What is claimed is:

1. A process for obtaining a microbial oil comprising one or more polyunsaturated fatty acids from one or more microbial cells, wherein the process comprises:
(a) lysing the cells comprising the microbial oil to form a lysed cell composition;
(b) demulsifying the lysed cell composition by adding an acid to form a demulsified lysed cell composition;
(c) separating the oil from the demulsified lysed cell composition; and
(d) recovering the oil;
wherein (b) comprises lowering the pH of the lysed cell composition to a pH of from about 0.5 to 6.0.

2. The process of claim 1, wherein at least one of (a) or (b) further comprises heating the cells or the composition to at least 70° C.

3. The process of claim 2, wherein at least one of (a) or (b) further comprises heating the cells or the composition to from about 70° C to about 100° C.

4. The process of claim 1, wherein (b) further comprises adding an emulsifier to the lysed cell composition.

5. The process of claim 1, wherein (b) further comprises adding an acid in an amount of from about 0.5% to about 20%, by weight, lysed cell composition.

6. The process of claim 1, wherein (b) further comprises adding a salt in an amount of from about 0.05% to about 20%, by weight, of the lysed cell composition.

7. The process of claim 1, wherein (b) further comprises agitating the lysed cell composition.

8. The process of claim 1, wherein (a) further comprises agitating the cells.

9. The process according to claim 1, wherein the acid is selected from sulfuric,

phosphoric, hydrochloric, hydrobromic, hydroiodic, hypochlorous, chlorous, chloric, perchloric, fluorosulfuric nitric, fluoroantimonic, fluoroboric, hexafluorophosphoric, chromic, boric, acetic, citric, formic, and combinations thereof.

10. The process of claim 9, wherein the acid is sulfuric.

11. The process of claim 1, wherein the cells of (a) are unwashed.

12. The process of claim 1, wherein the cells of (a) are contained in a fermentation broth.

13. The process of claim 1, wherein (c) further comprises centrifuging the demulsified lysed cell composition.

14. The process of claim 1, wherein the polyunsaturated fatty acid is selected from an omega-3 fatty acid, an omega-6 fatty acid, and mixtures thereof.

15. The process of claim 1, wherein the polyunsaturated fatty acid is selected from docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA), arachidonic acid (ARA), gamma-linolenic acid (GLA), dihomo-gamma-linolenic acid (DGLA), stearidonic acid (SDA), and mixtures thereof.

16. The process of claim 15, wherein the polyunsaturated fatty acid is docosahexaenoic acid (DHA).

17. The process of claim 15, wherein the polyunsaturated fatty acid is arachidonic acid (ARA).

18. The process of claim 1, wherein the microbial cells are algae, yeast, fungi, protist, or bacteria cells.

19. The process of claim 1, wherein the microbial cells are from the genus *Mortierella*, genus *Crypthecodinium*, or order Thraustochytriales.

20. The process of claim 18, wherein the microbial cells are from the order Thraustochytriales.

21. The process of claim 19, wherein the microbial cells are from the genus *Thraustochytrium*, *Schizochytrium*, or mixtures thereof.

22. The process of claim 18, wherein the microbial cells are from *Mortierella* Alpine.

23. The process of claim 1, wherein the lysed cell composition comprises liquid, cell debris, and microbial oil.

24. The process of claim 1, wherein an organic solvent is not used to obtain the oil from the cells.

25. The process of claim 1, wherein the mean particle size of the demulsified lysed cell composition is 25 microns or less.

26. The process of claim 4, wherein the emulsifier is an ionic emulsifier.

27. The process of claim 26, wherein the ionic emulsifier is an anionic emulsifier selected from an anionic sulfate emulsifier, an anionic sulfonate emulsifier, an anionic phosphate emulsifier, an anionic carboxylate emulsifier, and combinations thereof.

28. The process of claim 27, wherein the ionic emulsifier is an anionic sulfate emulsifier selected from ammonium lauryl sulfate, sodium dodecyl sulfate, sodium laureth sulfate, sodium lauryl ether sulfate, sodium myreth sulfate, and combinations thereof.

29. The process of claim 4, wherein the emulsifier is added in an amount of from 0.2% to 10% by weight of the lysed cell composition.

30. The process of claim 6, wherein the salt is selected from the group consisting of alkali metal salts, alkali earth metal salts, sulfate salts, and combinations thereof.

31. The process of claim 1, wherein the oil of (d) is a crude oil.

32. The process of claim 31, wherein (d) further comprises refining the crude oil to obtain a refined oil.

33. The process of claim 1, wherein the oil comprises at least 30% by weight arachidonic acid.

34. The process of claim 1, wherein the oil comprises at least 30% by weight docosahexaenoic acid.

35. The process of claim 1, wherein the oil has an anisidine value of less than about 50.

36. The process of claim 1, wherein the oil has a phosphorus content of about 8 ppm or less.

37. The process of claim 1, wherein the oil has a peroxide value of less than about 5 meq/kg.

38. The process according to claim 1 wherein (a) and (b) are combined together to form a one-step lysing and demulsifying step.

39. The process according to claim 1, wherein (c) further comprises raising the pH of the demulsified lysed cell composition.

40. A process for obtaining a microbial oil comprising one or more polyunsaturated fatty acids from one or more microbial cells, wherein the process comprises:
(a) lysing the cells comprising the microbial oil by adding an acid to form a demulsified lysed cell composition having a pH from about 0.5 to 6;
(b) separating the oil from the demulsified lysed cell composition; and
(c) recovering the oil;
wherein said demulsified lysed cell composition is obtained during said lysing.