that chemical product, such as but not limited to various fatty acids and fatty acid derived products.

SUMMARY OF THE INVENTION

[0007] In one aspect, there is provided a genetically modified organism producing a fatty acid or fatty acid derived product, wherein the fatty acid chain length can be selected from 4 to > 18, wherein fatty acids are produced via a growing fatty acyl-CoA chain and wherein additionally, the fatty acid chain is extended with at least one malonyl-CoA molecule and without the use of malonyl-ACP.

[0007a] In one aspect, there is provided a genetically modified microorganism of claim 1, wherein the butyryl-CoA product/intermediate is made from acetyl-CoA and malonyl-CoA.

[0007b] According to one embodiment, the invention is directed to a method for producing a fatty acid or fatty acid derived product including but not limited to a fatty acid, an alcohol, aldehyde, alkane, alkene or diacid, said method comprising i) combining a carbon source and a microorganism cell culture to produce such fatty acid or fatty acid derived product, wherein a) said cell culture comprises an inhibitor of fatty acid synthase or said microorganism is genetically modified for reduced enzymatic activity in the microorganism's fatty acid synthase pathway; or b) wherein said microorganism is genetically modified for increased enzymatic activity in the microorganism's malonyl-CoA dependent, malonyl-ACP independent, fatty acyl-CoA metabolic pathway ("MDMIFAA") This pathway is also referred to herein as malonyl-CoA dependent, but malonyl-ACP independent, fatty acyl-CoA metabolic pathway. Such increase in the microorganism's malonyl-CoA dependent, malonyl-ACP independent fatty acyl-CoA metabolic pathway can be achieved by an increased activity or expression of a gene or a pathway comprising an acetoacetyl-CoA synthase, a ketoacyl-CoA synthase (or elongase), an enoyl-CoA reductase, a ketoacyl-CoA reductase and/or a 3-hydroxyacyl-CoA dehydratase in combination with a decrease in expression or activity of acetoacetyl-CoA thiolase. Alternatively, increased activity in the microorganism's malonyl-CoA dependent, malonyl-ACP independent fatty acyl-CoA metabolic pathway can be achieved by an increased expression of a gene or a pathway comprising an acetoacetyl-CoA synthase, a ketoacyl-CoA thiolase, a enoyl-CoA reductase, a ketoacyl-CoA reductase and/or a 3-hydroxyacyl-CoA dehydratase in combination with a decrease in expression or activity of acetoacetyl-CoA thiolase. In various aspects, the carbon source provided to the micro-organism has a ratio of carbon-14 to carbon-12 of about 1.0×10^{-14} or greater.

[0008] The carbon source according to the invention may be predominantly glucose, sucrose, fructose, dextrose, lactose, xylose, other cellulosic sugars or a combination thereof. Alternatively, the carbon source is glycerol.

[0009] In various embodiments, the increase in production of the fatty acid or fatty acid derived product is at least 20 percent, at least 50 percent, at least 75 percent, at least 100 percent, or at least 150 percent above the production of the product in a microorganism that does not comprise the genetic modifications and/or culture system features of the invention.