Claims

1. A method for purification of lipid material originating from biological material **characterized** in that said method comprises the steps of

a. providing said lipid material comprising acylglycerols and phosphorus impurities and at least one added nonpolar solvent and at least one added polar solvent into a reaction zone whereby at least a two phase system comprising a nonpolar phase and a polar phase is formed, and
b. heating said phase system in the closed reaction zone under mixing at a temperature from 150 °C to 300 °C and at a pressure wherein said solvents are in subcritical state, preferably of below 100 bar, dependent on the vapor pressure of the selected solvents, until the phosphorus impurity is removed from the polar phase, and
c. separating and recovering from said phase system said nonpolar phase including the purified oil comprising acylglycerols.

2. The method according to claim 1 **characterized** in that said phosphorus impurities are in the form of phospholipids.

3. The method according to claim 1or 2 **characterized** in that said biological material comprises plant, animal or microorganism material.

4. The method according to claim 3 **characterized** in that said plant material is selected from the group of vegetable fat plants, preferably selected from the group of seed oil, vegetable oil, fruit oil and pine oil, more preferably selected from rapeseed, canola, soybean, palm, cotton, sunflower, camelina, jatropha, corn, hemp and used cooking oil.

5. The method according to claim 2 or 3 **characterized** in that said animal material comprises animal fat, preferably rendered animal fat, more preferably selected from beef, pork, sheep or poltry lard, tallow, butter or fat or mixtures thereof.

6. The method according to claim 2 or 3 **characterized** in that said microorganism material is selected from the group of algae, bacteria, fungi, preferably algae and fungi, most preferably algae.

7. The method according to claim 1 **characterized** in that said lipid material is oil containing residue or waste originating from oil extraction processes, preferably from degumming.

8. The method according to claim 1 **characterized** in that said lipid material further comprises complex lipids selected from glycolipids and sphingolipids.

9. The method according to claim 1 **characterized** in that said temperature is from 160 °C to 260 °C, preferably from 180 °C to 250 °C, more preferably from 190 °C to 240 °C, such as from 200 °C to 230 °C, or even from 210 °C to 230 °C.

10. The method according to any one of the previous claims **characterized** in that said at least two phase system further comprises a third phase, preferably said at least two phase system further comprises a third phase comprising solid impurities or solid phase residue formed during processing.

11. The method according to any of the previous claims **characterized** in that said nonpolar solvent comprises aliphatic or cyclic alkanes of C_3-C_{20} or mixtures thereof, preferably C_5-C_{16} alkanes or mixtures thereof, more preferably product from hydrodeoxygenation process, LIAV, hexane, heptanes, octane or mixtures thereof.

12. The method according to any of the previous claims **characterized** in that said polar solvent comprises water, preferably a mixture of water and an alcohol readily soluble in water, more preferably a mixture of water and an alcohol selected from methanol, ethanol and a mixture thereof.

13. The method according to any one of the previous claims **characterized** in that said purified oil is recovered dissolved in the nonpolar solvent and the impurities are removed from the nonpolar phase together with the polar phase or as a solid.

14. The method according to any one of the previous claims **characterized** in that the ratio of said lipid material to said nonpolar solvent is less than 10:1, preferably 1:1, more preferably 1:5, most preferably 1:10.

15. The method according to any one of the previous claims **characterized** in that the ratio of the combined amount of said lipid material and nonpolar solvent to polar solvent is more than 1:10, preferably 1:5, more preferably 1:1, most preferably at least 5:4, such as 10:1.

16. Use of said purified oil obtained from the method according to any of the claims 1–16 for production of biodiesel, renewable diesel, jet fuel, gasoline or base oil components.

Claims

1. A method for purification of lipid material originating from biological material characterized in that said method comprises the steps of

a. providing said lipid material comprising acylglycerols and phosphorus impurities and at least one added nonpolar solvent and at least one added polar solvent into a reaction zone whereby at least a two phase system comprising a nonpolar phase and a polar phase is formed, and

b. heating said phase system in the closed reaction zone under mixing at a temperature from 150 °C. to 300 °C. and at a pressure wherein said solvents are in subcritical state until the phosphorus impurity is removed from the polar phase, and

c. separating and recovering from said phase system said nonpolar phase including the purified oil comprising acylglycerols.

2. The method according to claim 1 characterized in that said phosphorus impurities are in the form of phospholipids.

3. The method according to claim 1 characterized in that said biological material comprises plant, animal or microorganism material.

4. The method according to claim 3 characterized in that said plant material is selected from the group of seed oil, vegetable oil, fruit oil and pine oil.

5. The method according to claim 3 characterized in that said animal material comprises rendered animal fat selected from beef, pork, sheep or poultry lard, tallow, butter or fat or mixtures thereof.

6. The method according to claim 3 characterized in that said microorganism material is selected from the group of algae, bacteria, fungi, preferably algae and fungi.

7. The method according to claim 1 characterized in that said lipid material is oil containing residue or waste originating from oil extraction processes.

8. The method according to claim 1 characterized, in that said lipid material further comprises complex lipids selected from glycolipids and sphingolipids.

9. The method according to claim 1 characterized in that said temperature is from 160 °C. to 260 °C.

10. The method according to claim 1 characterized in that said at least two phase system further comprises a third phase, comprising solid impurities or solid phase residue formed during processing.

11. The method according to claim 1 characterized in that said nonpolar solvent comprises aliphatic or cyclic alkanes of C_3-C_{20} or mixtures thereof.

12. The method according to claim 1 characterized in that said polar solvent comprises water.

13. The method according to claim 1 characterized in that said purified oil is recovered dissolved in the nonpolar solvent and the impurities are removed from the nonpolar phase together with the polar phase or as a solid.

14. The method according to claim 1 characterized in that the ratio of said lipid material to said nonpolar solvent is less than 10:1.

15. The method according to claim 1 characterized in that the ratio of the combined amount of said lipid material and nonpolar solvent to polar solvent is more than 1:10.

16. The method according to claim 3 characterized in that said plant material is selected from the group of canola, soybean, palm, cotton, sunflower, camelina, jatropha, corn, hemp and used cooking oil.

17. The method according to claim 1 characterized in that said nonpolar solvent comprises C_5-C_{16} alkanes or mixtures thereof.

18. The method according to claim 1 characterized in that said polar solvent comprises a mixture of water and an alcohol readily soluble in water.

19. The method according to claim 1 characterized in that the ratio of said lipid material to said nonpolar solvent is less than 1:1.