feed contains less than 10 mass % 400 - 630 degrees F TBP boiling material and the liquid oil product has been cracked in the hydroprocessing step and contains greater than 40 mass % 400 - 630 degrees F TBP boiling material. In one embodiment, the liquid oil product has been cracked in the hydroprocessing step and contains 3-6 mass-% boiling at 260 to 400 degrees F, 6 to 10 mass-% boiling at 400 to 490 degrees F, 20 to 40 mass-% boiling at 490 to 630 degrees F, and 35 to 40 mass-% boiling at 630 to 1020 degrees, and 10 to 27 mass-% boiling at 1020 + degrees F. In yet another embodiment, the hydroprocessing effluent is distilled into fractions and at least one fraction is recycled for additional hydroprocessing to further crack the at least one fraction. In another embodiment, the renewable oil feed is an algae oil extracted from algae biomass.

In a first aspect, there is provided an oleaginous composition comprising oil extracted from biomass comprising a microorganism wherein the composition is hydrotreated and the hydrotreated composition comprises:a) from about 30 weight percent to about 90 weight percent carbon containing compounds selected from the group consisting of C8,C9, C10, C11, C12, C13, C14, C15, C16, C17, and C18 containing compounds; b) from about 30 weight percent to about 70 weight percent carbon containing compounds selected from the group consisting of C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, and C18 containing compounds; or c) from about 10 weight percent to about 80 weight percent carbon containing compounds selected from the group consisting of C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, and C32 containing compounds; wherein weight percent is of the total amount of compounds detectable by mass spectrometry or gas chromatography analysis.

In another aspect, there is provided an oleaginous composition comprising oil extracted from biomass comprising a microorganism wherein the composition is hydrotreated and the hydrotreated composition: a) has a reduction of nitrogen of at least 70% as compared to the unhydrotreated composition; b) the hydrotreated composition comprises less than 100 ppm of nitrogen; or c) the unhydrotreated composition has up to 8 weight percent nitrogen, and the hydrotreated composition has less than 1 weight percent nitrogen.

In yet another aspect, there is provided an oleaginous composition comprising oil extracted from biomass comprising a microorganism wherein the composition is hydrotreated and the hydrotreated composition comprises a percent mass fraction with a boiling point of from 260 °F to 1020 °F of between about 40% and about 95% as determined by ASTM protocol D7169.

In still another aspect, there is provided an oleaginous composition comprising oil extracted from biomass comprising a microorganism wherein the oleaginous composition has: a) at least 60% of its components boiling below about 320 °C (about 608 °F); or b) at least 90% of its components boiling above about 450 °F (about 232.22 °C) as determined by ASTM D7169.

In a further aspect, there is provided an oleaginous composition comprising oil extracted from biomass comprising a microorganism wherein the composition is hydrotreated and the hydrotreated composition comprises: from about 70.8 to about 86.6 weight percent Carbon; from about 9.5 to about 14.5 weight percent Hydrogen; or from about 0.0.3 to about 3.6 weight percent Nitrogen.

In still a further aspect, there is provided an oleaginous composition comprising oil extracted from biomass comprising a microorganism wherein the composition is hydrotreated and the hydrotreated composition comprises; a) an area percent of saturated hydrocarbons from about 36.3 to about 75.7; an area percent of unsaturated hydrocarbons from about 0.3 to about 5.5; an area percent of N-aromatics from about 0.1 to about 1.2; and an area percent of oxygen compounds from about 0.7 to about 5.6; or b) an area percent of saturated hydrocarbons from about 43.0 to about 74.0; an area percent of unsaturated hydrocarbons of less than or equal to 0.7; an area percent of aromatics from about 0.7 to about 2.3; and an area percent of oxygen compounds from about 1.4 to about 2.7.

In another aspect, there is provided a method of upgrading renewable oil obtained from biomass, the method comprising: a) providing the renewable oil; b) dissolving at least a portion of the renewable oil in a solvent; and c) upgrading the renewable oil in the solvent by a. method comprising: hydrotreating the renewable oil in the solvent in the presence of a catalyst, at a temperature of from about 300 °C to about 500 °C; a total pressure and/or hydrogen partial pressure of from about 800 psi to about 3000 psi; a space velocity from about 0.1 volume of oil per volume of catalyst per hour to about 10 volume of oil per volume of catalyst per hour; and a hydrogen feed rate of from about 10 m^3H_2/m^3 dissolved oil to about 1700m^3 H_2/m^3 dissolved oil, to obtain a hydrotreating effluent.

In still another aspect, there is provided a hydrotreated effluent made by the process of: a) providing a renewable oil; b) dissolving at least a portion of the renewable oil in a solvent; and c) upgrading the renewable oil in the solvent by a method comprising: hydrotreating the renewable oil in the solvent in the presence of a catalyst, at a temperature of from about 300 °C to about 500 °C; a total pressure and/or hydrogen partial pressure of from about 800 psi to about 3000 psi; a space velocity from about 0.1 volume of oil per volume of catalyst per hour to about 10 volume of oil per volume of catalyst per hour; and a hydrogen feed rate of from about 10 m^3H_2/m^3 dissolved oil to about 800m^3 H_2/m^3 dissolved oil, to obtain the hydrotreating effluent.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims and accompanying figures, where:

[0023] **Figure 1** is a photo of oil upgraded product samples from the seven experiments ("runs" 1SEBR, 2SEBR, 3SEBR, 4SEBR, 5SEBR, 6SEBR, and 7SEBR, left to right) of EXAMPLE I of this disclosure, wherein the processes and/or the products may be some but not the only embodiments of the invention.

[0024] **Figure 2** is a distillation curve overlay, of three of the experiments of **Figure 1**, that is, 1 SEBR – 3 SEBR, compared to the algae oil feed.

[0025] **Figure 3** is a distillation curve overlay, of three other of the experiments of **Figure 1**, that is, 4 SEBR – 6 SEBR, compared to the algae oil feed.

[0026] **Figure 4** is a distillation curve overlay, of the one thermal experiment (without catalyst) of **Figure 1**, that is 7 SEBR compared to the algae oil feed.

[0027] **Figure 5** is a bar-graph showing % mass fraction of 6 fractions commonly used in petroleum refining, for the oil products of 1 SEBR – 3 SEBR of **Figure 1** and **Figure 2** compared to algae oil feed.

[0028] **Figure 6** is a graph showing % mass fraction for the 1 SEBR – 3 SEBR oil products and algae oil feed of **Figure 5**.

[0029] **Figure 7** is a bar-graph showing % mass fraction of the 6 fractions commonly used in petroleum refining, for the oil products of 4 SEBR – 6 SEBR of **Figure 1** and **Figure 3** compared to algae oil feed.

[0030] **Figure 8** is a graph showing % mass fraction for the 4 SEBR – 6 SEBR oil products and algae oil feed of **Figure 7**.

[0031] **Figure 9** is a bar-graph showing % mass fraction of 6 fractions, for the oil product of 7 SEBR of **Figure 1** and **Figure 4** compared to algae oil feed.

[0032] **Figure 10** is a graph showing % mass fraction for the 7 SEBR oil product and algae oil feed of **Figure 9**.

[0033] **Figure 11** is a HT GC-MS chromatogram of the algae oil feed of EXAMPLE I and EXAMPLE II.

[0034] **Figure 12** is a HT GC-MS chromatogram of the oil product of 1SEBR.

[0035] **Figure 13** is a HT GC-MS chromatogram of the oil product of 3 SEBR.

[0036] **Figure 14** is a HT GC-MS chromatogram of the oil product of 5 SEBR.

[0037] **Figure 15** is a HT GC-MS chromatogram of the oil product of 7 SEBR.