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BIOCOMBUSTIBLES A PARTIR DE ALGAS: PROYECTOS EUROPEOS

Los biocombustibles obtenidos a partir de algas constituyen los denominados biocombustibles de tercera generación y se consideran una de las fuentes de energía renovable más prometedoras.

Las microalgas, tales como Botryococcus braunii, Nannochloropsis sp., Dunaliella primolecta, Chlorella sp. y Crypthecodinium cohnii, son capaces de producir en el interior de sus células grandes cantidades de lípidos, pudiendo alcanzar niveles de producción de aceite del 80% en peso (B. braunii). El proceso de transesterificación de estos aceites (triglicéridos) con monoalcoholes de cadena corta (metanol) conduce a formación de biodiésel. La biomasa algal puede, asimismo, someterse a una gran variedad de procesos de conversión termoquímicos, bioquímicos y químicos, obteniéndose energía y distintos tipos de biocombustibles como bioetanol o biogás. Por otra parte, además de biocombustibles, las microalgas son capaces de sintetizar numerosos compuestos como polisacáridos, carotenoides y compuestos bioactivos, entre otros, con aplicaciones en los sectores farmacéutico, químico, dietética y nutrición y la industria de la alimentación.

Sin embargo, a día de hoy, la producción comercial de biocombustibles a partir de algas se encuentra con numerosas barreras que hay que solventar. Por un lado, los sistemas de producción necesitan un mayor grado de desarrollo que permitan alcanzar eficiencias fotosintéticas más altas. Por otro, los costes derivados de los procesos de concentración de biomasa algal y su contenido de lípidos son muy elevados (secado, filtración, extracción, centrifugación, etc.).

En los últimos años se está realizando en muchos países un esfuerzo intenso en la investigación para tratar de paliar estas dificultades y lograr la implantación de la tecnología. En este apartado se recogen los proyectos europeos vigentes en 2015 y 2016 para ofrecer una visión de las instituciones y países implicados en este proceso, así como de sus líneas de investigación principales. Los proyectos se buscaron en las bases de datos CORDIS y LIFE. Cabe resaltar la significativa participación de numerosos centros españoles.

BIOMIC-FUEL: BIO-INSPIRED PHOTONICS FOR ENHANCED MICROALGAL PHOTOSYNTHESIS IN BIOFUELS	
Duración: 01-01-2017 a 31-12-2019	**Financiación:** Horizon2020 (aprobado)
Participantes: The Chancellor, Masters and Scholars of the University of Cambridge (Reino Unido)	
SOLENALGAE: IMPROVING PHOTOSYNTHETIC SOLAR ENERGY CONVERSION IN MICROALGAL CULTURES FOR THE PRODUCTION OF BIOFUELS AND HIGH VALUE PRODUCTS	
Duración: 01-03-2016 a 28-02-2021	**Financiación:** European Research Council (ERC)
Participantes: • ARC-Net, University of Verona (Italia) • Politecnico di Milano (Italia)	

Tabla 1. Proyectos europeos

MACROFUELS: DEVELOPING THE NEXT GENERATION MACRO-ALGAE BASED BIOFUELS FOR TRANSPORTATION VIA ADVANCED BIO-REFINERY PROCESSES

Duración: 01-01-2016 a 31-12-2019 | **Financiación:** Horizon2020

Participantes:
- **Coordinador:** Teknologisk Institut (Dinamarca)
- Aarhus Universitet (Dinamarca)
- Avantium Chemicals Bv (Holanda)
- Environmental Resources Management Limited (Reino Unido)
- Matis OHF (Islandia)
- Stichting Energieonderzoek Centrum Nederland (Holanda)

BIORECYGAS: FARMING HIGH VALUE ALGAE WITH INDUSTRIAL GAS EMISSIONS

Duración: 01-12-2015 a 31-05-2016 | **Financiación:** Horizon2020

Participantes: Alging Ambientaciones SL (España)

PHOTOFUEL: BIOCATALYTIC SOLAR FUELS FOR SUSTAINABLE MOBILITY IN EUROPE

Duración: 01-05-2015 a 30-04-2019 | **Financiación:** Horizon2020

Participantes:
- **Coordinador:** Volkswagen AG (Alemania)
- A4F Algafuel SA (Portugal)
- IFP Energies Nouvelles (Francia)
- Karlsruher Institut für Technologie (Alemania)
- Universitaet Bielefeld (Alemania)
- Uppsala Universitet (Suecia)

ECO-LOGIC GREEN FARM: DESIGN OF AN AGRICULTURAL GREENHOUSE FOR INTENSIVE GROWING OF MICROALGAE IN FRESH / SEA WATER WITH A SYNGAS PRODUCTION PLANT AND ORGANIC FARMING OF CHICKENS AND PIGS OUTDOORS

Duración: 01-08-2015 a 31-01-2017 | **Financiación:** Horizon2020

Participantes: Societa' Agricola Serenissima SS (Italia)

WATECCO: WATER COLUMN PROFILER FOR QUANTIFICATION OF PHOTOSYNTHESIS AND BIOMASS OF PHYTOPLANKTON IN NATURAL AND MAN MADE WATER BODIES

Duración: 01-11-2014 a 30-04-2016 | **Financiación:** European Research Council (ERC)

Participantes: Bar Ilan University (Israel)

ALGAEPRINT: ALGAE PRODUCTS' INTERNATIONALIZATION

Duración: 01-10-2014 a 28-02-2015 | **Financiación:** Horizon2020

Participantes: Algaenergy SA (España)

Tabla 1. Proyectos europeos

WSDGATFORBIODIESEL: X-RAY CRYSTALLOGRAPHIC, STRUCTURAL, AND BIOCHEMICAL STUDIES OF THREE WAX ESTER SYNTHASE VARIANTS FOR FUTURE BIOTECHNOLOGICAL APPLICATIONS

Duración: 01-04-2014 a 31-03-2018	**Financiación:** 7PM

Participantes: Izmir Institute of Technology (Turquía)

ALGAEOILSYNTH: TOWARDS IMPROVING BIOFUEL PRODUCTION - OIL SYNTHESIS AND ACCUMULATION PATHWAYS IN PROMISING OLEAGINOUS MICROALGAE

Duración: 01-05-2014 a 30-04-2017	**Financiación:** 7PM

Participantes:

- **Coordinador:** Georg-August-Universitaet Goettingen Stiftung Oeffentlichen Rechts (Alemania)

MIRACLES: MULTI-PRODUCT INTEGRATED BIOREFINERY OF ALGAE: FROM CARBON DIOXIDE AND LIGHT ENERGY TO HIGH-VALUE SPECIALTIES

Duración: 01-11-2013 a 31-10-2017	**Financiación:** 7PM

Participantes:

- **Coordinador:** Wageningen University (Holanda)
- Ewos Innovation AS (Noruega)
- Fundación Canaria Parque Científico Tecnológico de La Universidad de Las Palmas de Gran Canaria (España)
- Nova-Institut für Politische und Okologische Innovation GmbH (Alemania)
- Stichting Dienst Landbouwkundig Onderzoek (Holanda)
- Universidad de Huelva (España)

FUEL4ME: FUTURE EUROPEAN LEAGUE 4 MICROALGAL ENERGY

Duración: 01-01-2013 a 31-12-2016	**Financiación:** 7PM

Participantes:

- **Coordinador:** Stichting Dienst Landbouwkundig Onderzoek (Holanda)
- Ben-Gurion University of The Negev (Israel)
- IDconsortium SL (España)
- Joanneum Research Forschungs GmbH (Austria)
- Norsker Investigaciones SL (España)
- Wageningen University (Holanda)

CYANOFACTORY: DESIGN, CONSTRUCTION AND DEMONSTRATION OF SOLAR BIOFUEL PRODUCTION USING NOVEL (PHOTO)SYNTHETIC CELL FACTORIES

Duración: 01-12-2012 a 30-11-2015	**Financiación:** 7PM

Participantes:

- **Coordinador:** Uppsala Universitet (Suecia)
- Instituto de Biologia Molecular e Celular, IBMC (Portugal)
- Ruhr-Universitaet Bochum (Alemania)
- Univerza V Ljubljani (Eslovenia)
- Universidad Politécnica de Valencia (España)
- University of Sheffield (Reino Unido)

Tabla 1. Proyectos europeos

DEMA: DIRECT ETHANOL FROM MICROALGAE

Duración: 01-12-2012 a 31-05-2017 | **Financiación:** 7PM

Participantes:
- **Coordinador:** University of Limerick (Irlanda)
- A4F Algafuel SA (Portugal)
- ERCANE GIE (Francia)
- Imperial College of Science Technology and Medicine (Reino Unido)
- Photanol BV (Holanda)
- Universiteit Van Amsterdam (Holanda)

BIOLEAP: BIOTECHNOLOGICAL OPTIMIZATION OF LIGHT USE EFFICIENCY IN ALGAE PHOTOBIOREACTORS

Duración: 01-10-2012 a 30-09-2017 | **Financiación:** European Research Council (ERC)

Participantes: Universita degli Studi di Padova (Italia)

BUCEFALOS: BLUE CONCEPT FOR A LOW NUTRIENT/CARBON SYSTEM-REGIONAL AQUA RESOURCE MANAGEMENT

Duración: 01-09-2012 a 31-08-2015 | **Financiación:** LIFE+

Participantes:
- **Coordinador:** Skåne Regional Council (Suecia)
- Muncipality of Trelleborg (Suecia)

HOPSEP: HARNESSING OXYGENIC PHOTOSYNTHESIS FOR SUSTAINABLE ENERGY PRODUCTION

Duración: 01-01-2012 a 31-12-2017 | **Financiación:** European Research Council (ERC)

Participantes: Tel Aviv University (Israel)

WW-SIP: FROM URBAN WASTEWATER TREATMENT PLANT TO SELF SUSTAINABLE INTEGRATED PLATFORM FOR WASTEWATER REFINEMENT

Duración: 01-01-2012 a 31-12-2016 | **Financiación:** LIFE+

Participantes:
- **Coordinador:** Istituto Superiore di Ricerca e Formazione Sui Materiali Speciali per le Tecnologie Avanzatel, SRIM Scarl (Italia)
- Águas da Figueira SA (Portugal)
- Cyclus RD Ltd (España)
- Portuguese National Laboratory of Energy and Geology, LNEG (Portugal)
- Umbra Acque SpA (Italia)

PHOTO.COMM: DESIGN & ENGINEERING OF PHOTOSYNTHETIC COMMUNITIES FOR INDUSTRIAL CULTIVATION

Duración: 01-10-2012 a 30-09-2016 | **Financiación:** 7PM

Participantes:
- **Coordinador:** Kobenhavns Universitet (Dinamarca)
- Albert-Ludwigs-Universitaet Freiburg (Alemania)
- Algae Biotech SL (España)
- A4F Algafuel SA (Portugal)
- Technion-Israel Institute of Technology (Israel)
- Turun Yliopisto (Suecia)

Tabla 1. Proyectos europeos

CO2ALGAEFIX: CO2 CAPTURE AND BIO-FIXATION THROUGH MICROALGAL CULTURE

Duración: 01-09-2011 a 31-12-2015 | **Financiación:** LIFE+

Participantes:

- **Coordinador:** Algaenergy (España)
- Agencia Andaluza de la Energía (España)
- EXELERIA SL (España)
- Iberdrola Generación SA (España)
- Madrid Network (España)
- Universidad de Almería (España)

DOP-ECOS: OPTIMAL DESIGN AND OPERATION OF MICROBIAL ECOSYSTEMS FOR BIOENERGY PRODUCTION AND WASTE TREATMENT

Duración: 01-09-2011 a 31-12-2015 | **Financiación:** 7PM

Participantes:

- **Coordinador:** Imperial College of Science Technology and Medicine (Reino Unido)

ALL GAS: INDUSTRIAL SCALE DEMONSTRATION OF SUSTAINABLE ALGAE CULTURES FOR BIOFUEL PRODUCTION

Duración: 01-05-2011 a 30-04-2016 | **Financiación:** 7PM

Participantes:

- **Coordinador:** FCC Aqualia SA (España)
- BDI-Bioenergy International AG (Austria)
- Feyecon BV (Holanda)
- Hygear BV (Holanda)
- Fraunhofer Gesellschaft zur Foerderung der Angewandten Forschung EV (Alemania)
- University of Southampton (Reino Unido)

INTESUSAL: DEMONSTRATION OF INTEGRATED AND SUSTAINABLE ENCLOSED RACEWAY AND PHOTOBIOREACTOR MICROALGAE CULTIVATION WITH BIODIESEL PRODUCTION AND VALIDATION

Duración: 01-05-2011 a 31-10-2015 | **Financiación:** 7PM

Participantes:

- **Coordinador:** Centre for Process Innovation Limited (Reino Unido)
- Bornova Belediyesi (Turquía)
- EUREC EESV (Bélgica)
- National Renewable Energy Centre Limited (Reino Unido)
- Necton-Companhia Portuguesa de Culturas Marinhas SA (Portugal)
- Gea Westfalia Separator Group GmbH (Alemania)

BIOFAT: BIOFUEL FROM ALGAE TECHNOLOGIES

Duración: 01-05-2011 a 30-04-2015 | **Financiación:** 7PM

Participantes:

- **Coordinador:** A4F Algafuel SA (Portugal)
- Abengoa Bioenergía Nuevas Tecnologías SA (España)
- AlgoSource Technologies (Francia)
- Ben-Gurion University of The Negev (Israel)
- Ecocarburantes Españoles SA (España)
- Evodos BV (Holanda)

Tabla 1. Proyectos europeos

PHOTOBIOFUEL: DIRECT PHOTOBIOLOGICAL CONVERSION OF SOLAR ENERGY TO VOLATILE TRANSPORT FUELS	
Duración: 01-01-2011 a 31-12-2015	**Financiación:** European Research Council (ERC)

Participantes:

- **Coordinador:** Imperial College of Science Technology and Medicine (Reino Unido)
- Turun Yliopisto (Finlandia)
- AlgoSource Technologies (Francia)
- Ben-Gurion University of The Negev (Israel)
- Ecocarburantes Españoles SA (España)
- Evodos BV (Holanda)

BIOWALK4BIOFUELS: BIOWASTE AND ALGAE KNOWLEDGE FOR THE PRODUCTION OF 2ND GENERATION BIOFUELS	
Duración: 01-04-2010 a 31-03-2015	**Financiación:** European Research Council (ERC)

Participantes:

- **Coordinador:** Universita degli Studi di Roma La Sapienza (Italia)
- Aarhus Universitet (Dinamarca)
- Asociación NGVA Europe (España)
- Council of Scientific and Industrial Research (India)
- Hashemite University (Jordania)
- Scandinavian GtS AB (Suecia)

Tabla 1. Proyectos europeos **Nota:** Se recoge el coordinador del proyecto y otras cinco instituciones participantes

ANÁLISIS DE PATENTES

Durante el tercer trimestre de 2016 se han identificado 1333 familias de patentes en la base de datos WPI (World Patent Index) sobre tecnologías de conversión de la biomasa para la producción de energía. La mayoría de las referencias corresponde a invenciones para las que sólamente se solicita protección en países asiáticos (Tabla 2). Con el fin de ofrecer una visión más global de los actores implicados, éstas se van a excluir del análisis que se va a realizar en este Apartado.

Teniendo en cuenta la consideración del párrafo anterior, el 76.5% de las famílas se refiere a las tecnologías termoquímicas. El 21.7% y el 8.8% hacen referencia a las tecnologías bioquímicas y químicas, respectivamente. La tecnología de combustión es la que cuenta con mayor número de resultados, 41.0% del total.

Tipos de tecnologías de conversión de la biomasa	Nº Familias (Todos los ámbitos de protección)	Nº Familias (Ámbitos de protección exclusivamente asiáticos)
Tecnologías termoquímicas	**1118**	**952**
Combustión directa	550	461
Gasificación/pirólisis	605	524
Tecnologías bioquímicas	**152**	**105**
Digestión anaeróbica	101	82
Fermentación de azúcares	52	23
Tecnologías químicas (transesterificación, Fischer-Tropsch síntesis de metanol)	**93**	**74**
Nº TOTAL FAMILIAS DE PATENTES	**1333**	**1116**

Tabla 2. Número de familias de patentes clasificados por tecnologías **Nota:** Alguna invención puede incluirse en más de una tecnología

En la Tabla 3 se muestran los países líderes en protección. En primer lugar se encuentran las solicitudes internacionales (PCT), con 93 documentos; en segundo lugar se encuentra EE.UU, con 54. En tercer lugar y muy distanciados, se sitúan los documentos de patente europea (EP), con 22 referencias. En España, en el periodo analizado, se publicaron 4. En la Tabla 4 se recogen los ámbitos de protección más representativos de las invenciones correspondientes a las distintas tecnologías.

	País	Nº referencias
1	PCT	93
2	EE.UU. (US)	54
3	EP	22
4	Alemania (DE)	19
5	Brasil (BR)	15
6	Polonia (PL)	11

Tabla 3. Ranking por países (excluyendo países asiáticos)

TIPOS DE TECNOLOGÍA (Nº DOCUMENTOS)			
	Termoquímicas	Bioquímicas	Químicas
PCT	67	27	10
EP	19	4	0
Alemania (DE)	16	4	0
Brasil (BR)	10	2	3
EE.UU. (US)	40	12	6
España (ES)	4	0	0
Francia (FR)	3	1	0
México (MX)	3	1	0
Polonia (PL)	10	1	1
Reino Unido (GB)	9	0	0
Rusia (RU)	6	2	0
Nº Familias totales	**166**	**47**	**19**

Tabla 4. Ámbitos de protección más solicitados por tecnologías (excluyendo países asiáticos)

En los Apartados posteriores se presenta una selección de los documentos de patentes identificados en este trimestre.

TECNOLOGÍAS TERMOQUÍMICAS
Patentes

COMBUSTIÓN DIRECTA		
Nº Publicación	Solicitante (País)	Contenido técnico
GB2535824	Arada Ltd (GB)	**Fuel burning stove.** A fuel burning stove comprises a grate for supporting fuel to be burned, the grate comprising a set of separate grate bars 5 extending approximately parallel to one another from a first side of the grate to a second side opposite the first side with spaces between adjacent bars. The grate bars 5 are supported at their ends with the tops of their ends at approximately the same level, that level defining a first horizontal plane, and the tops of middle portions 8 of the grate bars are lower than the first horizontal plane thereby defining a depressed middle portion of the grate.
ES2575121	Efilume SL (ES)	**Quemador autolimpiable.** La presente invención se engloba dentro del campo del equipamiento de calefacción y agua caliente sanitaria, cuando se emplean como combustibles sólidos, y más concretamente se refiere a un quemador autolimpiable para ser utilizado en calderas de combustibles sólidos, especialmente de pellets. Está constituido por un primer cuerpo tubular de eje horizontal, que dispone en la parte inferior de orificios, y por un segundo cuerpo tubular de eje vertical, que dispone de orificios cerca del borde libre y desemboca en el primer cuerpo tubular. A lo largo del primer cuerpo tubular discurre coaxialmente un eje giratorio que es portador de dos discos circulares de diámetro aproximadamente igual al interno del primer cuerpo tubular, entre cuyos discos va montada una pletina rascadora.
PL123676	Energa Spółka Akcyjna (PL) et al.	**Travelling step grate for steam boiler intended for burning biomass and agricultural wastes.** The boiler has a support frame equipped with a grid section. A fixed base is connected to a water jacket grate. Guide roller tappet sections are provided with movable clamping rollers and guide rollers. Fixturing elements are connected with grid slots on a rod. The rod is mounted on a support. A fixed grate is mounted on a fixed poker. A trolley section of a moving grid is equipped with the fixturing elements. A main frame is mounted on two axes of flat beams and attached with a pusher section and a cantilevered beam. Movable grate elements are fixed with the grid and the fixed poker.
WO2016128615	Fortum OYJ (FI)	**Method for nox reduction in a circulating fluidized bed boiler, a circulating fluidized bed boiler and use thereof.** The current invention relates to a method for reducing NOx emissions in a circulating fluidized bed boiler (CFB boiler), the CFB boiler comprising a fur- nace, the furnace comprising a bottomand fluidizable bed material. The method com- prises feeding primary air from below through the bottom and the bed material into the furnace for fluidizing the bed material and entrapping at least a part of the bed material for circulating it in the furnace; feeding secondary air into the furnace at a height above the primary air feeding, for sub-stoichiometric com- bustion of fuel; and feeding fuel into the furnace at a height above the primary air feeding for combusting the fuel. The method is characterized in comprising feeding over-fire air (OFA) into the fur- nace at a height above the secondary air feeding, for super-stoichiometric combus- tion of the fuel. Uses include but are not limited to coal, peat, wood chips, wood processing by-products and community waste.

COMBUSTIÓN DIRECTA		
Nº Publicación	Solicitante (País)	Contenido técnico
DE202016002202	Frei Robert (DE)	**Combustion chamber for rocket furnace used for combustion of solid fuel, particularly pellets.** The combustion chamber comprises a filling opening for charging solid fuel into the combustion chamber. Inside the combustion chamber, a fuel vent area is present and is arranged perpendicular to the incoming air and perpendicular to the filling direction of the solid fuel into the combustion chamber. The fuel vent area is designed such that the fuel vent area is not filled with fuel during combustion of fuel.
EP3056087	Fritsch GmbH (DE)	**Solid fuel baking device with central blower unit.** The invention relates to a baking device with at least two ovens and at least four wood burning devices. The wood burning devices are used for heating the ovens, where wood fuel is proportionally umgewandet in fuel gas, which is burned at the introduction into the oven. equip instead each wood combustion device with its own blower and make a fixed allocation to a plurality of air inlets of the respective wood burning device, a central air handling unit is used, wherein the air supply to the plurality of wood combustion devices via adjustable throttle elements can be adjusted.
WO2016128608	Hawupro OY (FI)	**Portable heat and electricity generating device.** A portable heat and electricity generating device comprising: within the enclosure there are provided an intake channel for combustion air, a combustion chamber, a heat transfer element and an electricity generating element, a fire grate for fuel material to be located for combustion, the fuel feed opening is located above the combustion chamber so that the fuel feed is gravity based, the intake channel is located parallel to the combustion chamber and the direction of the air flow in the intake channel is configured opposite to the direction of the combustion/exhaust gas flow, a heat sink is provided in the intake channel for pre-heating the intake air (A) before combustion, the electricity generating element is a thermoelectric element provided between the heat sink and the heat transfer element.
WO2016124639	Holz & Agrar Produktion GmbH (AT)	**Multi-layer plant fuel element for grilling and cooking.** The invention relates to a fuel element in the form of a pressed article having plant material content and having an igniting element, characterized in that the fuel element comprises: an ember layer of slowly burning ember-producing fuel that contains pressed charred plant material as a main constituent; a fire-catching layer of highly flammable fuel, said fuel being a pressed article that contains, as a main constituent, a granular material or slivers of plant material such as coconut shell, coconut fiber, wood shavings, bamboo shavings, straw, peanut shell, sugarcane, and optionally binder; and an igniting element as a highly flammable mixture of wax or wax-like substance such as beeswax, vegetable wax, synthetic wax, stearin, said igniting element containing fibers or slivers such as coconut fibers, wood shavings, bamboo shavings, cotton fibers as a constituent.
US2016209029	Kobayashi Hisashi (US) et al.	**Oxygen Enhanced Combustion of Biomass.** The energy output of a power plant combustion chamber that combusts fuel comprising biomass as all or part of the fuel can be increased by feeding oxygen into the combustion chamber so that said fuel is in contact with gaseous oxidant whose oxygen content exceeds that of air by up to 5 vol. % above that of air.
PL410290	Koziara Mirosław Globerit (PL)	**Boiler for firing solid fuels, preferably wood.** The boiler has a combustion chamber connected with an exhaust outlet. A damping chamber is connected with a tubular liquid inlet. The combustion chamber is connected to the damping chamber through an opening. An upper wall is attached with the tubular liquid inlet.

COMBUSTIÓN DIRECTA		
Nº Publicación	Solicitante (País)	Contenido técnico
US2016209043	Nat Inst Chung Shan Science & Technology (TW)	**Combustion furnace.** A combustion furnace includes an inner shell, an outer shell, a gas inlet piping and a flame inhibiting cover. The inner shell defines a receiving cavity therein. The inner shell defines a plurality of first gas holes around the periphery of a top portion thereof. The inner shell defines a gas inlet hole at a bottom thereof. The outer shell encloses the inner shell such that a gas flowing space is defined between the inner shell and the outer shell. The gas inlet piping has an opening formed at one end thereof, and the gas inlet piping communicates with the gas flowing space. The flame inhibiting cover is atop the outer shell and the inner shell, and a lower flange of the flame inhibiting cover is below the first gas holes.
RU2591388	Nesterov Aleksandr Veniaminovich (RU) et al.	**Device for automatic loading of wood in solid-fuel boiler.** Invention relates to heat engineering, specifically to a device for automatic loading of wood in solid-fuel boiler. Device for automatic loading of wood in solid-fuel boiler comprises a hopper for solid fuel, a controller, a temperature sensor, electric drive, rotary element equipped with mechanism to convert rotary motion of engine shaft into rotation of said element. Device is additionally equipped with sleeves for grouping of separate logs, rotary element is made in form of rotary capsule placed under mouth of hopper, moving sleeve with wood, rotary capsule is made with an upper segment cut-out along axis, and is connected to rod ejecting firewood in solid-fuel boiler from sleeve and removes empty sleeves from rotary capsule, said rod being equipped with induction motor installed with possibility of horizontal movement.EFFECT: technical result is automation of wood solid-fuel heating boiler of small buildings.1 cl, 3 dwg
WO2016137345	Pellasx Spółka Z O O Spółka Komandytowa (PL)	**Device for supplying air and fuel to a pellet burner.** The subject of the utility model is the a device for supplying fuel and air to the pellet burner, comprising a centrifugal fan, a drive motor of which is located inside a blade-ring of the fan's rotor. The device is characterised in that a fan has a shaft with a notched rack, which meshes with a transmission mechanism, in addition, the transmission is aligned with the fan by means of a centring sleeve, whereas a feeder formed in a steel worm spiral is attached to the shaft of the transmission, and it is advantageously ended with a mixing element.
WO2016097338	Reinke Waldemar (DE)	**Solid-fuel combustion device having a fuel reservoir.** The invention relates to a solid-fuel combustion device, comprising a fuel reservoir for a solid fuel in the form of fuel pieces and a combustion chamber having at least one first opening for the feeding of air and having at least one second opening for the escape of heat and exhaust gases produced when the solid fuel is burned. During proper use, the fuel reservoir is arranged in such a way that the fuel pieces can enter the combustion chamber under the force gravity and can burn there. The fuel reservoir is closed air-tight at least in such a way that no or at least no significant burning can occur in the fuel reservoir during proper use. During proper use, the first opening is arranged below the combustion chamber and the second opening is arranged to the side of the combustion chamber. The combustion chamber and the fuel reservoir are arranged one directly above the other during proper use.
WO2016098014	Ronda SPA (IT)	**Pellet-burning barbecue.** A pellet-burning barbecue comprises a reservoir for storing pellets, a cooking surface, and a burner unit which includes a pellet burning container and a feed device for conveying pellets. The feed device comprises a screw housed in a conveying conduit which extends with an inclination relative to a horizontal direction, and is connected to the container at a lower end of the container, in such a way that the screw forms a bottom surface of the container.

COMBUSTIÓN DIRECTA

Nº Publicación	Solicitante (País)	Contenido técnico
BR102014010534	Sanchez Sanchez J J (ES)	**Energy system for combusting waste incineration biomass.** The system has a combustion chamber whose front part is provided with a fan. The combustion chamber provides sufficient heat to a sub-chamber. A circular table is made of refractory material. An upper side of the combustion chamber is provided with an anti-return device. A horizontal chamber is provided with a tubular heat exchanger for collecting energy that is produced by waste. A conical bottom collects ash. Chimney outputs gas and comprises a sampling element. A remote management system monitors emission level of biomass.
WO2016129892	Senergy Co Ltd (KR)	**Combustor.** The present invention relates to a combustor comprising: an outer case having an accommodating space formed therein; an inner case provided in the accommodating space of the outer case and having an air injection port communicating with one side thereof; a combustion furnace provided inside the inner case so as to make the fuel fed therein combust; a grate provided, at the lower side of the combustion furnace, in a state in which the upper end thereof is eccentric, so as to stir the fuel and the byproducts of combustion when rotating; and a driving module for rotationally driving the grate. According to the present invention, since the eccentrically rotating grate stirs solid fuel, such as wood pellets, and ash so as to allow the smooth discharge of ash and inflow of air, the discharge of the byproducts of combustion and combustion efficiency can be increased, and clinkers generated when impurities of the fuel are hardened while being melted and fixed during combustion can be minimized.
EP3040619	Spartherm Feuerungstechnik GmbH (DE)	**Fireplace.** The fire place (1) comprises a chimney insert or device for the incineration of solid fuel, such as timber pressed shapes, particularly briquettes or pellets or inorganic fuel, such as charcoal or anthracite coal. Vertical guides are provided, which are arranged for up and down movable guide of the combustion chamber door (3) at the fire place body (2) laterally beside the combustion chamber aperture (5.1).
WO2016130903	Tandra Danny S (US)	**Apparatus and method of using sound waves to reduce sorbent consumption in dry sorbent injection air pollution control systems.** A sorbent material is introduced into the emission gases flowing from the combustion system. Sound waves are also applied to the emission gases in the flow path. The sound waves can be introduced into the emission gas flow path at a location upstream from where the sorbent is introduced into the emission gas flow path. The sound waves can also be introduced into the emission gas flow path such that the sound waves travel in a downstream direction in the flow path. The emissions can include Hg and acid gases such as SO2. The sorbent material can be trona or activated carbon. The sound waves enhance mixing of and mass transfer between the sorbent and pollutants in the gas thereby reducing the amount of sorbent necessary to reduce harmful emissions. Method for reducing emissions in flue gas i.e. acid gas (claimed) produced in a combustion system. Uses include but are not limited to coal fired boilers, waste-to-energy plants, biomass boilers and incinerators.
EP3045813	V F M N V (BE)	**Discharge of flue gases.** Stove with a combustion chamber for burning a fuel, wherein the stove has an inlet for combustion air and an outlet for flue gases, which outlet for flue gases is provided with a flue gas extractor for active discharge of flue gases, which flue gas extractor is controllable by a controller to at least two extraction positions in order to minimize an excess of air during burning of the fuel, wherein the flue gas extractor is placed at a distance of at least 1 metre from the combustion chamber.

PIRÓLISIS/GASIFICACIÓN		
Nº Publicación	Solicitante (País)	Contenido técnico
WO2016123714	Anaergia Inc (CA)	**Solid waste treatment with conversion to gas and anaerobic digestion.** Waste solids are treated by pyrolysis at a temperature over 700 degrees C to produce char and a gas. The gas is treated in an anaerobic digester. In one system, gas and digestate are brought into contact in a diffusion cone. In another option, headspace gas above the digestate is re-circulated through the digestate, for example by way of an eductor downstream of the diffusion cone.
US2016229697	Advanced Organic Methods Llc (US) et al.	**Activated Carbon Production at Biomass-Fueled Steam/Electric Power Plants.** Production of activated carbon at biomass-fueled steam/electric power plants (biomass plants) is described. At a typical biomass plant, various types of woody fuels are combusted to produce steam, and a steam turbine drives a generator to produce electric power. According to the invention, the biomass plant's existing fuel handling, combustion, and ash handling processes are replaced, in whole or in part, by pyrolysis, pyrolysis gas combustion, char activation, and activation offgas combustion using known methods. Carbonaceous feedstocks, typically nut shells which are known to produce high quality activated carbon, are pyrolyzed, producing char containing fixed carbon and ash, while the volatile constituents are driven off and collected. The char is activated by steam to produce activated carbon and syngas. Particulate matter is removed from the volatile pyrolysis products and activation offgas. A fraction of the gases are combusted to sustain the pyrolysis and activation processes and the remainder combusted in the biomass plant's existing combustion chamber to drive the steam/electric power generation process and also produce steam for the activation process. The sale of the activated carbon creates a significant new revenue stream. Application of the invention greatly improves the profitability of the combined operation and reduces air pollution from particulate matter. The reduction of particulate matter emissions, and sequestration of carbon in the activated product, may create additional economic benefits through the sale of air pollution credits and carbon credits respectively.
WO2016118067	Bioendev AB (SE)	**Method and system for energy efficient torrefaction of biomass.** The present invention relates to a method and system for torrefaction of biomass and combustion of generated torrefaction gases. The torrefaction gases released from the biomass during the torrefaction reaction are withdrawn from the reactor and into a first burning zone. A secondary stream of air is introduced to the first burning zone to combust the torrefaction gases whereupon hot flue gases are obtained. Part of the hot flue gases are directed to a mixing unit. The rest of the hot flue gas is directed to a second burning zone for complete combustion of the flue gases. The fully combusted flue gases obtained in the second burning zone are directed to a heat recovery unit where the temperature of the flue gas is decreased. Part of the cold flue gases are directed to the mixing unit where it is mixed with the hot flue gases such that a stream of cooled flue gases is obtained. The stream of the cooled flue gases are diverted into the torrefaction reactor for direct heating of the biomass.
WO2016130009	Blackwood Tech BV (NL)	**Cooling process of torrefied biomass.** The present invention relates to a process for cooling hot torrefied biomass, which process comprises the steps of a) applying water onto the hot torrefied biomass, resulting in steam with entrained dust and organic volatiles, and cooled torrefied biomass comprising water; b) condensing the steam with entrained dust and organic volatiles to form a condensate comprising dust and organic volatiles; and c)recycling the condensate comprising dust and organic volatiles to step a).. The invention also relates to a cooling device for cooling hot torrefied biomass enabling the cooling process according to the invention, and a system for producing torrefied biomass comprising such a cooling device.

PIRÓLISIS/GASIFICACIÓN		
Nº Publicación	Solicitante (País)	Contenido técnico
EP3048161	En Tèrmiques Bàsiques SLl (ES)	**Industrial plant for biomass thermochemical treatment.** The present invention relates to a plant for the thermochemical treatment of biomass wherein the proposed plant operating under anoxic or almost anoxic conditions includes a cylindrical thermochemical reaction chamber surrounded by thermal insulation and with a screw conveyor therein, said chamber having a plurality of ceramic plates between the cylindrical wall of the chamber and the thermal insulation, each of said ceramic plates being associated with at least one external electrical heating means which allow causing a torrefaction, pyrolysis or gasification reaction with respect to a biomass introduced in said chamber, and said ceramic plates being arranged in different angular positions and/or in successive axial positions with respect to the cylindrical wall of the chamber, and additionally having internal heating means associated with the screw conveyor.
US2016194262	Fluor Tech Corp (US)	**Methods and system for decreasing gas emissions from landfills.** A method of diverting municipal solid waste (MSW) from a landfill that includes receiving, at a MSW processing system, a quantity of MSW, gasifying the quantity of MSW in a gasification unit to yield a syngas stream and biochar stream, converting at least a portion of the syngas to mixed alcohols in an alcohol synthesis unit, separating the mixed alcohols into one or more alcohol products, and determining a carbon offset for diverting the MSW from the landfill to the MSW processing system.
WO2016134794	Fraunhofer-Gesellschaft Zur Förderung Der Angewandten Forschung EV (DE)	**Pyrolysis oil and method and plant for producing same.** The invention relates to a method for producing a pyrolysis oil. In said method, a starting material to be treated is first pyrolyzed in a pyrolysis zone, in which the starting material is heated to a temperature of 250 °C to 700 °C and pyrolyzed solids and pyrolysis vapors are formed. The pyrolysis vapors are then reformed at a temperature of 450 °C to 1200 °C in a post-conditioning zone, in which the pyrolysis vapors are brought into contact with a catalyst bed, wherein the pyrolysis oil is formed. The catalyst comprises a pyrolyzed solid that can be obtained after the pyrolysis indicated above. Finally, the pyrolysis oil is separated from additional formed pyrolysis products in a separation unit. The pyrolysis oil has a carbon content greater than 65 wt%, a hydrogen content greater than 5 wt%, and an oxygen content less than 16 wt%. In addition, the pyrolysis oil has a 14C content of at least 0.1 ppt and an acid number less than 15 mg KOH/g.
GB2535797	Future Blends Ltd (GB)	**Process for removal of water and light organics from pyrolysis oil.** Described is an integrated process for converting biomass pyrolysis oil into products that will be more useful for transportation fuels as well as industrial solvents. In one embodiment, a method of stabilizing the pyrolysis oil using stabilizing agents (e.g. ethanol, methanol) is disclosed. In other embodiments, a method of obtaining a vacuum heavy fraction (VHF) and vacuum light fraction (VLF) through a vacuum distillation process of stabilized pyrolysis oil is disclosed. In other embodiments, a method to extract the stabilizing agent, and industrial chemicals from the VLF through atmospheric distillation is disclosed. Also, in other embodiments the method includes recycling the extracted stabilizing agent to stabilize the pyrolysis oil. In other embodiments, the VHF can be upgraded to transportation fuel through emulsification and catalytic processes.
US2016244686	Integro Earth Fuels Inc (US)	**High energy content densified lignocellulose biomass.** Methods and systems for forming densified lignocellulose biomass are described. Methods can include torrefaction and densification of a lignocellulose feedstock. Temperature and pressure control and lubricant addition throughout the process can provide for the lignin to dissipate more completely throughout the biomass and better coat the cellulose. The product can include a high level of lignin and low volatiles, both of which can improve the energy density of the product. In addition, the process can include a cooling step that can increase the crystallinity of the solidified lignin, which can further increase bulk density and improve grindability of the product.

PIRÓLISIS/GASIFICACIÓN		
Nº Publicación	Solicitante (País)	Contenido técnico
GB2534916	John Atkins (GB)	**Improved grate assembly for a gasifier.** A grate assembly for use in a gasifier is described. The grate assembly comprises a first and second grate having respective first and second grate elements. The grate assembly also comprises a driving mechanism arranged to enable relative motion between the two grates. Moreover, the driving mechanism is arranged to drive the first and second grate elements relative to one another through a primary movement. The primary movement causes the first and second grates to move alongside one another so that a spacing therebetween is substantially maintained. Moreover, the primary movement causes material trapped within the spacing to be ground between the grate elements. The grate elements 20, 30 may each be made of concentric rings 22 joined by spokes 26, with two elements rotated relative to each other.
BRPI1104399	Maia Fabiano Surian (BR)	**Pyrolysis by electromagnetic induction.** The present invention relates to an inductive reactor through the pyrolysis process converts many waste from household, industrial waste, rubber based waste or any type of biomass into products and by-products with added values such as biofuels, black gas smoke, charcoal briquettes, charcoal, synthetic resins and other products for the industry, trade and the environment.
GB2536048	Standard Gas Ltd (GB)	**Advanced thermal treatment methods and apparatus.** A multi-stage pyrolysis system comprises a retort structure which rotates about an axis. Calorific material is fed into the retort structure at an input end. There is a continuous path between the input end of the retort structure to the exit end 9 of a gas conduit. A heating system includes a section that heats the retort structure in a first zone at a first temperature and the gas conduit in a second zone at a second temperature, the temperatures being sufficient for pyrolysis of the calorific material with the second temperature being higher than the first temperature. The retort structure may be enclosed in a thermally insulated housing and a pipe may extend along an external surface of the retort structure and may be connected between the output end of the retort structure and the gas conduit. A three stage pyrolysis method, heating system for heating a gas enclosure, and method of cracking hydrocarbons are also claimed.
GB2536047	Standard Gas Ltd (GB)	**Pyrolysis methods and apparatus.** Pyrolysis apparatus comprises a first heating chamber which has a first thermally conducting plate as at least a portion of one side of the chamber, and a second thermally conducting plate. A second heating chamber has the first plate as at least a portion of one side of the chamber, and also contains a heater. The first and second chambers are atmospherically isolated from each other. The plates may be made from copper welded to nickel alloy or stainless steel. A system, such as a chain drive or conveyor belt may transport feedstock from one end of the first heating chamber to another end. The second chamber may contain an array of pipes which are isolated from the atmosphere of the second chamber. Apparatus with means for transporting feedstock along a face of the first thermally conductive plate is also claimed. A method of performing pyrolysis on feedstock between the plates and in an array of pipes inside the second chamber is also claimed.
WO2016139495	Standard Gas Ltd (GB)	**Pyrolysis retort methods and apparatus.** A pyrolysis surface such as a rotating retort is provided by copper sheet supported by a nickel alloy framework. Pyrolysis is used to destroy calorific waste and/or to produce gas therefrom.

PIRÓLISIS/GASIFICACIÓN		
Nº Publicación	Solicitante (País)	Contenido técnico
EP3061726	Terranova Energy GmbH (DE)	**Method for the separation of phosohorous from biomass and device.** Disclosed is a process for separating phosphorus from biomass, in particular sewage sludge, in which first a hydrothermal carbonization is carried out, then the resulting coal slurry is lowered without a preceding solid-liquid separation in the pH-value, then only a solid-liquid separation for the separation of the liquid phase is carried out and finally, the liquid phase of a phosphorus elimination is subjected. And a device, in particular for carrying out the method described above comprising a durchbeaufschlagtes reaction volume to carry out the hydrothermal carbonization a reaction vessel with agitator and acid feed in direct communication with one or with a device for gravimetric thickening, a solid-liquid separator container for phosphorus removal by deposition by precipitation / crystallization or by evaporation of water an outlet for the phosphorus-containing solid / the phosphorus-containing aqueous concentrate, optionally with further processing by dewatering and / or drying and / or granulation, an outlet for coal.
WO2016135979	The Chugoku Electric Power Co Inc (JP) et al.	**Supercritical water gasification system and gasification method.** The present invention comprises: a gasification reactor which subjects a slurry body generated from a feedstock comprising biomass to a gasification process using supercritical water; and a heat exchanger which preheats the slurry body before the slurry body is subjected to the gasification process using supercritical water by the gasification reactor. The present invention is provided with a supercritical pressure boiler which discharges steam at a pressure which is equal to or greater than the pressure in a supercritical water gasification system. The heat exchanger uses the steam discharged from the supercritical pressure boiler to preheat the slurry body. Consequently, preheating the slurry body that includes water-containing biomass with the heat exchanger using high pressure steam equal to or greater than the pressure in the supercritical water gasification system allows the heat exchanger to be small, reduces generation of tar and char so that clogging of tubes of the heat exchanger 130 is avoided, and allows efficient generation of fuel gas such as methane or hydrogen from the water-containing biomass.
BR102014008767	Univ Fed Do Ceará (BR)	**Equipment for carrying out pyrolysis of biomass through use of solar radiant energy as primary source.** Equipment comprises a pyrolysis reactor with internal holes, a biomass feeding system, a charcoal discharging system, a condensable and noncondensable gas conduction system and a sunlight concentration system.
WO2016130703	V-Grid Energy Systems (US)	**Method and system for automatic solids flow in a gasifier.** A method is described for processing biomass using a series of mechanisms that operate in unison to maintain solids flow through small gasifiers that are otherwise prone to blockage. An automated system that implements these methods is also disclosed. Embodiment's of the present disclosure are directed toward methods for preventing biomass and charcoal bridging by automating solid flow of feed material and gasification products in a fixed bed gasifier. These methods are applicable to a wide range of biomass materials and wide range of moisture levels. Constant feed rate through the gasifier is desired without logjams or congestion points. Processes are provided for clearing logjams and congestion as input biomass is converted to char or ash in vertical column gasifiers.
US2016218593	V-Grid Energy Systems (US)	**Method and system for implementing a micro integrated gasification combined cycle.** Renewable electricity, such as from solar or wind, powers a topping cycle utilizing combustion energy electricity generation, such that the electricity output of the system exceeds the combined standalone outputs. Renewable carbon, such as from biomass, can also power a similar topping cycle, having the same effect.

TECNOLOGÍAS BIOQUÍMICAS
Patentes

DIGESTIÓN ANAERÓBICA		
Nº Publicación	Solicitante (País)	Contenido técnico
RU2590536	Federalnoe G Byudzhetnoe Obrazovatelnoe Uchrezhdenie Vysshego Obrazovaniya Saratovskij G Agrarnyj Un (RU)	**Method of producing heat and electric energy by complex processing of wastes.** FIELD: energy. SUBSTANCE: biowastes are fed into sorting unit 10, where they are divided depending on possibility of anaerobic decomposition. Prepared organic substrate is directed into anaerobic fermentation 6 plant, where combustible biogas and by-products are generated, directed to consumers in form of organic fertilizer. Wastes, which are not subjected to anaerobic decomposition, are subjected to dehydration and (or) drying and granulation. Produced pellets are supplied to store 13, from which are supplied to gas generator 8, in which synthesis gas is generated. Purified biogas and synthetic gas are supplied into fuel substitution unit 2 for supply of co-generators 1, generating from them heat and electric energy to consumers. Also, for production of synthesis gas directly in gas generator 8 dry wastes are fed, which does not require preliminary preparation. During peak increase of heat energy peak solid-fuel boiler 3 is activated, in which reserves of pellets are burnt.EFFECT: higher reliability of power supply in enterprises of agroindustrial complex owing to use of independent power systems.1 cl, 1 dwg.
WO2016117576	Fuji Clean Co Ltd (JP)	**Water treatment device.** To provide a technique for efficient treatment of water to be treated. [Solution] A treatment tank unit 101 of this water treatment device is equipped with a settling separation tank, an anaerobic treatment tank, an aerobic treatment tank, a treatment water tank, and a disinfection tank. A third airlift pump for feeding water to be treated in the treatment water tank to the disinfection tank is provided. In so doing, it is possible for water levels in the settling separation tank, the anaerobic treatment tank, the aerobic treatment tank, and the treatment water tank to fluctuate at identical water levels. Further, a first airlift pump feeds water to be treated in the anaerobic treatment tank to the settling separation tank, and a second airlift pump feeds water to be treated from the aerobic treatment tank to the settling separation tank. In so doing, the water to be treated is circulated through the settling separation tank, the anaerobic treatment tank, the aerobic treatment tank, and the treatment water tank.
PL411560	Jjra Spółka z Ograniczoną Odpowiedzialnością (PL)	**Method and system for the production of biomethane, ecomethane as well as electric power and heat energy.** The method for the manufacture of bio-methane and eco-methane as well as electric and thermal energy according to the present invention consists in hydrogasification of a mixture of bio-carbon and fossil carbon in a carbon hydrogasification reactor using bio-hydrogen obtained in a bio-hydrogen production reactor from a mixture of bio-methane and steam in the presence of a catalyst and with a CO2 acceptor being a mixture of magnesium and calcium oxides. The raw gas formed, after purification, is subjected to separation into hydrogen and methane sent to a hydrogen production process and to feed a power generation unit. Spent CO2 acceptor is subjected to calcination and the CO2 produced in the calcination process is directed to a CO2 sequestration process. The system for the manufacture of methane and energy consists of a first reactor for the hydrogasification of a mixture of bio-carbon and carbon prepared by a carbon feed preparation unit connected to a biomass pyrolysis apparatus and a carbon conveyor and fed by a carbon mixture conveyor to the first reactor connected to a vapour and gas separator, said separator having a hydrogen outlet connected to the first reactor and a methane outlet connected to a third reactor and the power generation unit. Additionally, the third reactor has a CO2 acceptor inlet connected to a second reactor for the calcination of the spent CO2 acceptor and a spent CO2 outlet at the third reactor connected via a conveyor to the second reactor. A CO2 pipeline is connected to a CO2 sequestration system, whereas another CO2 pipeline (l0d) for the regenerating CO2 stream exiting the second reactor is connected via a heat exchanger and a preheater (9) of that stream, connected via a pipeline to the second reactor.

DIGESTIÓN ANAERÓBICA		
Nº Publicación	Solicitante (País)	Contenido técnico
DE102015100848	Obermeier - Widmann Gbr (DE)	**Generating biogas from cellular biomass.** Method for generating biogas from the cellular biomass, involves acidifying the cellular biomass, recovering biogas from the acidified biomass and exposing the cellular biomass to mechanical load which destroys the cell walls of cellular biomass.
DE102014119290	Renergon Int Ag (CH)	**Biogas plant useful for fermentation of stackable biomass comprises percolate supply unit for providing percolate coatable on stackable biomass, gas-collecting rail, mobile gas-tight fermenter box and receiving device.** Biogas plant comprises a percolate supply unit for providing a percolate coatable on the stackable biomass, a gas-collecting rail for collecting the biogas produced during the fermentation, at least one mobile gas-tight fermenter box for receiving and fermenting the stackable biomass, and at least one receiving device for receiving the at least one mobile fermenter box. The fermenter-box is mechanically coupled with the receiving device and is adapted to couple the fermenter box to the receiving device, and to couple fermenter box with the percolate supply unit and the gas-collecting rail by the mechanical coupling.
WO2016111410	SK Chemicals Co Ltd (KR)	**Method for high-temperature anaerobic digestion of organic waste using energy recirculation.** The present invention relates to a method for high-temperature anaerobic digestion of organic waste using energy recirculation and, more particularly, to a method for high-temperature anaerobic digestion of organic waste, and a high-temperature anaerobic digestion equipment which can be applied thereto, in a process of high-temperature anaerobic digestion of organic waste comprising an organic waste thermal solubilization pre-treatment step, a high-temperature anaerobic digestion step, and a cogeneration using biogas, wherein the process may accomplish high energy self-sufficiency by substituting the amount of heat needed to be supplied from the outside through recovering and recirculating internally generated energy generated during the process, and is thereby highly economically advantageous.
WO2016097638	Veolia Proprete (FR)	**In-situ biostimulation of the hydrolysis of organic matter for optimizing the energy recovery therefrom.** The subject matter of the present invention is a process for treating organic waste coupling in-situ biostimulation to produce hydrolytic enzymes and hydrolysis of the refractory organic matter from waste using these enzymes for the purpose of energy recovery.

FERMENTACIÓN DE AZÚCARES

Nº Publicación	Solicitante (País)	Contenido técnico
WO2016118509	Bioprocess Algae (US)	**Process and method for simultaneous saccharification and fermentation using microalgae.** The present invention generally relates to the production of biofuels and, in particular, to a process for simultaneous saccharification and fermentation using a microalgae substrate. According to one aspect of the present invention, a process is provided in which the temperature and pH of a broth mixture are adjusted to slow the rate of glucose conversion and to match the glucose metabolizing rate of the microalgae.
WO2016131788	Deinove (FR)	**L-arabinose assimilation pathway and uses thereof.** The present invention relates to a new L-arabinose assimilation pathway and uses thereof. In particular, the present invention relates to polypeptides exhibiting L-arabinose isomerase, L-ribulokinase or L-ribulose-5-phosphate-4-epimerase activity, and recombinant host cells expressing said polypeptides. The present invention also relates to a method of producing a fermentation product, preferably ethanol, from an arabinose containing substrate, using a polypeptide or a host cell of the invention.
EP3050967	Evonik Degussa GmbH (DE)	**A method of producing higher alcohols.** The present invention relates to a reaction mixture and a method of producing at least one higher alcohol comprising a reaction mixture comprising a mixed culture of a first and a second microorganism in an aqueous medium comprising carbon monoxide gas, wherein - the first microorganism is an acetogenic microorganism capable of converting a carbon source to acetate and/or ethanol; and - the second microorganism is selected from the group consisting of Clostridium kluyveri, and C. Carboxidivorans capable of converting capable of converting the acetate and/or ethanol to form an acid; wherein the first microorganism is further capable of converting the acid to the corresponding higher alcohol and the higher alcohol comprises at least 6 carbon atoms.
RU2588655	Mikhajlov Leonid Nikolaevich (RU)	**Raw material for obtaining bioethanol.** FIELD: biotechnology. SUBSTANCE: invention relates to use of excessive active sludge in secondary settling tanks of biological treatment plants in cities and settlements in order to obtain bioethanol. Bioethanol is obtained by introduction sugar-rectificate and yeast into sludge with subsequent fermentation, distillation of obtained alcohol and its rectification. Products remaining after distillation of alcohol can be used as organic fertilizers.EFFECT: suggested invention allows to save natural resources and improve environment due to waste processing.1 cl, 1 tbl.
WO2016111830	Purdue Research Foundation (US)	**Methods for mitigating the inhibitory effects of lignin and soluble phenolics for enzymatic conversion of cellulose.** Disclosed herein are methods for improving ethanol production from biomass sources by blocking cellulose from binding to lignin.
WO2016131951	Repsol SA (ES)	**Solanum tuberosum plants for biofuel production.** The invention relates to genetically modified plants of the Solanum genus comprising a lignin composition with a particular ratio of the amounts of the monolignols sinapyl alcohol (S) / coniferyl alcohol (G) in the cell wall, that allow a better glucose extractability without compromising plant integrity. The invention also relates to parts, cells and manufactured plant products derived from these genetically modified plants. Particular methods for obtaining the genetically modified including down-regulation of CCR1 and CAD2 enzymes are also disclosed, as well as methods for producing bioethanol from said genetically modified plants.

FERMENTACIÓN DE AZÚCARES

Nº Publicación	Solicitante (País)	Contenido técnico
WO2016105538	Sandia Corp Sandia Nat Lab (US)	**Adjusting the ph of a pretreatment solution using carbon dioxide useful for integrating saccharification and fermentation.** The present invention provides for a method of fermenting or saccharifying a biomass comprising: (a) (i) contacting a biomass comprising a polysaccharide, and an ionic liquid (IL) to form a first solution, or (ii) providing the first solution comprising the biomass and the IL, (b) contacting the first solution and carbon dioxide such that the first solution results in a lower pH, (c) introducing (i) an enzyme capable of enzymatically to breakdown at least one bond in the polysaccharide or a breakdown product of the polysaccharide, and/or (ii) a microorganism that capable of producing the enzyme and/or fermenting the polysaccharide or a breakdown product of the polysaccharide, such that the polysaccharide is at least partially broken down and the first solution is transformed into a second solution.
WO2016132760	San Nopco KK (JP)	**Additive for bioethanol fermentation process and method for producing bioethanol.** The purpose of the present invention is to provide an additive that is capable of improving bioethanol production efficiency. The additive for a bioethanol fermentation process according to the present invention is characterized by comprising: a polyoxyalkylene alkyl compound (A) having a Griffin HLB value of 0-6; a polyoxyalkylene polyol (B); and a base oil (C) which is liquid at 25°C. The compound (A) is preferably a mixture of a compound represented by formula (1) with a compound represented by formula (2). R1O-(AO)m-R2 (1) R3O-(AO)n-(EO)p-R4 (2) In formulae (1) and (2): R1 and R3 represent an alkyl or alkenyl; R2 and R4 represent a hydrogen atom or a monovalent organic group; AO represents an oxyalkylene having 3-18 carbon atoms, a reaction residue of glycidol, a reaction residue of an alkyl glycidyl ether or a reaction residue of an alkenyl glycidyl ether; EO represents oxyethylene; m and n are 1-100; and p is 3-10.
WO2016112238	Univ Cincinnati (US)	**Neurospora crassa strains with amplified expression of cellulases and production of biofuel therefrom.** Transgenic strains of Neurospora crassa engineered to comprise a synthetic positive feedback loop for a transcriptional activator of cellulase expression such that cellulase production is amplified are disclosed, along with compositions thereof. The transgenic strains are particularly useful in methods for generating purified cellulases, fermentable sugars, and cellulosic ethanol for the efficient production of biofuel from cellulose-containing biomass and waste.
WO2016109286	Univ Indiana Res & Tech Corp (US)	**Culture conditions that allow zymomonas mobilis to assimilate n2 gas as a nitrogen source during bio-ethanol production.** Chemically defined culture medium and culture conditions that allow bacteria to assimilate dinitrogen gas (N2) as a nitrogen source during bio-ethanol production are disclosed herein. Methods of bioethanol production using the chemically defined culture medium and culture conditions are also disclosed.
US2016237103	Xyleco Inc (US)	**Processing biomass.** 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 use feedstock materials, such as cellulosic and/or lignocellulosic materials and/or starchy materials, to produce a product or intermediate, e.g., energy, a food, a fuel, or a material.

TECNOLOGÍAS QUÍMICAS
Patentes

Nº Publicación	Solicitante (País)	Contenido técnico
US2016186081	Chao Chih-Jung (TW) et al.	**Environmental protection liquid fuel generator.** An environmental protection liquid fuel generator, in which the fuel oil generator is a structure made from a receiving device, an esterification device, a first standing separation device, a compression distillation device, an acid-base neutralization device, a second standing separation device, and a decompression distillation device. A mixed proportion of a vegetable oil and an alkide (catalyzing enzyme) is placed into the fuel generator, and the esterification device is used to increase electron affinity and accelerate the reaction rate, thereby enabling the distillation of low polluting and low sulfur containing environmental protection fuel oil.
WO2016098025	Inis Biotech Llc (US) et al.	**Process for the purification of biodiesel.** The invention relates to a process for the purification of crude biodiesel obtained by reacting triacylglycerol with an alcohol in the presence of a catalyst, comprising a series of water-washing operations in order to reduce the total amount of contaminants and, in particular, sterol glucosides and monoacylglycerides. The invention is characterised by the addition of water to the system before the glycerol phase is separated from the biodiesel phase.
WO2016100944	Inventure Renewables Inc (US)	**Systems and methods for the non-catalytic production of biodiesel from oils.** In alternative embodiments, provided are systems and processes for the preparation of high-quality biodiesel and high-quality glycerol from oils: e.g., natural oils: corn oil, distillers corn, linseed, flaxseed, cottonseed, rapeseed (canola), peanut, sunflower, safflower, coconut, palm, soybean, comprising a high percentage (e.g. →10%) of organic acids, e.g. free fatty acids. In alternative embodiments, provided are systems and processes for the production of biodiesel meeting or exceeding the specifications for B100 biodiesel set forth in ASTM Specification D6751-14, as well as a glycerol co-product meeting or exceeding the standards for U.S. Pharmacopeial Convention (USP)-grade glycerol from natural oil feedstocks comprising high percentages of organic acids. In alternative embodiments, natural oil feedstocks with high organic acid content are subjected to a transesterification reaction with an alcohol under conditions at or above the critical temperature and pressure of the alcohol in the absence of any catalyst.
US2016230106	Ruan Rongsheng (US) et al.	**Production of biodiesel from scum.** A method for production of a biodiesel is described herein. The method for production of a biodiesel comprises (a) separating solids from a waste oil composition to provide a clarified oil composition; (b) acidifying the clarified oil composition to produce an acidified oil composition including free fatty acids derived from the waste oil; (c) converting at least a portion of the free fatty acids in the acidified oil composition to glycerides to provide a glyceride composition; and (d) reacting at least a portion of the glycerides in the glyceride composition with methanol to form fatty acid methyl ester to provide a biodiesel composition.
WO2016109469	Shell Oil Co (US) et al.	**Methods and systems for processing cellulosic biomass.** Separation of a product of digestion of cellulosic biomass solids may be challenging due to the various components contained therein. Methods and systems for processing cellulosic biomass, particularly a reaction product of a hydrothermal reaction containing lignin-derived products, such as phenolics, comprise providing the reaction product to a separation zone comprising a liquid-liquid extraction unit. The liquid-liquid extraction unit can provide an aqueous portion and a non-aqueous portion, where these portions can be separated into various fractions individually. For example, desirable compounds in the aqueous portion and non-aqueous portion can be recovered from the portions individually and optionally combined to be further processed into a fuels product. Heavier components in the aqueous portion and non-aqueous portion can be recovered from the portions individually and used in the process, such as phenolics that can be used as a digestion solvent.

Nº Publicación	Solicitante (País)	Contenido técnico
US2016257908	Univ Drexel (US) et al.	**Acidic Methanol Stripping Process That Reduces Sulfur Content of Biodiesel From Waste Greases.** The present invention provides a method of producing fatty acid alkyl esters from a lipid, comprising steps of introducing a gas comprising vapor of an alcohol selected from methanol, ethanol, 1-propanol, iso-propanol and butanols, into the lipid in a form of bubbles to enable the bubbles to pass through the lipid and be discharged from the lipid. The product may then be subjected to a transesterification process catalyzed by a base catalyst. The present invention is robust with low quality feedstocks thus significantly reduce production cost for biodiesel.
BRPI1105825	Univ Fed do Rio Grande do Sul (BR) et al.	**New guanidine based catalyst used in solid support for base catalyzed reactions and for producing biodiesel by transesterification of vegetable and animal oils.** The present invention discloses substituted guanidine and substituted guanidines based material, both with catalytic properties. They are further described the method for obtaining the substituted guanidines and the impregnation of these guanidines in solid carriers. The catalysts described in this invention may be used homogeneously or heterogeneously, wherein the heterogeneously are preferably supported on a solid matrix.
WO2016122298	Velez de la Rocha José Martin (MX)	**Device for evaporating residual methanol in bio-diesel, by means of a cavitation means having an extended surface and uni-directional flow.** The invention relates to a device for evaporating methanol in a process for producing bio-diesel by means of ultrasonic cavitation, comprising a cavitation device formed in stainless steel having a rectangular shape. The device is provided with an injection tube and an outlet tube (5) of dry bio-diesel. Grooves are provided in the upper part to permit the release in a gaseous form of the evaporated alcohol of a low molecular weight (methanol, ethanol, 1-propanol, 2-propanol, 1-butanol, etc.). Bio-diesel is admitted by means of the injection tube with alcohol of low molecular weight in concentrations of up to 5% by weight as a residue of the transesterification process with potassium methoxide. This mixture is admitted at a temperature of 35 to 45 °C in order to accelerate the speed of the evaporation of the residual alcohol by 50%.
WO2016117991	Velez de la Rocha José Martin (MX)	**System for generating bio-diesel from different raw materials having a high lipid content by means of the in situ transesterification process.** The invention relates to the production of bio-diesel from wet biomass having a high lipid content, using a process with two main stages, involving hydrothermal carbonisation (HTC) and supercritical in situ transesterification (SC-IST). The wet carbon or "hydrochar" produced by HTC is reacted with ethanol or methanol, not in excess, controlling the residence time, moisture levels, pressure and temperature. A continuous process is established, involving a number of stages such as hydrothermal carbonisation, filtering and supercritical in situ transesterification. This process observes the conditions that provide the best results: in the hydrothermal carbonisation, working with a mixture of 20% solids and at a temperature of 250°C for a time of 45 minutes, and for the supercritical in situ transesterification, working with a molar ratio of 20:1 of ethanol and fatty acids, having a moisture level between 45 and 50%, at a temperature of 275°C, and for a time of 180 minutes.

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