

[0042] In some embodiments, a system comprises a first nonmetal-removing reactor configured to remove at least one of nitrogen or oxygen from an oil composition, wherein the first nonmetal-removing reactor is in fluidic communication with a second nonmetal-removing reactor.

[0043] A nonmetal-removing catalyst can, for example, comprise a support of alumina, aluminosilicate, aluminosilic; and Co/Mo, Ni/Mo, or W/Mo.

[0044] In some embodiments, a system herein is in fluidic communication with an oil pipeline.

[0045] In some embodiments, a system herein can further comprise a distilling device in fluidic communication with at least one reactor configured to remove hydrocarbons that are C4 hydrocarbons or smaller from a hydrocarbon composition obtained from the system.

[0045a] In one aspect, there is provided a method for upgrading an oil composition obtained from a biomass, comprising, removal of a heteroatom, a metal, or a metalloid from the oil composition, wherein the biomass is obtained from a photosynthetic bacterium, a yeast, an alga, or a vascular plant wherein the oil composition prior to upgrading comprises at least one of: i) a phosphorus concentration of 0 % to 5% w/w; ii) a nitrogen concentration of 0 % to 10% w/w; iii) a sulfur concentration of 0 % to 5% w/w; and iv) an oxygen concentration of 0 % to 20% w/w; and wherein the removal of the heteroatom, metal, or metalloid is by a hydrodemetallization (HDM) reaction, and at least one of a hydrodenitrogenation (HDN) reaction, a hydrodesulfurization (HDS) reaction, or a hydrodeoxygenation (HDO) reaction, and by at least one catalyst.

[0045b] In another aspect, there is provided an upgraded oil composition made by the method as defined above.

[0045c] In another aspect, there is provided a method for preparing an upgraded oil composition comprising: removing chlorophyll or chlorophyllide from an oil composition; and catalytically removing metals or metalloids and oxygen from the oil composition to create the upgraded oil composition.

[0045d] In another aspect, there is provided an upgraded oil composition obtained from an algal biomass, made by the process of:

i) removing a heteroatom, a metal, or a metalloid from an oil composition to obtain the upgraded oil composition, wherein the upgraded oil composition is used to make a product with a freezing point of -60°C to -70°C.

[0045e] In another aspect, there is provided an upgraded oil composition obtained from an algal biomass, made by the process of:

i) removing a heteroatom, a metal, or a metalloid from an oil composition to obtain the upgraded oil composition, wherein the upgraded oil composition is used to make a product with a freezing point of -50°C to -75°C.

[0045f] In another aspect, there is provided an upgraded oil composition obtained from an algal biomass, made by the process of:

i) removing a heteroatom, a metal, or a metalloid from an oil composition to obtain the upgraded oil composition, wherein the upgraded oil composition is used to make a product with a freezing point of -67°C.

[0045g] In another aspect, there is provided a method for upgrading an oil composition obtained from an algal biomass, comprising:

i) removing a heteroatom, a metal, or a metalloid from the oil composition to obtain the upgraded oil composition, wherein the upgraded oil composition is used to make a product with a freezing point of -60°C to -70°C.

[0045h] In another aspect, there is provided a method for upgrading an oil composition obtained from an algal biomass, comprising:

i) removing a heteroatom, a metal, or a metalloid from the oil composition to obtain the upgraded oil composition, wherein the upgraded oil composition is used to make a product with a freezing point of -50°C to -75°C.

[0045i] In another aspect, there is provided a method for upgrading an oil composition obtained from an algal biomass, comprising:

i) removing a heteroatom, a metal, or a metalloid from the oil composition to obtain the upgraded oil composition, wherein the upgraded oil composition is used to make a product with a freezing point of -67°C.

[0045j] In another aspect, there is provided an upgraded oil composition made by the method as defined above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0046] These and other features, embodiments, and advantages of the present disclosure will become better understood with regard to the following description, appended claims and accompanying figures where:

[0047] **Figure 1** shows a comparison of certain components of an exemplary crude oil and an exemplary algal oil.

[0048] **Figure 2** shows an overview of the processes that can be involved in the production of a product obtained from a biomass and/or oil composition.

[0049] **Figure 3** shows an overview of the processes that can be involved in the production of a product obtained from a biomass and/or oil composition, specifically possible fractions, possible upgrading techniques, and possible products.

[0050] **Figure 4** shows exemplary methods and systems as described herein comprising hydrodemetallization (HDM), hydrodesulfurization (HDS), hydrodenitrogenation (HDN), and hydrodeoxygenation (HDO).

[0051] **Figure 5** shows examples of terpenes that can be obtained from a biomass.

[0052] **Figure 6** shows the isoprenoid pathway, and exemplary products of the pathway, for example, fusicocca-2,10(14)-diene.

[0053] **Figure 7** shows the MEP pathway for the production of IPP and DMAPP.

[0054] **Figure 8** shows an overview of terpene biosynthesis in photosynthetic eukaryotes.

[0055] **Figure 9** shows a GC-FID chromatogram.

[0056] **Figure 10** shows a GC-FID chromatogram.