CLAIMS

What Is Claimed Is:

1. A process of making an algal biomass comprising at least 67% total fat comprising culturing an algae under culture conditions sufficient to provide an algal biomass comprising 67% or more total fat.

2. The process of claim 1, wherein the algae biomass is cultured in two or more types of culture medium in a sequential manner.

3. The process of claim 2, wherein one culture medium of the two or more culture medium contains 50 g/L of a carbon source, about 7.5 g/L yeast extract, about 0.15 g/L magnesium sulfate, about 0.15 g/L calcium chloride and 0.15 g/L magnesium chloride.

4. The process of claim 3, wherein the carbon source is a sugar.

5. The process of claim 4, wherein the sugar is glucose.

6. The process of claim 2, wherein one culture medium of the two or more culture medium contains 50 g/L of a carbon source, about 7.5 g/L yeast extract, about 4.0 g/L magnesium sulfate, about 1 g/L urea, about 2 g/L calcium chloride, about 2 g/L magnesium chloride and about 0.25 g/L monopotassium phosphate.

7. The process of claim 6, wherein the carbon source is a sugar.

8. The process of claim 7, wherein the sugar is glucose.

9. The process of claim 2, wherein one culture medium of the two or more culture medium contains a carbon source, yeast extract and sea salt.

10. The process of claim 9, wherein the carbon source is a sugar.

11. The process of claim 10, wherein the sugar is glucose.

12. The process of claim 2, wherein the algae are cultured in a first culture medium containing glucose, yeast extract and sea salt; transferred into and incubated in a second culture medium containing glucose, yeast extract, magnesium sulfate, calcium chloride and magnesium chloride; and transferred into and incubated in a third culture medium containing glucose, yeast extract, magnesium sulfate, urea, calcium chloride, magnesium chloride and monopotassium phosphate.

13. The process of claim 12, wherein the third culture medium is supplemented with a fed-batch feed.

14. The process of claim 13, wherein the fed-batch feed comprises urea and monopotassium phosphate.

15. The process of claim 12, wherein the algal biomass is harvested from the third culture medium between 12-24 hours after cessation of the fed-batch process.

16. The process of claim 15, wherein the algal biomass is harvested from the third culture medium after all of the nutrients have been removed/consumed from the medium.

17. The process of claim 15, wherein the algal biomass is harvested via centrifugation of the third culture medium comprising the algal biomass.

18. The process of claim 17, wherein the third culture medium is chilled prior to harvesting the algal biomass.

19. The process of claim 18, wherein the third culture medium is chilled to between about 5 and 25 C.

20. The process of claim 1, wherein the algae is *Schizochytrium limacinum*.

21. The process of claim 12, wherein the first culture medium contains about 50 g/L glucose, about 10 g/L yeast extract and about 4 g/L sea salt.

22. The process of claim 12, wherein the second culture medium contains about 50 g/L glucose, about 7.5 g/L yeast extract, about 0.15 g/L magnesium sulfate, about 0.15 g/L calcium chloride and 0.15 g/L magnesium chloride.

23. The process of claim 12, wherein the third culture medium contains about 50 g/L glucose, about 7.5 g/L yeast extract, about 4.0 g/L magnesium sulfate, about 1 g/L urea, about 2 g/L calcium chloride, about 2 g/L magnesium chloride and about 0.25 g/L monopotassium phosphate.

24. The process of claim 1, wherein the culture conditions comprise running the algae culture at 30 C under airflow and agitation conditions so as to maintain dissolved oxygen at 10%.

25. The process of claim 1, wherein algae are cultured under sterile conditions.

26. An algal biomass having a total fat content of at least 67% by weight comprising about 170-250 mg/g docosahexaenoic acid (DHA) and about 150-400 mg/g palmitic acid.

27. A lipid composition prepared from the algal biomass of claim 26.

28. A food product comprising the lipid composition of claim 27.

29. A food product comprising the algal biomass of claim 26.

30. An algal biomass having a total fat content of at least 67% by weight.

31. Use of an algal biomass having a total fat content of at least 67% by weight in the preparation of a biofuel.

32. The use of claim 31, wherein the biofuel is biodiesel.

CLAIMS

What Is Claimed Is:

1. A process of making an algal biomass comprising at least 67% total fat comprising culturing an algae in two or more types of culture medium sequentially, and wherein said culturing comprises:

culturing the algae in a culture medium comprising a carbon source, yeast extract, a magnesium source, and a calcium source; and subsequently, culturing the algae in a culture medium comprising a carbon source, a yeast extract, a nitrogen source, a phosphate source, a magnesium source, a calcium source, and 4 g/L or less of sodium chloride, wherein the nitrogen and phosphate are in a ratio of 50: 1 to 4: 1, and wherein the type of algae is selected from the group consisting of Thraustochytrium, Schizochytrium, and Aurantiochytrium.

2. The process of claim 1, wherein one culture medium of the two or more types of culture medium contains 50 g/L of a carbon source, 7.5 g/L yeast extract, 0.15 g/L magnesium sulfate, 0.15 g/L calcium chloride and 0.15 g/L magnesium chloride.

3. The process of claim 1, wherein the carbon source is a sugar.

4. The process of claim 3, wherein the sugar is glucose.

5. The process of claim 1, wherein one culture medium of the two or more culture medium contains 50 g/L of a carbon source, 7.5 g/L yeast extract, 4.0 g/L magnesium sulfate 1 g/L urea, 2 g/L calcium chloride, 2 g/L magnesium chloride and 0.25 g/L monopotassium phosphate.

6. The process of claim 5, wherein the carbon source is a sugar.

7. The process of claim 1, wherein one culture medium of the two or more culture medium contains a carbon source, yeast extract and sea salt.

8. The process of claim 7, wherein the carbon source is a sugar.

9. The process of claim 8, wherein the sugar is glucose.

10. The process of claim 1, further comprising culturing the algae in a culture medium containing glucose, yeast extract and sea salt prior to the culturing in the culture medium comprising a carbon source, yeast extract, a magnesium source, and a calcium source.

11. The process of claim 1, wherein the culture medium comprising a carbon source, a yeast extract, a nitrogen source, a phosphate source, a magnesium source, a calcium source, and 4 g/L or less of sodium chloride, wherein the nitrogen and phosphate are in a ratio of 50: 1 to 4: 1 is supplemented with a fed-batch feed.

12. The process of claim 11, wherein the fed-batch feed comprises urea and monopotassium phosphate.

13. The process of claim 11, wherein the algal biomass is harvested from the culture medium between 12-24 hours after cessation of the fed-batch process.

14. The process of claim 13, wherein the algal biomass is harvested from the culture medium after all of the nutrients have been removed/consumed from the medium.

15. The process of claim 13, wherein the algal biomass is harvested via centrifugation of the culture medium comprising the algal biomass.

16. The process of claim 15, wherein the culture medium is chilled prior to harvesting the algal biomass.

17. The process of claim 16, wherein the culture medium is chilled to between about 5 and 250 C.

18. The process of claim 1, wherein the algae is *Schizochytrium limacinum.*

19. The process of claim 10, wherein the culture medium contains 50 g/L glucose, about 10 g/L yeast extract and about 4 g/L sea salt.

20. The process of claim 1, wherein the culture conditions comprise running the algae culture at 300C under airflow and agitation conditions so as to maintain dissolved oxygen at 10%.

21. The process of claim 1, wherein algae are cultured under sterile conditions.

22. The process of claim 1, wherein the culture medium comprising a carbon source, a yeast extract, a nitrogen source, a phosphate source, a magnesium source, a calcium source, and 4 g/L or less of sodium chloride, wherein nitrogen and phosphate are in a ratio of 50:1 to 4:1 has magnesium and calcium in a ratio of 4.5:1 to 1: 1.

23. The process of claim 1, wherein the nitrogen source is at least one of urea, peptone, malt extract, meat extract, casamino acid, corn steep liquor, sodium glutamate, ammonium acetate, ammonium sulfate, ammonium chloride, or ammonium nitrate.