Summary

In one aspect, there is provided a genetically modified yeast, comprising:

at least one genetic modification that ~~substantially~~ blocks beta oxidation activity;

at least one genetic modification that increase at least one activity selected from the group consisting of: monooxygenase activity, monooxygenase reductase activity, thioesterase activity, acyltransferase activity, isocitrate dehydrogenase activity, glyceraldehyde-3-phosphate dehydrogenase activity, glucose-6-phosphate dehydrogenase activity, acyl-coA oxidase activity, fatty alcohol oxidase activity, acyl-CoA hydrolase activity, alcohol dehydrogenase activity, peroxisomal biogenesis factor activity, fatty aldehyde dehydrogenase activity, CTF, UTR, FAT1; and

at least one genetic modification that decreases MIG1 activity, as compared to corresponding yeast not comprising said genetic modification.

In one aspect, there is provided a method for producing a desired diacid, comprising:

contacting a genetically modified yeast as described herein with a feedstock capable of being converted by the yeast to a diacid; and

culturing the yeast under conditions in which the desired diacid is produced from the feedstock.

In one aspect, there is provided a method for producing a desired diacid by a yeast from a feedstock toxic to the yeast, comprising:

(a) contacting a genetically modified yeast in culture with a feedstock not substantially toxic to the yeast, thereby performing an induction; and

(b) contacting the yeast after the induction in (a) with a feedstock toxic to the yeast,

whereby the desired diacid is produced by the yeast from the feedstock toxic to the yeast in an amount greater than the amount of the diacid produced from the feedstock toxic to the yeast when the induction is not performed.

In one aspect, there is provided a diacid produced by the method as described herein.

We Claim:

1. A genetically modified yeast, comprising:

at least one genetic modification that substantially blocks beta oxidation activity;

at least one genetic modification that increase at least one activity selected from the group consisting of: monooxygenase activity, monooxygenase reductase activity, thioesterase activity, acyltransferase activity, isocitrate dehydrogenase activity, glyceraldehyde-3-phosphate dehydrogenase activity, glucose-6-phosphate dehydrogenase activity, acyl-coA oxidase activity, fatty alcohol oxidase activity, acyl-CoA hydrolase activity, alcohol dehydrogenase activity, peroxisomal biogenesis factor activity, fatty aldehyde dehydrogenase activity, CTF, UTR, FAT1; and

at least one genetic modification that decreases MIG1 activity, as compared to corresponding yeast not comprising said genetic modification.

2. The genetically modified yeast of claim 1, comprising at least one genetic modification that increases one or more monooxygase activities selected from a CYP52A12 monooxygenase activity, CYP52A13 monooxygenase activity, CYP52A14 monooxygenase activity, CYP52A15 monooxygenase activity, CYP52A16 monooxygenase activity, CYP52A17 monooxygenase activity, CYP52A18 monooxygenase activity, CYP52A19 monooxygenase activity, CYP52A20 monooxygenase activity, CYP52D2 monooxygenase activity and BM3 monooxygenase activity.

3. The genetically modified yeast according to one of claims 1-2, comprising at least one genetic modification that increases one or more monooxygenase reductase activities selected from the group consisting of: CPRA monooxygenase reductase activity, CPRB monooxygenase reductase activity and CPR750 monooxygenase reductase activity.

4. The genetically modified yeast according to one of claims 1-3 comprising at least one genetic modification that increases IDP2 isocitrate dehydrogenase activity.

5. The genetically modified yeast according to one of claims 1-4 comprising at least one genetic modification that increases a GDP1 glyceraldehyde-3-phosphate dehydrogenase activity.

6. The genetically modified yeast according to one of claims 1-5, comprising at least one genetic modification that increases at least one glucose-6-phosphate dehydrogenase activity selected from the group consisting of: a ZWF1 glucose-6-phosphate dehydrogenase activity and ZWF2 glucose-6-phosphate dehydrogenase activity.

7. The genetically modified yeast according to one of claims 1-6, comprising at least one genetic modification that increases one or more fatty alcohol oxidase activities selected from the group consisting of: FAO1 fatty alcohol oxidase activity, FAO2A fatty alcohol oxidase activity, FAO2B fatty alcohol oxidase activity, FAO13 fatty alcohol oxidase activity, FAO17 fatty alcohol oxidase activity, FAO18 fatty alcohol oxidase activity and FAO20 fatty alcohol oxidase activity.

8. The genetically modified yeast according to one of claims 1-7, comprising at least one genetic modification that increases one or more alcohol dehydrogenase activities selected from the group consisting of: ADH1 alcohol dehydrogenase activity, ADH2 alcohol dehydrogenase activity, ADH3 alcohol dehydrogenase activity, ADH4 alcohol dehydrogenase activity, ADH5 alcohol dehydrogenase activity, ADH7 alcohol dehydrogenase activity, ADH8 alcohol dehydrogenase activity and SFA alcohol dehydrogenase activity.

9. The genetically modified yeast according to one of claims 1-8, comprising at least one genetic modification that increases one or more acyl-CoA hydrolase activities selected from the group consisting of: ACH-A acyl-CoA hydrolase activity and ACH-B acyl-CoA hydrolase activity.

10. The genetically modified yeast according to one of claims 1-9, comprising at least one genetic modification that increases one or more acyltransferase activities selected from the group consisting of: acyl-CoA sterol acyltransferase activity, diacylglycerol acyltransferase activity and phospholipid:diacylglycerol acyltransferase activity.

11. The genetically modified yeast according to claim 10, wherein the one or more acyltransferase activities are selected from the group consisting of: ARE1 acyl-CoA sterol acyltransferase activity, ARE2 acyl-CoA sterol acyltransferase activity, DGA1 diacylglycerol acyltransferase activity, and LRO1 phospholipid:diacylglycerol acyltransferase activity.

12. The genetically modified yeast according to any one of claims 1 to 11, comprising at least one genetic modification that increases an acyl-coA thioesterase activity.

13. The genetically modified yeast according to claim 12, wherein the acyl-coA thioesterase activity is a TESA acyl-coA thioesterase activity.

14. The genetically modified yeast according to any one of claims 1 to 13, comprising at least one genetic modification that increases a PEX11 peroxisomal biogenesis factor activity.

15. The genetically modified yeast according to any one of claims 1 to 14, comprising at least one genetic modification that increases one or more fatty aldehyde dehydrogenase activites selected from the group consisting of: HFD1 fatty aldehyde dehydrogenase activity and HFD2 fatty aldehyde dehydrogenase activity.

16. The genetically modified yeast according to any one of claims 1 to 15, comprising at least one genetic modification that increases a POX5 acyl-coA oxidase activity.

17. The genetically modified yeast according to any one of claims 1 to 13, comprising at least one genetic modification that increases a monooxygenase activity and a monooxygenase reductase activity.

18. The genetically modified yeast according to claim 17, wherein the at least one genetic modification increases a CYP52A19 monooxygenase activity and a CPRB monooxygenase reductase activity.

19. The genetically modified yeast according to claim 17, wherein the at least one genetic modification increases a CYP52A14 monooxygenase activity and a CPRB monooxygenase reductase activity.

20. The genetically modified yeast according to any one of claims 1-19, comprising one or more genetic modifications resulting in an increase in a monooxygenase activity, a monooxygenase reductase activity, and a isocitrate dehydrogenase activity.

21. The genetically modified yeast according to claim 20, wherein one or more genetic modifications increase a CYP52A19 monooxygenase activity, a CPRB monooxygenase reductase activity, and a IDP2 isocitrate dehydrogenase activity.

22. The genetically modified yeast according to any one of claims 1 to 21, comprising at least one genetic modification that increases a monooxygenase activity, a monooxygenase reductase activity, and a glucose-6-phosphate dehydrogenase activity.

23. The genetically modified yeast according to claim 22, comprising at least one genetic modification that increases a CYP52A19 monooxygenase activity, a CPRB monooxygenase reductase activity, and a ZWF1 glucose-6-phosphate dehydrogenase activity.

24. The genetically modified yeast according to any one of claims 1 to 23, wherein said monooxygenase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 52, 53, 54, 55, 56, 57, 58, 59, 60 and 61.

25. The genetically modified yeast according to claim 24, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24.

26. The genetically modified yeast according to any one of claims 1-25, wherein said monooxygenase reductase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 28, 63, 64 and 65.

27. The genetically modified yeast according to claim 26, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 24, 25, 26 and 27.

28. The genetically modified yeast according to any one of claims 1-27, wherein a thioesterase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 38.

29. The genetically modified yeast according to claim 28, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 37.

30. The genetically modified yeast according to any one of claims 1-29, wherein an acyltransferase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 44, 46, 48 and 50.

31. The genetically modified yeast according to claim 30, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 43, 45, 47 and 49.

32. The genetically modified yeast according to any one of claims 1 to 31, wherein an isocitrate dehydrogenase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 67, 69 or 100.

33. The genetically modified yeast according to claim 32, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 68, 70 or 99.

34. The genetically modified yeast according to any one of claims 1-34, wherein a glyceraldehyde-3-phosphate dehydrogenase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 72.

35. The genetically modified yeast according to claim 34, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 71.

36. The genetically modified yeast according to any one of claims 1-35, wherein a glucose-6-phosphate dehydrogenase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 74, 76 or 157.

37. The genetically modified yeast according to claim 36, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 73 or 75.

38. The genetically modified yeast according to any one of claims 1-37, wherein an acyl-coA oxidase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 32.

39. The genetically modified yeast according to claim 38, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 31.

40. The genetically modified yeast according to any one of claims 1-39, wherein a fatty alcohol oxidase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 3, 5, 7, 9, 11, 13, 132 and 134.

41. The genetically modified yeast according to claim 40, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 2, 4, 6, 8, 10, 12, 131 and 133.

42. The genetically modified yeast according to any one of claims 1-41, wherein an acyl-CoA hydrolase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 34 and 36.

43. The genetically modified yeast according to claim 42, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 33 and 35.

44. The genetically modified yeast according to any one of claims 1-43, wherein an alcohol dehydrogenase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 129, 113, 115, 117, 119, 121, 123, 125, 127, 152 and 154.

45. The genetically modified yeast according to claim 44, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 130, 114, 116, 118, 120, 122, 124, 126, 128, 153 and 155.

46. The genetically modified yeast according to any one of claims 1-45, wherein a peroxisomal biogenesis factor activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 96.

47. The genetically modified yeast according to claim 46, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 95.

48. The genetically modified yeast according to any one of claims 1-47, wherein a fatty aldehyde dehydrogenase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 139 and 141.

49. The genetically modified yeast according to claim 48, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 140 and 142.

50. The genetically modified yeast according to any one of claims 1-49, comprising at least one genetic modification that decreases an acyl-coA synthetase activity.

51. The genetically modified yeast according to claim 50, wherein the at least one genetic modification decreases one or more acyl-coA synthetase activities selected from the group consisting of: ACS1 acyl-coA synthetase activity and FAT1 long-chain acyl-CoA synthetase activity.

52. The genetically modified yeast according to any one of claims 50-51, wherein at least one genetic modification disrupts a nucleic acid that encodes a polypeptide having the acyl-coA synthetase activity.

53. The genetically modified yeast according to any one of claims 50-52, wherein the acyl-coA synthetase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 40, 42, 80, 82, 84, 90, 158 and 159.

54. The genetically modified yeast according to claim 53, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 39, 41, 79, 81, 83 and 89.

55. The genetically modified yeast according to any one of claims 1-54, which is a Candida spp. yeast.

56. The genetically modified yeast according to claim 55, wherein the Candida spp. yeast is selected from the group consisting of: C. tropicalis and C. viswanathii.

57. The genetically modified yeast according to claim 56, wherein the Candida spp. yeast is a genetically modified ATCC20336 yeast.

58. The genetically modified yeast according to any one of claims 1-57, which is selected from the group consisting of: a Yarrowia spp. yeast, Pichia spp. yeast, Saccharomyces spp. yeast and Kluyveromyces spp. yeast.

59. The genetically modified yeast according to claim 58, which is selected from the group consisting of: Y. lipolytica, P. pastoris, P. membranifaciens, P. kluyveri, P. guilliermondii, P. heedii, P. subpelliculosa, S. cerevisiae, S. bayanus, S. pastorianus, S. carlsbergensis, K. lactis and K. marxianus.

60. The genetically modified yeast according to any one of claims 1-59, wherein said yeast is capable of producing a desired diacid from a feedstock comprising at least one component obtained from a vegetable oil.

61. The genetically modified yeast according to claim 60, wherein the desired diacid is a C4 to C24 diacid.

62. The genetically modified yeast according to claim 61, wherein the desired diacid is a C10, C12, C14, C16, C18 or C20 diacid.

63. The genetically modified yeast according to claim 62, wherein the desired diacid is a C10 diacid.

64. The genetically modified yeast according to claim 62, wherein the desired diacid is a C12 diacid.

64. The genetically modified yeast according to claim 62, wherein the desired diacid is a C18 diacid.

65. The genetically modified yeast according to any one of claims 60-64, wherein the desired diacid contains no substantial unsaturation.

66. The genetically modified yeast according to any one of claims 60-64, wherein the desired diacid contains one or more unsaturations.

67. The genetically modified yeast according to any one of claims 60-66, wherein the desired diacid is the predominant diacid in a mixture of diacids.

68. The genetically modified yeast according to any one of claims 60-67, wherein the feedstock comprises a substantially pure oil.

69. The genetically modified yeast according to any one of claims 60-68, wherein the feedstock comprises a plurality of fatty acids.

70. The genetically modified yeast according to claim 69, wherein the feedstock comprises a soapstock.

71. The genetically modified yeast according to claim 69, wherein the feedstock comprises a fatty acid distillate.

72. The genetically modified yeast according to any one of claims 60-71, wherein the vegetable oil is from a plant selected from the group consisting of: palm, palm kernel, coconut, soy, safflower, canola or combination thereof.

73. The genetically modified yeast according to any one of claims 1-72, wherein a genetic modification that increases an activity comprises incorporating in the yeast multiple copies of a polynucleotide that encodes a polypeptide having the activity.

74. The genetically modified yeast according to any one of claims 1-73, wherein a genetic modification that increases an activity comprises incorporating in the yeast a promoter in operable linkage with a polynucleotide that encodes a polypeptide having the activity.

75. The genetically modified yeast according to claim 74, wherein the promoter is native to the yeast.

76. The genetically modified yeast according to any one of claims 74-75, wherein the promoter is selected from the group consisting of: a POX4 promoter, PEX11 promoter, TEF1 promoter, PGK promoter and FAO1 promoter.

77. The genetically modified yeast according to claim 76, wherein the promoter comprises a polynucleotide selected from the group consisting of: SEQ ID NOs: 162, 165, 166, 167 and 169.

78. A method for producing a desired diacid, comprising:

contacting a genetically modified yeast of any one of claims 1-77 with a feedstock capable of being converted by the yeast to a diacid; and

culturing the yeast under conditions in which the desired diacid is produced from the feedstock.

79. The method of claim 78, wherein the feedstock comprises one or more components from a vegetable oil.

80. The method of any one of claims 78-79, wherein the desired diacid is a C4 to C24 diacid.

81. The method of claim 80, wherein the desired diacid is a C10, C12, C14, C16, C18 or C20 diacid.

82. The method of claim 81, wherein the desired diacid is a C10 diacid.

83. The method of claim 81, wherein the desired diacid is a C12 diacid.

84. The method of claim 81, wherein the desired diacid is a C18 diacid.

85. The method of any one of claims 78-84, wherein the desired diacid contains no unsaturation.

86. The method of any one of claims 78-85, wherein the desired diacid contains one or more unsaturations.

87. The method of any one of claims 78-86, wherein the desired diacid is the predominant diacid in a mixture of diacids.

88. The method of any one of claims 78-87, wherein the feedstock comprises a substantially pure oil.

89. The method of any one of claims 78-87, wherein the feedstock comprises a plurality of fatty acids.

90. The method of claim 89, wherein the feedstock comprises a soapstock.

91. The method of claim 89, wherein the feedstock comprises a fatty acid distillate.

92. The method of any one of claims 78-91, wherein the vegetable oil is from a plant selected from the group consisting of: palm, palm kernel, coconut, soy, safflower, canola or combination thereof.

93. The method of any one of claims 78-85 wherein the feedstock comprises a fatty acid methyl ester.

94. The method of claim 93 wherein the fatty acid methyl ester is methyl laurate and the diacid comprises dodecanedioic acid.

95. The method of any one of claims 78-85 wherein the feedstock comprises a fatty acid ethyl ester and the diacid comprises dodecanedioic acid.

96. The method of any one of claims 78-85 wherein the feedstock comprises lauric acid and the diacid comprises dodecanedioic acid.

97. The method of any one of claims 78-85 wherein the feedstock comprises ethyl caprate and the diacid comprises sebacic acid.

98. A diacid produced by the method of any one of claims 78-97.

99. A method for producing a desired diacid by a yeast from a feedstock toxic to the yeast, comprising:

(a) contacting a genetically modified yeast in culture with a feedstock not substantially toxic to the yeast, thereby performing an induction; and

(b) contacting the yeast after the induction in (a) with a feedstock toxic to the yeast,

whereby the desired diacid is produced by the yeast from the feedstock toxic to the yeast in an amount greater than the amount of the diacid produced from the feedstock toxic to the yeast when the induction is not performed.

100. The method according to claim 99, wherein the feedstock not substantially toxic to the yeast has the same number of carbons as the feedstock toxic to the yeast.

101. The method according to claim 99, wherein the feedstock not substantially toxic to the yeast has a different number of carbons compared to the feedstock toxic to the yeast.

102. The method according to any one of claims 99-101, wherein the feedstock not substantially toxic to the yeast comprises a fatty acid methyl ester.

103. The method according to any one of claims 99-102, wherein the feedstock not substantially toxic to the yeast comprises a free fatty acid.

104. The method according to any one of claims 99-103, wherein the feedstock not substantially toxic to the yeast comprises more than twelve carbons.

105. A diacid produced by the method of any one of claims 99-104.

106. An isolated nucleic acid comprising a polynucleotide that encodes a polypeptide of SEQ ID NO: 148 or 150.

107. The isolated nucleic acid according to claim 106, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 147 or 149.

108. An isolated nucleic acid, comprising a polynucleotide that comprises: the nucleotide sequence of SEQ ID NO: 37 or a nucleotide sequence having greater than 75% identity to SEQ ID NO: 37.

109. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 44; a polypeptide comprising an amino acid sequence having greater than 71% identity to SEQ ID NO: 44; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 44.

110. The isolated nucleic acid of claim 109, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 43 or a nucleotide sequence having greater than 69% identity to SEQ ID NO: 43.

111. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 46; a polypeptide comprising an amino acid sequence having greater than 71% identity to SEQ ID NO: 46; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 46.

112. The isolated nucleic acid according to claim 111, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 45 or a nucleotide sequence having greater than 70% identity to SEQ ID NO: 45.

113. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 48; a polypeptide comprising an amino acid sequence having greater than 87% identity to SEQ ID NO: 48; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 48.

114. The isolated nucleic acid according to claim 113, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 47 or a nucleotide sequence having greater than 78% identity to SEQ ID NO: 47.

115. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 50; a polypeptide comprising an amino acid sequence having greater than 80%

identity to SEQ ID NO: 50; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 50.

116. The isolated nucleic acid according to claim 115, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 49 or a nucleotide sequence having greater than 75% identity to SEQ ID NO: 49.

117. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 67; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 67; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 67.

118. The isolated nucleic acid according to claim 117, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 68 or a nucleotide sequence having greater than 97% identity to SEQ ID NO: 68.

119. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 74; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 74; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 74.

120. The isolated nucleic acid according to claim 119, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 73 or a nucleotide sequence having greater than 97% identity to SEQ ID NO: 73.

121. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 76; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 76; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 76.

122. The isolated nucleic acid according to claim 121, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 75 or a nucleotide sequence having greater than 99% identity to SEQ ID NO: 75.

123. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 3; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 3; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 3.

124. The isolated nucleic acid according to claim 123, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 2 or a nucleotide sequence having greater than 99% identity to SEQ ID NO: 2.

125. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 5; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 5; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 5.

126. The isolated nucleic acid according to claim 125, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 4 or a nucleotide sequence having greater than 98% identity to SEQ ID NO: 4.

127. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 7; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 7; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 7.

128. The isolated nucleic acid according to claim 127, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 6 or a nucleotide sequence having greater than 99% identity to SEQ ID NO: 6.

129. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 34; a polypeptide comprising an amino acid sequence having greater than 95% identity to SEQ ID NO: 34; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 34.

130. The isolated nucleic acid according to claim 129, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 33 or a nucleotide sequence having greater than 73% identity to SEQ ID NO: 33.

131. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 36; a polypeptide comprising an amino acid sequence having greater than 94% identity to SEQ ID NO: 36; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 36.

132. The isolated nucleic acid according to claim 131, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 35 or a nucleotide sequence having greater than 73% identity to SEQ ID NO: 35.

133. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 129; a polypeptide comprising an amino acid sequence having greater than 89% identity to SEQ ID NO: 129; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 129.

134. The isolated nucleic acid according to claim 133, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 130 or a nucleotide sequence having greater than 84% identity to SEQ ID NO: 130.

135. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 113; a polypeptide comprising an amino acid sequence having greater than 85% identity to SEQ ID NO: 113; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 113.

136. The isolated nucleic acid according to claim 135, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 114 or a nucleotide sequence having greater than 84% identity to SEQ ID NO: 114.

137. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 115; a polypeptide comprising an amino acid sequence having greater than 97%

identity to SEQ ID NO: 115; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 115.

138. The isolated nucleic acid according to claim 137, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 116 or a nucleotide sequence having greater than 86% identity to SEQ ID NO:116

139. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 117; a polypeptide comprising an amino acid sequence having greater than 80% identity to SEQ ID NO: 117; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 117.

140. The isolated nucleic acid according to claim 139, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 118 or a nucleotide sequence having greater than 80% identity to SEQ ID NO: 118.

141. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 119; a polypeptide comprising an amino acid sequence having greater than 84% identity to SEQ ID NO: 119; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 119.

142. The isolated nucleic acid according to claim 141, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 120 or a nucleotide sequence having greater than 76% identity to SEQ ID NO: 120.

143. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 121; a polypeptide comprising an amino acid sequence having greater than 81% identity to SEQ ID NO: 121; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 121.

144. The isolated nucleic acid according to claim 143, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 122 or a nucleotide sequence having greater than 74% identity to SEQ ID NO: 122.

145. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 123; a polypeptide comprising an amino acid sequence having greater than 90% identity to SEQ ID NO: 123; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 123.

146. The isolated nucleic acid according to claim 145, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 124 or a nucleotide sequence having greater than 82% identity to SEQ ID NO: 124.

147. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 125; a polypeptide comprising an amino acid sequence having greater than 80% identity to SEQ ID NO: 125; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 125.

148. The isolated nucleic acid according to claim 147, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 126 or a nucleotide sequence having greater than 77% identity to SEQ ID NO: 126.

149. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 127; a polypeptide comprising an amino acid sequence having greater than 81% identity to SEQ ID NO: 127; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 127.

150. The isolated nucleic acid according to claim 149, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 128 or a nucleotide sequence having greater than 78% identity to SEQ ID NO: 128.

151. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 96; a polypeptide comprising an amino acid sequence having greater than 85% identity to SEQ ID NO: 96; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 96.

152. The isolated nucleic acid according to claim 151, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 95 or a nucleotide sequence having greater than 72% identity to SEQ ID NO:95

153. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 139; a polypeptide comprising an amino acid sequence having greater than 76% identity to SEQ ID NO: 139; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 139.

154. The isolated nucleic acid according to claim 153, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 140 or a nucleotide sequence having greater than 77% identity to SEQ ID NO: 140.

155. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 141; a polypeptide comprising an amino acid sequence having greater than 83% identity to SEQ ID NO: 141; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 141.

156. The isolated nucleic acid according to claim 155, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 142 or a nucleotide sequence having greater than 73% identity to SEQ ID NO: 142.

157. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 90; a polypeptide comprising an amino acid sequence having greater than 95% identity to SEQ ID NO: 90; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO:90.

158. The isolated nucleic acid according to claim 157, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 89 or a nucleotide sequence having greater than 81% identity to SEQ ID NO: 89.

159. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 40; a polypeptide comprising an amino acid sequence having greater than 92%

identity to SEQ ID NO: 40; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 40.

160. The isolated nucleic acid according to claim 159, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 39 or a nucleotide sequence having greater than 84% identity to SEQ ID NO: 39.

161. An isolated nucleic acid, comprising a polynucleotide that comprises: the nucleotide sequence of SEQ ID NO: 166 or a nucleotide sequence having greater than 84% identity to SEQ ID NO: 166.

162. An isolated nucleic acid, comprising a polynucleotide that comprises: the nucleotide sequence of SEQ ID NO: 167 or a nucleotide sequence having greater than 85% identity to SEQ ID NO: 167.

163. An isolated nucleic acid, comprising a polynucleotide that comprises: the nucleotide sequence of SEQ ID NO: 164 or a nucleotide sequence having greater than 92% identity to SEQ ID NO: 169.

164. The isolated nucleic acid according to any one of claims 108-160, wherein at least one of the 1 to 5 amino acid substitutions is conservative.

165. The isolated nucleic acid of any one of claims 108-160, wherein at least one of the 1 to 5 amino acid substitutions is non-conservative.

166. An expression vector comprising the isolated nucleic acid of any one of claims 106 to 165.

167. A host cell comprising a nucleic acid of any one of claims 106-165.

168. The host cell of claim 167, wherein said cell is a bacterial cell.

169. The host cell of claim 167, which is a yeast cell.

170. The host cell of claim 169, which is a Candida spp. yeast.

171. The host cell of claim 170, wherein the Candida spp. yeast is selected from the group consisting of: C. tropicalis and C. viswanathii.

172. The host cell of claim 170, wherein the Candida spp. yeast is a genetically modified ATCC20336 yeast.

173. The host cell of claim 169, which is selected from the group consisting of: a Yarrowia spp. yeast, Pichia spp. yeast, Saccharomyces spp. yeast and Kluyveromyces spp. yeast.

174. The host cell of claim 173, which is selected from the group consisting of: Y. lipolytica, P. pastoris, P. membranifaciens, P. kluyveri, P. guilliermondii, P. heedii, P. subpelliculosa, S. cerevisiae, S. bayanus, S. pastorianus, S. carlsbergensis, K. lactis and K. marxianus.

175. An expression product comprising dodecanedioic acid obtained by a method of any one of claims 78-97 and 99-104.

176. An expression product comprising dodecanedioic acid obtained by contacting a genetically modified yeast from any one of claims 1-77 with a suitable feedstock; and culturing the yeast under conditions such that said expression product comprising dodecanedioic acid is produced from said feedstock.

What is claimed is:

1. A genetically modified yeast, comprising:

at least one genetic modification that blocks beta oxidation activity;

at least one genetic modification that increase at least one activity selected from the group consisting of: monooxygenase activity, monooxygenase reductase activity, thioesterase activity, acyltransferase activity, isocitrate dehydrogenase activity, glyceraldehyde-3-phosphate dehydrogenase activity, glucose-6-phosphate dehydrogenase activity, acyl-coA oxidase activity, fatty alcohol oxidase activity, acyl-CoA hydrolase activity, alcohol dehydrogenase activity, peroxisomal biogenesis factor activity, fatty aldehyde dehydrogenase activity, CTF, UTR, FAT1; and

at least one genetic modification that decreases MIG1 activity, as compared to corresponding yeast not comprising said genetic modification.

2. The genetically modified yeast of claim 1, comprising at least one genetic modification that increases one or more monooxygenase activities selected from a CYP52A12 monooxygenase activity, CYP52A13 monooxygenase activity, CYP52A14 monooxygenase activity, CYP52A15 monooxygenase activity, CYP52A16 monooxygenase activity, CYP52A17 monooxygenase activity, CYP52A18 monooxygenase activity, CYP52A19 monooxygenase activity, CYP52A20 monooxygenase activity, CYP52D2 monooxygenase activity and BM3 monooxygenase activity.

3. The genetically modified yeast according to one of claims 1-2, comprising at least one genetic modification that increases one or more monooxygenase reductase activities selected from the group consisting of: CPRA monooxygenase reductase activity, CPRB monooxygenase reductase activity and CPR750 monooxygenase reductase activity.

4. The genetically modified yeast according to one of claims 1-3 comprising at least one genetic modification that increases IDP2 isocitrate dehydrogenase activity.

5. The genetically modified yeast according to one of claims 1-4 comprising at least one genetic modification that increases a GDP1 glyceraldehyde-3-phosphate dehydrogenase activity.

6. The genetically modified yeast according to one of claims 1-5, comprising at least one genetic modification that increases at least one glucose-6-phosphate dehydrogenase activity selected from the group consisting of: a ZWF1 glucose-6-phosphate dehydrogenase activity and ZWF2 glucose-6-phosphate dehydrogenase activity.

7. The genetically modified yeast according to one of claims 1-6, comprising at least one genetic modification that increases one or more fatty alcohol oxidase activities selected from the group consisting of: FAO1 fatty alcohol oxidase activity, FAO2A fatty alcohol oxidase activity, FAO2B fatty alcohol oxidase activity, FAO13 fatty alcohol oxidase activity, FAO17 fatty alcohol oxidase activity, FAO18 fatty alcohol oxidase activity and FAO20 fatty alcohol oxidase activity.

8. The genetically modified yeast according to one of claims 1-7, comprising at least one genetic modification that increases one or more alcohol dehydrogenase activities selected from the group consisting of: ADH1 alcohol dehydrogenase activity, ADH2 alcohol dehydrogenase activity, ADH3 alcohol dehydrogenase activity, ADH4 alcohol dehydrogenase activity, ADH5 alcohol dehydrogenase activity, ADH7 alcohol dehydrogenase activity, ADH8 alcohol dehydrogenase activity and SFA alcohol dehydrogenase activity.

9. The genetically modified yeast according to one of claims 1-8, comprising at least one genetic modification that increases one or more acyl-CoA hydrolase activities selected from the group consisting of: ACH-A acyl-CoA hydrolase activity and ACH-B acyl-CoA hydrolase activity.

10. The genetically modified yeast according to one of claims 1-9, comprising at least one genetic modification that increases one or more acyltransferase activities selected from the group consisting of: acyl-CoA sterol acyltransferase activity, diacylglycerol acyltransferase activity and phospholipid:diacylglycerol acyltransferase activity.

11. The genetically modified yeast according to claim 10, wherein the one or more acyltransferase activities are selected from the group consisting of: ARE1 acyl-CoA sterol acyltransferase activity, ARE2 acyl-CoA sterol acyltransferase activity, DGA1 diacylglycerol acyltransferase activity, and LRO1 phospholipid:diacylglycerol acyltransferase activity.

12. The genetically modified yeast according to any one of claims 1 to 11, comprising at least one genetic modification that increases an acyl-coA thioesterase activity.

13. The genetically modified yeast according to claim 12, wherein the acyl-coA thioesterase activity is a TESA acyl-coA thioesterase activity.

14. The genetically modified yeast according to any one of claims 1 to 13, comprising at least one genetic modification that increases a PEX11 peroxisomal biogenesis factor activity.

15. The genetically modified yeast according to any one of claims 1 to 14, comprising at least one genetic modification that increases one or more fatty aldehyde dehydrogenase activities selected from the group consisting of: HFD1 fatty aldehyde dehydrogenase activity and HFD2 fatty aldehyde dehydrogenase activity.

16. The genetically modified yeast according to any one of claims 1 to 15, comprising at least one genetic modification that increases a POX5 acyl-coA oxidase activity.

17. The genetically modified yeast according to any one of claims 1 to 13, comprising at least one genetic modification that increases a monooxygenase activity and a monooxygenase reductase activity.

18. The genetically modified yeast according to claim 17, wherein the at least one genetic modification increases a CYP52A19 monooxygenase activity and a CPRB monooxygenase reductase activity.

19. The genetically modified yeast according to claim 17, wherein the at least one genetic modification increases a CYP52A14 monooxygenase activity and a CPRB monooxygenase reductase activity.

20. The genetically modified yeast according to any one of claims 1-19, comprising one or more genetic modifications resulting in an increase in a monooxygenase activity, a monooxygenase reductase activity, and a isocitrate dehydrogenase activity.

21. The genetically modified yeast according to claim 20, wherein one or more genetic modifications increase a CYP52A19 monooxygenase activity, a CPRB monooxygenase reductase activity, and a IDP2 isocitrate dehydrogenase activity.

22. The genetically modified yeast according to any one of claims 1 to 21, comprising at least one genetic modification that increases a monooxygenase activity, a monooxygenase reductase activity, and a glucose-6-phosphate dehydrogenase activity.

23. The genetically modified yeast according to claim 22, comprising at least one genetic modification that increases a CYP52A19 monooxygenase activity, a CPRB monooxygenase reductase activity, and a ZWF1 glucose-6-phosphate dehydrogenase activity.

24. The genetically modified yeast according to any one of claims 1 to 23, wherein said monooxygenase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 52, 53, 54, 55, 56, 57, 58, 59, 60 and 61.

25. The genetically modified yeast according to claim 24, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24.

26. The genetically modified yeast according to any one of claims 1-25, wherein said monooxygenase reductase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 28, 63, 64 and 65.

27. The genetically modified yeast according to claim 26, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 24, 25, 26 and 27.

28. The genetically modified yeast according to any one of claims 1-27, wherein a thioesterase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 38.

29. The genetically modified yeast according to claim 28, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 37.

30. The genetically modified yeast according to any one of claims 1-29, wherein an acyltransferase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 44, 46, 48 and 50.

31. The genetically modified yeast according to claim 30, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 43, 45, 47 and 49.

32. The genetically modified yeast according to any one of claims 1 to 31, wherein an isocitrate dehydrogenase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 67, 69 or 100.

33. The genetically modified yeast according to claim 32, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 68, 70 or 99.

34. The genetically modified yeast according to any one of claims 1-34, wherein a glyceraldehyde-3-phosphate dehydrogenase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 72.

35. The genetically modified yeast according to claim 34, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 71.

36. The genetically modified yeast according to any one of claims 1-35, wherein a glucose-6-phosphate dehydrogenase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 74, 76 or 157.

37. The genetically modified yeast according to claim 36, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 73 or 75.

38. The genetically modified yeast according to any one of claims 1-37, wherein an acyl-coA oxidase activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 32.

39. The genetically modified yeast according to claim 38, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 31.

40. The genetically modified yeast according to any one of claims 1-39, wherein a fatty alcohol oxidase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 3, 5, 7, 9, 11, 13, 132 and 134.

41. The genetically modified yeast according to claim 40, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 2, 4, 6, 8, 10, 12, 131 and 133.

42. The genetically modified yeast according to any one of claims 1-41, wherein an acyl-CoA hydrolase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 34 and 36.

43. The genetically modified yeast according to claim 42, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 33 and 35.

44. The genetically modified yeast according to any one of claims 1-43, wherein an alcohol dehydrogenase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 129, 113, 115, 117, 119, 121, 123, 125, 127, 152 and 154.

45. The genetically modified yeast according to claim 44, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 130, 114, 116, 118, 120, 122, 124, 126, 128, 153 and 155.

46. The genetically modified yeast according to any one of claims 1-45, wherein a peroxisomal biogenesis factor activity is by a polypeptide comprising an amino acid sequence of SEQ ID NO: 96.

47. The genetically modified yeast according to claim 46, wherein the polypeptide is encoded by a polynucleotide of SEQ ID NO: 95.

48. The genetically modified yeast according to any one of claims 1-47, wherein a fatty aldehyde dehydrogenase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 139 and 141.

49. The genetically modified yeast according to claim 48, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 140 and 142.

50. The genetically modified yeast according to any one of claims 1-49, comprising at least one genetic modification that decreases an acyl-coA synthetase activity.

51. The genetically modified yeast according to claim 50, wherein the at least one genetic modification decreases one or more acyl-coA synthetase activities selected from the group consisting of: ACS1 acyl-coA synthetase activity and FAT1 long-chain acyl-CoA synthetase activity.

52. The genetically modified yeast according to any one of claims 50-51, wherein at least one genetic modification disrupts a nucleic acid that encodes a polypeptide having the acyl-coA synthetase activity.

53. The genetically modified yeast according to any one of claims 50-52, wherein the acyl-coA synthetase activity is by a polypeptide comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 40, 42, 80, 82, 84, 90, 158 and 159.

54. The genetically modified yeast according to claim 53, wherein the polypeptide is encoded by a polynucleotide selected from the group consisting of: SEQ ID NOs: 39, 41, 79, 81, 83 and 89.

55. The genetically modified yeast according to any one of claims 1-54, which is a Candida spp. yeast.

56. The genetically modified yeast according to claim 55, wherein the Candida spp. yeast is selected from the group consisting of: C. tropicalis and C. viswanathii.

57. The genetically modified yeast according to claim 56, wherein the Candida spp. yeast is a genetically modified ATCC20336 yeast.

58. The genetically modified yeast according to any one of claims 1-57, which is selected from the group consisting of: a Yarrowia spp. yeast, Pichia spp. yeast, Saccharomyces spp. yeast and Kluyveromyces spp. yeast.

59. The genetically modified yeast according to claim 58, which is selected from the group consisting of: Y. lipolytica, P. pastoris, P. membranifaciens, P. kluyveri, P. guilliermondii, P. heedii, P. subpelliculosa, S. cerevisiae, S. bayanus, S. pastorianus, S. carlsbergensis, K. lactis and K. marxianus.

60. The genetically modified yeast according to any one of claims 1-59, wherein said yeast is capable of producing a desired diacid from a feedstock comprising at least one component obtained from a vegetable oil.

61. The genetically modified yeast according to claim 60, wherein the desired diacid is a C4 to C24 diacid.

62. The genetically modified yeast according to claim 61, wherein the desired diacid is a C10, C12, C14, C16, C18 or C20 diacid.

63. The genetically modified yeast according to claim 62, wherein the desired diacid is a C10 diacid.

64. The genetically modified yeast according to claim 62, wherein the desired diacid is a C12 diacid.

64. The genetically modified yeast according to claim 62, wherein the desired diacid is a C18 diacid.

65. The genetically modified yeast according to any one of claims 60-64, wherein the desired diacid contains no unsaturation.

66. The genetically modified yeast according to any one of claims 60-64, wherein the desired diacid contains one or more unsaturations.

67. The genetically modified yeast according to any one of claims 60-66, wherein the desired diacid is the predominant diacid in a mixture of diacids.

68. The genetically modified yeast according to any one of claims 60-67, wherein the feedstock comprises a pure oil.

69. The genetically modified yeast according to any one of claims 60-68, wherein the feedstock comprises a plurality of fatty acids.

70. The genetically modified yeast according to claim 69, wherein the feedstock comprises a soapstock.

71. The genetically modified yeast according to claim 69, wherein the feedstock comprises a fatty acid distillate.

72. The genetically modified yeast according to any one of claims 60-71, wherein the vegetable oil is from a plant selected from the group consisting of: palm, palm kernel, coconut, soy, safflower, canola or combination thereof.

73. The genetically modified yeast according to any one of claims 1-72, wherein a genetic modification that increases an activity comprises incorporating in the yeast multiple copies of a polynucleotide that encodes a polypeptide having the activity.

74. The genetically modified yeast according to any one of claims 1-73, wherein a genetic modification that increases an activity comprises incorporating in the yeast a promoter in operable linkage with a polynucleotide that encodes a polypeptide having the activity.

75. The genetically modified yeast according to claim 74, wherein the promoter is native to the yeast.

76. The genetically modified yeast according to any one of claims 74-75, wherein the promoter is selected from the group consisting of: a POX4 promoter, PEX11 promoter, TEF1 promoter, PGK promoter and FAO1 promoter.

77. The genetically modified yeast according to claim 76, wherein the promoter comprises a polynucleotide selected from the group consisting of: SEQ ID NOs: 162, 165, 166, 167 and 169.

78. A method for producing a desired diacid, comprising:

contacting a genetically modified yeast of any one of claims 1-77 with a feedstock capable of being converted by the yeast to a diacid; and

culturing the yeast under conditions in which the desired diacid is produced from the feedstock.

79. The method of claim 78, wherein the feedstock comprises one or more components from a vegetable oil.

80. The method of any one of claims 78-79, wherein the desired diacid is a C4 to C24 diacid.

81. The method of claim 80, wherein the desired diacid is a C10, C12, C14, C16, C18 or C20 diacid.

82. The method of claim 81, wherein the desired diacid is a C10 diacid.

83. The method of claim 81, wherein the desired diacid is a C12 diacid.

84. The method of claim 81, wherein the desired diacid is a C18 diacid.

85. The method of any one of claims 78-84, wherein the desired diacid contains no unsaturation.

86. The method of any one of claims 78-84, wherein the desired diacid contains one or more unsaturations.

87. The method of any one of claims 78-86, wherein the desired diacid is the predominant diacid in a mixture of diacids.

88. The method of any one of claims 78-87, wherein the feedstock comprises a substantially pure oil.

89. The method of any one of claims 78-87, wherein the feedstock comprises a plurality of fatty acids.

90. The method of claim 89, wherein the feedstock comprises a soapstock.

91. The method of claim 89, wherein the feedstock comprises a fatty acid distillate.

92. The method of any one of claims 78-91, wherein the vegetable oil is from a plant selected from the group consisting of: palm, palm kernel, coconut, soy, safflower, canola or combination thereof.

93. The method of any one of claims 78-85 wherein the feedstock comprises a fatty acid methyl ester.

94. The method of claim 93 wherein the fatty acid methyl ester is methyl laurate and the diacid comprises dodecanedioic acid.

95. The method of any one of claims 78-85 wherein the feedstock comprises a fatty acid ethyl ester and the diacid comprises dodecanedioic acid.

96. The method of any one of claims 78-85 wherein the feedstock comprises lauric acid and the diacid comprises dodecanedioic acid.

97. The method of any one of claims 78-85 wherein the feedstock comprises ethyl caprate and the diacid comprises sebacic acid.

98. A method for producing a desired diacid by a yeast from a feedstock toxic to the yeast, comprising:

(a) contacting a genetically modified yeast in culture with a feedstock not substantially toxic to the yeast, thereby performing an induction; and

(b) contacting the yeast after the induction in (a) with a feedstock toxic to the yeast,

whereby the desired diacid is produced by the yeast from the feedstock toxic to the yeast in an amount greater than the amount of the diacid produced from the feedstock toxic to the yeast when the induction is not performed.

99. The method according to claim 98, wherein the feedstock not substantially toxic to the yeast has the same number of carbons as the feedstock toxic to the yeast.

100. The method according to claim 98, wherein the feedstock not substantially toxic to the yeast has a different number of carbons compared to the feedstock toxic to the yeast.

101. The method according to any one of claims 98-100, wherein the feedstock not substantially toxic to the yeast comprises a fatty acid methyl ester.

102. The method according to any one of claims 98-101, wherein the feedstock not substantially toxic to the yeast comprises a free fatty acid.

103. The method according to any one of claims 98-102, wherein the feedstock not substantially toxic to the yeast comprises more than twelve carbons.

104. A diacid produced by the method of any one of claims 98-103.

105. An isolated nucleic acid comprising a polynucleotide that encodes a polypeptide of SEQ ID NO: 148 or 150.

106. The isolated nucleic acid according to claim 105, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 147 or 149.

107. An isolated nucleic acid, comprising a polynucleotide that comprises: the nucleotide sequence of SEQ ID NO: 37 or a nucleotide sequence having greater than 75% identity to SEQ ID NO: 37.

108. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 44; a polypeptide comprising an amino acid sequence having greater than 71% identity to SEQ ID NO: 44; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 44.

109. The isolated nucleic acid of claim 108, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 43 or a nucleotide sequence having greater than 69% identity to SEQ ID NO: 43.

110. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 46; a polypeptide comprising an amino acid sequence having greater than 71% identity to SEQ ID NO: 46; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 46.

111. The isolated nucleic acid according to claim 110, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 45 or a nucleotide sequence having greater than 70% identity to SEQ ID NO: 45.

112. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 48; a polypeptide comprising an amino acid sequence having greater than 87% identity to SEQ ID NO: 48; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 48.

113. The isolated nucleic acid according to claim 112, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 47 or a nucleotide sequence having greater than 78% identity to SEQ ID NO: 47.

114. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 50; a polypeptide comprising an amino acid sequence having greater than 80% identity to SEQ ID NO: 50; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 50.

115. The isolated nucleic acid according to claim 114, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 49 or a nucleotide sequence having greater than 75% identity to SEQ ID NO: 49.

116. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 67; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 67; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 67.

117. The isolated nucleic acid according to claim 116, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 68 or a nucleotide sequence having greater than 97% identity to SEQ ID NO: 68.

118. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 74; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 74; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 74.

119. The isolated nucleic acid according to claim 118, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 73 or a nucleotide sequence having greater than 97% identity to SEQ ID NO: 73.

120. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 76; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 76; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 76.

121. The isolated nucleic acid according to claim 120, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 75 or a nucleotide sequence having greater than 99% identity to SEQ ID NO: 75.

122. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 3; a polypeptide comprising an amino acid sequence having greater than 99% identity to

SEQ ID NO: 3; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 3.

123. The isolated nucleic acid according to claim 122, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 2 or a nucleotide sequence having greater than 99% identity to SEQ ID NO: 2.

124. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 5; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 5; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 5.

125. The isolated nucleic acid according to claim 124, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 4 or a nucleotide sequence having greater than 98% identity to SEQ ID NO: 4.

126. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 7; a polypeptide comprising an amino acid sequence having greater than 99% identity to SEQ ID NO: 7; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 7.

127. The isolated nucleic acid according to claim 126, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 6 or a nucleotide sequence having greater than 99% identity to SEQ ID NO: 6.

128. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 34; a polypeptide comprising an amino acid sequence having greater than 95% identity to SEQ ID NO: 34; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 34.

129. The isolated nucleic acid according to claim 128, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 33 or a nucleotide sequence having greater than 73% identity to SEQ ID NO: 33.

130. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 36; a polypeptide comprising an amino acid sequence having greater than 94% identity to SEQ ID NO: 36; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 36.

131. The isolated nucleic acid according to claim 130, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 35 or a nucleotide sequence having greater than 73% identity to SEQ ID NO: 35.

132. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 129; a polypeptide comprising an amino acid sequence having greater than 89% identity to SEQ ID NO: 129; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 129.

133. The isolated nucleic acid according to claim 132, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 130 or a nucleotide sequence having greater than 84% identity to SEQ ID NO: 130.

134. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 113; a polypeptide comprising an amino acid sequence having greater than 85% identity to SEQ ID NO: 113; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 113.

135. The isolated nucleic acid according to claim 134, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 114 or a nucleotide sequence having greater than 84% identity to SEQ ID NO: 114.

136. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 115; a polypeptide comprising an amino acid sequence having greater than 97% identity to SEQ ID NO: 115; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 115.

137. The isolated nucleic acid according to claim 136, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 116 or a nucleotide sequence having greater than 86% identity to SEQ ID NO:116.

138. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 117; a polypeptide comprising an amino acid sequence having greater than 80% identity to SEQ ID NO: 117; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 117.

139. The isolated nucleic acid according to claim 138, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 118 or a nucleotide sequence having greater than 80% identity to SEQ ID NO: 118.

140. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 119; a polypeptide comprising an amino acid sequence having greater than 84% identity to SEQ ID NO: 119; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 119.

141. The isolated nucleic acid according to claim 140, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 120 or a nucleotide sequence having greater than 76% identity to SEQ ID NO: 120.

142. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 121; a polypeptide comprising an amino acid sequence having greater than 81% identity to SEQ ID NO: 121; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 121.

143. The isolated nucleic acid according to claim 142, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 122 or a nucleotide sequence having greater than 74% identity to SEQ ID NO: 122.

144. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 123; a polypeptide comprising an amino acid sequence having greater than 90% identity to SEQ ID NO: 123; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 123.

145. The isolated nucleic acid according to claim 144, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 124 or a nucleotide sequence having greater than 82% identity to SEQ ID NO: 124.

146. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 125; a polypeptide comprising an amino acid sequence having greater than 80% identity to SEQ ID NO: 125; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 125.

147. The isolated nucleic acid according to claim 146, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 126 or a nucleotide sequence having greater than 77% identity to SEQ ID NO: 126.

148. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 127; a polypeptide comprising an amino acid sequence having greater than 81% identity to SEQ ID NO: 127; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 127.

149. The isolated nucleic acid according to claim 148, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 128 or a nucleotide sequence having greater than 78% identity to SEQ ID NO: 128.

150. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 96; a polypeptide comprising an amino acid sequence having greater than 85% identity to SEQ ID NO: 96; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 96.

151. The isolated nucleic acid according to claim 150, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 95 or a nucleotide sequence having greater than 72% identity to SEQ ID NO:95

152. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 139; a polypeptide comprising an amino acid sequence having greater than 76% identity to SEQ ID NO: 139; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 139.

153. The isolated nucleic acid according to claim 152, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 140 or a nucleotide sequence having greater than 77% identity to SEQ ID NO: 140.

154. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 141; a polypeptide comprising an amino acid sequence having greater than 83% identity to SEQ ID NO: 141; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 141.

155. The isolated nucleic acid according to claim 154, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 142 or a nucleotide sequence having greater than 73% identity to SEQ ID NO: 142.

156. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 90; a polypeptide comprising an amino acid sequence having greater than 95% identity

to SEQ ID NO: 90; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO:90.

157. The isolated nucleic acid according to claim 156, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 89 or a nucleotide sequence having greater than 81% identity to SEQ ID NO: 89.

158. An isolated nucleic acid comprising a polynucleotide that encodes: the polypeptide of SEQ ID NO: 40; a polypeptide comprising an amino acid sequence having greater than 92% identity to SEQ ID NO: 40; or a polypeptide comprising an amino acid sequence having 1 to 5 amino acid substitutions in the sequence of SEQ ID NO: 40.

159. The isolated nucleic acid according to claim 158, wherein the polynucleotide comprises the nucleotide sequence of SEQ ID NO: 39 or a nucleotide sequence having greater than 84% identity to SEQ ID NO: 39.

160. An isolated nucleic acid, comprising a polynucleotide that comprises: the nucleotide sequence of SEQ ID NO: 166 or a nucleotide sequence having greater than 84% identity to SEQ ID NO: 166.

161. An isolated nucleic acid, comprising a polynucleotide that comprises: the nucleotide sequence of SEQ ID NO: 167 or a nucleotide sequence having greater than 85% identity to SEQ ID NO: 167.

162. An isolated nucleic acid, comprising a polynucleotide that comprises: the nucleotide sequence of SEQ ID NO: 164 or a nucleotide sequence having greater than 92% identity to SEQ ID NO: 169.

163. The isolated nucleic acid according to any one of claims 107-159, wherein at least one of the 1 to 5 amino acid substitutions is conservative.

164. The isolated nucleic acid of any one of claims 107-159, wherein at least one of the 1 to 5 amino acid substitutions is non-conservative.

165. An expression vector comprising the isolated nucleic acid of any one of claims 105 to 164.

166. A host cell comprising a nucleic acid of any one of claims 105-164.

167. The host cell of claim 166, wherein said cell is a bacterial cell.

168. The host cell of claim 166, which is a yeast cell.

169. The host cell of claim 168, which is a Candida spp. yeast.

170. The host cell of claim 169, wherein the Candida spp. yeast is selected from the group consisting of: C. tropicalis and C. viswanathii.

171. The host cell of claim 169, wherein the Candida spp. yeast is a genetically modified ATCC20336 yeast.

172. The host cell of claim 168, which is selected from the group consisting of: a Yarrowia spp. yeast, Pichia spp. yeast, Saccharomyces spp. yeast and Kluyveromyces spp. yeast.

173. The host cell of claim 172, which is selected from the group consisting of: Y. lipolytica, P. pastoris, P. membranifaciens, P. kluyveri, P. guilliermondii, P. heedii, P. subpelliculosa, S. cerevisiae, S. bayanus, S. pastorianus, S. carlsbergensis, K. lactis and K. marxianus.