SUMMARY

In an example of the present disclosure, a colloidal composition comprises a first phase, comprising at least one gas; a second phase, comprising at least one monosaccharide, disaccharide, or polysaccharide; filamentous fungal particles; and water, wherein the first phase is dispersed in the second phase, and wherein at least about 65 wt% of protein in the colloidal composition is provided by the filamentous fungal particles.

In one aspect, the present disclosure refers to a colloidal composition, comprising: a first phase, comprising at least one gas; a second phase, comprising at least one monosaccharide, disaccharide, or polysaccharide; filamentous fungal particles; and water, wherein the first phase is dispersed in the second phase, and wherein at least about 65 wt% of protein in the colloidal composition is provided by the filamentous fungal particles.

In examples, the filamentous fungal particles may be in a form selected from the group consisting of a flour, a dispersion of particles, wet biomat-derived particles, a paste, and combinations thereof.

In examples, the colloidal composition may comprise the at least one monosaccharide, disaccharide, or polysaccharide in an amount of at least about 10 wt%. The colloidal composition may, but need, comprise the at least one monosaccharide, disaccharide, or polysaccharide in an amount of between about 10 wt% and about 35 wt%. The colloidal composition may, but need not, comprise the at least one monosaccharide, disaccharide, or polysaccharide in an amount of between about 17 wt% and about 25 wt%. The at least one monosaccharide, disaccharide, or polysaccharide may, but need not, comprise at least one of sucrose, dextrose, and glucose.

In examples, the colloidal composition may comprise at least one monosaccharide or disaccharide and at least one polysaccharide, wherein the polysaccharide is provided in an amount of between about 5 wt% and about 10 wt%. The colloidal composition may, but need not, comprise the at least one polysaccharide in an amount of between about 7.2 wt% and about 8.2 wt%. The at least one polysaccharide may, but need not, comprise at least one of an inulin, psyllium, and a fructooligosaccharide.

In examples, the colloidal composition may comprise the filamentous fungal particles in an amount of between about 6 wt% and about 17.0 wt%. The filamentous fungal particles may, but need not, be provided as part of a homogenate or dispersion, a weight ratio of a liquid to filamentous fungal particles in the aqueous homogenate or dispersion may, but need not, be between about 0.1 and about 10, and the liquid may, but need not, be selected from the group consisting of water, coconut water, soy milk, almond milk, oat milk, and a fruit juice. The weight ratio of the liquid to filamentous fungal particles in the aqueous homogenate or dispersion may, but need not, be between about 2.5 and about 3.5.

In examples, the colloidal composition may further comprise at least one fatty substance. The colloidal composition may, but need not, comprise the at least one fatty substance in an amount of between about 4.5 wt% and about 60.0 wt%. The fatty substance

may, but need not, comprise at least one of canola oil, palm oil, palm kernel oil, sunflower oil, vegetable oil, refined coconut oil, almond oil, peanut oil, and palm olein.

In examples, the colloidal composition may further comprise a foam stabilizer in an amount of between about 0.05 wt% and about 0.5 wt%. The foam stabilizer may, but need not, comprise at least one of a monoglyceride, a diglyceride, locust bean gum, guar gum, carob bean gum, cellulose gum, and a fatty oil.

In examples, the colloidal composition may be substantially free of non-fungal-derived emulsifiers, stabilizers, and surfactants.

In examples, the first phase and the second phase may remain substantially homogenously mixed, and/or may not visibly separate, for at least about one day, at least about two days, at least about three days, at least about four days, at least about five days, at least about six days, at least about one week, at least about two weeks, at least about three weeks, at least about one month, at least about two months, at least about three months, at least about four months, at least about five months, at least about six months, at least about seven months, at least about eight months, at least about nine months, at least about ten months, at least about eleven months, at least about twelve months, at least about thirteen months, at least about fourteen months, at least about fifteen months, at least about sixteen months, at least about seventeen months, or at least about eighteen months after formation of the colloidal composition.

In examples, a volume ratio of the at least one gas to the remainder of the colloidal composition may be at least about 0.1, at least about 0.2, at least about 0.3, at least about 0.4, at least about 0.5, at least about 0.75, at least about 1, at least about 2, at least about 3, at least about 4, or at least about 5. The gas may, but need not, be selected from the group consisting of argon, nitrogen, air, helium, and carbon dioxide.

In examples, the colloidal composition may have a foam stability of at least about 50%, at least about 60%, at least about 70%, at least about 80%, at least about 90%, or at least about 95% over a period of at least about one day, at least about two days, at least about three days, at least about four days, at least about five days, at least about six days, at least about one week, at least about two weeks, at least about three weeks, at least about one month, at least about two months, at least about three months, at least about four months, at least about five months, at least about six months, at least about seven months, at least about eight months, at least about nine months, at least about ten months, at least about eleven months, at least about twelve months, at least about thirteen months, at least about fourteen

months, at least about fifteen months, at least about sixteen months, at least about seventeen months, or at least about eighteen months.

In examples, the colloidal composition may comprise at least one monosaccharide or disaccharide in an amount of between about 17 wt% and about 25 wt%, at least one polysaccharide in an amount of between about 7.2 wt% and about 8.2 wt%, and the filamentous fungal particles in an amount of between about 12.8 wt% and about 17.0 wt%, and may further comprise at least one fatty substance in an amount of between about 4.5 wt% and about 10.0 wt% and a foam stabilizer in an amount of between about 0.05 wt% and about 0.50 wt%, and the at least one monosaccharide or disaccharide may comprise at least one of sucrose, dextrose, and glucose, the at least one polysaccharide may comprise an inulin, the fatty substance may comprise refined coconut oil, and the foam stabilizer may comprise locust bean gum, and may further comprise between about 0.01 wt% and about 40 wt% of at least one flavoring ingredient.

In examples, the colloidal composition may be a dairy analog food product. The dairy analog food product may, but need not, be a cream analog food product having a fat content of at least about 10.5 wt%.

In examples, the colloidal composition may be a frozen food product. The frozen food product may, but need not, have a melting point of no more than about 15 °C.

In examples, the colloidal composition may be an ice cream analog food product. The colloidal composition may, but need not, be a vanilla ice cream analog food product and the at least one flavoring ingredient may, but need not, comprise vanilla beans or vanilla paste. The colloidal composition may, but need not, be a strawberry ice cream analog food product and the at least one flavoring ingredient may, but need not, comprise strawberry puree and lemon juice. The colloidal composition may, but need not, be a chocolate ice cream analog food product and the at least one flavoring ingredient may, but need not, comprise cacao powder.

In examples, at least about 10% (by number, volume, or weight), at least about 20% (by number, volume, or weight), at least about 30% (by number, volume, or weight), at least about 40% (by number, volume, or weight), at least about 50% (by number, volume, or weight), at least about 60% (by number, volume, or weight), at least about 70% (by number, volume, or weight), at least about 80% (by number, volume, or weight), at least about 90% (by number, volume, or weight), at least about 91% (by number, volume, or weight), at least about 92% (by number, volume, or weight), at least about 93% (by number, volume, or weight), at least about 94% (by number, volume, or weight), at least about 95%

(by number, volume, or weight), at least about 96% (by number, volume, or weight), at least about 97% (by number, volume, or weight), at least about 98% (by number, volume, or weight), or at least about 99% (by number, volume, or weight) of ice crystals in the colloidal composition may have particle sizes of less than about 25 μm, less than about 24 μm, less than about 23 μm, less than about 22 μm, less than about 21 μm, less than about 20 μm, less than about 19 μm, less than about 18 μm, less than about 17 μm, less than about 16 μm, less than about 15 μm, less than about 14 μm, less than about 13 μm, less than about 12 μm, less than about 11 μm, less than about 10 μm, less than about 9 μm, less than about 8 μm, less than about 7 μm, less than about 6 μm, or less than about 5 μm.

In examples, the colloidal composition may be characterized by a subjective iciness score of no more than about 5, no more than about 4, no more than about 3, or no more than about 2 on a scale of 0 to 10.

In examples, the colloidal composition may be characterized by a subjective firmness score in the mouth of between about 3 and about 7 on a scale of 0 to 10, or equivalents of these values on another numerical scale.

In examples, the colloidal composition may be characterized by a subjective creamy mouthfeel score of between about 3 and about 6 on a scale of 0 to 10, or equivalents of these values on another numerical scale.

In examples, the colloidal composition may be characterized by a subjective creamy mouthcoating score of between about 3 and about 5 on a scale of 0 to 10, or equivalents of these values on another numerical scale.

In examples, the at least one gas may comprise at least one of air, nitrogen, oxygen, argon, carbon dioxide, and helium.

In examples, the colloidal composition may have a total fat content of less than about 10 wt%, less than about 9 wt%, less than about 8 wt%, less than about 7 wt%, less than about 6 wt%, or less than about 5 wt%.

In examples, the colloidal composition may have a total fat content of at least about 10 wt%, at least about 15 wt%, at least about 20 wt%, at least about 25 wt%, at least about 30 wt%, at least about 35 wt%, at least about 40 wt%, or at least about 45 wt%.

In examples, the colloidal composition may have a saturated fat content of less than about 55 wt% of the total fat content, less than about 50 wt% of the total fat content, less than about 45 wt% of the total fat content, or less than about 40 wt% of the total fat content.

In examples, the colloidal composition may have a saturated fat content of less than about 5.5 wt% of the composition, less than about 5 wt% of the composition, less than about 4.5 wt% of the composition, less than about 4 wt% of the composition, less than about 3.5 wt% of the composition, less than about 3 wt% of the composition, less than about 2.5 wt% of the composition, or less than about 2 wt% of the composition.

In examples, the colloidal composition may further comprise at least one hydrophobin. The at least one hydrophobin may, but need not, make up at least about 1 wt% of a total protein content of the colloidal composition.

In examples, the colloidal composition or a mix or precursor thereof may have a dynamic viscosity, at 20 °C and 1 atm, of greater than about 400 cP.

In another example of the present disclosure, a colloidal composition comprises an oil phase; an aqueous phase; and filamentous fungal particles, wherein the filamentous fungal particles stabilize the colloidal composition, and wherein the colloidal composition is an oil-in-water emulsion.

In one aspect, the present disclosure refers to a colloidal composition, comprising: an oil phase; an aqueous phase; and filamentous fungal particles, wherein the filamentous fungal particles stabilize the colloidal composition, and wherein the colloidal composition is an oil-in-water emulsion.

In examples, the colloidal composition may be stabilized by a combination of the oil phase and mycelial proteins in the filamentous fungal particles.

In examples, at least about 50 wt% of protein in the colloidal composition may be provided by the filamentous fungal particles. At least about 65 wt% of protein in the colloidal composition may, but need not, be provided by the filamentous fungal particles.

In examples, the filamentous fungal particles may be dispersed in the aqueous phase.

In examples, the oil phase and the aqueous phase may remain substantially homogenously mixed, and/or may not visibly separate, for at least about one day, at least about two days, at least about three days, at least about four days, at least about five days, at least about six days, at least about one week, at least about two weeks, at least about three weeks, at least about one month, at least about two months, at least about three months, at least about four months, at least about five months, at least about six months, at least about seven months, at least about eight months, at least about nine months, at least about ten months, at least about eleven months, at least about twelve months, at least about thirteen months, at least about fourteen months, at least about fifteen months, at least about sixteen months, at least about seventeen months, or at least about eighteen months after formation of the colloidal composition.

In examples, the colloidal composition may be a mayonnaise analog food product.

In examples, the colloidal composition may be an analog of a sauce or spread other than mayonnaise.

In examples, the colloidal composition may be a foie gras analog food product.

In another example of the present disclosure, a colloidal composition comprises a first phase; a continuous second phase; and filamentous fungal particles, wherein the filamentous fungal particles comprise elongated particles having a length of between about 1 micron and about 50 microns, and wherein the filamentous fungal particles are substantially uniformly dispersed throughout the continuous second phase.

In one aspect, the present disclosure refers to a colloidal composition, comprising: a first phase; a continuous second phase; and filamentous fungal particles, wherein the filamentous fungal particles comprise elongated particles having a length of no more than about 120 microns, and wherein the filamentous fungal particles are substantially uniformly dispersed throughout the continuous second phase.

In examples, the first phase may comprise a gas. The gas may, but need not, comprise at least one species selected from the group consisting of nitrogen, oxygen, argon, carbon dioxide, and helium.

In examples, the continuous second phase may comprise at least one of a fatty substance, a monosaccharide, a disaccharide, a polysaccharide, and ice crystals.

In examples, the filamentous fungal particles may comprise elongated particles having a length of between about 5 microns and about 20 microns.

In examples, the filamentous fungal particles may comprise elongated particles having a width of between about 0.01 microns and about 4 microns.

In examples, the colloidal composition may be a dairy analog food product. The dairy analog food product may, but need not, be a cream analog food product having a fat content of at least about 10.5 wt%.

In examples, the colloidal composition may be a frozen food product.

In examples, the colloidal composition may be an ice cream analog food product comprising at least one flavoring ingredient. The colloidal composition may, but need not, be a vanilla ice cream analog food product and the at least one flavoring ingredient may, but need not, comprise vanilla beans or vanilla paste. The colloidal composition may, but need not, be a strawberry ice cream analog food product and the at least one flavoring ingredient may, but need not, comprise strawberry puree and lemon juice. The colloidal composition may, but need not, be a chocolate ice cream analog food product and the at least one flavoring ingredient comprises cacao powder.

In examples, at least about 10% (by number, volume, or weight), at least about 20% (by number, volume, or weight), at least about 30% (by number, volume, or weight), at least about 40% (by number, volume, or weight), at least about 50% (by number, volume, or weight), at least about 60% (by number, volume, or weight), at least about 70% (by number, volume, or weight), at least about 80% (by number, volume, or weight), at least

about 90% (by number, volume, or weight), at least about 91% (by number, volume, or weight), at least about 92% (by number, volume, or weight), at least about 93% (by number, volume, or weight), at least about 94% (by number, volume, or weight), at least about 95% (by number, volume, or weight), at least about 96% (by number, volume, or weight), at least about 97% (by number, volume, or weight), at least about 98% (by number, volume, or weight), or at least about 99% (by number, volume, or weight) of ice crystals in the colloidal composition may have particle sizes of less than about 25 μm, less than about 24 μm, less than about 23 μm, less than about 22 μm, less than about 21 μm, less than about 20 μm, less than about 19 μm, less than about 18 μm, less than about 17 μm, less than about 16 μm, less than about 15 μm, less than about 14 μm, less than about 13 μm, less than about 12 μm, less than about 11 μm, less than about 10 μm, less than about 9 μm, less than about 8 μm, less than about 7 μm, less than about 6 μm, or less than about 5 μm.

In examples, the colloidal composition may be characterized by a subjective iciness score of no more than about 5, no more than about 4, no more than about 3, or no more than about 2 on a scale of 0 to 10.

In examples, the colloidal composition may be characterized by a subjective firmness score in the mouth of between about 3 and about 7 on a scale of 0 to 10, or equivalents of these values on another numerical scale.

In examples, the colloidal composition may be characterized by a subjective creamy mouthfeel score of between about 3 and about 6 on a scale of 0 to 10, or equivalents of these values on another numerical scale.

In examples, the colloidal composition may be characterized by a subjective creamy mouthcoating score of between about 3 and about 5 on a scale of 0 to 10, or equivalents of these values on another numerical scale.

In examples of any colloidal composition as disclosed herein, the filamentous fungal particles may have an average particle size of between about 2 microns and about 10 microns, between about 10 microns and about 20 microns, between about 20 microns and about 50 microns, between about 50 microns and about 75 microns, or between about 75 microns and about 120 microns. The filamentous fungal particles may, but need not, comprise particles having a particle size of less than about 1 μm or less than about 500 nm.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise at least about 46 wt% protein.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise particles of at least one filamentous fungus

belonging to an order selected from the group consisting of Mucorales, Ustilaginales, Russulales, Polyporales, Agaricales, Pezizales, and Hypocreales.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise particles of at least one filamentous fungus belonging to a family selected from the group consisting of Mucoraceae, Ustilaginaceae, Hericiaceae, Polyporaceae, Grifolaceae, Lyophyllaceae, Strophariaceae, Lycoperdaceae, Agaricaceae, Pleurotaceae, Physalacriaceae, Omphalotaceae, Tuberaceae, Morchellaceae, Sparassidaceae, Nectriaceae, Bionectriaceae, and Cordycipitaceae.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise particles of at least one filamentous fungus belonging to a family selected from the group consisting of *Rhizopus oligosporus*, *Ustilago esculenta*, *Hericululm erinaceus*, *Polyporous squamosus*, *Grifola fondrosa*, *Hypsizygus marmoreus*, *Hypsizygus ulmarius* (elm oyster), *Calocybe gambosa*, *Pholiota nameko*, *Calvatia gigantea*, *Agaricus bisporus*, *Stropharia rugosoannulata*, *Hypholoma lateritium*, *Pleurotus eryngii*, *Pleurotus ostreatus* (pearl), *Pleurotus ostreatus* var. *columbinus* (Blue oyster), *Tuber borchii*, *Morchella esculenta*, *Morchella conica*, *Morchella importuna*, *Sparassis crispa* (cauliflower), *Fusarium venenatum*, *Fusarium* strain *flavolapis*, *Disciotis venosa*, *Clonostachys rosea*, *Cordyceps militaris*, *Trametes versicolor*, *Ganoderma lucidum*, *Flammulina velutipes*, *Lentinula edodes*, *Pleurotus djamor*, *Pleurotus ostreatus*, and *Leucoagaricus* spp.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise particles of at least one filamentous fungus belonging to the genus *Fusarium*.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise particles of *Fusarium venenatum*.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise particles of the *Fusarium* strain *flavolapis* identified by ATCC Accession Deposit No. PTA-10698.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may be derived from a fungal biomass comprising at least one of mycelia, conidia, and a fruiting body. The filamentous fungal particles may, but need not, be derived from a fruiting body and the colloidal composition may, but need not, be an ice cream analog food product.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may, but need not, be derived from a filamentous fungal biomat. The filamentous fungal biomat may, but need not, be produced by a fermentation method selected from the group consisting of surface fermentation, submerged fermentation, and solid substrate fermentation.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may be provided as part of a homogenate, and the homogenate may further comprise a liquid.

In examples of any of the colloidal compositions disclosed herein, at least one of the following may be true: (i) no more than about 36.2% of the filamentous fungal particles have a particle size of less than about 53 microns; (ii) between about 10.7% and about 67.1% of the filamentous fungal particles have a particle size of less than about 105 microns; (iii) no more than about 69.8% of the filamentous fungal particles have a particle size of between about 53 microns and about 105 microns; (iv) between about 2.7% and about 59.6% of the filamentous fungal particles have a particle size of between about 105 microns and about 177 microns; (v) no more than about 28.6% of the filamentous fungal particles have a particle size of between about 177 microns and about 250 microns; (vi) no more than about 42.6% of the filamentous fungal particles have a particle size of between about 250 microns and about 350 microns; (vii) no more than about 41.8% of the filamentous fungal particles have a particle size of between about 350 microns and about 590 microns; and (viii) no more than about 4.8% of the filamentous fungal particles have a particle size of between about 590 microns and about 1190 microns.

In examples of any of the colloidal compositions disclosed herein, a circular equivalent number-average particle size of the filamentous fungal particles may be between about 1.46 microns and about 6.42 microns. The circular equivalent number-average particle size of the filamentous fungal particles may, but need not, be between about 3.64 microns and about 4.64 microns.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise at least about 27 wt% dietary fiber. The filamentous fungal particles may, but need not, comprise no more than about 37 wt% dietary fiber.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise at least about 30 wt% protein. The filamentous fungal particles may, but need not, comprise no more than about 80 wt% protein.

In examples of any of the colloidal compositions disclosed herein, the colloidal composition may comprise at least about 4.0 wt%, at least about 4.5 wt%, at least about 5.0 wt%, at least about 5.5 wt%, at least about 6.0 wt%, at least about 6.5 wt%, at least about 7.0 wt%, at least about 7.5 wt%, at least about 8.0 wt%, at least about 8.5 wt%, at least about 9.0 wt%, at least about 9.5 wt%, at least about 10.0 wt%, at least about 10.5 wt%, at least about 11.0 wt%, at least about 11.5 wt%, at least about 12.0 wt%, or at least about 12.5 wt% protein.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise no more than about 14% moisture. The filamentous fungal particles may, but need not, comprise at least about 4% moisture.

In examples of any of the colloidal compositions disclosed herein, protein, fat, and air may be substantially uniformly distributed throughout the colloidal composition.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise at least about 11.0 μmol/g, at least about 11.5 μmol/g, at least about 12.0 μmol/g, at least about 12.5 μmol/g, at least about 13.0 μmol/g, at least about 13.5 μmol/g, at least about 14.0 μmol/g, or at least about 14.5 μmol/g phospholipids.

In examples of any of the colloidal compositions disclosed herein, the colloidal composition may comprise no more than about 18.5 μmol/g, no more than about 18.0 μmol/g, no more than about 17.5 μmol/g, no more than about 17.0 μmol/g, no more than about 16.5 μmol/g, no more than about 16.0 μmol/g, no more than about 15.5 μmol/g, or no more than about 15.0 μmol/g phospholipids.

In examples of any of the colloidal compositions disclosed herein, the colloidal composition may comprise at least about 0.01 wt%, at least about 0.02 wt%, at least about 0.03 wt%, at least about 0.04 wt%, at least about 0.05 wt%, at least about 0.1 wt%, at least about 0.15 wt%, at least about 0.2 wt%, at least about 0.25 wt%, at least about 0.3 wt%, at least about 0.35 wt%, at least about 0.4 wt%, at least about 0.45 wt%, or at least about 0.5 wt% phospholipids.

In examples of any of the colloidal compositions disclosed herein, the colloidal composition may comprise no more than about 1 wt%, no more than about 0.95 wt%, no more than about 0.9 wt%, no more than about 0.85 wt%, no more than about 0.8 wt%, no more than about 0.75 wt%, no more than about 0.7 wt%, no more than about 0.65 wt%, no more than about 0.6 wt%, or no more than about 0.55 wt% phospholipids.

In examples, the phospholipids may act as an emulsifier of the colloidal composition.

In examples of any of the colloidal compositions disclosed herein, the colloidal composition may have a pH of at between about 5 and about 7.

In examples of any of the colloidal compositions disclosed herein, the colloidal composition may have a zeta potential magnitude, at a temperature of 20°C and a pH of between 5 and 7, of at least about 10 mV, at least about 15 mV, or at least about 20 mV. The colloidal composition may, but need not, have a dynamic viscosity at 20°C and 1 atm of between about 1.5 cP and about 25,000 cP, or at a temperature of between 0 °C and 25 °C and 1 atm of between about 200 cP and about 2,100 cP.

In examples of any of the colloidal compositions disclosed herein, the colloidal composition may have a contact angle on a silicon wafer, at a temperature of 25°C and a pressure of 1 atm, of at least about 45°. The contact angle may, but need not, be between about 45° and about 75°.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise at least one compound selected from the group consisting of vitamins, lipids, glycolipids, polysaccharides, sugar alcohols, and ω-3 fatty acids.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise at least one substance that improves an aesthetic or sensory quality of the filamentous fungus, wherein the substance is selected from the group consisting of pigments, inks, dyes, and fragrances.

In examples of any of the colloidal compositions disclosed herein, the colloidal composition may be substantially free of lactose and the filamentous fungal particles may comprise one or more β-glucans.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise at least one hydrophobin. The at least one hydrophobin may, but need not, make up at least about 1 wt% of a total protein content of the colloidal composition.

In examples of any of the colloidal compositions disclosed herein, the filamentous fungal particles may comprise at least one ice-structuring protein.

In another example of the present disclosure, a particle-stabilized colloidal food product comprises a dispersed phase; a dispersion medium; and filamentous fungal particles, wherein at least a portion of the filamentous fungal particles are positioned at an interface

between the dispersed phase and the dispersion medium to stabilize the colloidal food product.

In one aspect, the present disclosure refers to a particle-stabilized colloidal food product, comprising: a dispersed phase; a dispersion medium; and filamentous fungal particles, wherein at least a portion of the filamentous fungal particles are positioned at an interface between the dispersed phase and the dispersion medium to stabilize the colloidal food product.

In examples, the filamentous fungal particles may have a hydrophilic-lipophilic balance of between about 3 and about 16.

In examples, the filamentous fungal particles may have an average particle size of between about 2 microns and about 10 microns, between about 10 microns and about 20 microns, between about 20 microns and about 50 microns, between about 50 microns and about 75 microns, or between about 75 microns and about 120 microns.

In examples, the dispersed phase may comprise at least one of nitrogen, oxygen, carbon dioxide, argon, and helium and the dispersion medium may comprise at least one monosaccharide, disaccharide, or polysaccharide. The dispersion medium may, but need not, comprise at least one monosaccharide or disaccharide and at least one polysaccharide.

In examples, the dispersed phase may comprise an oil and the dispersion medium may comprise at least one of water, coconut water, soy milk, almond milk, oat milk, and a fruit juice.

In another example of the present disclosure, a method for preparing a colloidal food product as disclosed herein is provided.

In one aspect, the present disclosure refers to a method for preparing the colloidal food product disclosed herein.

In another example of the present disclosure, a Pickering emulsion comprises a dispersed phase; a continuous phase; and filamentous fungal particles, wherein at least a portion of the filamentous fungal particles adsorb onto an interface between the continuous phase and the dispersed phase to stabilize the emulsion by the Pickering phenomenon.

In one aspect, the present disclosure refers to a Pickering emulsion, comprising: a dispersed phase; a continuous phase; and filamentous fungal particles, wherein at least a portion of the filamentous fungal particles adsorb onto an interface between the continuous phase and the dispersed phase to stabilize the emulsion by the Pickering phenomenon.

In examples, the continuous phase may comprise water.

In another example of the present disclosure, a method for preparing a Pickering emulsion as disclosed herein comprises combining a dispersed phase material, a continuous phase, and filamentous fungal particles to form a mixture; and agitating the mixture to form the Pickering emulsion.

In one aspect, the present disclosure refers to a method for preparing the Pickering emulsion disclosed herein, comprising: combining a dispersed phase material, a continuous phase, and filamentous fungal particles to form a mixture; and agitating the mixture to form the Pickering emulsion.

In examples, the continuous phase may comprise water.

In another example of the present disclosure, a colloid comprises a first phase; a second phase; and filamentous fungal particles, the colloid having a zeta potential magnitude, at a temperature of 20°C and a pH of between 5 and 7, of at least about 10 mV, at least about 15 mV, or at least about 20 mV.

In one aspect, the present disclosure refers to a colloid, comprising: a first phase; a second phase; and filamentous fungal particles, the colloid having a zeta potential magnitude, at a temperature of 20°C and a pH of between 5 and 7, of at least about 10 mV, at least about 15 mV, or at least about 20 mV.

In another example of the present disclosure, a method for preparing an ice cream analog food product comprises (a) heating a first mixture to a first temperature, the first mixture comprising a fungal dispersion, the fungal dispersion comprising particles of

filamentous fungus dispersed in a liquid; (b) adding at least one monosaccharide, disaccharide, or polysaccharide to the first mixture to form a fungus- and saccharide-containing mixture; (c) heating the fungus- and saccharide-containing mixture to a second temperature; (d) heating the fungus- and saccharide-containing mixture to a third temperature and maintaining this temperature for at least about two minutes to form an emulsion; (e) cooling the emulsion to a fourth temperature; (f) churning the emulsion to incorporate air into the emulsion; and (g) freezing the emulsion to a fifth temperature.

In examples, the method may further comprise, during step (b), between steps (b) and (c), during step (c), between steps (c) and (d), or during step (d), adding a fatty substance to the fungus- and saccharide-containing mixture.

In one aspect, the present disclosure refers to a method for preparing an ice cream analog food product, comprising: (a) heating a first mixture to a first temperature, the first mixture comprising a fungal dispersion, the fungal dispersion comprising particles of filamentous fungus dispersed in water; (b) adding at least one monosaccharide, disaccharide, or polysaccharide to the first mixture to form a fungus- and saccharide-containing mixture; (c) heating the fungus- and saccharide-containing mixture to a second temperature; (d) heating the fungus- and saccharide-containing mixture to a third temperature and maintaining this temperature for at least about two minutes to form an emulsion; (e) cooling the emulsion to a fourth temperature; (f) churning the emulsion to incorporate air into the emulsion; and (g) freezing the emulsion to a fifth temperature.

In examples, at least one of the first mixture and the fatty substance may comprise a flavoring ingredient.

In examples, at least one of the following may be true: (i) the first temperature is about 40°C; (ii) the second temperature is between about 45°C and about 70°C; (iii) the third temperature is about 82°C; (iv) the fourth temperature is about 5°C; and (v) the fifth temperature is about -18°C.

In examples, the method may further comprise, between steps (e) and (f) or during step (f), adding a flavoring ingredient to the emulsion.

In examples, the method may further comprise, between steps (b) and (c) or during step (c), adding a foam stabilizer to the second mixture.

In examples, the first mixture may comprise at least one monosaccharide or disaccharide and at least one polysaccharide.

In examples, a freezing temperature of the fungal dispersion may be greater than -0.5 °C.

In examples, the fungal dispersion may have a CIELAB lightness value L^* of at least about 64.

In examples, the fungal dispersion may have a dietary fiber content of at least about 2 wt%.

In another example of the present disclosure, an ice cream analog food product is made by a method as disclosed herein.

In one aspect, the present disclosure refers to an ice cream analog food product, made by the method disclosed herein.

In one aspect, the present disclosure refers to a colloidal composition, comprising: an oil phase; an aqueous phase; and filamentous fungal particles that stabilize the colloidal composition, wherein the oil phase is a dispersion medium and the aqueous phase is a liquid dispersed phase, such that the colloidal composition is a water-in-oil colloid.

In one aspect, the present disclosure refers to a particle-stabilized colloidal food product, comprising: a dispersed phase; a dispersion medium; and filamentous fungal particles, wherein: at least a portion of the filamentous fungal particles are positioned at an interface between the dispersed phase and the dispersion medium to stabilize the colloidal food product; and the particle-stabilized colloidal food product is a gel.

The advantages of the present disclosure will be apparent from the disclosure contained herein.

As used herein, “at least one,” “one or more,” and “and/or” are open-ended expressions that are both conjunctive and disjunctive in operation. For example, each of the

expressions “at least one of A, B, and C,” “at least one of A, B, or C,” one or more of A, B, and C,” “one or more of A, B, or C,” and “A, B, and/or C” means A alone, B alone, C alone, A and B together, A and C together, B and C together, or A, B, and C together.

It is to be noted that the term “a” or “an” entity refers to one or more of that entity. As such, the terms “a” (or “an”), “one or more,” and “at least one” can be used interchangeably herein. It is also to be noted that the terms “comprising,” “including,” and “having” can be used interchangeably.

The examples and configurations described herein are neither complete nor exhaustive. As will be appreciated, other examples of the disclosure are possible utilizing, alone or in combination, one or more of the features set forth above or described in detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a flowchart illustrating a method for preparing an ice cream analog food product, according to embodiments of the present invention.

Figure 2 is a graph illustrating results of viscosity testing of an aqueous filamentous fungal homogenate, according to embodiments of the present invention.

Figure 3 is a graph illustrating results of viscosity testing of an aqueous filamentous fungal homogenate treated with a protease, according to embodiments of the present invention.

Figure 4 is a graph illustrating results of viscosity testing of an aqueous filamentous fungal homogenate treated with glycine, according to embodiments of the present invention.

Figure 5 is a graph illustrating results of viscosity testing of an aqueous filamentous fungal homogenate treated with saponins, according to embodiments of the present invention.

Figures 6A and 6B are graphs illustrating results of viscosity testing of an aqueous filamentous fungal homogenate, respectively before and after replacement of the supernatant with a potassium chloride solution, according to embodiments of the present invention.

Figures 7A, 7B, and 7C are images of the morphology of vanilla ice cream analog products made with a drum-dried filamentous fungal flour, a spray-dried filamentous fungal flour, and a filamentous fungal milk, respectively, according to embodiments of the present invention.

Figures 8A, 8B, and 8C are images of the morphology of strawberry ice cream analog products made with a drum-dried filamentous fungal flour, a spray-dried filamentous