the reaction conditions must be extremely tightly regulated. Hydrogenation (whether partial or full) and interesterification (whether chemical or enzymatic) therefore both share the same requirements for significant investments to operate.

[0008] Therefore, there remains a need for alternative ways to prevent polymorphic transformation of the crystalline structures of oil-based fats.

SUMMARY

[0009] In one aspect, the present disclosure refers to a composition comprising at least one triacylglycerol (TAG), wherein the at least one triacylglycerol comprises at least one odd chain fatty acid (OCFA), wherein the at least one TAG is selected from the group consisting of triundecanoin, tritridecanoin, tripentadecanoin, triheptadecanoin, trinonadecanoin, triheneicosanoin, tritricosanoin, and combinations thereof; wherein at least one of the TAG is tripentadecanoin or triheptadecanoin; and wherein at least one TAG is in an α or a β' crystal form.

[0010] In another aspect, the present disclosure refers to a fat composition comprising the composition as described herein.

[0011] In another aspect, the present disclosure refers to a bakery specialty fat comprising the fat composition as described herein.

[0012] In another aspect, the present disclosure refers to an animal-based product comprising the fat composition as described herein.

[0013] In another aspect, the present disclosure refers to an edible product comprising the fat composition as described herein.

[0014] In another aspect, the present disclosure refers to a cosmetic product comprising the fat composition as described herein.

[0015] In another aspect, the present disclosure refers to a prophylactic product comprising the fat composition as described herein.

[0016] In another aspect, the present disclosure refers to a method of producing a composition comprising at least 80% TAG containing at least one OCFA, the method comprises the following steps: (a) adding at least one OCFA to glycerol in a reaction vessel; (b) adding between 0.1% to 0.3% activated carbon by total reaction mass; (c) flushing the atmosphere with nitrogen gas, thereby obtaining a nitrogen blanket; (d) increasing temperature of the reaction vessel consistently to between 205°C to 210°C; (e) incubating for about 7 to about 8 hours at between about 205°C to about 210°C; (f) allowing the reaction

vessel to cool to about 80°C and subsequently filtering the reaction vessel content, thereby producing a composition comprising at least 80% TAG containing at least one OCFA, wherein the TAG is selected from the group consisting of triundecanoin, tritridecanoin, tripentadecanoin, triheptadecanoin, trinonadecanoin, triheneicosanoin, tritricosanoin, and combinations thereof; and wherein at least one of the TAG is tripentadecanoin or triheptadecanoin.

[0017] In another aspect, the present disclosure refers to a method for obtaining a fat composition as described herein, the method comprising: (i) melting at least one TAG comprising at least one OCFA and melting a fat blend; (ii) mixing the melted at least one TAG

Claims:

1. A composition comprising at least one triacylglycerol (TAG), wherein the at least one triacylglycerol comprises at least one odd chain fatty acid (OCFA), wherein the at least one TAG is selected from the group consisting of triundecanoin, tritridecanoin, tripentadecanoin, triheptadecanoin, trinonadecanoin, triheneicosanoin, tritricosanoin, and combinations thereof; wherein at least one of the TAG is tripentadecanoin or triheptadecanoin; and wherein at least one TAG is in an α or a β′ crystal form.

2. The composition of claim 1, wherein the at least one TAG has a crystal structure that is in the β′ crystal form; or wherein there is more of the β′ crystal form of the at least one TAG present in the composition than any other crystal form of the at least one TAG.

3. The composition of claim 1, wherein the at least one TAG has a crystal structure that is in the α crystal form; or wherein there is more of the α crystal form of the at least one TAG present in the composition than any other crystal form of the at least one TAG.

4. The composition of any one of the preceding claims, wherein the at least one OCFA is a saturated OCFA.

5. The composition of any one of the preceding claims, wherein the at least one OCFA is selected from the group consisting of undecanoic acid (C11:0), tridecanoic acid (C13:0), pentadecanoic acid (C15:0), heptadecanoic acid (C17:0), nonadecanoic acid (C19:0), heneicosanoic acid (C21:0), tricosanoic acid (C23:0), and combinations thereof.

6. The composition of claim 5, wherein the at least one OCFA is selected from the group consisting of pentadecanoic acid (C15:0), heptadecanoic acid (C17:0), and combinations thereof.

7. The composition of any one of the preceding claims, wherein the at least one OCFA is present in an amount of at least 50 wt% of the total composition.

8. A fat composition comprising the composition as defined in any one of claims 1 to 7, and a fat blend.

9. The fat composition of claim 8, wherein the total amount of the at least one TAG comprising at least one OCFA present in the fat composition is in an amount of between 0.4

wt% to 20 wt%, or in an amount of at least 0.5 wt%, at least 1 wt%, at least 2 wt%, at least 3 wt%, at least 6 wt%, at least 9 wt%, at least 12 wt%, at least 15 wt%, or at least 18 wt% of the total fat composition.

10. The fat composition of claim 8 or 9, wherein the fat composition comprises a mixture of TAGs, wherein one of the TAGs is tripentadecanoin or triheptadecanoin.

11. The fat composition of any one of claims 8 to 10, wherein the fat blend comprises a vegetable oil and/or a fractionated product of vegetable oil.

12. The fat composition of claim 11, wherein the vegetable oil is selected from the group consisting of soybean oil, rapeseed oil, coconut oil, palm kernel oil, palm oil, peanut oil, shea nut oil, corn oil, cottonseed oil, rice bran oil, olive oil, canola oil, and combinations thereof.

13. The fat composition of claim 11, wherein the fractionated product of vegetable oil is selected from the group consisting of palm stearin, palm soft stearin, palm hard stearin, palm mid fraction, palm olein, palm super olein, palm kernel stearin, palm kernel olein, shea stearin, and shea olein.

14. The fat composition of any one of claims 11 to 13, where the vegetable oil is palm oil, and the fractionated product of vegetable oil is palm stearin.

15. The fat composition of any one of claims 8 to 14, wherein the fat composition has an x-ray diffraction (XRD) signature showing at least one β′ crystal signal.

16. The fat composition of any one of the claims from 8 to 15, wherein the XRD signature of the fat composition shows β′ crystal form; or wherein the XRD signature of the fat composition shows that there is more TAG of the β′ crystal form present in the fat composition than TAGs of any other crystal form.

17. A bakery specialty fat comprising the fat composition of any one of claims 8 to 16.

18. The bakery specialty fat of claim 17, wherein the bakery specialty fat is selected from the group consisting of puff pastry margarine, puff pastry shortening, general purpose shortening, general purpose margarine, spread margarine, low fat spread, butter oil substitute, and liquid shortening.

19. An animal-based product comprising the fat composition of any one of claims 8 to 16.

20. An edible product comprising the fat composition of any one of claims 8 to 16.

21. A cosmetic product comprising the fat composition of any one of claims 8 to 16.

22. A prophylactic product comprising the fat composition of any one of claims 8 to 16.

23. A method of producing a composition comprising at least 80% TAG containing at least one OCFA, the method comprises the following steps:

(a) adding at least one OCFA to glycerol in a reaction vessel;

(b) adding between 0.1% to 0.3% activated carbon by total reaction mass;

(c) flushing the atmosphere with nitrogen gas, thereby obtaining a nitrogen blanket;

(d) increasing temperature of the reaction vessel consistently to between 205°C to 210°C;

(e) incubating for 7 to 8 hours at between 205 to 210°C;

(f) allowing the reaction vessel to cool to about 80°C and subsequently filtering the reaction vessel content,

thereby producing a composition comprising at least 80% TAG containing at least one OCFA, wherein the TAG is selected from the group consisting of triundecanoin, tritridecanoin, tripentadecanoin, triheptadecanoin, trinonadecanoin, triheneicosanoin, tritricosanoin, and combinations thereof; and wherein at least one of the TAG is tripentadecanoin or triheptadecanoin.

24. The method of claim 23, wherein the ratio of OCFA to glycerol is between 2.9:1 to 3.2:1.

25. The method of claim 23 or 24, wherein the activated carbon is added in an amount of about 0.2% by total reaction mass.

26. The method of any one of claims 23 to 25, wherein the method further comprises:

(g) adding at least 0.1% tetrabutyl titanate (TBT; functions as an esterification catalyst) by total reaction mass to the reaction vessel after step (e) (but before step (f));

(h) incubating the reaction vessel for 4 to 5 hours under negative pressure at between 205°C to 210°C after step (g) (but before step (f));

(i) (after step (f)) alkali washing, dehydrating and decolorising the filtered reaction vessel content from step (f), to obtain the composition.

27. The method of claim 26, where the composition comprises at least 95% TAG with at least one OCFA.

28. The method of any one of claims 23 to 27, wherein the at least one OCFA is selected from the group consisting of undecanoic acid (C11:0), tridecanoic acid (C13:0), pentadecanoic acid (C15:0), heptadecanoic acid (C17:0), nonadecanoic acid (C19:0), heneicosanoic acid (C21:0), tricosanoic acid (C23:0), and combinations thereof.

29. The method of claim 28, wherein the at least one OCFA is selected from the group consisting of pentadecanoic acid (C15:0), heptadecanoic acid (C17:0), and combinations thereof.

30. A method for obtaining a fat composition as defined in any one of claims 8 to 16, the method comprising:

(i) melting at least one TAG comprising at least one OCFA and melting a fat blend;

(ii) mixing the melted at least one TAG and the melted fat blend from step (i) to obtain a mixture; and

(iii) solidifying the mixture from step (ii) to obtain the fat composition.

31. The method of claim 30, wherein step (iii) is carried out at a temperature between 15°C to 20°C.

32. The method of claim 30 or 31, wherein the at least one TAG comprising the at least one OCFA is added in an amount of between 0.4 wt% to 20 wt%, or in an amount of at least 0.5%, at least 1%, at least 2%, at least 3%, at least 6%, at least 9%, at least 12%, at least 15%, or at least 18% of the total fat composition.

33. The method of any one of claims 30 to 32, wherein step (ii) further comprises fractionating after mixing.

34. The method of any one of claims 30 to 33, wherein the method further comprises step (iv) texturizing the solidified mixture.

35. The method of claim 34, wherein texturizing the solidified mixture comprises melting at about 70°C, and cooling at less than 10°C.

36. The method of claim 35, wherein texturizing the solidified mixture comprises traditional margarine or shortening processing, including chilling and working.