *Arthrobacter*, *Streptomyces*, *Rhodobacter*, and/or *Xanthobacter* microorganism; or-

~~36. The method according to claim 34, wherein (b) the carbon source comprises a gaseous C1 molecule, optionally -~~

~~37. The method according to claim 36, wherein the gaseous C1 molecule comprises carbon dioxide.~~

~~38. The method according to claim 35, wherein the microorganism comprises a *Cupriavidus* microorganism.~~

[Claim 1439]. The method according to claim 1234, wherein the protein product comprises one or more of single cell protein, cell lysate, protein isolate, protein extract, protein hydrolysate, free amino acids, peptides, oligopeptides, or combinations thereof.

[Claim 1540]. The method according to claim 1439, wherein:

(a) step (c) comprises processing the protein product into a dough composition, optionally-

~~41. The method according to claim 40, further comprising thermochemical processing of the dough, further optionally-~~

~~42. The method according to claim 41, wherein the thermochemical processing comprises extrusion; or-~~

~~43. The method according to claim 39, wherein (b) step (c) comprises a spinning process, thereby producing fibers; or-~~

~~44. The method according to claim 39, wherein (c) step (c) comprises a process for structured hydrocolloid formation.~~

[Claim 1645]. The method according to claim 1234, wherein the structured food product is a structured meat analogue product, optionally wherein:-

~~46. The method according to claim 45, wherein (a)~~ the structured meat analogue product is a structured beef, poultry, pork, fish, or seafood analogue product; or,

~~47. The method according to claim 45, wherein (b)~~ the structured meat analogue product reproduces a texture and/or organoleptic characteristic of natural meat; or,

~~48. The method according to claim 45, wherein (c)~~ the meat analogue product mimics the structure of ground or muscle meat; or,

~~49. The method according to claim 45, wherein (d)~~ the structured meat analogue product comprises a flavohemoprotein flavorant; optionally,

~~50. The structured food product according to claim 49,~~ wherein the flavohemoprotein flavorant is produced by the microorganism; further optionally,

~~51. The structured food product according to claim 50,~~ wherein the microorganism is a *Cupriavidus*, *Rhodococcus*, *Hydrogenovibrio*, *Rhodopseudomonas*, *Hydrogenobacter*, *Gordonia*, *Arthrobacter*, *Streptomyces*, *Rhodobacter*, and/or *Xanthobacter* microorganism.

[\[Claim 1752\]](#). A thermochemical process for processing a dough composition according to claim [222](#) into a structured meat analogue composition, comprising extruding the dough composition to produce aligned fibers; optionally,

~~53. A thermochemical process according to claim 52,~~ wherein the protein product comprises a protein hydrolysate; further optionally,

~~54. The thermochemical process according to claim 53,~~ wherein the microorganism comprises a chemoautotrophically grown microorganism; even further optionally,

~~55. The thermochemical process according to claim 54,~~ wherein the chemoautotrophically grown microorganism comprises a *Cupriavidus*, *Cupriavidus*, *Rhodococcus*, *Hydrogenovibrio*, *Rhodopseudomonas*, *Hydrogenobacter*, *Gordonia*, *Arthrobacter*, *Streptomyces*, *Rhodobacter*, and/or *Xanthobacter* microorganism.