



TECNOLOGÍAS TERMOQUÍMICAS: PRODUCCIÓN CIENTÍFICA

Como introducción a este boletín, **este trimestre se va a presentar un análisis conciso de la producción científica en el área de las tecnologías termoquímicas de conversión de la biomasa** (combustión directa, pirólisis y gasificación) medida a través del número de publicaciones científicas identificadas en la base de datos Web of Science de ISI WoK mediante las estrategias de búsqueda diseñadas con tal fin.

La producción científica a nivel mundial en el ámbito de las tecnologías termoquímicas de conversión de la biomasa supera las 31300 publicaciones. El 83% son artículos científicos en revistas especializadas y el 17% comunicaciones a congresos. El 4% del total son revisiones del estado del arte de la tecnología. Los países líderes en publicaciones son EE.UU. y China, con el 20.3 y 15.6%, respectivamente. España ocupa una posición muy avanzada, con el 5.8%, ocupando el cuarto lugar tras Japón, con el 6.0%. La quinta posición la ocupa Alemania con el 5.7%. Estos porcentajes se mantienen con pequeñas variaciones para cada una de las tecnologías.

Agrupando las publicaciones por tecnologías, el 64% hace referencia a la pirólisis, el 36% a la combustión directa y el 28% a la gasificación. Estos resultados ponen de manifiesto que en muchos casos se identifican dos tecnologías en la misma publicación.

La evolución temporal de la producción científica a nivel mundial refleja que, en los tres tipos de tecnología, entre un 50-55% de los artículos se publicaron en los últimos cinco años y entre un 75-80% en los últimos diez. Esto evidencia el interés global creciente suscitado por esta área con el paso de los años. Las tendencias señaladas se mantienen, asimismo, en el caso de las publicaciones españolas.

Las instituciones líderes en publicaciones a nivel mundial se recogen en la Tabla 1. A la cabeza se encuentra la *Chinese Academy of Sciences*, con el 2.8% de las publicaciones mundiales y, tras ella, el *US Department of Energy*, con el 2.6%. El Consejo Superior de Investigaciones Científicas (CSIC) es el centro español que se encuentra entre los líderes mundiales, ocupando la sexta posición, correspondiéndole el 1.4% de las publicaciones. Cabe señalar que son muy numerosos los organismos trabajando en este campo y que en países líderes como Japón y Alemania la producción científica procede de múltiples centros, sin existir ninguno cuya contribución al total ascienda al 1%. En estos países los centros con más publicaciones son la Universidad de Kyoto (Japón) y el Instituto Max Planck (Alemania), con aportaciones del 0.6 y 0.7%. En el caso de Francia, sin embargo, el 50% de la producción científica procede de una sola institución, el *Centre National de la Recherche Scientifique* (CNRS), contribuyendo al balance global con el 2.1%.

Si nos referimos a España (Tabla 2), la producción científica procede esencialmente de centros de investigación y Universidades. La institución más puntera es el CSIC, con el 23.7% de las 1800 publicaciones identificadas, seguida de la Universidad de Zaragoza, con el 11.0%. El 67% de las publicaciones hacen referencia a procesos de pirólisis, el 35% a procesos de combustión directa y el 29% a procesos de gasificación. En la Tabla 2 se identifican las temáticas más representativas de las publicaciones de cada una de las instituciones. Cabe señalar que los centros españoles elaboran publicaciones conjuntas fundamentalmente con instituciones de Estados Unidos y con otros centros europeos. Así, por ejemplo, el 4.2% de sus publicaciones las firman, además, instituciones estadounidenses y el 3.8%, 3.2%, 3.1 y 3.0% se elaboran con centros de Francia, Inglaterra, Italia y Alemania, respectivamente.

Tabla1:

INSTITUCIONES LÍDERES EN PUBLICACIONES A NIVEL MUNDIAL				
Institución	Nº Publicaciones (%) ¹	Áreas temáticas ²		
		Combustión directa	Pirólisis	Gasificación
Chinese Academy of Sciences (CN)	2.8	x	x	x
US Department of Energy (US)	2.6	x	x	x
Centre National de la Recherche Scientifique, CNRS (FR)	2.1	x	x	x
US Department of Agriculture (US)	1.5	x	x	
University of California System (US)	1.4	x		
Consejo Superior de Investigaciones Científicas (ES)	1.4	x	x	
National Renewable Energy Laboratory (US)	0.9		x	x
Technical University of Denmark (DK)	0.9	x		
University of Leeds (UK)	0.9			x
VTT Technical Research Center Finland (FI)	0.9	x		
Zhejiang University (CN)	0.9		x	

¹ 1% = 313 publicaciones; ² Se señalan las instituciones firmantes de más del 1% de las publicaciones de cada área temática

Tabla2:

INSTITUCIONES ESPAÑOLAS LÍDERES EN PUBLICACIONES				
Institución	Nº Publicaciones (%) ¹	Áreas temáticas ²		
		Combustión directa	Pirólisis	Gasificación
CSIC	23.7	x	x	x
Univ. Zaragoza	11.0	x	x	x
Univ. País Vasco	6.6	x	x	x
Univ. Sevilla	6.1	x	x	x
Univ. Vigo	4.9	x	x	
Univ. Extremadura	4.3	x	x	x
Univ. Alicante	4.1	x	x	
Univ. Politécnica Madrid	3.2	x	x	
Univ. Complutense Madrid	3.1		x	x
Univ. Córdoba	2.9	x	x	
CIEMAT	2.8	x		x
Univ. Castilla La Mancha	2.6	x	x	x
Univ. Politécnica Valencia	2.3		x	x
Univ. Santiago de Compostela	2.2		x	
Univ. Autónoma Barcelona	2.1		x	
Univ. Jaén	2.1	x		x
Univ. Rovira i Virgili	2.0		x	x

¹ 1% = 18 publicaciones; ² Se señalan las instituciones firmantes de más del 2% de las publicaciones de cada área temática

ANÁLISIS DE PATENTES

Durante el tercer trimestre de 2015 se han identificado en la base de datos WPI (World Patent Index) 1583 familias de patentes sobre tecnologías de conversión de la biomasa para la producción de energía (Tabla 3). El 49.0% de las referencias encontradas están relacionadas con las tecnologías bioquímicas. La tecnología de digestión anaeróbica es la que cuenta con mayor número de resultados, 41.3% de los totales, seguida de la gasificación/pirólisis (24.7%).

Tipos de tecnologías de conversión de la biomasa	3 ^{er} trimestre. 2015
Tecnologías termoquímicas	637
Combustión directa	246
Gasificación/pirólisis	391
Tecnologías bioquímicas	776
Digestión anaeróbica	654
Fermentación de azúcares	122
Tecnologías químicas (transesterificación, Fischer-Tropsch síntesis de metanol)	170
Nº TOTAL FAMILIAS DE PATENTES	1583

Tabla 3. Número de familias de patentes clasificados por tecnologías

En la Tabla 4 se muestran los países que han publicado más de 20 documentos de patente en el tercer trimestre de 2015. El país líder es China con 942 documentos de patente, en segundo lugar, y con gran diferencia, le siguen las solicitudes internacionales (PCT). En tercero y cuarto lugar se encuentran EE.UU. y Corea con 112 y 90 documentos, respectivamente. Durante este trimestre en España se han publicado 12 documentos.

	País	Nº referencias
1	China	942
2	PCT	194
3	EE.UU.	112
4	Corea	90
5	Japón	67
6	Alemania	55
7	EP	46
8	Rusia	38
9	Francia	26
10	Brasil	25

Tabla 4. Ranking por países.

En los apartados posteriores se recoge una selección de los documentos de patentes identificados en el trimestre analizado.

TECNOLOGÍAS TERMOQUÍMICAS

Patentes

COMBUSTIÓN DIRECTA		
Nº Publicación	Solicitante (País)	Contenido técnico
WO2015130190	Obschestvo s Ogranichennoi Otvetstvennostyu Unicat (RU)	Device for neutralizing organic waste and sour crude oil. The invention relates to devices for neutralizing liquid organic waste and sour crude oil by catalytic combustion in the fluidized bed of a catalyst and can be used in the chemical, petrochemical, wood-chemical and nuclear industries and in heat and power engineering. What is described is: a device for combusting organic waste and sour crude oil by means of oxidation with atmospheric oxygen while capturing acid gases with an alkaline adsorbent, said device consisting of a reactor with a vertical body with air, waste and alkaline adsorbent feed pipes in the lower part and pipes for discharging flue gases and charging catalyst in the upper part, wherein a gas-distributing grating is arranged within the body between the air feed pipes and the waste and adsorbent feed pipes, with a layer of disperse thorough-oxidation catalyst or a mixture of catalyst and inert material being located on said gas-distributing grating, above which a regulating nozzle and a heat exchanger are arranged in series in a pseudo-fluidized bed, wherein the upper part of the body of the reactor has an expanded portion which comprises a pipe or pipes for feeding additional air. The technical result consists in reducing deterioration of the catalyst, and simplifying the technology for the neutralization of organic waste, including sour crude oil, in the absence of secondary pollutants.
EP2910854	Riener Karl Stefan (AT)	Flue gas valve device. The present invention relates generally to a flue gas flap device and also a heating device for the combustion of biomass with such a flue gas flap device. The invention relates to a flue gas valve means, with a flue gas flap, a rotatable shaft, and a holding device, wherein the flue gas flap is connected to the shaft and wherein the flue gas valve means adapted to is that the holding device, the flue gas flap in a closed operating position holding against gravity and that the holding device can release the flue gas flap, so that the flue gas flap is moved by gravity in an open operating position.
EP2910853	Ramböll Danmark AS (DK)	A combustion system and a method for combusting fibrous biomass. Disclosed is a combustion system for combusting fibrous biomass. The combustion system comprising a pulverised fuel fired combustion chamber and milling means for pulverising the fibrous biomass. The combustion system further comprises gas flow means for establishing a flow of carrier gas through the milling means and into the combustion chamber for carrying the pulverised biomass into the combustion chamber and temperature maintaining means for ensuring that the temperature of the pulverised biomass and carrier gas mix does not drop more than 5% from the milling mean and until it reaches the combustion chamber.
WO2015121331	Stuv SA (BE)	Solid-fuel combustion chamber. The present invention relates to a solid-fuel combustion chamber comprising a staged burner with a lower stage in which, during use, primary combustion of the solid fuel takes place and with an upper stage in which, during use, secondary combustion of the gases derived from the primary combustion takes place, said burner comprising in the upper stage: a first hollow body intended to accommodate, within its interior volume, the gases derived from the primary combustion, said first hollow body comprising a conical part, and a secondary-air duct arranged around said first hollow body and opening at the upper end thereof, said duct being delimited, on the one hand, by the first hollow body and, on the other hand, by a wall of a shape that substantially complements that of the first hollow body so as to ensure parallel injection of the secondary air along the first hollow body.
WO2015121848	Gruppo Piazzetta SPA (IT)	Storage heating or slow heat release stove. A storage heating stove, comprising a base, a furnace provided with a relative brazier foreseen inside it, and at least one conveying duct for conveying the combustion fumes generated inside the furnace associated with respective suction means, the conveying duct being at least partially surrounded, along at least one portion of its length, by heat storage material suitable for storing heat conveyed by the combustion fumes and for progressively releasing it into the environment to be heated; the stove further comprises at least one solid fuel tank, of the pellet type, associated with the base and provided with automatic feeding means for feeding the fuel communicating with an opening foreseen in the furnace.

COMBUSTIÓN DIRECTA

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015121849	Gruppo Piazzetta SPA (IT)	Adjusting device for heat generators. An adjusting device for heat generators, comprising at least one box-shaped body, provided with at least one inlet opening for introducing the comburant air and with at least one outlet opening of the comburant air, and at least one rotatable gate valve, interposed between said inlet opening and said outlet opening. The device comprises at least one dividing element, interposed between the rotatable gate valve and the outlet opening, defining a first passageway and a second passageway of the comburant air isolated from one another. The first passageway and the second passageway are suitable for being placed in communication with respective distinct paths of the comburant air (B',C) foreseen in the heat generator. The rotatable gate valve comprises a support shaft with which a laminar element is associated; the laminar element comprises a first portion and a second portion coplanar with one another and respectively suitable for selectively obstructing the first passageway and the second passageway by rotation of the support shaft.
ES2540702	Fundacion Cidaut (ES)	Solid fuel boiler. The invention relates to a boiler comprising a solid fuel store, a dispensing unit and a combustion chamber, the combustion chamber comprising an inner wall having a truncated cone shape, supported by the upper face of a hollow grate that supports the solid fuel, and including openings in the lower face thereof through which a secondary air flow is introduced into the combustion chamber, characterised in that the inner wall of said chamber and the upper face of the grate form a conical volume of fuel with a reaction area that is variable according to the primary air flow introduced into the combustion chamber, and the secondary air flow supplied through the grate is regulated according to the quantity of oxygen in the exhaust gases.
ES2539246	Fundacion Cidaut (ES)	Vertical solid-fuel boiler. The invention relates to a vertical boiler that operates with solid fuels such as, for example, biomass, coal, wood, etc. The boiler comprises a furnace divided into two sections, namely: a lower section in which partial combustion of the solid fuel occurs, and an upper section into which a secondary air flow is introduced in order to complete the combustion of the gases generated in the lower section. A necking is disposed between the two sections of the furnace, which can be used to increase the velocity of the gases from the partial combustion to be mixed with the secondary air flow in order to complete the combustion.
EP2905540	Bullerjan GmbH (DE)	Fireplace. Fireplace at least comprising: a housing enclosing a combustion chamber having a height, a width and a depth; wherein said housing at least comprises: a bottom wall; a front wall; side walls; wherein the front wall or at least one of the side walls is/are at least partially construed as door through which said combustion chamber may be supplied with combustible; a top wall; a rear wall; at least one outlet for smoke gas that is formed when operating the fireplace when burning a combustible in said combustion chamber, preferably wherein said outlet is located in the top wall and/or rear wall of the housing; an ash grate being arranged in the combustion chamber above the bottom wall; wherein the height of the combustion chamber is greater than the width and the depth, respectively; said combustion chamber comprises at least one first means for aerating through which combustion air may flow into the combustion chamber in order to support the burning of combustible, and at least one second means for aerating through which combustion air may flow into the combustion chamber in order to support the burning of combustible; the first means for aerating is arranged above the ash grate and the second means for aerating is arranged above the first means for aerating.
WO2015113512	Che Zhanbin (CN)	Combustion method and combustion apparatus for solid fuel. A combustion method and a combustion apparatus for a solid fuel. The combustion method is such that: a material-piling area is enclosed in a furnace chamber, a heat accumulator is arranged on a flow path of a volatile matter airflow, during combustion, air transversely traverses the material-piling area and flows towards a combustion chamber while carrying a precipitated volatile matter, and the volatile matter is ignited by a combustion flame and is introduced into the combustion chamber for combustion.

COMBUSTIÓN DIRECTA

Nº Publicación	Solicitante (País)	Contenido técnico
US2015211743	Univ Colorado State Res Found (US)	Combustion Chamber for Charcoal Stove. A combustion chamber may include an upper and a lower chamber. The chambers may be separable to aid in loading fuel and removing spent fuel. The cross-section of the upper combustion chamber may be less than the cross-section of the lower section. Charcoal or other biomass fuel may be added into the lower combustion chamber and may be supported by a grate. Oxygen may be fed into the combustion chamber through a plurality of apertures that may be substantially shielded from direct line of site of the fuel bed. The upper combustion chamber may further include an annular constriction, to aid in constricting the view factor between the cooking vessel and the fuel bed. The constriction may also aid in radiating energy back to the fuel bed.
WO2015112606	Biolite LLC (US); et al	Portable combustion device utilizing thermoelectrical generation. This invention provides a portable combustion device that provides a cleaner combustion, provides a more efficient overall combustion through the use of a fan that directs a predetermined volume of airflow over the combustible fuel- typically wood or similar cellulose-based biological solids and provides a cooking surface that is a grill top. The combustion device has a combustion chamber into which the fuel source is placed for combustion. Mounted to the side of the combustion chamber is a housing that encloses the TEG, which generates an electrical output, based on a difference in temperature on opposing sides. Mounted onto the TEG housing and protruding into the combustion chamber through a small passageway is a heat-conducting probe and heat-conducting probe base unit.
WO2015104021	Aduro AS (DK)	Wood-burning stove combustion monitoring system. The invention relates to a method of providing combustion-related information, a wood-burning stove, a combustion monitoring system and a method of retrofitting; wherein a combustion monitoring system is non-invasively with respect to the combustion chamber coupled to a wood-burning stove, and is arranged to provide information about and optimization suggestions for a combustion taking place inside the combustion chamber.
WO2015105989	Sullivan Eugene J (US); et al	Combustion boiler with pre-drying fuel chute. A solid fuel boiler with one or more fuel chutes configured to pre-dry wet solid fuel prior to loading into a combustion chamber of the boiler, enabling higher thermal efficiencies and burning less fuel to produce the same steam quantity. The pre-drying fuel chutes pass through the boiler where hot combustion gases radiantly and convectively - heat the chute walls to dry the wet solid fuel by radiant, convective, and/or conductive heating. Agitator mechanisms or structures within the chute mix the fuel for uniform heating, break up clumps of wet fuel, regulate the speed of falling fuel, prevent sticking, dry the fuel by means of steam and/or hot air, transport and deliver a cooling medium while a chute is offline in an operating boiler, and suppress fire using steam injection. Fuel from the chute can flow into a fuel storage bin or directly into the combustion zone of the furnace.
EP2896883	Ulrich Brunner GmbH (DE)	Furnace for burning combustible material, in particular wooden off-cuts. The present invention relates to a furnace for the combustion of fuel consisting of renewable raw materials, such as wood, mainly wood chips, coal, biomass or waste, or a mixture thereof, with a boiler body having a combustion chamber, in the the combustion takes place, wherein the vessel body has a walling in which an inlet opening for the fuel and an outlet opening for discharging the exhaust gas are formed from the combustion chamber, a combustion grate is on the gasified and combusted, the fuel material and which is supplied with combustion air from an air duct, which is by means of a blower is blown into the air channel, and an exhaust passage extending starting from the combustion grate extends through the combustion chamber and in which there is a further combustion. It is characterized by the fact that the combustion grate at least two combustion chambers, the air supply is individually controllable.

COMBUSTIÓN DIRECTA

Nº Publicación	Solicitante (País)	Contenido técnico
EP2891843	Imerys Ceramics France (FR)	Mineral additive blend compositions and methods for operating waste to energy combustors for improving their operational performance and availability, protecting combustor materials and equipment, improving ash quality and avoiding combustion problems. Mineral additives and a method for operating a waste-to-energy furnace are provided in order to improve its operational performance and availability, increase the lifetime of the combustor building materials (refractory walls and heat-exchanger metallic tubes) and flue gas treatment equipment, improve ash quality, reduce emissions and avoid combustion problems such as agglomeration, slagging, deposition and corrosion. A method for operating a waste-to-energy furnace, such as a fluidized bed reactor, pulverized-fuel combustor, grate combustor includes introducing mineral additive into the furnace. The method further includes heating at least a portion of the mineral additive either intimately in contact with the fuel, such that the ability of mineral additive to induce crystallization of the surface of forming ashes is enhanced, or minimizing the contact of the mineral additive with the fuel and the forming ashes, such that the solid-gas reactions between the mineral additive and the volatile compounds in the flue gas are favored and the mineral additive power to capture at least a portion of the inorganic volatile compounds present in the furnace is enhanced.
ES1138939	Bronpi Calefaccion SL (ES)	Caldera de biomasa para calentar agua en el ambito domestico. 1. Caldera de biomasa para calentar agua en el ámbito doméstico, que comprende: una tolva de almacenamiento de combustible sólido granulado, una cámara de combustión con un quemador, un sistema alimentador de combustible que lleva el combustible sólido granulado desde la tolva al quemador, una entrada de aire por donde entra a la cámara de combustión el aire comburente, una entrada y salida del agua a calentar, un extractor para expulsar los gases procedentes de la combustión al exterior, y un sistema intercambiador de calor entre los gases procedentes de la combustión y el agua a calentar; caracterizado porque el sistema intercambiador de calor comprende: - una cámara interna de gases conectada a la cámara de combustión y por la que circula los gases procedentes de la combustión; - una cámara interna de agua por la que circula el agua a calentar y que recubre la superficie externa de la cámara de combustión y la cámara interna de gases; - una cámara externa de agua conectada a la cámara interna de agua y por la que circula el agua a calentar; - una cámara externa de gases conectada a la cámara interna de gases y por la que circula los gases procedentes de la combustión, estando dicha cámara externa de gases ubicada entre la cámara interna de agua y la cámara externa de agua y en contacto con sus respectivas superficies. 2. Caldera de biomasa según la reivindicación 1, caracterizado porque la superficie interna de la cámara interna de gases está en contacto con la superficie externa de la cámara de combustión. 3.; Caldera de biomasa según cualquiera de las reivindicaciones anteriores, caracterizado porque la cámara interna de agua, la cámara externa de gases y la cámara externa de agua tienen forma de U invertida. 4. Caldera de biomasa según cualquiera de las reivindicaciones anteriores, caracterizado porque la parte trasera de la cámara de combustión está forrada de vermiculita.
EP2886953	Van Rossum Martijn Arnold (DE)	Wood stove with a supply duct for logs. A wood burning stove 1 has a housing 3 containing a combustion chamber 5 provided with a discharge opening 9 for discharge of combustion gases. Feed openings 19 for wood are present in the upper side 17 of the combustion chamber. To each supply opening a stock tube 21a-c for logs 23 is connected, which stock tube is open at both ends and extends upwardly in a vertical direction. As the fire burns the lower logs, the tower of logs falls down automatically and supplies new fuel to the fire. The wood stove further has a vertically movable partition plate 27 which is present between the two stock tubes and is movable between an inactive position, in which the partition plate is present fully or almost fully between the stock tubes, and an active position, in which the partition plate is partly or completely in the combustion chamber 5 and shields a part of the combustion chamber from the fire.
EP2889537	Kaindl Rupert (CH)	Drying plant and combustion facility. The combustion system has a material feed, a furnace associated with the material object, a chimney for the discharge of flue gas and a flue gas guide, which guides the flue gas from the furnace to the chimney. A predrying system is arranged with respect to the material flow of the combustible material between the material feed and the furnace. The flue gas guiding the predrying system crosses in such a way that the flue gas flows through the combustible material located in the predrying system.

PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
EP2915869	Siemens AG (DE)	Entrained bed gasifier with integrated medium temperature plasma. It is a process of gasifying solid or liquid gasification substances, in particular biomass, proposed at pressures between atmospheric pressure and 10 MPa and at gasification temperatures between 800 °C and 1500 °C to a high-calorie synthesis gas, wherein in the gasification chamber of an entrained-flow gasifier runs an endothermic steam gasification process and a plasma medium temperature (typically ≤ 3500 °C., preferably ≤ 2000 °C) heat of reaction in an amount in the gasification chamber brings such that the gasification temperature is kept below the ash softening temperature of 1500 °C. According to the inventive gasification process run endothermic reactions, especially those with high activation energy, with high rates at far lower gas temperatures from, as in the case of a thermal process. The gasification process which does not require oxygen plant, provides a free of hydrocarbons raw gas.
WO2015131117	Ohio State Innovation Foundation (US)	Systems and methods for partial or complete oxidation of fuels. A system used for converting multiple fuel feedstocks may include three reactors. The reactor system combination can be so chosen that one of the reactors completely or partially converts the fuel while the other generates the gaseous product required by utilizing the gaseous product from the second reactor. The metal-oxide composition and the reactor flow-patterns can be manipulated to provide the desired product. A method for optimizing the system efficiency where a pressurized gaseous fuel or a pressurized utility is used for applications downstream can be used to any system processing fuels and metal-oxide.
WO2015131123	Kior Inc (US)	Process for enhancing process performance during the thermocatalytic treatment of biomass. A process for enhancing the conversion of biomass into a bio-oil containing liquid feed wherein the processability index, PI, of the biomass is optimized prior to introducing the biomass into the biomass conversion unit where catalytic pyrolysis of the biomass occurs. The PI is dependent on the ratio (S/G) between the S-unit population and the G-unit population of the biomass as well as the weight percent acetate, the weight percent alkaline (Group I metals), the weight percent of non-metals in the biomass of Group 15, Group 16 and Group 17 elements, the weight percent of metalloids (Group 13 and Group 14 elements), the weight percent xylan and the weight percent of alkaline earth (Group II metals) in the biomass feedstream.
WO2015116385	Kior Inc (US)	Method of biomass conversion using a multi-functional catalyst system. Solid biomass may be converted to hydrocarbons for use in renewable fuels uses by feeding biomass into a biomass conversion unit and pyrolyzing the biomass in the presence of a regenerated multi-functional catalyst. The regenerated multi-functional catalyst contains an acidic component, a basic component and a metallic component. The biomass is treated within the biomass conversion unit in at least two stages wherein at least one component of the regenerated multi-functional catalyst is fed into each of the stages.
WO2015125166	Benzi Giuseppe (IT)	Method and plant for disposing of wastes composed of plastic materials and biomasses. The present invention deals with a method and a plant for disposing of solid wastes, composed of plastic materials and biomasses, and liquid wastes, particularly composed of spend vegetal oils and greases. The method provides a pyrolysis treatment of the solid and liquid wastes, from which a synthesis gas (syngas) and an inert residual are obtained. The pyrolysis plant comprises: a first section, which performs the pyrolysis of solid and liquid waste materials, the pyrolysis producing synthesis gas (syngas) and residual ashes; a second section which performs the separation of a lighter fraction of ashes (pulverized coal or carbon black) from syngas, the lighter fraction being transported by the syngas; a third section, which performs the fractioned distillation of syngas, obtaining the separation of the volatile fraction of syngas from a bituminous residual (tar); a fourth section, which performs the recycle of the bituminous residual of the fractioned distillation, for a further treatment.

PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015130593	UOP Llc (US)	Green fluid catalytic cracking process. A process and apparatus for co-processing a hydrocarbon feedstock and a renewable biomass feedstock are described. Solid particles of biomass are introduced into the riser reactor zone and mixed with catalyst. The hydrocarbon feed stock is also introduced into the riser reactor zone. The solid particles of biomass react in the presence of the catalyst and are converted into oxygenated hydrocarbons, while the hydrocarbon reacts in the presence of the catalyst to form hydrocarbon products having a lower boiling point than the feedstock.
US2015232769	Res Usa Llc (US)	Gasification system and method. A method including introducing a carbonaceous feedstock and a heated heat transfer material into a gasifier, whereby at least a portion of the carbonaceous material is pyrolyzed; removing a gasification product gas comprising, entrained therein, char, particulate heat transfer material, and optionally unreacted carbonaceous feedstock; separating a solids product comprising char, heat transfer material and optionally unreacted carbonaceous material from the gasification product gas; heating at least a portion of the solids product via a combustor, thus producing a heated portion of the solids product and a combustor flue gas, wherein a portion of the heat for heating is obtained via combustion of the char; separating the heated portion from the flue gas, and introducing the separated heated portion into the gasifier, providing heat for pyrolysis; and utilizing at least a portion of the gasification product gas for Fischer-Tropsch synthesis and/or power production.
WO2015121299	Luxembourgeoise de Biocombustible Soc (LU)	Process for converting a biomass into at least one biochar. The invention relates to a process for converting a biomass into at least one biochar, comprising the following steps: (a) a ground and dried biomass is provided, said biomass containing at least 30% of a lignocellulosic biomass, by mass relative to the dry mass of the ground and dried biomass; (b) this biomass is gradually heated at a temperature above 140 DEG C and below 350 DEG C, in an oxygen-free gas stream, under a pressure of between 1 and 40 bar; (c) the reaction is left to take place by maintaining the temperature within the range of 300-700 DEG C and the pressure within the range of 1-40 bar; (d) the biomass resulting from (c) is cooled to a temperature of at most 100 DEG C in an oxygen-free gas stream; and (e) the biochar is recovered. The invention also relates to the biochar thus obtained.
WO2015113136	Gaudreault Guy (CA)	Biomass gasification power generator. Biomass gasification power generator has a combustion chamber that produces hot air. The hot air circulates in a closed circuit around a combustion chamber. An air heat exchanger transfers heat to a liquid which circulates in a liquid closed circuit. The liquid is heated into a pressurized gas. The gas pressure is recorded and monitored by a pressure micro controller. The pressurized gas thus generated by the heat exchanger is used for moving a piston. A system recuperates the oil within the circuit. A method for generating heat and electricity from biomass is also provided.
EP2905322	Solex Thermal Science Inc (CA)	Torrefaction reactor. A torrefaction reactor includes a preheater section and a torrefaction section arranged to receive the biomass material from the preheater section. The preheater section includes a plurality of preheater plates arranged to facilitate the flow of the biomass material between the preheater plates by the force of gravity, each of the preheater plates facilitates a flow of a preheater fluid through the preheater plate for heating the biomass material. The torrefaction section includes a plurality of torrefaction plates arranged to facilitate the flow of the biomass material between the torrefaction plates by the force of gravity, each the torrefaction plates facilitates a flow of a torrefaction fluid through the torrefaction plate for heating the biomass material to the torrefaction temperature, and a first and second torrefaction purge gas openings to facilitate a flow of a torrefaction purge gas for providing an oxygen-depleted environment within the torrefaction section.

PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015115354	Mitsubishi Heavy Ind Environmental & Chemical Eng (JP)	Gasification melting facility. Provided is a gasification melting facility characterized by having: a fluid sand gasification furnace that generates a thermal decomposition gas by thermally decomposing waste material, and that discharges incombustible material; a melting furnace into which the thermal decomposition gas is introduced; a thermal decomposition gas passage connecting the fluid sand gasification furnace and the melting furnace; a pulverizing device that pulverizes the incombustible material discharged from the fluid sand gasification furnace by passing this material between multiple rods; a vibrating sieve that sorts the incombustible material pulverized by the pulverizing device; a volumetric feed device, which has multiple transport chambers capable of rotating between a position for receiving incombustible material from the vibrating sieve and a position for discharging the incombustible materials, and which supplies fixed amounts of the incombustible material that has passed through the vibrating sieve; and an air current transport device that, together with air currents, transports the incombustible material supplied in fixed amounts from the volumetric feed device.
WO2015110653	Areva Renouvelables (FR)	Method and plant for roasting biomass. The invention relates to a method for roasting biomass, which comprises the biomass flowing by gravity from the top to the bottom of a column against a flow of hot gases circulating from the bottom to the top of the column, establishing a temperature gradient increasing from the top to the bottom of the column, recovering the gases at the top of the column and recirculating same to the bottom of the column by means of a gas circuit such that the gases circulate in a closed loop in the column and the gas circuit, and heating the recovered gases by passing same through a heat exchanger prior to recirculating same to the bottom of the column.
WO2015116706	Malyala Rajashekhara M (US); et al	A system and method for the production of jet fuel, diesel, and gasoline from lipid-containing feedstocks. The production of jet fuel, diesel and gasoline components from lipid rich biomass is described. This process includes a hydrothermal pyrolysis step followed by catalytic conversion of bio vapors to the fuel product. Biochar is a co-product of the process. This process avoids capital intensive investment in oil extraction technologies, and instead incorporates the oil extraction and oil conversion in one step.
WO2015104430	Fraunhofer Ges Zur Förderung Der Angewandten Forschung EV (DE)	Method for producing pyrolysis gas or pyrolysis oil from biogenic starting materials and pyrolysis oil, pyrolysis gas and deoxygenation catalysts that can be produced by means of said method. A method is described for producing pyrolysis gas and pyrolysis oil from biogenic starting materials. First, a biogenic starting material, selected from lignocellulosic biomass and lignocellulosic residual substances, and a carbon-based catalyst are provided. The starting material is then thermally treated in a pyrolysis reactor at a temperature T1 to effect pyrolysis of the starting material to liquid, vaporous or gaseous pyrolysis products. These pyrolysis products are then brought into contact with the carbon-based catalyst at a temperature T2 so that deoxygenation of the pyrolysis products to at least partially deoxygenated pyrolysis products occurs. These products are then collected in a separation device in which product separation takes place. In addition to liquid or gaseous pyrolysis products, catalysts that can be used for deoxygenation are also described which can be produced from the solid material that was separated following pyrolysis.
WO2015092143	Upm Kymmene Corp (FI)	Integrated pyrolysis process. The present invention relates to an integrated pyrolysis process comprising the steps where feedstock comprising biomass is pyrolyzed in the presence of a heat transfer material comprising a solid reducing agent in reduced form to produce pyrolysis products char, gases and heat transfer material comprising the reducing agent in oxidized form, separating the pyrolysis products from the char and heat transfer material, separating pyrolysis oils from non-condensable gases, and directing the char and heat transfer material comprising the reducing agent to a boiler, feeding solid fuel to the boiler and combusting it in the presence of the heat transfer material comprising the reducing agent in the oxidized form to produce heat, flue gas and heat transfer material comprising the reducing agent in the reduced form, and conducting the heat transfer material comprising the reducing agent to the pyrolysis reactor.

PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015109206	Biogenic Reagent Ventures Llc (US)	Carbon micro-plant. The present disclosure provides biorefining systems for co-producing activated carbon along with primary products. A host plant converts a feedstock comprising biomass into primary products and carbon-containing co-products; a modular reactor system pyrolyzes and activates the co-products, to generate activated carbon and pyrolysis off-gas; and an oxidation unit oxidizes the pyrolysis off-gas, generating CO ₂ , H ₂ O, and energy. The energy is recycled and utilized in the host plant, and the CO ₂ and H ₂ O may be recycled to the reactor system as an activation agent. The host plant may be a saw mill, a pulp and paper plant, a corn wet or dry mill, a sugar production facility, or a food or beverage plant, for example. In some embodiments, the activated carbon is utilized at the host plant to purify one or more primary products, to purify water, to treat a liquid waste stream, and/or to treat a vapor waste stream.
WO2015107450	Turboden Srl (IT)	Method and gasifier for gasifying a biomass. A method for producing syngas from preferably vegetal biomass is described. The method provides for the use of a fixed bed gasifier, equipped with two reactors. The biomass is fed to both reactors together with a primary flow rate of air. Advantageously, the method according to the present invention is different from the known art since a secondary flow rate of air is withdrawn from the first reactor at the area where the biomass dries, and fed to the second reactor at the area where the biomass dries, and vice versa, alternately during time. Alternatively, an oscillating air flow is created in each reactor. The achievable result is a greater syngas production, but not exclusively. The syngas quality is improved too, since the biomass has a longer time for completing the gasification reactions.
WO2015104400	Manik Ventures Ltd (GB)	A pyrolysis chamber for treating domestic refuse and dwelling equipped with such a chamber. Existing approaches to refuse handling are all based on historical approaches which rely on a network of refuse collection vehicles collecting waste from individual households and delivering this to a centralised landfill or MBI location. This is highly undesirable and wasteful. An alternative process is disclosed, relying on the thermal treatment of waste and like products produced or brought in to the residential property and processed within the domestic curtilage to produce fuel or other forms of energy. Thus, domestic waste will be thermally treated at the home instead of being collected by local authorities and disposed of. The waste input material will be loaded into a domestically engineered thermal conversion unit either directly or after a pre-process such as shredding. The feedstock will be converted into fuels by a thermal treatment, such as pyrolysis. The resultant output of oil and gas can either be stored or fed into a boiler unit to be used as a fuel to produce hot water, or used to run an electricity generating unit to power the dwelling in question or for supply to a feed-in tariff. Thus, a domestic dwelling includes a thermal treatment unit for processing waste produced in the dwelling, an output of the thermal treatment unit being combusted for producing an energy output for the dwelling. A suitable pyrolysis chamber is disclosed.
WO2015106125	All Power Labs Inc (US)	Downdraft gasification system. A gasifier configured to receive biomass, including: a pyroreactor defining a first end, a second end, and an interior lumen, the first end defining a biomass inlet, the second end defining a pyroreactor outlet; a reduction basket arranged proximal the pyroreactor outlet, the reduction basket including a closed end and a basket opening opposing the closed end; a set of air manifolds fluidly connected to the interior lumen of the pyroreactor through a set of air inlets arranged between the first and second ends, proximal the second end; and a gasifier housing enclosing the pyroreactor, reduction basket, and set of air manifolds within a housing lumen.

PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015106790	Ecoloop GmbH (DE)	Method for thermally cleaving organic waste substances. The invention relates to a method for thermally cleaving organic waste substances that have a melting point of less than 250 DEG C. The production of, for example, synthesis gas from organic waste substances having a low melting point is often difficult because the materials evaporate and can enter the discharged gas flow undecomposed. In order to avoid this, the organic waste substances according to the invention are metered in liquid and/or vaporous form into the rising gas flow countercurrently to an energy buffer formed as a heated bulk-material moving bed and the organic waste substances are thermally cleaved into synthesis gas under reductive conditions while the organic waste substances flow through the energy buffer, the intrinsic temperature of the energy buffer having a gradient that decreases in the flow direction of the formed synthesis gas.
WO2015102480	Regenergy Technologies Sdn Bhd (MY)	An apparatus for producing biofuels from biomass. An apparatus for producing fuels from biomass comprises of (i) a reaction chamber defined by an integral space form by an outer inverted cyclone structure and an inner cyclone structure with an open-end lower tapered section and a tubular outlet at the top. The inner cyclone structure is enclosed coaxially within the outer cyclone structure; (ii) a combustion chamber disposed underneath the reaction chamber; in addition, infeed inlets are mounted tangentially onto the sidewalls of the outer cyclone structure and the combustion chamber for infeed of biomass with high speed blown gas. The combustion chamber generates and supplies heat to the reaction chamber by combustion of biomass up to temperatures 800 DEG C.; Biomass feedstock is injected into the reaction chamber to form a vortex swirling at high speed wherein the biomass is converted into torrefied product, fuel vapor or producer gas under different operation conditions under the control of a PLC. The gaseous products exit through the tubular outlet at the top while the solid products or solid remnants such as ash are discharged through the bottom opening of the inner cyclone structure to a water-cooled discharging screw conveyor assembly.
WO2015091492	Axens (FR); et al	Method for roasting a carbonaceous feedstock comprising an optimised drying step. The present invention concerns a method for roasting a carbonaceous feedstock comprising at least one step of drying the carbonaceous feedstock and one step of roasting the dried carbonaceous feedstock, producing roasting gases and roasted biomass, in which at least a portion of the roasting gases originating in the roasting step is sent to a combustion step producing a combustion gas at a temperature greater than or equal to 700 DEG C, at least a portion of which is recycled in the drying step, mixed with at least a gaseous effluent, the temperature of the gaseous mixture recycled in the drying step being between 200 and 900 DEG C.

TECNOLOGÍAS BIOQUÍMICAS

Patentes

DIGESTIÓN ANAERÓBICA

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015126478	Sgc Advisors Llc (US)	Dual-mode system and method for processing organic material. A dual-mode system and method is disclosed for processing organic material. In a first mode of operation, the system pre-treats an organic feedstock before digestion for improved methanization. In a second mode of operation, the system post-treats digested material to generate a useful product.

DIGESTIÓN ANAERÓBICA

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015128095	Novozymes AS (DK)	A method for improving substrate degradation in agricultural biogas plants. The invention relates to the use of at least one bacterial amylase and/or bacterial or fungal cellulase in combination with one or more protease(s) in substrates for anaerobic digestion processes for biogas production for improving degradation of maize, maize silages and/or other biogas substrates, in particular for improving gas yield, velocity and substrate conversion rate.
WO2015124136	Deger Oliver (DE)	Method for preparing organic waste. The invention relates to a method for preparing organic waste, such as biomass or waste waters, for further processing, in particular for gasification. According to said method, in a first process step the organic waste is fed to an aerobic and/or anaerobic digester and is mixed with an inoculum, and in a second process step the CO ₂ produced in the digester is fed to a gas reformer (7) in which it is converted to methane gas.
WO2015120983	Niederbacher Michael (IT)	Method and system for producing biomethane. The invention relates to a method and to a system for producing biomethane, comprising a methanation unit in which carbon dioxide, carbon monoxide, and hydrogen are converted into methane and water. Furthermore, according to the invention, there is an electrolysis apparatus in which water supplied to the electrolysis apparatus is split by electrical current into hydrogen and oxygen, wherein the hydrogen produced by means of the electrolysis apparatus is at least partially supplied to the methanation unit. The invention further relates to a biogas plant in which a biogas containing at least methane and carbon dioxide is produced in at least one fermenter of the biogas plant by fermentation of fermentable substances and is at least partially supplied to the methanation unit. The invention further relates to a gasification apparatus in which a synthetic gas containing at least carbon monoxide, hydrogen, carbon dioxide, and methane is produced by means of a gasification means and/or oxidation means in at least one reactor of the gasification apparatus by gasification of gasifiable substances and which is at least partially supplied to the methanation unit, wherein the biomethane formed in the methanation unit is supplied to a recovery and/or storage apparatus, in particular a gas storage tank and/or a gas network.
ES2542257	Univ Valencia (ES); et al	Method for the purification of gases containing volatile organic compounds. A method for purifying a gas is described, the method comprising: a) feeding the gas to an absorber and bringing into contact said gas with a stream (or alternatively) to obtain a liquid and a purified gas stream; b) feeding the liquid to a conditioning tank and adding a mineral nutrient medium and a suitable amount of base to the liquid to obtain a liquid effluent; c) feeding the liquid effluent to an anaerobic bioreactor to obtain a biomethane stream and a liquid stream; d) feeding the liquid stream to a degasser to obtain a gas stream and a stream; and e) recirculating the stream by feeding it to the absorber.
EP2905327	Syigma Spółka Z Ograniczona Odpowiedzialnos- cia (PL); et al	System for biogas production under elevated pressure. The invention relates to the system for production of biogas under elevated pressure, by processing organic matter by anaerobic digestion under spontaneously generated elevated pressure. The system comprises a substrate tank, connected to a pneumatic substrate metering vessel, the upper part of which is connected by a gas receiving pipeline to a low-pressure gas tank through a gas valve, and by a gas supplying pipeline provided with a valve - to a high-pressure gas tank. Furthermore, the bottom head of the pneumatic metering vessel is connected by a pipeline provided with a valve to a bioreactor where in its upper part a separatory zone for the biogas separation is situated, the separatory zone is connected by a pipeline provided with a digestate valve to a digestate tank. To the upper wall of the bioreactor connected is a gas pipeline provided with a valve for receiving the biogas to a high-pressure gas tank, and a pipeline provided with a gas valve for receiving the biogas to a low-pressure tank. In addition, an outlet pipeline provided with a valve is situated in the bottom head of the bioreactor for discharging the sedimenting fraction into the digestate tank.

DIGESTIÓN ANAERÓBICA

Nº Publicación	Solicitante (País)	Contenido técnico
EP2905328	Syigma Spółka Z Ograniczona Odpowiedzialnos- cia (PL); et al	<p>Method and system for processing organic matter by anaerobic digestion. The object of the invention is a method of processing organic matter by anaerobic digestion, in conjunction with biogas production, wherein each of the stages of the process, including hydrolysis of macromolecular compounds to smaller molecules, conversion thereof to organic acids, followed by conversion into acetates, methanol and carbon dioxide, and processing to methane, proceeds within spontaneously created reaction zones under elevated hydraulic pressure, changing in pulses, with involvement of microorganisms that are specific for the given processing stage. The consecutive stages of the process are run in bioreactor chambers of length suitable for reactions proceeding therein, possibly connected in series, preferably filled with a bed. The reagents are transferred from one reaction zone to another in form of pulsating reciprocating stream of reaction mixture. At the same time, the undissolved fraction that needs longer time of digestion and is separated from obtained soluble decomposition products, is continuously removed from the bioreactor to a bioreactor operating in parallel, of extended hydraulic retention time. This invention also relates to a system for processing organic matter, comprising two processing sections operating under different pressures. The first section, for processing the quick-decomposing fraction, comprises the following components connected to one another consecutively: a substrate tank, substrate metering pump, ascending vessel providing reciprocating movement of the substrate through the section and at least one bioreactor, and in the upper part of the bioreactor situated is a separatory zone, from which to the digestate tank is transferred the digestate, separate from the biogas, while the biogas is received by a pipeline provided with a gas valve. In the bottom of each bioreactor mounted is an outlet pipeline for removing the sedimenting fraction into the bioreactor placed in the processing section, where required is longer digestion time, fed from the first section, and comprising an ascending vessel and at least one bioreactor.</p>
WO2015104031	Schwarz Wolfgang H (DE)	<p>Disruption of biomass by endogenous pressure generation from fermentation. The present invention relates to a method of disrupting biomass by an abrupt pressure release. For disrupting biomass, in particular as pretreatment of biomass for improved degradability, in an environmentally friendly manner, without harsh chemical substances and with reduced energy input and costs, the inventive method performs the steps of fermenting the biomass with a microorganism or with a consortium of microorganisms producing gas in a vessel, said gas increasing the pressure in the vessel; and disrupting the biomass by abruptly releasing the increased pressure.</p>
WO201512579	Mitsui Shipbuilding Eng (JP)	<p>Methane fermentation method and methane fermentation system. The purpose of the present invention is to provide a methane fermentation method and a methane fermentation system, whereby an efficiency of separating a litter from organic waste matters containing the litter and excreta can be improved, an efficiency of grinding the litter can be improved, the amount of a biogas generated by methane fermentation can be increased, and, after the completion of the methane fermentation, the utility value of a digested liquid can be heightened and the amount of wastes can be reduced. To achieve this purpose, a methane fermentation method is provided, said method comprising: a first litter-separating step for separating a litter from organic waste matters containing the litter and excreta; a grinding step for grinding the litter having been separated in the first litter-separating step; a methane fermentation step for introducing the organic waste matters, from which the litter has been separated in the first litter-separating step, and the litter, which has been ground in the grinding step, into a methane fermentation tank and then conducting methane fermentation; and a second litter-separating step for separating the litter from a digested liquid having been generated in the methane fermentation step, wherein the digested liquid from which the litter has been separated in the second litter-separating step is added to the organic waste matters to be supplied to the first litter-separating step.</p>

DIGESTIÓN ANAERÓBICA

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015103590	Univ King Abdullah Sci & Tech (SA); et al	Anaerobic electrochemical membrane bioreactor and process for wastewater treatment. An anaerobic electrochemical membrane bioreactor (AnEMBR) can include a vessel into which wastewater can be introduced, an anode electrode in the vessel suitable for supporting electrochemically active microorganisms (EAB, also can be referred to as anode reducing bacteria, exoelectrogens, or electricigens) that oxidize organic compounds in the wastewater, and a cathode membrane electrode in the vessel, which is configured to pass a treated liquid through the membrane while retaining the electrochemically active microorganisms and the hydrogenotrophic methanogens (for example, the key functional microbial communities, including EAB, methanogens and possible synergistic fermenters) in the vessel. The cathode membrane electrode can be suitable for catalyzing the hydrogen evolution reaction to generate hydrogen
EP2894217	Tenax Spa (IT); et al	Plant for producing biogas and process for making the same plant. Process for forming a tank for biogas plants, comprising the following steps: providing a plurality of reinforcing elements having a reticular structure; providing a predetermined amount of ground; forming a containing site comprising a base and a side wall mainly of ground transversally emerging from base. The side wall has an inner wall which, together with the base, defines a containing cavity. The step of providing the side wall comprises at least the following sub-steps: forming a first ground compacted layer having a rising surface and an upper abutment surface; positioning on the upper abutment surface a plurality of reinforcing elements extending around the base to define a closed outline; connecting the reinforcing elements to define a continuous layer of elements suitable for covering at least partially the upper abutment surface; positioning, after having positioned the reinforcing elements, a second ground layer having a rising surface, so that the reinforcing elements are at least partially interposed between the first and second ground layers. Each ground layer and the respective reinforcing element associated to the former, defining a reinforced layer: the repetition of said sub-steps defining a plurality of reinforced layers overlapping each other so that these latter define the inner face of the side wall.
WO2015096829	Agratec Invest AG (DE)	Biogas production method and biogas production apparatus. The invention relates to a biogas production method and to a biogas production apparatus. In the biogas production method, a fermentation vessel having a space velocity of at least 8 kilograms per cubic meter and day (kg/(m ³ d)) is charged and operated in a thermophilic range, wherein a heat exchange apparatus is controlled automatically in such a way that an actual temperature in the fermentation vessel is determined and a climate control fluid is introduced as feed into a heat exchange body in such a way that contents of the fermentation vessel are thermally affected by means of the climate control fluid via a heat exchange surface of the heat exchange body, wherein the feed has a feed temperature which is intermittently greater and intermittently smaller than the actual temperature.
WO2015097648	Suez Environment (FR)	Process for treating effluents loaded with ammoniacal nitrogen, and reactor for the implementation of the process. Process for treating effluents loaded with ammoniacal nitrogen in a single-chamber reactor, to remove the ammoniacal nitrogen therefrom, according to which: provided in the reactor is an anode on which a biofilm essentially containing autotrophic bacteria is formed, and a cathode, then completely anaerobic conditions are established in the reactor; a volume of effluent to be treated is introduced into the reactor; a potential difference is applied and maintained between the anode and the cathode throughout the duration of the treatment for eliminating the ammoniacal nitrogen.
WO2015096832	AEV Energy GmbH (DE)	Method and device for obtaining biogas. The invention relates to a method for producing biogas and a biogas plant for wet fermentation by use of nitrogen-rich, interfering-substance-laden input substrate (3) having an ammonium nitrogen concentration of more than 5 kg NH ₄ -N/m ³ , wherein a first process stage is provided for interfering-substance separation and a second process stage is provided for the continuous formation of acetic acid and methane at a substantially stable temperature in the psychrophilic range. The invention further relates to a fermentation tank of a biogas plant, wherein the fermentation tank has a vertically arranged screw provided with a rotary drive, which screw runs in a pipe that is open at both ends and substantially fills up the pipe, wherein the pipe extends from below the substrate level to above the bottom of the fermentation tank and is firmly connected to the fermentation tank.

DIGESTIÓN ANAERÓBICA

Nº Publicación	Solicitante (País)	Contenido técnico
EP2886654	Univ Rigas Tehnis-ka (LV)	<p>A method of anaerobic digestion of acidic whey in four-chamber system. The invention relates to treatment of dairy by-products and may be used for anaerobic digestion of acidic whey for producing biogas. Technical problem to be solved by present invention is to create a simple method of anaerobic digestion of untreated acidic whey suitable for small size dairies, using milk proteins as an additional energy source. A method of anaerobic digestion of acidic whey in a four-chamber system having anaerobic microorganisms for producing biogas comprises the steps of: injecting untreated acidic whey in the first chamber providing the hydrolysis of acidic whey and the sedimentation of milk proteins; separating the milk proteins sediment and 8-12 vol% of the bulk liquid and transferring them to the second chamber providing the treatment and partial anaerobic digestion of the milk proteins in the second chamber; transferring the treated milk proteins from the second chamber and remaining bulk liquid from the first chamber to the third chamber providing mainly acetogenesis and methanogenesis processes; transferring effluent from the third chamber to the fourth chamber and providing mainly methanogenesis process in the fourth chamber.</p>
WO2015090261	Archea GmbH (DE)	<p>Modular system for constructing a biogas fermenter. The invention relates to a modular system which allows a biogas fermenter comprising a container for receiving biomass to be constructed using simple technical means. One part of the container is formed by a recess in the ground. An above-ground part of the container consists of a ring-shaped steel wall which is composed of a plurality of curved individual sheets, the ring-shaped side wall being arranged on a ring-shaped ground anchoring, e.g. a foundation. The container receiving the biomass is configured using special, water-tight container films which are connected to a gas-tight covering roof.</p>
EP2889363	Liepajas Univ (LV)	<p>Optimal anaerobic environment maintenance system for producing biogas. The invention is related to biogas production and namely - to the systems anticipated for control and maintenance of anaerobic bacteria processes in the solid domestic waste layer. A system is proposed, which contains: humidity, pressure and temperature sensors placed in the layer of the solid household wastes; the data monitoring and analysis unit; the command unit; the water and auxiliary substance supply system, which contains the liquid feeder and the system of pipes, located in the layer of solid household wastes; the humidity, pressure and temperature sensors are connected to the data monitoring and analysis unit having a possibility to send and receive electronic signals, which is connected to the command unit having also a possibility to send and receive electronic signals, which, in its turn, is connected to the liquid feeder having a possibility to send and receive electronic signals; the liquid feeder is designed with a possibility, when receiving a command from the command unit, to selectively supply liquid into the system of watering pipes for watering a segment of the solid household waste polygon, whereas the watering pipe system is designed with a possibility to provide uniform watering of a segment of the solid household waste polygon, where each mentioned segment of the waste polygon contains humidity sensors, which are placed at the borders of the segment, at least one temperature sensor and at least one pressure sensor, which are placed in the centre of the segment; the position of the humidity sensor is chosen in such a way that the coordinates (x, y, z) of the humidity, pressure and temperature sensors would correspond to the existing formulas, where the reference point is the south-eastern corner of the solid household waste polygon.</p>

FERMENTACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015126581	Archer Daniels Midland Co (US)	Process for making furfural. Processes are described for producing furfural from a mixture of pentoses and hexoses, by dehydrating and cyclizing pentoses to provide furfural using a water-soluble acid at elevated temperatures in the presence of a low-boiling, water-immiscible organic solvent, such as toluene, which is effective for extracting the furfural into an organic phase portion. In certain embodiments, a fermentation step occurs prior to the dehydration step to convert hexoses in the mixed pentoses and hexoses to ethanol while conserving pentoses therein for making furfural.
WO2015123627	Univ Toledo (US)	Enhancement of lignocellulose saccharification via a low temperature ionic liquid pre-treatment scheme. A method for pretreating lignocellulosic biomass having a lignin component, a hemicellulose component, and a cellulose component, for conversion to sugar is disclosed. Also disclosed is the pretreated lignocellulosic biomass resulting from the method.
WO2015120859	Inbicon AS (DK)	Methods of processing sugar cane and sweet sorghum with integrated conversion of primary and lignocellulosic sugars. The current invention concerns methods and products related to the production of alcohol from sugar cane and/or sweet sorghum with integration of 1st and 2nd generation (1G/2G) biorefining, thus comprising the integrated conversion of primary and secondary soft lignocellulosic biomass. In particular, methods of processing sugar cane and/or sweet sorghum feedstock are disclosed, said methods comprising the steps of providing raw juice from the feedstock, recovering a residual bagasse, pre-treating the bagasse and mixing it with some quantity of raw juice, and hydrolyzing the pretreated bagasse enzymatically.
WO2015121450	Deinove (FR)	Biomass Transformation. The present invention provides improved methods of transforming biomass using Deinococcus bacteria. More particularly, the invention discloses improved methods that combine suitable biomass treatment and processing conditions, allowing transformation of biomass and generation of valuable products under industrially-effective conditions.
WO2015118205	Abengoa Bioenergía Nuevas Tecnologías AS (ES)	Polypeptides with polysaccharide monooxygenase activity and use thereof for the production of fermentable sugars. The invention relates to: polypeptides with polysaccharide monooxygenase activity; a host cell expressing said polypeptides, preferably a Myceliophthora thermophila cell; an enzymatic composition comprising at least one of said polypeptides, preferably together with other cellulolytic enzymes; the use of said host cell, of at least one of the polypeptides with polysaccharide monooxygenase activity or of the enzymatic composition for the degradation of cellulosic biomass; and a method for producing bioproducts, preferably bioethanol, comprising the use of said host cell, of at least one of the polypeptides of the invention or of the enzymatic composition of the invention.
WO2015116411	API IP Holdings LLC (US)	Methods and apparatus for removing dissolved gases from fermentation streams. The present invention provides a method of treating a fermentation stream to remove dissolved gases, comprising obtaining a fermentation stream including water, one or more fermentation products, and dissolved gases; continuously sonicating the fermentation stream to generate acoustically cavitated gases from the dissolved gases; and applying vacuum to release the acoustically cavitated gases from the fermentation stream. The dissolved gases may include air, oxygen, nitrogen, helium, argon, carbon dioxide, carbon monoxide, hydrogen, or other non-condensables. The release of acoustically cavitated gases may optionally be done simultaneously with sonication. At least 75 %, such as up to 95 % or more, of the dissolved gases may be released from the fermentation stream. The disclosed method positively impacts downstream operations and product quality by removing dissolved gases.

FERMENTACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
WO2015109405	Univ Concordia (CA)	Novel cell wall deconstruction enzymes of chaetomium thermophilum, thermomyces stellatus, and corynascus sepedonium, and uses thereof. The present invention relates to novel polypeptides and enzymes (e.g., thermostable proteins and enzymes) having activities relating to biomass processing and/or degradation (e.g., cell wall deconstruction), as well as polynucleotides, vectors, cells, compositions and tools relating to same, or functional variants thereof. More particularly, the present invention relates to secreted enzymes that may be isolated from the fungi <i>Chaetomium thermophilum</i> strain ATCC 16451, <i>Thermomyces stellatus</i> strain CBS 241.64, and <i>Corynascus sepedonium</i> strain ATCC 9787. Uses thereof in various industrial processes such as in biofuels, food preparation, animal feed, pulp and paper, textiles, detergents, waste treatment and others are also disclosed.
WO2015107415	Lali Arvind Mallinath (IN)	A process for production of soluble sugars from biomass. The present invention provides a process for enzyme mediated hydrolysis of biomass for production of soluble sugars, wherein the said process comprises of steady addition of small portions of biomass to enzyme solution, enabling rapid solubilization of biomass. The process used for enzymatic saccharification allows for increased biomass loading, enzyme recycle and mitigation of substrate and product inhibitory effect. The recycling of unhydrolysed biomass along with soluble enzyme ensures complete reuse of the said enzyme for effective repeated hydrolysis thereby increasing the overall productivity of enzyme used.
WO2015095462	Bp Biofuels Uk Ltd (GB)	Process for extracting lipids for use in production of biofuels. Methods and systems used to extract lipids suitable in production of biofuels from a fermentation broth may include using heat to pre-treat the fermentation broth in order to more easily extract a product from oleaginous microorganisms in the broth. Additionally or alternatively, a combination of enzymes including amylase, 1-4 mannosidase, and 1-3 mannosidase may be used to break down cell walls of the oleaginous microorganisms. Residual broth water may be recycled and used as imbibition water for washing a process feedstock to extract sugar.
WO2015101753	Lesaffre & Cie (FR)	Yeast Strains For Producing First-Generation Ethanol. The present invention concerns yeast strains that have improved properties relative to the specialised strains that are used in the production of first-generation ethanol. In particular, the strains of the invention have an increased ethanol yield, a lower production of glycerol and ethanol production kinetics that are similar or slightly slower than standard strain D1B. The present invention also concerns the yeasts obtained by culturing said strains, and the use of said yeasts and/or of said strains in the industrial production of ethanol.
WO2015097686	Israel State (IL); et al	Lactic acid bacteria for the production of ethanol from biomass material. Lactic acid bacterial cultures, cell populations and articles of manufacture comprising same are disclosed for generating ethanol from lignocellulose.

TECNOLOGÍAS QUÍMICAS

Patentes

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WO2015122578	Korea Inst Sci & Tech (KR)	New nephroselmis sp. Novel strain KGE2 and method for increasing fatty acid content within relevant novel stain. The present invention relates to a new Nephroselmis sp. novel strain and a method for increasing fatty acid content within a strain using the same. The novel strain of the present invention has a fast growth rate and contains a high content of lipids and fatty acids, and thus can be useful in the production of biodiesel. Also, since the novel strain of the present invention is separated from the acid mine and has a resistance to heavy metals, the activity thereof can be maintained even in waste water. Furthermore, the novel strain of the present invention has an advantage of being able to grow using minerals in the waste water by maintaining the activity in harsh environments such as waste water. In addition, in the case of culturing the strain with mine drainage and waste water, the novel strain of the present invention can maximally increase the content of the fatty acid, and thus is available in biodiesel production, and can be used to produce alternative energy.
EP2907869	Lafleur Christof (AT)	Biofuel production from fatty acid rich feedstock. The present invention relates to a method of continuously making a liquid biodiesel product from FFA-rich vegetable and/or animal oil or fat feedstock, wherein esterification of the FFA is carried out in a first biofuel reactor equipped with binary fluid pneumatic nozzles utilizing an inert gas as a carrier gas for feeding aerosols of oil and alcohol components into the reactor, and allowing the esterification reaction to take place thus yielding a first reaction mixture; and wherein in a second step a phase separation is carried out to yield a light phase comprising fatty acid alkyl esters (FAAE) and unreacted glycerides, and a heavy phase comprising excess alcohol, catalyst, and water; wherein the phase separation is carried out by means of an integrated phase separator device comprising at least one demister or coalescer unit. The invention further relates to means and methods for purification of the crude biodiesel reaction mixture and for recovering and recycling at least part of unreacted starting materials and reaction by-products.
WO2015110982	Nest Srl (IT)	Emulsifying mixture and use of it. The present invention relates to a two-component mixture emulsifier, obtainable from renewable raw materials. The above mentioned emulsifying mixture is particularly useful to form water/fuel emulsions. These emulsions have proved to be stable for at least 3 months and have shown that they can be used in internal combustion devices, without substantial changes to the mechanical system; to obtain output powers from the engine, fuelled by these emulsions, comparable with those provided in using exclusively non-emulsified fuel and to achieve significant reductions of particulate amount and greenhouse gases emitted by the exhausts.
WO2015105233	Advanced Biomass R & D CT (KR)	Recombinant vector for increasing biomass and lipid productivity of microalgae and use thereof. The present invention relates to: a recombinant vector comprising an inducible promoter induced under a condition in which ammonium is not present or a condition in which nitrate is present, and a glyceraldehyde-3-phosphate dehydrogenase (GAPDH) protein coding gene under the promoter; a method for producing transgenic microalgae having increased biomass and lipid productivity by transforming microalgae cells using the recombinant vector; transgenic microalgae produced by the method; a composition containing the recombinant vector as an active ingredient for increasing biomass and lipid productivity in microalgae; a method for producing lipid by cultivating the transgenic microalgae; and a method for manufacturing biodiesel by using the transgenic microalgae.
EP2899281	Commissariat Energie Atomique (FR)	Inhibitors of sterol metabolism for their use to accumulate triglycerides in microalgae, and methods thereof. The invention relates to a method for accumulating triacylglycerols in microalgae by inhibiting the sterol metabolism. The invention also relates to a method for producing fatty acids, biofuels, pharmaceutical or cosmetic compositions, and also food supplements, comprising a triacylglycerols accumulation step in microalgae according to the invention. Finally, the invention concerns the use of an inhibitor of sterol metabolism to accumulate triglycerides in microorganisms, and preferably microalgae.

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WO2015111994	Velez de la Rocha José Martín (MX)	Mini-reactor for the continuous production of biodiesel. The invention relates to a novel structure for the continuous flow reaction of the transesterification of oils or fats, by means of the phase coupling of at least three ultrasonic cavitation devices in a tubular structure.
WO2015116329	Exxonmobil Res & Eng Co (US)	Production of renewable diesel and propylene. Feeds containing triglycerides are processed to produce a diesel fuel product and propylene. The diesel product and propylene are generated by deoxygenating the triglyceride-containing feed using processing conditions that enhance preservation of olefins that are present in the triglycerides. The triglyceride-containing feed is processed in the presence of a catalyst containing a Group VI metal and a Group VIII non-noble metal and in the presence of CO.
WO2015101909	Versalis Spa (IT)	Process for the production of olefinic compounds and a hydrocarbon fuel or a fraction thereof. The present invention relates to a process for the production of olefinic compounds that can be used for the production of detergents, additives, lubricants and/or plastic materials, or components which can be used in the field of oil explorations and productions, and a hydrocarbon fuel or a fraction thereof, which comprises subjecting a mixture of glycerides having at least one unsaturated hydrocarbon chain, to metathesis reaction and, after separating the olefinic mixture obtained, effecting a hydrodeoxygenation and subsequently hydroisomerization process, so as to obtain the hydrocarbon fuel or a fraction thereof.
EP2889361	Shell Int Research (NL)	Diesel fuel formulation and use thereof. A fuel composition is provided comprising a hydrocarbon blend, the hydrocarbon blend comprising: (a) between 60 and 70 vol% of Fischer-Tropsch derived fuel component, (b) between 20 and 30 vol% of a naphthenic base oil, and (c) between 9 and 11 vol% of a bio-derived diesel component, said fuel composition having a cetane number of at least 68.
WO2015093991	ALS Bioenergy Corp (PA)	Continuous industrial method for the production of biodiesel fuel. Continuous industrial method for the production of biodiesel fuel comprising a step of inter-esterification of triglycerides with a methyl or ethyl ester having up to 6 carbon atoms in an ultrasonic cavitation reactor and in two stirred tank reactors, the product being filtered to recover the reaction catalyst; a step of recovering the unreacted methyl or ethyl ester by means of two vertical evaporators and flash evaporation; and a step of separating and obtaining the biodiesel by distillation of the solution obtained from the flash evaporation using short path distillation in distillation columns arranged in series.
WO2015086904	BioGTS Oy (FI)	Method and system for producing liquid biofuel from bio-based oils and/or fats. The invention is related to a method for producing liquid biofuel from bio-based oils and/or fats, wherein the process steps include: mixing alcohol with a raw material for forming a reaction mixture, pumping the reaction mixture to a reactor, mixing 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, adjusting the temperature and pressure of the reactor so that the reaction mixture achieves the supercritical state, - esterifying the reaction mixture to produce biofuel, and separating by-products and alcohol from biofuel. The method uses biogas as catalyst. The invention is also related to an equivalent system for producing liquid biofuel from bio-based oils and/or fats.

Nº Publicación	Solicitante (País)	Contenido técnico
W02015069129	Inst Nat Cercetare Dezvoltare (RO)	<p>Process and catalyst for obtaining fatty acid methyl ester. The invention refers to a process and catalyst for obtaining fatty acid methyl esters, by the chemical processing of fats with content of free fatty acids, in order to be used as diesel biofuel, also referred to as biodiesel, intermediates for synthetic biofuels for aviation, or environmental-friendly solvents. The process according to the invention consists of treating the fats with methanol and with super-acid solid catalyst S0427Ti02-La203j at temperatures of 68+-2 DEG C, the water resulting din esterification reaction of the fatty acids is separated from methanol in a rectification column and is removed, and methanol is recirculated, until the acidity index of the reaction mass drops under 2 mg KOH/g, the super-acid solid catalyst is removed by filtration, and the filtrate is treated in the next step with a heterogeneous alkaline catalyst, at temperatures of 67+-2 DEG C, for 60-90 minute, the catalyst is removed by filtration or centrifugation, glycerine is separated from the methyl esters of fatty acids by decantation or centrifugation, and is then treated with the heterogeneous alkaline catalyst separated before, at temperatures of 67+-2 DEG C, for 60-90 minute, the catalyst is removed by filtration or centrifugation, and excess methanol is removed by distillation, first at atmospheric pressure and then under vacuum, glycerine is separated from the methyl esters of fatty acids by decantation or centrifugation, which is finally filtered through an inorganic filtering layer. The heterogeneous alkaline catalyst according to the invention has the molecular formula: CH₂,464- 2.5350o,428-o,-528No.o3i-o.o43Clo.o3 i-o.o43Cao. io5-o.i29Sio.o64-o.o73, and the process for obtaining it consists of treating the calcium oxide with methanol with a molar ratio of 1 :4, at a temperature of 65 DEG C for 60 minutes, treating the mixture with glycerine with a molar ratio of 1 : 1 to the calcium oxide, at temperatures of 65-70 DEG C for 60 minutes, methanol is removed by distillation from the reaction mass, which is treated with a solvent, with triethanolamine with a molar ratio of 1 :2 to the calcium oxide, and with trialkylchlorosilane with a molar ratio of 1 :2 to the calcium oxide, at ambient temperature, for 60-120 minutes, the resulting suspension is filtered, and the solvent is removed by drying.</p>
W02015070332	Nexen Energy Ulc (CA)	<p>Conversion of synthesis gas into liquid hydrocarbons via fischer tropesch synthesis. A process for converting at least one synthesis gas, having a molar H₂ to CO ratio between about 0.25 and 1, into at least one hydrocarbon, via Fischer-Tropsch synthesis by contacting the at least one synthesis gas with at least one catalyst, forming at least one hydrocarbon, wherein said at least one catalyst has Water Gas Shift and Fischer-Tropsch synthesis activity.</p>

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