Claims

1. A composition comprising solid particles prepared from one or more biological materials, that are capable of locating to or at an interface when combined with two or more immiscible liquids, wherein the biological material is obtained from photosynthetic organisms selected from raw plant or algae material (dried or undried), powder, or mixtures thereof.

2. A composition according to claim 1, wherein the photosynthetic organisms is selected from the group consisting of blue-green algae (spirulina), the Rutaceae family (including Citrus such as orange, lime or lemon), the Malvaceae family (including cocoa and marshmallow), the Rubiaceae family (including coffee), the Amaranthaceae family (including beetroot and spinach), the Poaceae family (including bamboo and oat), the Ginkgoaceae (including ginkgo), the Araliaceae family (including ginseng), the Theaceae (including matcha tea), the Asteraceae family (including milk thistle), the Oleaceae family (including olive tree), the Moringaceae family (including moringa), the Bromeliaceae family (including pineapple), the Brassicaceae family (including red radish), the Rosaceae family (including rosehip), the Sapindaceae family (including guarana), and the Lamiacea family (including rosemary, sage, thyme, basil, and oregano), and mixtures thereof.

3. A composition according to claims 1 or 2, wherein the particles may be prepared from biological material selected from the group consisting of spirulina, Citrus (such as orange, lime or lemon), cocoa, marshmallow, coffee, beetroot, spinach, bamboo, oat, curcuma, ginkgo, ginseng, matcha tea, milk thistle, olive tree, moringa, pineapple, red radish, rosehip or guarana.

4. A composition according to any one of the preceding claims, wherein the particles are present in an amount from about 0.1 to about 100% by weight of the composition, such as from about 1 to about 80% or from about 10 to about 60%.

5. A composition according to any one of the preceding claims, wherein the particles have a diameter from about 0.1 µm to about 100 µm, such as from about 1 µm to about 50 µm.

6. A composition according to any one of the preceding claims, wherein the particles comprise an antioxidant.

7. A composition comprising particles prepared from one or more biological materials that are capable of locating to or at an interface when combined with two or more immiscible liquids, wherein the particles are prepared from animal lipids and/or plant lipids are solid at room temperature, the emulsion comprising an internal phase dispersed in a continuous external phase, wherein particles are located at the interface of the external and the internal phase and wherein and antioxidant is added to the particles.

8. A composition according to claim 6 or 7, wherein the anti-oxidant is in or from a plant or microalgal extract rich in antioxidants.

9. A composition according to claim 8, wherein the plant or microalgal extract rich in antioxidants is a rosemary, sage, or green tea extract, raw material or extraction cake, a Dunaliella salina extract or oleoresin, a spirulina extract or extraction cake, or a spinach extract, raw material or extraction cake.

10. A composition according to any one of claims 6 to 9, wherein the anti-oxidant is an extract from rosemary.

11. A composition according to any one of claims 6 to 10 wherein the antioxidant is selected from the group consisting of tocopherols, tocotrienols, plastochromanols, phenolic diterpenes, flavonoids, phenolic acids and esters, stilbenes, carotenoids, essential oils and mixtures thereof, and/or synthetic antioxidants selected from the group consisting of butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), tert-butyl-hydroxyquinone (TBHQ), propyl gallate (PG), ascorbyl palmitate and mixtures thereof.

12. A composition according to any one of claims 6 to 11, wherein the particles comprise from about 0.01 mg antioxidant/g of particles to about 100 mg antioxidant/g of particles.

13. An emulsion comprising a composition comprising particles as defined in claims 1 to 12, the emulsion comprising an internal phase dispersed in a continuous external phase, wherein particles are located at the interface of the external and the internal phase and at least one of the internal or external phase comprises an oxidisable compound.

14. An emulsion according to claim 13, wherein the oxidisable material comprises a lipid, preferably a lipid with at least one carbon-carbon double bond in the fatty acyl chain.

15. An emulsion according to claim 13 or 14, wherein the lipid with at least one carbon-carbon double bond in the fatty acyl chain is selected from the group consisting of palmitoleic acid, oleic acid, myristoleic acid, linoleic acid, arachidonic acid, linolenic acid, eicosapentaenoic acid, docosahexaenoic acid, sunflower, soybean, canola, rapeseed, flaxseed, olive, peanut, corn, cottonseed, palm, and fish oils.

16. An emulsion according to any one of claims 13 to 15, wherein the emulsion is an oil-in-water emulsion.

17. An emulsion according to any one of claims 13 to 16, wherein the composition is present in an amount from about 0.01 % to about 60 % by weight of the emulsion.

18. An emulsion according to any one of claims 13 to 17, wherein the emulsion comprises from about 1 % to about 80 % w/w liquid oil, and from about 0.1 % to about 10 % particles.

19. An emulsion according to any one of claims 13 to 18, wherein the emulsion comprises from about 0.001 µg antioxidant/g emulsion to about 80 mg antioxidant/g emulsion.

20. A method for reducing or preventing oxidation and/or enhancing the oxidative stability of an emulsion comprising either:

(i) forming an emulsion comprising an internal phase dispersed in a continuous external phase and adding a composition comprising particles as defined in any one of claims 1 to 12 to the emulsion; or

(ii) forming an emulsion comprising an internal phase dispersed in a continuous external phase and a composition comprising particles as defined in any one of claims 1 to 12 by mixing two or more immiscible liquids and the particles under conditions suitable for forming an emulsion;

wherein at least one of the internal or external phase comprises an oxidisable material.

21. A method of prolonging the shelf-life of a beverage, a nutraceutical, a pharmaceutical or food product comprising an emulsion, wherein the method comprises either:

(i) forming an emulsion comprising an internal phase dispersed in a continuous external phase and adding a composition comprising particles as defined in any one of claims 1 to 12 to the emulsion; or

(ii) forming an emulsion comprising an internal phase dispersed in a continuous external phase and a composition comprising particles as defined in any one of claims 1 to 12 by mixing two or more immiscible liquids and the particles under conditions suitable for forming an emulsion;

wherein at least one of the internal or external phase comprises an oxidisable material.

22. The use of a composition comprising particles as defined in any one of claims 1 to 12 to stabilise an emulsion comprising an internal phase dispersed in a continuous external phase by reducing, delaying or preventing oxidation, wherein at least one of the internal or external phase comprises an oxidisable material.

23. The use of a composition comprising particles as defined in any one of claims 1 to 12 to enhance the oxidative stability of an emulsion comprising an internal phase dispersed in a continuous external phase, wherein at least one of the internal or external phase comprises an oxidisable material.

24. The use of a composition comprising particles as defined in any one of claims 1 to 12 to prolong the shelf life of a beverage, a nutraceutical, a pharmaceutical or food product comprising an emulsion, wherein the emulsion comprises an internal phase dispersed in a continuous external phase, and at least one of the internal or external phase comprises an oxidisable material.

25. A method or use according to claims 20 to 24, wherein the oxidisable material comprises a lipid, preferably a lipid with at least one carbon-carbon double bond in the fatty acyl chain.

26. A method or use according to any one of claims 20 to 25, wherein the lipid with at least one carbon-carbon double bond in the fatty acyl chain is selected from the group consisting of palmitoleic acid, oleic acid, myristoleic acid, linoleic acid, arachidonic acid, linolenic acid, eicosapentaenoic acid, docosahexaenoic acid, sunflower, soybean, canola, olive, peanut, corn, cottonseed, palm, and fish oils.

27. A method or use according to any one of claims 20 to 26, wherein the internal phase comprises oil and the external phase comprises water.

28. A method or use according to any one of claims 20 to 27, wherein the composition is present in the emulsion an amount from about 0.01 % to about 60 % by weight of the emulsion.

29. A method or use according to any one of claims 20 to 28, wherein the emulsion comprises from about 1 % to about 80 % w/w liquid oil, and from about 0.01 % to about 60 % particles.

30. A method or use according to any one of claims 20 to 29, wherein the emulsion comprises from about 0.001 µg antioxidant/g emulsion to about 80 mg antioxidant/g emulsion.

31. A method or use according to any one of claims 20 to 30, wherein the particles reduce, delay and/or prevent the formation of oxidation products such as primary oxidation products including lipid hydroperoxides and conjugated diene hydroperoxides and/or secondary oxidation products including aldehyde, ketone, alcohol, and carboxylic acid volatile compounds and/or non-volatile secondary oxidation products such as p-anisidine, epoxides, dimers and polymers.

32. A method or use according to any one of claims 20 to 31, wherein the emulsion is a nutraceutical composition, dietary or food product for humans or animals, nutritional supplement, fragrance or flavouring, pharmaceutical or veterinary composition, oenological or cosmetic formulation or the emulsion is part of a nutraceutical composition, dietary or food product for humans or animals, nutritional supplement, fragrance or flavouring, pharmaceutical or veterinary composition, oenological or cosmetic formulation.

33. A nutraceutical composition, a dietary or food product for human or animals, nutritional supplements, a fragrance or flavouring, a pharmaceutical or veterinary composition, an oenological or cosmetic formulation comprising a composition as defined in any one of claims 1 to 12 or an emulsion as defined in any one of claims 13 to 19.

34. Use of the composition as defined in any one of claims 1 to 12 or the emulsion as defined in any one of claims 13 to 19 to provide a nutraceutical composition, a dietary or food product for humans or animals, a nutritional supplement, a fragrance or flavouring, a pharmaceutical or veterinary composition, an oenological or cosmetic formulation.

35. A method for the preparation of an emulsion as defined in any one of claims 13 to 19, wherein the method comprises:

mixing a composition as defined in any one of claims 1 to 12 with either:

(c) two or more immiscible liquids; or

(d) a pre-prepared emulsion comprising an internal phase dispersed in a continuous external phase.

36. A kit for use to stabilise an emulsion comprising an internal phase dispersed in a continuous external phase by reducing, delaying or preventing oxidation, wherein at least one of the internal or external phase comprises an oxidisable material; the kit comprising particles as defined in any one of claims 1 to 12 and instructions for use.

37. A kit for use to enhance the oxidative stability of an emulsion comprising an internal phase dispersed in a continuous external phase, wherein at least one of the internal or external phase comprises an oxidisable material; the kit comprising particles as defined in any one of claims 1 to 12 and instructions for use.

38. A kit for use to prolong the shelf life of a beverage, a nutraceutical, a pharmaceutical or food product comprising an emulsion, wherein the emulsion comprises an internal phase dispersed in a continuous external phase, and at least one of the internal or external phase comprises an oxidisable material; the kit comprising particles as defined in any one of claims 1 to 12 and instructions for use.