

#### Search history

Search 1: biodiesel and supercritic\* and cool\* and transesterif\* and distillat\* and (pre heat\* or preheat\*) and (palm or chicken or ((recycled or used near oil)) (Results 54)

Search 2: 1 and press\* and water and exchang\* (Results 43)

Search 3: 2 and distill\* and mol\* (Results 43)

Search 4: 3 and temperature and tubular and reactor (Results 14)

Search 5: (4) AND PD=(2009 OR 2011 OR 2014 OR 2008 OR 2015 OR 2016 OR 2012 OR 2007 OR 2010 OR 2013 OR 2004 OR 2005 OR 2006) (Results 14)

**Title:** CONDUCTIVE POLYMER COMPOSITE STRUCTURE

**Abstract:** In order to obtain actuator elements capable of being displaced such as expansion and contract or bending for practical use even when used as actuator elements with larger size, stacked layers or bundles in which conductive polymer-containing layers or fiber-like tubes are provided with conductive polymer composite structures which include conductive substrates and conductive polymers, said conductive substrates have deformation property, and conductivity of said conductive substrates is not less than  $1.0 \times 10^3$  S/cm are used.

**Classifications:**

**International (IPC 8-9):** B01J21/08 B01J23/20 B01J23/22 B01J23/847 B01J29/89 B25J19/00 B25J7/00 B32B27/06 B32B7/02 B32B9/04 B81B3/00 C07B61/00 C07C27/02 C07C29/128 C07C31/22 C07C51/43 C07C67/03 C07C67/58 C07C69/24 C07C69/533 C07C69/58 C08G61/12 C08G85/00 C08J5/04 C08L65/00 C08L73/00 C11C3/00 C11C3/10 C25D11/00 F03G7/00 F16F1/06 F16F15/00 H01B13/00 H01G9/00 H02N11/00 H02N2/00 (Advanced/Invention); B01J21/06 B01J35/00 C07B61/00 (Advanced/Non-invention); B01J21/00 B01J23/16 B01J23/76 B01J29/00 B25J19/00 B25J7/00 B32B27/06 B32B7/02 B32B9/04 B81B3/00 C07B61/00 C07C27/00 C07C29/00 C07C31/00 C07C51/42 C07C67/00 C07C69/00 C08G61/00 C08G85/00 C08J5/04 C08L65/00 C08L73/00 C11C3/00 C11C3/10 C25D11/00 F03G7/00 F16F1/04 F16F15/00 H01B13/00 H01G9/00 H02N11/00 H02N2/00 (Core/Invention); B01J21/00 B01J35/00 C07B61/00 (Core/Non-invention)

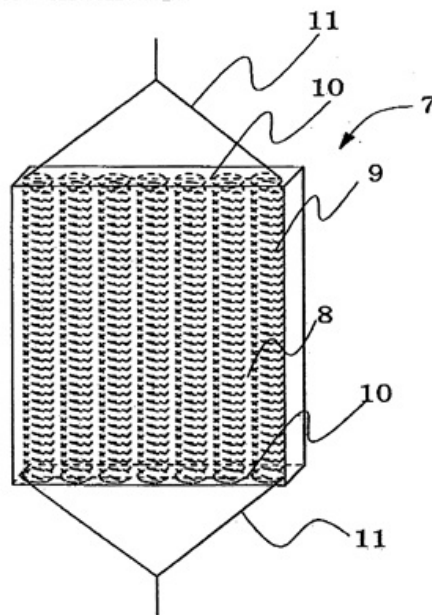
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**CPC:** B01J21/063 B01J21/066 B01J23/20 B01J23/22 B01J23/8472 B01J35/002 C11C3/003 Y02E50/13 Y10T29/417 Y10T428/32 Y10T428/325 F16F15/005 Y10T428/31504 Y10T428/31551

**European:** B01J23/20 B01J23/22 B01J23/847B C11C3/00B F16F15/00P L01J21/06T L01J21/06W L01J35/00D Y02E50/13

**US:** 205/317 29/25.03 29/25.0305 428/411.1 428/411.100P 428/423.1 428/423.100S 428/692.1 428/693.1 554/169 554/170 554/174 554/174P

PatBase - US2006124470\_AA



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
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| AU2004269265 AA    | 20050310         | AU20040269265      | 20040830         |
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| BRPI0414031 A      | 20061024         | BR2004PI14031      | 20040830         |
| CA2535747 AA       | 20060213         | CA20042535747      | 20040830         |
| CN1842586 A        | 20061004         | CN200480024822     | 20040830         |
| DE60341200 D1      | 20120802         | DE20036041200      | 20031105         |
| EP1589059 A1       | 20051026         | EP20030810597      | 20031105         |
| EP1589059 A4       | 20060201         | EP20030810597      | 20031105         |
| EP1589059 B1       | 20120606         | EP20030810597      | 20031105         |
| EP1660619 A1       | 20060531         | EP20040772825      | 20040830         |
| EP1660619 A4       | 20090805         | EP20040772825      | 20040830         |
| IN00638KN2006 A    | 20070803         | IN2006KN00638      | 20060320         |
| IN241081 B         | 20100618         | IN2006KN00638      | 20060320         |
| JP2004216868 A2    | 20040805         | JP20030376062      | 20031105         |
| JP2004217904 A2    | 20040805         | JP20030421446      | 20031218         |
| JP2005200398 A2    | 20050728         | JP20040247429      | 20040826         |
| JP2005206575 A2    | 20050804         | JP20040245864      | 20040825         |
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| JP4048236 B2       | 20080220         | JP20030376062      | 20031105         |
| JP4685343 B2       | 20110518         | JP20030421446      | 20031218         |
| US2006124470 AA    | 20060615         | US20050533915      | 20051212         |
| US2007167642 AA    | 20070719         | US20040569979      | 20040830         |
| US2009004476 AA    | 20090101         | US20080131916      | 20080602         |
| US7605281 BB       | 20091020         | US20040569979      | 20040830         |
| US7943240 BB       | 20110517         | US20080131916      | 20080602         |
| WO04041914 A1      | 20040521         | WO2003JP14094      | 20031105         |
| WO05021697 A1      | 20050310         | WO2004JP12876      | 20040830         |

**Priority:**

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|---------------|----------|---------------|----------|---------------|----------|
| JP20020321671 | 20021105 | JP20020373085 | 20021224 | JP20020380860 | 20021227 |
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**Probable Assignee:** NIPPON SHOKUBAI CO LTD

**Assignee(s):** (std): HARA SUSHUMU ; HARA SUSUMU ; ZAMA TETSUJI ; SEWA SHINGO ; NIPPON CATALYTIC CHEM IND ; OKU

TOMOHARU ; NONOGUCHI MASANORI ; MORIGUCHI TOSHIMITSU ; NIPPON SHOKUBAI CO LTD ; EAMAX CORP ; EAMEX CO ; EAMEX CORP

**Assignee(s):** EAMEX SUITA SHI CORP ; NIPPON SHOKUBAI CO

**Inventor(s):** (std): MASANORI NONOGUCHI ; MORIGUCHI TOSHIMITSU ; NONOGUCHI MASANORI ; OKU TOMOHARU ; HARA SUSHUMU ; HARA SUSUMU ; SEWA SHINGO ; TOMOHARU OKU ; TOSHIMITSU MORIGUCHI ; TOSHIMITSU OKU TOMOHARU NONOGU ; ZAMA TETSUJI

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**Agent(s):** GRIFFITH HACK; RICHES MCKENZIE AND HERBERT LLP; ISARPATENT PATENTANWAELE BEHNISCH BARTH CHARLES HASSA PECKMANN AND PARTNER MBB; ISARPATENT; NOVAK DRUCE AND QUIGG LLP; CONNOLLY BOVE LODGE AND HUTZ LLP; WATCHSTONE P AND D PLC; WESTERMAN HATTORI DANIELS AND ADRIAN LLP

**Designated states:** AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT KE KG KP KR KZ LC LI LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NA NE NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

**Title:** METHOD FOR PRODUCING **BIODIESEL** USING **SUPERCRITICAL** ALCOHOLS

**Abstract:** Disclosed herein is a method for producing **biodiesel** in the form of fatty acid alkyl ester by esterifying oils-and-fats, including animal or vegetable oils-and-fats or waste thereof, with **supercritical** alcohol. According to the disclosed method, it is possible to produce high-purity fatty acid alkyl ester at low cost and high productivity.

**Classifications:**

**International (IPC 8-9):** C07C69/003 C10G3/00 C10L1/02 C10L1/16 C11C3/10 (Advanced/Invention);  
C10G3/00 C10L1/16 (Advanced/Non-invention);  
C07C69/00 C10G3/00 C10L1/00 C10L1/10 C11C3/00 (Core/Invention)

**International (IPC 1-7):** C10G3/00

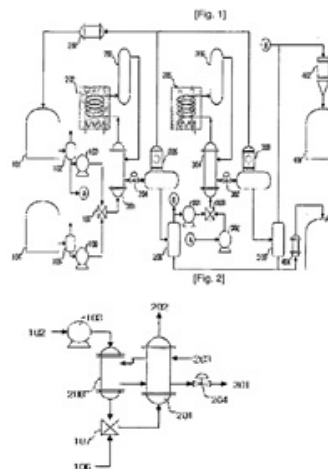
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**European:** C10L1/02D C11C1/00B M10G300/10B Y02E50/13

**US:** 560/129 560/129P

PatBase - US2009264671\_AA

Patent Application Publication Oct. 22, 2009 US 2009/0264671 A1



**Family:**

| Publication number | Publication date | Application number | Application date |
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| EP1948760 A1       | 20080730         | EP20060843837      | 20061116         |
| EP1948760 A4       | 20110525         | EP20060843837      | 20061116         |
| IN00763MN2008 A    | 20080613         | IN2008MN00763      | 20080421         |
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| JP2009516047 T2    | 20090416         | JP20080541078T     | 20061116         |
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| KR20070052830 A    | 20070523         | KR20050110551      | 20051118         |
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| WO07058485 A1      | 20070524         | WO2006KR04828      | 20061116         |

**Priority:**

KR20050110551 20051118 WO2006KR04828 20061116

**Probable Assignee:** EXST CO LTD

**Assignee(s):** (std): EXST CO LTD ; NOH MIN JEONG ; YOO KI PUNG ; CHOI YOUNG HAE

**Assignee(s):** EXST CO

**Inventor(s):** (std): YOO KI PUNG ; NOH MIN JEONG ; CHOI YOUNG HAE ; PUNG YOO KI ; HAE CHOI YOUNG

**Agent(s):** BECKER PHILIPPE ET AL; MEYERTONS HOOD KIVLIN KOWERT AND GOETZEL PC

**Designated states:** AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KZ LA LC LI LK LR LS LT LU LV LY MA MC MD MG MK ML MN MR MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

**Title:** BIO-DIESEL MANUFACTURE WITH A MICRO-**REACTOR****Abstract:** Methods and apparatus for producing bio-diesel from triglycerides and lower alcohols, desirably in the presence of liquid or **supercritical** CO<sub>2</sub>, are provided. The apparatus are designed to enhance the miscibility of the triglycerides with lower alcohols.**Classifications:****International (IPC 8-9):** B01F7/00 C10L1/02 C10L1/16

C10L1/18 (Advanced/Invention);

C10L1/10 (Core/Invention)

**CPC:** Y02W30/74 B01F13/0059 C11B13/00 C11C3/003 C10L1/19

B01F7/00875 B01J3/008 B01J19/0093 B01J2219/00006 B01J2219/00783

B01J2219/00889 B01J2219/00891 B01J2219/00984 C10L1/026 Y02E50/13

Y02P20/544 C10G2300/1011 C11C3/00 Y02P30/20

**European:** B01F13/00M B01F7/00H1B B01J19/00R B01J3/00S

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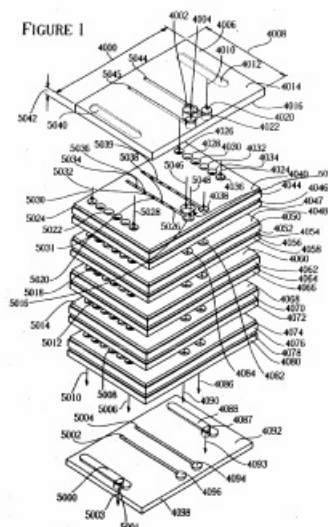
**US:** 366/292 366/292S 366/297 366/297S 44/307 44/307P 44/308

44/308P

PatBase - US2007214712\_AA

Patent Application Publication Sep. 20, 2007 Sheet 1 of 15 US 2007/0214712 A1

FIGURE 1

**Family:**

| Publication number | Publication date | Application number | Application date |
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| US2007214712 AA    | 20070920         | US20060490861      | 20060721         |
| US2009000184 AA    | 20090101         | US20080125847      | 20080522         |
| US2012060409 AA    | 20120315         | US20100884114      | 20100916         |

**Priority:**

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| US20060783963P 20060320 | US20060786959P 20060329 | US20060799515P 20060511 |
| US20060490861 20060721  | US20070931837P 20070525 | US20070950249P 20070717 |
| US20070953741P 20070803 | US20070967658P 20070906 | US20080125847 20080522  |
| US20100884114 20100916  |                         |                         |

**Probable Assignee:** AMERICAN BEEF PROC LLC**Assignee(s):** (std): AMERICAN BEEF PROC LLC ; GARWOOD ANTHONY J**Assignee(s):** AMERICAN BEEF PROCESSING LLC**Inventor(s):** (std): GARWOOD ANTHONY J**Agent(s):** FOLEY AND LARDNER LLP

**Title:** METHODS AND SYSTEMS FOR GENERATING POLYOLS

**Abstract:** Disclosed are methods for generating propylene glycol, ethylene glycol and other polyols, diols, ketones, aldehydes, carboxylic acids and alcohols from biomass using hydrogen produced from the biomass. The methods involve reacting a portion of an aqueous stream of a biomass feedstock solution over a catalyst under aqueous phase reforming conditions to produce hydrogen, and then reacting the hydrogen and the aqueous feedstock solution over a catalyst to produce propylene glycol, ethylene glycol and the other polyols, diols, ketones, aldehydes, carboxylic acids and alcohols. The disclosed methods can be run at lower **temperatures** and **pressures**, and allows for the production of oxygenated hydrocarbons without the need for hydrogen from an external source.

**Classifications:**

**International (IPC 8-9):** B01J19/00 B01J23/06 B01J23/40 B01J23/42 B01J23/44 B01J23/46 B01J23/58 B01J23/60 B01J23/62 B01J23/63 B01J23/656 B01J23/745 B01J23/755 B01J23/80 B01J23/89 B01J27/16 B01J27/182 B01J29/18 B01J29/24 B01J29/40 B01J29/46 B01J29/70 B01J8/02 B01J8/04 B01J8/06 C01B3/00 C01B3/20 C01B3/32 C01B3/38 C01B3/40 C01B31/18 C01B31/20 C01B32/40 C01B32/50 C01B6/24 C07C1/00 C07C1/20 C07C1/207 C07C1/22 C07C1/24 C07C11/02 C07C13/00 C07C15/02 C07C2/86 C07C27/04 C07C27/06 C07C29/00 C07C29/14 C07C29/15 C07C29/17 C07C29/60 C07C29/88 C07C29/90 C07C31/00 C07C31/02 C07C31/08 C07C31/10 C07C31/12 C07C31/125 C07C31/13 C07C31/20 C07C31/22 C07C35/00 C07C4/00 C07C45/00 C07C45/51 C07C45/57 C07C45/85 C07C47/00 C07C49/00 C07C49/04 C07C61/00 C07C9/00 C07C9/02 C07C9/14 C07D307/06 C07D307/08 C07D309/04 C09K3/00 C10G1/00 C10G3/00 C10G45/04 C10G69/04 C10L1/00 C10L1/06 C10L1/182 C10L1/185 C10L3/08 (Advanced/Invention); B01J23/42 B01J23/44 B01J23/46 B01J23/58 B01J23/60 B01J23/62 B01J23/63 B01J23/656 B01J23/755 B01J23/80 B01J27/182 B01J29/18 B01J29/24 B01J29/40 B01J29/46 B01J29/70 C07B61/00 C07C1/20 C07C29/145 C07C29/60 C07C31/00 (Advanced/Non-invention); B01J19/00 B01J23/40 B01J23/42 B01J23/54 B01J23/755 B01J23/89 B01J8/02 C01B3/00 C07C1/00 C07C13/00 C07C29/00 C07C31/00 C07C35/00 C07C47/00 C07C61/00 C09K3/00 C10G3/00 C10G45/02 C10G69/00 C10L1/00 C10L3/00 (Core/Invention); C07B61/00 (Core/Non-invention); B01J C01B C07C C10G (Subclass/Invention)

**International (IPC 1-7):** B01J8/02 B01J8/06 C01B3/32 C01B3/38 C07C1/20 C07C29/60 C10G3/00

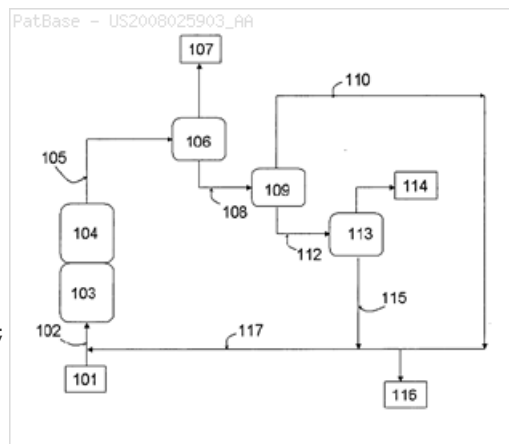
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**European:** B01J8/02D2 B01J8/06F B01J8/06H C01B3/32B C01B3/38 C07C29/60 C10G3/00 L01J208/00C20D L01J208/00C2D4F L01J208/00C2D4F2 L01J208/00C2R L01J208/00C2Z L01J208/00C4 L01J208/02D2B M01B203/02B2B M01B203/02B4B M01B203/06 M01B203/06D M01B203/06H M01B203/08B M01B203/08B3 M01B203/10D M01B203/10D2 M01B203/10D2B M01B203/10D2B2 M01B203/10D2D M01B203/10D2D2 M01B203/10D4 M01B203/12B2 M01B203/12B2B M01B203/84

**US:** 1/1 252/183.13 252/183.130S 252/373 252/373P 422/189 422/189S 422/190 422/193 422/193S 422/197 422/211 422/211S 422/600 422/600S 422/643 422/643S 422/652 422/652S 423/418.2 423/437.1 423/437.100P 423/644 423/648.1 423/650 423/651 44/306 44/307 44/307P 44/438 44/605 44/606 48/197R 48/61 549/356 549/356P 549/509 549/509S 562/400 562/400S 568/303 568/303 568/303P 568/383 568/386 568/400 568/403 568/403P 568/405 568/420 568/420S 568/700 568/700S 568/801 568/840 568/840S 568/852 568/852S 568/860 568/861 568/861P 568/863 585/1 585/14 585/14P 585/16 585/16P 585/1P 585/240 585/240S 585/242 585/310 585/310S 585/313 585/313S 585/317 585/317S 585/318 585/318S 585/319 585/319S 585/320 585/320S 585/321 585/321S 585/324 585/324S 585/357 585/357S 585/358 585/358S 585/454 585/454S 585/638 585/638S 585/733 585/733S

**Family:**

| Publication number | Publication date | Application number | Application date |
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| AU2007328458 AA    | 20080612         | AU20070328458      | 20070507         |
| AU2007328458 BB    | 20120906         | AU20070328458      | 20070507         |
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| EP2698416 A3      | 20141217 | EP20130192194   | 20080307 |
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| US2011257416 AA   | 20111020 | US20110171715   | 20110629 |
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| US2013185992 AA   | 20130725 | US20130793068   | 20130311 |
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| WO08069830 A3 | 20081127 | WO2007US11062 | 20070507 |
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| WO08140617 A3 | 20090115 | WO2007US88417 | 20071220 |
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**Priority:**

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| WO2007US11062  | 20070507 | US20070985475P | 20071105 | US20070985500P | 20071105 |
| AU20070353527  | 20071220 | US20070661280  | 20071220 | US20070961280  | 20071220 |
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| WO2008US56330  | 20080307 | IN2008DN09921  | 20081127 | US20080798484  | 20081127 |
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| US20110163412  | 20110617 | US20110163439  | 20110617 | US20110170757  | 20110628 |
| US20110171715  | 20110629 | US20120491749  | 20120608 | US20120539861  | 20120702 |
| US20120714223  | 20121213 | US20130793068  | 20130311 | AU20130203230  | 20130409 |
| AU20130203267  | 20130409 | US20130926319  | 20130625 | US20150978171  | 20151222 |

**Probable Assignee:** VIRENT INC

**Assignee(s):** (std): HORNEMANN CHARLES C ; ROZMIAREK ROBERT T ; VIRENT ENERGY SYSTEMS INC ; VIRENT INC ; VAJRENT INK ; BLOMMEL PAUL G ; CORTRIGHT RANDY D

**Assignee(s):** ENERGY UNITED STATES DEPARTMENT OF ; VIRENT ENERGY SYSTEMS INC3571 ANDERSON STREETMADISONWI53704US ; VIRENT INC3571 ANDERSON STREETMADISONWI53704US ; VIRENT INC MADISON

**Inventor(s):** (std): BLOMMEL PAUL G ; PAUL G BLOMMEL ; RANDY D CORTRIGHT ; RANDY D CORTRIGHT CIDADA0 NORTE AMERICANO ; ROZMIAREK ROBERT T ; BLOMMEL POL DZH ; VIRENT ENERGY SYSTEMS INC ; ROBERT T ROZMISREK ; CORTRIGHT RANDY D ; CORTRIGHT RANDY ; BLOMMEL PAUL ; NORTE AMERICANO CIDADA0 ; KORTRAJT REHNDI D ; HORNEMANN CHARLES C ; CHARLES C HORNEMANN CIDADA0 NORTE AMERICANO

**Inventor(s):** CIDADA0 NORTE AMERICANO ; CORTRIGHT RANDY DUS ; CORTRIGHT RANDY D MADISON ; ROBERT T ROZMIAREK ; BLOMMEL PAUL G OREGON ; BLOMMEL PAUL GUS ; CHARLES C HORNEMANN

**Agent(s):** SHELSTON IP; SHELSTON IP PTY LTD; BORDEN LADNER GERVAIS LLP; MAURICIO JARAMILLO CAMPUZANO; KRAUS AND WEISERT PATENTANWAELTE PARTGMBB; PATENTANWALTSKANZLEI MEYER; DUCKWORTH TIMOTHY JOHN; UNGRIA JAVIER; QUARLES AND BRADY LLP; DAVID; ROGERS CHRISTOPHER P

**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

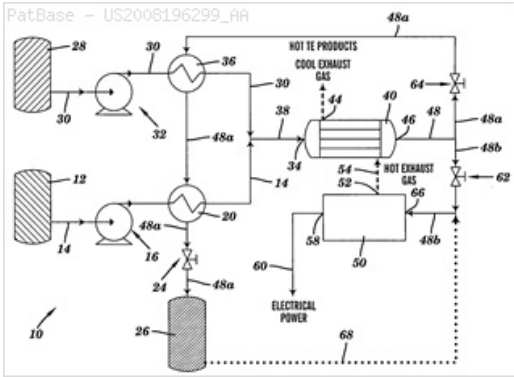
**US:** 554/174 554/174P 554/175

**Title:** INTEGRATED MULTISTAGE **SUPERCRITICAL** TECHNOLOGY TO PRODUCE HIGH QUALITY VEGETABLE OILS AND BIOFUELS

**Abstract:** The present invention relates to a power generation system, which includes a source of a seed oil, a source of alcohol, and a **reactor** in communication with the source of seed oil and the source of alcohol. The **reactor** produces a biofuel product. The system has a power source that operates on a biofuel energy source to produce heated exhaust. The power source is in communication with the **reactor** to utilize a portion of the biofuel product as its biofuel energy source. The system has a heat transfer mechanism that transfers heat from the exhaust manifold to the **reactor**. The power source also converts mechanical power into electrical power. Also disclosed is a system that involves extraction of oil from an oilseed product. A method of extracting oil from an oilseed product, a method of making a **transesterified** seed oil, and a method of making a biofuel are also disclosed, as are products obtained thereby.

**Classifications:**

**International (IPC 8-9):** C10G3/00 C10L1/02 C10L1/08 C10L1/14 C10L1/18 C10L1/24 C10L5/00 C11C3/00 F02M43/00 (Advanced/Invention); C10L1/00 C10L1/10 (Core/Invention)  
**CPC:** C10L1/02 C10G2300/1011 C10L1/026 C11C3/00 Y02E50/13 Y02P30/20  
**European:** C10L1/02D M10G300/10B Y02E50/13  
**US:** 123/304 123/304S 290/4.00RS 290/4R 422/199 422/199S 44/308 44/308P 44/388 44/639



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| CA2678338 AA       | 20090814         | CA20082678338      | 20080215         |
| EP2121877 A2       | 20091125         | EP20080730026      | 20080215         |
| EP2121877 A4       | 20131002         | EP20080730026      | 20080215         |
| US2008196299 AA    | 20080821         | US20080032391      | 20080215         |
| US2014196359 AA    | 20140717         | US20140225615      | 20140326         |
| US8690967 BB       | 20140408         | US20080032391      | 20080215         |
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| WO08101200 A2      | 20080821         | WO2008US54141      | 20080215         |
| WO08101200 A3      | 20081023         | WO2008US54141      | 20080215         |

**Priority:**

US20070890065P 20070215      US20080032391 20080215      WO2008US54141 20080215  
US20140225615 20140326

**Probable Assignee:** SYRACUSE UNIV

**Assignee(s):** (std): ANITESCU GHEORGHE ; TAVLARIDES LAWRENCE L ; UNIV SYRACUSE

**Assignee(s):** SYRACUSE UNIV ; SYRACUSE UNIVERSITY

**Inventor(s):** (std): ANITESCU GHEORGHE ; TAVLARIDES LAWRENCE L

**Agent(s):** RICHES MCKENZIE AND HERBERT LLP; BRUNNER MICHAEL JOHN; NIXON PEABODY LLP - PATENT GROUP; NIXON PEABODY LLP PATENT GROUP; BOND SCHOENECK AND KING PLLC; FREDERICK J M; DAVID L; DAVID; GEORGE; MERKEL EDWIN V ET AL

**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

**Title:** VESSELS AND METHODS FOR SYNTHESIS OF BIOFUEL

**Abstract:** Vessels and methods for esterification and **transesterification** of fatty acids under near critical or **supercritical** reaction conditions are disclosed herein. Alkyl esters produced in the vessel with the disclosed methods are used to create biofuel, such as **biodiesel**.

**Classifications:**

**International (IPC 8-9):** B01J19/00 C10L1/32

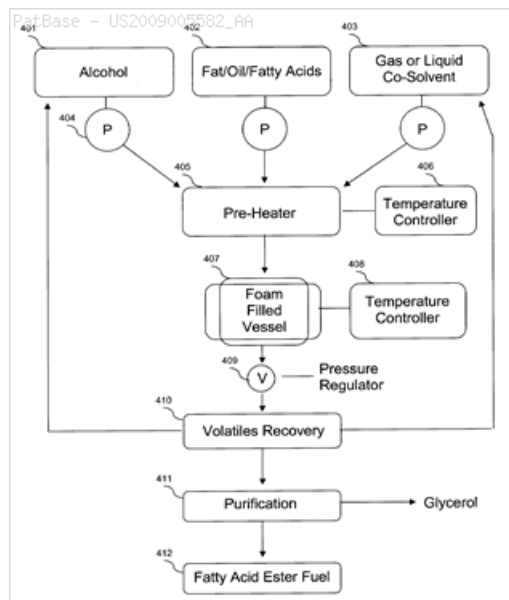
C11C3/00 (Advanced/Invention);

B01J19/00 C10L1/32 C11C3/00 (Core/Invention)

**CPC:** Y02P30/20 C11C3/003 C10G2300/1011 Y02E50/13

**European:** C11C3/00B M10G300/10B Y02E50/13

**US:** 422/202 422/202S 554/167 554/167P 554/170 554/170S



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| US2009005582 AA    | 20090101         | US20080143724      | 20080620         |
| WO09002880 A1      | 20081231         | WO2008US67781      | 20080620         |

**Priority:**

US20070945890P 20070622 US20080143724 20080620

**Probable Assignee:** BIOFUELBOX CORP

**Assignee(s):** (std): ANDERSON GREG ; BIOFUELBOX CORP

**Assignee(s):** SILICON VALLEY BANK

**Inventor(s):** (std): ANDERSON GREG

**Agent(s):** WILSON SONSINI GOODRICH AND ROSATI; ENG UP PETER ET AL

**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

**Title:** PROCESS FOR THE PRODUCTION OF BIO-NAPHTHA FROM COMPLEX MIXTURES OF NATURAL OCCURRING FATS AND OILS

**Abstract:** Process for making a bio-diesel and a bio-naphtha and optionally bio-propane from a complex mixture of natural occurring fats and oils, wherein said complex mixture is subjected to a refining treatment for removing the major part of the non-triglyceride and non-fatty acid components, thereby obtaining refined oils; said refined oils are subjected to a fractionation step for obtaining: an unsaturated or substantially unsaturated, liquid or substantially liquid triglyceride part (phase L); and a saturated or substantially saturated, solid or substantially solid triglyceride part (phase S); and said phase L is transformed into alkyl-esters as bio-diesel by a **transesterification**; said phase S is transformed into linear or substantially linear paraffin's as the bio-naphtha: by an hydrodeoxygenation or from said phase S are obtained fatty acids that are transformed into linear or substantially linear paraffin's as the bio-naphtha by hydrodeoxygenation or decarboxylation of the free fatty acids or from said phase S are obtained fatty acids soaps that are transformed into linear or substantially linear paraffin's as the bio-naphtha by decarboxylation of the soaps.

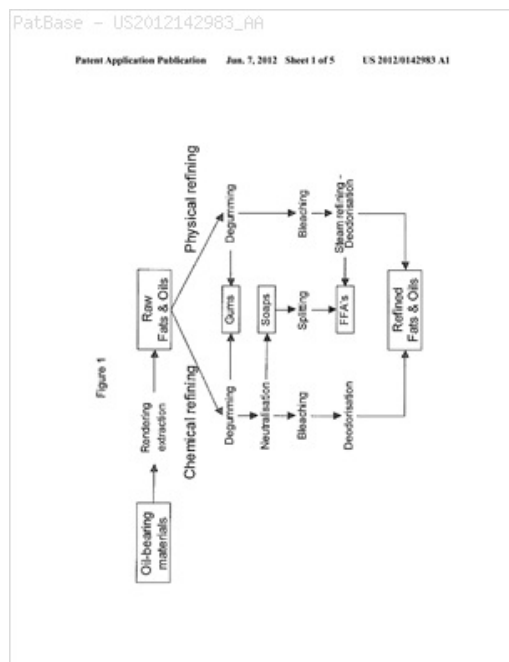
**Classifications:**

**International (IPC 8-9):** C07C1/20 C07C1/207 C07C4/04 C10G3/00 C10G9/36 C11B3/06 C11C1/10 C11C3/10 C11C3/12 (Advanced/Invention)

**CPC:** C10G3/40 C10G3/45 C10G3/46 C10G3/49 C10G3/50 C10G2300/1007 C10G2300/1014 C10G2300/1018 C10G2300/805 C10G2300/807 C10G2400/02 C10G2400/20 C10G2400/22 C10G2400/30 C11B3/06 C11C1/10 C11C3/10 C11C3/123 C11C3/126 Y02E50/13 Y02P30/20

**European:** C10G3/00 C11B3/06 C11C1/10 C11C3/10 C11C3/12B C11C3/12M Y02E50/13

**US:** 585/240 585/240P 585/242 585/319 585/321 585/324 585/327 585/350 585/350S 585/400 585/400S 585/613 585/613S 585/614 585/614S 585/615 585/615S 585/648 585/648S 585/652 585/652S



**Family:**

| Publication number | Publication date | Application number | Application date |
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| EP2290045 A1       | 20110302         | EP20090166486      | 20090727         |
| EP2459689 A2       | 20120606         | EP20100740175      | 20100713         |
| KR101484825 B1     | 20150120         | KR20127002452      | 20100713         |
| KR20120032018 A    | 20120404         | KR20127002452      | 20100713         |
| US2012142983 AA    | 20120607         | US20100382371      | 20100713         |
| US2014114105 AA    | 20140424         | US20130072429      | 20131105         |
| US8624071 BB       | 20140107         | US20100382371      | 20100713         |
| US8889933 BB       | 20141118         | US20130072429      | 20131105         |
| WO11012440 A2      | 20110203         | WO2010EP60031      | 20100713         |
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**Priority:**

EP20090166486 20090727 EP20100740175 20100713 WO2010EP60031 20100713  
US20120382371 20120224 US20130072429 20131105

**Probable Assignee:** TOTAL RESEARCH AND TECHNOLOGY FELUY

**Assignee(s):** (std): BOUVART FRANCOIS ; DUBUT NICOLAS ; TOTAL PETROCHEMICALS RES FELUY ; VERMEIREN WALTER ; TOTAL RES AND TECHNOLOGY FELUY

**Assignee(s):** TOTAL RESEARCH AND TECHNOLOGY FELUY ; TOTAL RESEARCH AND TECHNOLOGY FELUYZONE INDUSTRIELLE CB-7181FELUYSENEFFEBE ; TOTAL PETROCHEMICALS RESEARCH FELUYZONE INDUSTRIELLE CB-7181SENEFFEBE ; TOTAL PETROCHEMICALS RESEARCH FELUY

**Inventor(s):** (std): BOUVART FRANCOIS ; DUBUT NICOLAS ; FRANCOIS BOUVART ; NICOLAS DUBUT ; VERMEIREN WALTER ; WALTER VERMEIREN

**Inventor(s):** VERMEIREN WALTERBE ; DUBUT NICOLASFR ; BOUVART FRANCOISFR

**Agent(s):** GOWLING LAFLEUR HENDERSON LLP; NEEL HENRY

**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

**Title:** PROCESS FOR THE PRODUCTION OF BIO-NAPHTHA FROM COMPLEX MIXTURES OF NATURAL OCCURRING FATS AND OILS

**Abstract:** A process for making a bio-naphtha and optionally bio-propane from a complex mixture of natural occurring fats and oils, wherein said complex mixture is subjected to a refining treatment for removing the major part of non-triglyceride and non-fatty acid components, thereby obtaining refined fats and oils; said refined fats and oils are transformed into linear or substantially linear paraffin's as the bio-naphtha by an hydrodeoxygenation or from said refined fats and oils are obtained fatty acids that are transformed into linear or substantially linear paraffin's as the bio-naphtha by hydrodeoxygenation or decarboxylation of the free fatty acids or from said refined fats and oils are obtained fatty acids soaps that are transformed into linear or substantially linear paraffin's as the bio-naphtha by decarboxylation of the soaps.

**Classifications:**

**International (IPC 8-9):** C07C1/20 C07C1/207 C07C1/213 C07C1/22 C07C4/02 C07C4/04 C07C4/08 C10G3/00 C10G9/00 C11B13/02 C11B3/12 C11B3/14 C11C3/00 C11C3/02 C11C3/12 (Advanced/Invention)

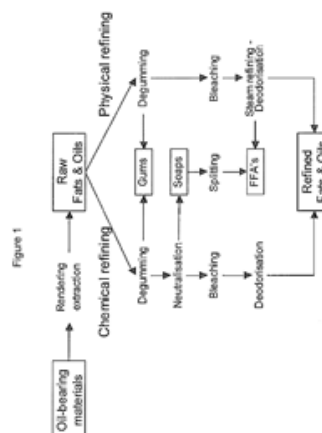
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**European:** C10G3/00 C11B3/12 C11C3/12

**US:** 208/130 44/308 44/629 585/240 585/240P 585/310 585/318 585/319 585/321 585/322 585/324 585/327 585/357 585/357S 585/483 585/483S 585/603 585/639 585/648 585/648S 585/733 585/752

PatBase - US2012157728\_AA

Patent Application Publication Jun. 21, 2012 Sheet 1 of 4 US 2012/0157728 A1



**Family:**

| Publication number | Publication date | Application number | Application date |
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| CA2767208 AA       | 20120104         | CA20102767208      | 20100713         |
| CA2767208 C        | 20150922         | CA20102767208      | 20100713         |
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| CN102549112 B      | 20150916         | CN201080042894     | 20100713         |
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| EP2459679 A1       | 20120606         | EP20100730483      | 20100713         |
| EP3059295 A1       | 20160824         | EP20160162464      | 20100713         |
| KR101424897 B1     | 20140801         | KR20127002088      | 20100713         |
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| US2012157728 AA    | 20120621         | US20100382308      | 20100713         |
| US2014155665 AA    | 20140605         | US20130095530      | 20131203         |
| US2015141715 AA    | 20150521         | US20150607321      | 20150128         |
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| US8975459 BB       | 20150310         | US20130095530      | 20131203         |
| WO11012439 A1      | 20110203         | WO2010EP60028      | 20100713         |

**Priority:**

EP20090166485 20090727 EP20100730483 20100713 EP20160162464 20100713  
 WO2010EP60028 20100713 US20120382308 20120308 US20130095530 20131203  
 US20150607321 20150128

**Probable Assignee:** TOTAL RESEARCH AND TECHNOLOGY FELUY

**Assignee(s):** (std): TOTAL PETROCHEMICALS RES FELUY ; TOTAL RES AND TECHNOLOGY FELUY ; VERMEIREN WALTER ; VAN GYSEGHEM NICOLAS

**Assignee(s):** TOTAL RESEARCH AND TECHNOLOGY FELUYZONE INDUSTRIELLE CB-7181FELUYSENEFFEBE ; TOTAL RESEARCH AND TECHNOLOGY FELUY ; TOTAL PETROCHEMICALS RESEARCH FELUY ; TOTAL PETROCHEMICALS RESEARCH FELUYZONE INDUSTRIELLE CB-7181SENEFFEBE

**Inventor(s):** (std): NICOLAS GYSEGHEM VAN ; VAN GYSEGHEM NICOLAS ; VERMEIREN WALTER ; WALTER VERMEIREN

**Inventor(s):** VERMEIREN WALTERBE ; VAN GYSEGHEM NICOLASBE

**Agent(s):** GOWLING LAFLEUR HENDERSON LLP; NEEL HENRY; MAZURELLE JEAN

**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

**Title:** HYDROTHERMAL TRANSFORMATION OF MICROALGAE THROUGH CATALYSIS WITH CLAYS AND ALUMINOSILICATES

**Abstract:** A process for producing one or more organic chemical products or fuel from microalgae or other lipid-containing biomass by means of high **pressure** hydrothermal treatment in the presence of clays and other aluminosilicates.

**Classifications:**

**International (IPC 8-9):** C10G1/00 C10G1/08 C12P13/00 C12P13/02 C12P17/00 C12P17/12 C12P5/00 C12P7/24

C12P7/26 (Advanced/Invention)

**CPC:** C10G1/086 C10G2300/1014 C10G2400/30 B01J21/16 B01J29/06 C11C1/007 C11C1/04 C11C3/00 C10G1/002 Y02P30/20

**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| WO11126383 A1      | 20111013         | WO2011NZ00048      | 20110407         |

**Priority:**

US20100321750P 20100407

**Probable Assignee:** AQUAFLOW BIONOMIC CORP LTD

**Assignee(s):** (std): AQUAFLOW BIONOMIC CORP LTD ; BATCHELOR RHYS ANTONY ; MILLER IAN JAMES

**Inventor(s):** (std): BATCHELOR RHYS ANTONY ; MILLER IAN JAMES

**Agent(s):** ADAMS MATTHEW D ET AL

**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

**Title:** HYDROCARBON SYNTHESIS METHODS, APPARATUS, AND SYSTEMS

**Abstract:** Embodiments of the invention include apparatus and systems for hydrocarbon synthesis and methods regarding the same. In an embodiment, the invention includes a process for creating a hydrocarbon product stream comprising reacting a reaction mixture in the presence of a catalyst inside of a reaction vessel to form a product mixture, the reaction mixture comprising a carbon source and **water**. The **temperature** inside the reaction vessel can be between 450 degrees Celsius and 600 degrees Celsius and the **pressure** inside the reaction vessel can be above **supercritical pressure** for **water**. In an embodiment, the invention includes an extrusion **reactor** system for creating a hydrocarbon product stream. The **temperature** inside the extrusion **reactor** housing between 450 degrees Celsius and 600 degrees Celsius. **Pressure** inside the reaction vessel can be above **supercritical pressure** for **water**. Other embodiments are also included herein.

**Classifications:**

**International (IPC 8-9):** B01J19/20 B01J21/06 B01J23/30 B01J23/34

B01J23/72 B01J23/755 B01J3/00 B01J35/00 B01J35/02 B01J35/10

B01J38/02 B01J8/08 B01J8/10 C07C29/94 C07C31/22 C10G3/00

C10L1/02 C10L1/04 C10L1/185 C10L1/32 C10L3/08 C10L9/08

C11C3/00 (Advanced/Invention);

B01J21/06 B01J21/20 B01J35/00 C10L3/10 (Advanced/Non-invention)

**CPC:** B01J3/008 B01J8/087 B01J8/10 B01J19/20 B01J21/06 B01J21/20

B01J38/02 B01J2208/00168 B01J2208/00539 B01J2208/00628

B01J2208/00814 B01J2219/00087 B01J2219/00162 B01J2219/00186

C10G3/45 C10G2300/805 C10L1/02 C10L1/023 C10L3/106

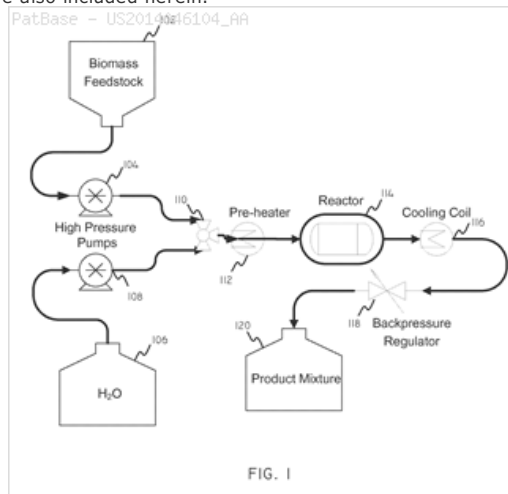
C10L2200/0469 C10L2270/023 C10L2290/06 C10L2290/50 C11C3/00

Y02P20/544 B01J21/063 B01J23/30 B01J23/34 B01J23/755 B01J35/023

B01J35/1014 B01J35/1038 B01J35/1061 C10L1/04 C10L9/086 Y02P30/20

B01J2208/00017 C10G3/44 B01J21/066 B01J35/0013 C10L3/08

**US:** 1/1 422/162 44/437 585/240 585/358 585/409

**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| US2014046104 AA    | 20140213         | US20130934713      | 20130703         |
| US2014115955 AA    | 20140501         | US20140146601      | 20140102         |
| US2017029711 AA    | 20170202         | US20160189428      | 20160622         |
| US9382491 BB       | 20160705         | US20140146601      | 20140102         |
| US9388345 BB       | 20160712         | US20130934713      | 20130703         |
| WO14008355 A1      | 20140109         | WO2013US49250      | 20130703         |

**Priority:**

US20120667813P 20120703 US20120680360P 20120807 US20120702582P 20120918  
US20130934713 20130703 US20140146601 20140102 US20160189428 20160622

**Probable Assignee:** SARTEC CORP

**Assignee(s):** (std): GREUEL PETER G ; MCNEFF CLAYTON V ; MCNEFF LARRY C ; NOWLAN DANIEL THOMAS ; YAN BINGWEN ; SARTEC CORP

**Inventor(s):** (std): YAN BINGWEN ; NOWLAN DANIEL THOMAS ; MCNEFF LARRY C ; MCNEFF CLAYTON V ; GREUEL PETER G

**Agent(s):** PAULY DEVRIES SMITH AND DEFFNER LLC; DEFFNER MARK E

**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

**Title:** PROCESS FOR THE PRODUCTION OF BIO-NAPHTHA FROM COMPLEX MIXTURES OF NATURAL OCCURRING FATS AND OILS

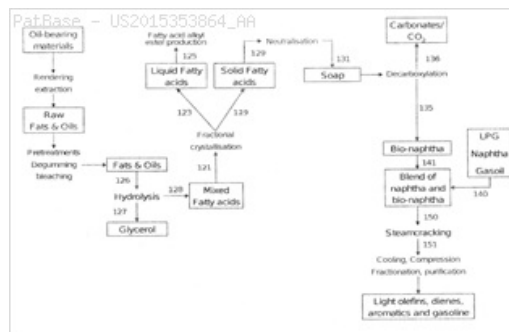
**Abstract:** A process for making a bio-diesel and a bio-naphtha from a complex mixture of natural occurring fats and oils may include subjecting the complex mixture to a refining treatment for removing non-triglyceride and non-fatty acid components, thereby obtaining refined oils. The complex mixture or refined oils may be subjected hydrolysis for obtaining glycerol and free fatty acids. The free fatty acids may be subjected to fractionation for obtaining: a liquid part (phase L); and a solid part (phase S). The phase L may be transformed into alkyl-esters as bio-diesel by an esterification. The phase S may be transformed into linear paraffins as the bio-naphtha by: hydrodeoxygenation or decarboxylation of the free fatty acids; or obtaining fatty acids soaps from the phase S and decarboxylation of the fatty acids soaps.

**Classifications:**

**International (IPC 8-9):** C07C1/207 C07C4/04 C10G3/00 C10L1/02 C10L1/04 C10L3/12 C11B3/00 C11B3/06 C11B3/10 C11B3/14 C11C1/00 C11C1/02 C11C1/04 C11C1/10 C11C3/00 C11C3/10 C11C3/12 (Advanced/Invention)

**CPC:** C10G3/49 C10G3/50 C11C3/123 C11C3/126 C11B3/10 C11C1/005 C11C1/04 C11C3/00 Y02E50/13 Y02P30/20 C10L1/026 C07C1/2078 C10G3/00 C07C4/04 C10L1/04 C10L3/12 C11C1/10 C10L2200/0476 C10L2290/543 C07C2523/883 C07C2521/04 C10L2200/0469 C11B3/001 C10G3/45 C10G3/46 C11B3/006 C11B3/06 C11B3/14 C11C1/025 C11C3/003

**US:** 554/162 585/304



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| BR112015016021 A2  | 20170711         | BR20151116021      | 20140121         |
| CA2896849 AA       | 20150629         | CA20142896849      | 20140121         |
| CN105051173 A      | 20151111         | CN201480017263     | 20140121         |
| EP2946003 A2       | 20151125         | EP20140716524      | 20140121         |
| KR20150110631 A    | 20151002         | KR20157022174      | 20140121         |
| US2015353864 AA    | 20151210         | US20140761646      | 20140121         |
| WO14111598 A2      | 20140724         | WO2014EP51152      | 20140121         |
| WO14111598 A3      | 20141016         | WO2014EP51152      | 20140121         |

**Priority:**

EP20130152095 20130121 EP20140716524 20140121 WO2014EP51152 20140121

**Probable Assignee:** TOTAL RESEARCH AND TECHNOLOGY FELUY

**Assignee(s):** (std): TOTAL RES AND TECHNOLOGY FELUY ; TOTAL RESEARCH AND TECH FELUY

**Assignee(s):** TOTAL RESEARCH AND TECHNOLOGY FELUY ; VERMEIREN WALTER ; DIVERCHY CHANTAL

**Inventor(s):** (std): CHANTAL DIVERCHY ; DIVERCHY CHANTAL ; VERMEIREN WALTER ; WALTER VERMEIREN

**Agent(s):** GOWLING LAFLEUR HENDERSON LLP; LEYDER FRANCIS; CHAILLOT GENEVIEVE

**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

**Title:** PROCESSING BIOMASS

**Abstract:** Biomass feedstocks (e.g., plant biomass, animal biomass, and municipal waste biomass) are processed to produce useful products, such as fuels. For example, systems are described that can be useful in enhancing sugar yields from biomass.

**Classifications:**

**International (IPC 8-9):** A61K8/85 A61K8/97 A61Q13/00 B01J B01J19/24 B01J3/00 B09B3/00 B09B5/00 B1J3/00 C07C209/46 C07C229/24 C07C231/02 C07C253/22 C07C29/147 C07C45/61 C07C67/08 C07C67/28 C07D207/36 C07D307/02 C07K1/00 C07K1/10 C08B1/00 C08G63/06 C08G63/08 C08G63/685 C08G63/78 C08G63/81 C08G63/82 C08G63/90 C08G69/04 C08G69/10 C08H8/00 C08J3/24 C08J3/28 C08K3/00 C08K3/04 C08K3/34 C08K3/36 C08K3/38 C08K5/00 C08K5/06 C08K5/11 C08L1/02 C08L23/00 C08L3/00 C08L67/00 C08L67/04 C08L7/00 C08L71/00 C08L75/04 C08L77/00 C08L77/04 C08L77/12 C08L83/04 C08L97/02 C11B C11B1/00 C12M1/00 C12M1/26 C12M1/40 C12P C12P1/04 C12P1/06 C12P13/00 C12P13/02 C12P13/04 C12P13/14 C12P13/20 C12P19/00 C12P19/02 C12P19/14 C12P7/02 C12P7/06 C12P7/10 C12P7/14 C12P7/20 C12P7/40 C12P7/42 C12P7/44 C12P7/46 C12P7/48 C12P7/56 C12P7/62 C13K1/02 C13K13/00 D21C1/00 D21C1/02 (Advanced/Invention);

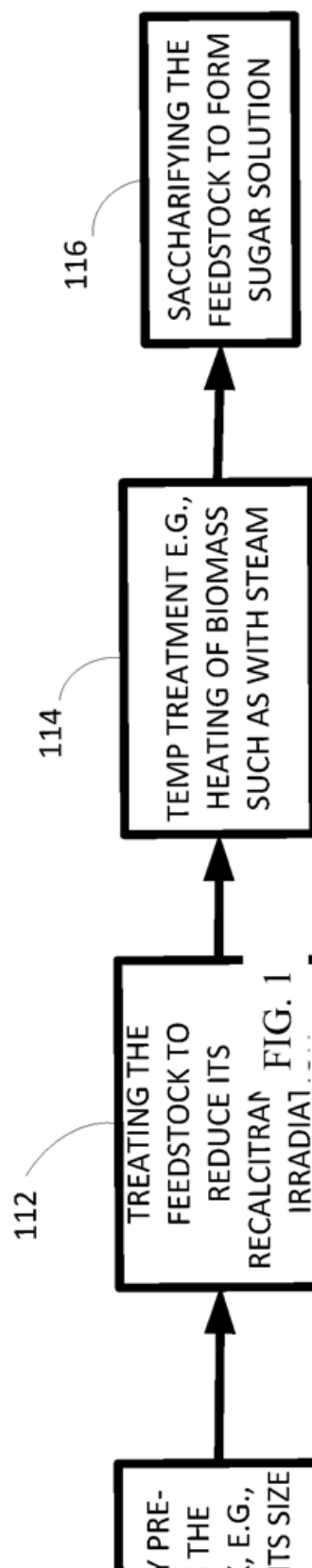
C07C211/09 C07C233/05 C07C255/04 C07C31/20 C07C69/40 (Advanced/Non-invention);

B01J3/00 C11B1/00 C12P1/04 C12P13/02 C12P7/02 C12P7/44 (Core/Invention)

**CPC:** C10G2300/1014 C10G2300/1018 C08G69/10 C12P19/02 C12P2203/00 C12P7/48 C08G63/06 C08G63/78 Y02P30/20 B01J3/006 C08G63/823 C08G63/90 C12M21/18 C12M29/18 C12M29/20 C12M33/16 C12P7/40 C13K13/002 C08G63/685 C07C229/24 B01J19/24 B01J2219/00164 B01J2219/24 C08L77/04 C12P13/14 C12P13/20 C08J3/24 C08L67/04 C08K5/0016 C08K5/0041 C08K5/005 A61Q13/00 A61K8/85 A61K8/97 C08J2367/04 C08L2312/00 A61K2800/591 C08G63/785 B01J19/247 C07C67/28 C12P7/625 C08K3/36 C08K3/34 C08K3/346 C08K3/38 C08L3/00 C08L1/02 C08L97/02 C08K5/11 C08K5/06 C08K2003/387 C12P7/46 C12P7/56 C08G63/08 C12P7/42 Y02E50/343 C12P2201/00 Y02E50/16 Y02E50/17 A61K8/99 A61K2800/10 A61K2800/56 A61Q19/00 C12P19/14 C12P7/10 C13K1/02 C08K3/04 C08H8/00

**US:** 127/46.1 264/211 264/328.1 264/328.17 264/331.21 264/500 264/523 422/131 435/105 435/109 435/110 435/121 435/126 435/128 435/129 435/135 435/139 435/148 435/158 524/14 524/310 524/311 524/312 524/317 524/333 524/35 524/377 524/386 524/405 524/413 524/445 524/449 524/450 524/451 524/47 524/599 524/606 525/190 525/397 525/420 525/424 525/425 525/427 525/431 525/433 525/434 525/437 525/450 528/271 528/336 528/361 562/568 562/589

PatBase - US2016017444\_AA



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
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| AP201508805 A0     | 20151031         | AP20150008805      | 20140425         |
| AP201508850 A0     | 20151130         | AP20150008850      | 20140516         |
| AP201508851 A0     | 20151130         | AP20150008851      | 20140516         |
| AU2014256918 AA    | 20141030         | AU20140256918      | 20140425         |
| AU2014256918 BB    | 20180426         | AU20140256918      | 20140425         |
| AU2014256919 AA    | 20141030         | AU20140256919      | 20140425         |
| AU2014256919 BB    | 20180419         | AU20140256919      | 20140425         |
| AU2014265243 AA    | 20141120         | AU20140265243      | 20140516         |
| AU2014265243 BB    | 20180426         | AU20140265243      | 20140516         |
| AU2014265308 AA    | 20141120         | AU20140265308      | 20140516         |
| AU2014265308 BB    | 20180208         | AU20140265308      | 20140516         |
| AU2018202833 AA    | 20180510         | AU20180202833      | 20180424         |
| AU2018203148 AA    | 20180524         | AU20180203148      | 20180507         |
| AU2018204676 AA    | 20180712         | AU20180204676      | 20180627         |
| AU2018204755 AA    | 20180719         | AU20180204755      | 20180629         |
| BR112015026760 A2  | 20170725         | BR20151126760      | 20140425         |
| BR112015026766 A2  | 20170725         | BR20151126766      | 20140425         |
| BR112015026769 A2  | 20170725         | BR20151126769      | 20140516         |
| BR112015026771 A2  | 20170725         | BR20151126771      | 20140516         |
| CA2886838 AA       | 20150331         | CA20142886838      | 20140425         |
| CA2886839 AA       | 20150331         | CA20142886839      | 20140425         |
| CA2886840 AA       | 20150331         | CA20142886840      | 20140516         |
| CA2886842 AA       | 20150331         | CA20142886842      | 20140516         |
| CN105142768 A      | 20151209         | CN201480021314     | 20140425         |
| CN105164268 A      | 20151216         | CN201480024015     | 20140516         |
| CN105209586 A      | 20151230         | CN201480024509     | 20140516         |
| CN105247060 A      | 20160113         | CN201480021991     | 20140425         |
| CU20150146 A7      | 20160629         | CU20150000146      | 20151026         |
| CU20150147 A7      | 20160729         | CU20150000147      | 20151026         |
| CU20150155 A7      | 20160831         | CU20150000155      | 20151111         |
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| CU20170135 A7      | 20180403         | CU20170000135      | 20140425         |
| CU20170143 A7      | 20180605         | CU20170000143      | 20140516         |
| EA201591635 A1     | 20160331         | EA20150091635      | 20140425         |
| EA201591639 A1     | 20160331         | EA20150091639      | 20140425         |
| EA201591846 A1     | 20160831         | EA20150091846      | 20140516         |
| EA201591851 A1     | 20160429         | EA20150091851      | 20140516         |
| EP2890481 A1       | 20150708         | EP20140788244      | 20140425         |
| EP2890481 A4       | 20160518         | EP20140788244      | 20140425         |
| EP2890794 A2       | 20150708         | EP20140788290      | 20140425         |
| EP2890794 A4       | 20160727         | EP20140788290      | 20140425         |
| EP2890802 A1       | 20150708         | EP20140798118      | 20140516         |
| EP2890802 A4       | 20160406         | EP20140798118      | 20140516         |
| EP2890804 A2       | 20150708         | EP20140798126      | 20140516         |
| EP2890804 A4       | 20161005         | EP20140798126      | 20140516         |
| EP3108055 A2       | 20161228         | EP20140882905      | 20141009         |
| EP3108055 A4       | 20171213         | EP20140882905      | 20141009         |
| ID201605571 A      | 20161014         | ID2015P0007033     | 20140516         |
| ID201703714 A      | 20170413         | ID2015P0006603     | 20140425         |
| ID201703828 A      | 20170413         | ID2015P0006604     | 20151013         |
| ID201703987 A      | 20170421         | ID2015P0007034     | 20140516         |
| IL241907 A0        | 20151231         | IL20140241907      | 20140425         |
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| IL242098 A0        | 20151231         | IL20140242098      | 20140516         |
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| IN02913MN2015 A    | 20160603         | IN2015MN02913      | 20151008         |
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| IN03024MN2015 A    | 20160603         | IN2015MN03024      | 20151020         |
| IN03025MN2015 A    | 20160603         | IN2015MN03025      | 20151020         |
| JP2016516870 T2    | 20160609         | JP20160510798T     | 20140425         |
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| KR20160002752 A   | 20160108 | KR20157028018  | 20140425 |
| KR20160007505 A   | 20160120 | KR20157030176  | 20140516 |
| KR20160007506 A   | 20160120 | KR20157030177  | 20140516 |
| MX2015014718 A1   | 20160307 | MX20150014718  | 20140425 |
| MX2015014719 A1   | 20160630 | MX20150014719  | 20140425 |
| MX2015015335 A1   | 20160304 | MX20150015335  | 20140516 |
| MX2015015336 A1   | 20160304 | MX20150015336  | 20140516 |
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| PH2015500599 A    | 20150511 | PH20150500599  | 20150318 |
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| SG10201707552V A1 | 20171129 | SG20171007552  | 20140516 |
| SG10201805568T A1 | 20180730 | SG20181005568  | 20140425 |
| SG10201805569R A1 | 20180830 | SG20181005569  | 20140425 |
| SG11201502476V A1 | 20150429 | SG20151102476  | 20140425 |
| SG11201502477W A1 | 20150429 | SG20151102477  | 20140425 |
| SG11201502478Y A1 | 20150429 | SG20151102478  | 20140516 |
| SG11201502479P A1 | 20150429 | SG20151102479  | 20140516 |
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| TH160619 A        | 20170302 | TH20151006408  | 20140516 |
| TH160620 A        | 20170302 | TH20151006409  | 20140516 |
| TH170534 A        | 20171116 | TH20151006146  | 20140425 |
| US2016017444 AA   | 20160121 | US20140439799  | 20141009 |
| US2016053047 AA   | 20160225 | US20140758893  | 20140516 |
| US2016060386 AA   | 20160303 | US20140786299  | 20140425 |
| US2016076062 AA   | 20160317 | US20140786388  | 20140425 |
| US2016083754 AA   | 20160324 | US20140891507  | 20140516 |
| US2017159077 AA   | 20170608 | US20170434779  | 20170216 |
| US2018187218 AA   | 20180705 | US20180886123  | 20180201 |
| WO14176508 A2     | 20141030 | WO2014US35467  | 20140425 |
| WO14176508 A3     | 20150122 | WO2014US35467  | 20140425 |
| WO14176509 A1     | 20141030 | WO2014US35469  | 20140425 |
| WO14186652 A1     | 20141120 | WO2014US38316  | 20140516 |
| WO14186670 A2     | 20141120 | WO2014US38341  | 20140516 |
| WO14186670 A3     | 20150611 | WO2014US38341  | 20140516 |
| WO15126463 A2     | 20150827 | WO2014US59970  | 20141009 |
| WO15126463 A3     | 20151029 | WO2014US59970  | 20141009 |

#### Priority:

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|-------------------------|-------------------------|-------------------------|
| US20130816664P 20130425 | US20130816664P 20130426 | US20130186664P 20130426 |
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| AU20180202833 20180424  | AU20180203148 20180507  | AU20180204676 20180627  |
| AU20180204755 20180629  |                         |                         |

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**Title:** PROCESS AND SYSTEM FOR PRODUCING LIQUID BIOFUEL FROM BIO-BASED OILS AND/OR FATS

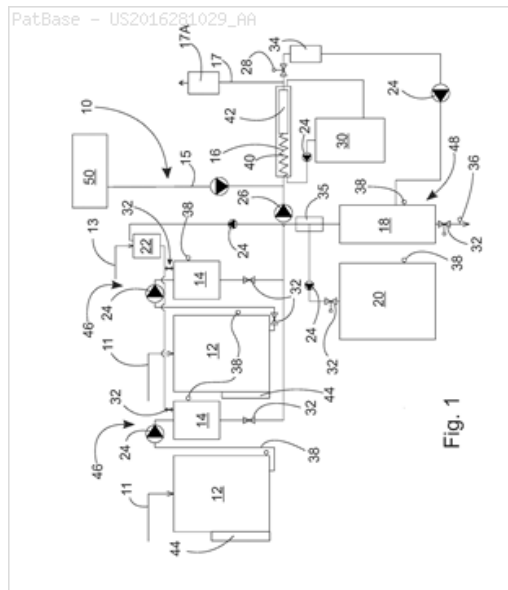
**Abstract:** A process for utilizing bio-based oils and/or fats for producing biofuels includes the steps of: mixing alcohol with a raw material for forming a reaction mixture; pumping the reaction mixture to a **reactor**; mixing biogas as a catalyst with the reaction mixture in a selected process step either before or after the supply of the reaction mixture to a high-**pressure** pump, the biogas including methane and carbon dioxide; adjusting a **temperature** and **pressure** of the **reactor** so that the reaction mixture achieves a **supercritical** state; esterifying the reaction mixture to produce liquid biofuel and by-products; separating the by-products including methane and alcohol from the liquid biofuel; and recovering separated methane. An equivalent system for utilizing bio-based oils and/or fats for producing biofuels is also disclosed.

**Classifications:**

**International (IPC 8-9):** C07C67/00 C07C67/02 C10G3/00 C10L1/02 C10L1/19 C11B13/00 C11C3/00 C11C3/10 (Advanced/Invention); C07C67/00 (Advanced/Non-invention)

**CPC:** C10L2200/0476 C10L2270/026 C10L2290/24 C10L2290/46 C10L2290/06 C10L2290/543 C11C3/003 C10L1/026 C10G3/42 C07C67/00 C10L1/19 Y02E50/10 C07C67/02 C11B13/00 Y02E50/13 Y02P30/20 Y02W30/74

**US:** 554/174



**Family:**

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| EP3080232 A4       | 20170809         | EP20140870192      | 20141210         |
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