Summary

In one aspect, there is provided a genetically modified Yarrowia lipoytica yeast comprising (i) an active, modified endogenous acyl-coA oxidase polypeptide or an active, modified endogenous acyl-coA dehydrogenase polypeptide; (ii) a genetic modification that alters a native enoyl co-A isomerase activity; and (iii) a genetic modification that alters a native dieneoyl CoA reductase (DCR) activity, wherein the yeast is capable of producing a diacid from a feedstock comprising one or more components from a vegetable oil.

In one aspect, there is provided a genetically modified yeast comprising an active, modified endogenous acyl-CoA oxidase polypeptide or an active, modified endogenous acyl-CoA dehydrogenase polypeptide, which yeast is capable of producing a diacid from a feedstock comprising one or more components from a vegetable oil.

In one aspect, there is provided a genetically modified yeast comprising (i) an active, modified endogenous acyl-CoA oxidase polypeptide or an active, modified endogenous acyl-CoA dehydrogenase polypeptide and (ii) a genetic modification that alters an enoyl CoA isomerase activity, wherein the yeast is capable of producing a diacid from a feedstock comprising one or more components from a vegetable oil.

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

(1) contacting a genetically modified yeast as described herein with a feedstock comprising one or more components from a feedstock containing at least one unsaturated vegetable fatty acid capable of being converted by the yeast to a diacid;

(2) culturing the yeast under conditions in which the diacid is produced from the feedstock; and

(3) hydrogenating the diacid to remove any unsaturation in the carbon chain.

In one aspect, there is provided a genetically modified yeast, comprising a heterologous acyl-CoA oxidase polypeptide or a heterologous acyl-CoA dehydrogenase polypeptide, which yeast is capable of producing a diacid from a feedstock comprising one or more components from a vegetable oil.

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 comprising one or more components from a vegetable oil 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 an isolated nucleic acid, comprising a polynucleotide that encodes a modified acyl-CoA oxidase polypeptide from a yeast.

In one aspect, there is provided an expression vector comprising the isolated nucleic acid as described herein.

In one aspect, there is provided a host cell comprising a nucleic acid as described herein.

In one aspect, there is provided a host cell as described herein, which is a Candida spp. yeast cell selected from the group consisting of: C. tropicalis and C. viswanathii.

In one aspect, there is provided a genetically modified yeast comprising (i) an active, modified endogenous acyl-coA oxidase polypeptide or an active, modified endogenous acyl-coA dehydrogenase polypeptide; (ii) a genetic modification that alters an enoyl co-A isomerase activity; and (iii) a genetic modification that alters a dieneoyl CoA reductase (DCR) activity, wherein the yeast is capable of producing a diacid from a feedstock comprising one or more components from a vegetable oil.

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

(a) contacting a genetically modified yeast as described herein with a feedstock comprising a vegetable oil; and

(b) culturing the yeast under conditions in which diacid is produced from the feedstock

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

(a) contacting a genetically modified yeast as described herein with a feedstock comprising an unsaturated vegetable fatty acid capable of being converted by the yeast to a diacid;

(b) culturing the yeast under conditions in which diacid containing one or more unsaturations is produced from the feedstock; and

(c) hydrogenating and removing one or more of the unsaturations.

In one aspect, there is provided a diacid obtained as described herein.

Provided in certain aspects is a genetically modified yeast comprising (i) an active, modified endogenous acyl-coA oxidase polypeptide or an active, modified endogenous acyl-coA dehydrogenase polypeptide; (ii) a genetic modification that alters an enoyl co-A isomerase activity; and (iii) a genetic modification that alters a dienoyl CoA reductase (DCR) activity, wherein the yeast is capable of producing a diacid from a feedstock comprising one or more components from a vegetable oil. Also provided in some aspects is a method for using such a genetically modified yeast to produce a diacid from a feedstock comprising one or more components from a vegetable oil.

Also provided in certain aspects is a method for producing a diacid, comprising: (a) contacting a genetically modified yeast of any of embodiments A1 to A44, B1 to B33, C1 to C15 and G1 to G65 with a feedstock comprising an unsaturated vegetable fatty acid capable of being converted by the yeast to a diacid; (b) culturing the yeast under conditions in which diacid containing one or more unsaturations is produced from the feedstock; and (c) hydrogenating and removing one or more of the unsaturations.
Certain embodiments are described further in the following description, examples, claims and drawings.

Brief Description of the Drawings

The drawings illustrate embodiments of the technology and are not limiting. For clarity and ease of illustration, the drawings are not made to scale and, in some instances, various aspects may be shown exaggerated or enlarged to facilitate an understanding of particular embodiments.

FIG. 1 is a schematic representation of the conversion of decane to sebacic acid in a beta-oxidation blocked microorganism. Capric acid is formed as an intermediate during omega oxidation.

FIG. 2 is a schematic representation of the conversion of dodecane to dodecanedioic acid in a beta-oxidation blocked microorganism. Lauric acid is formed as an intermediate during omega oxidation.