



## FERMENTACIÓN SECA DE BIOMASA

La digestión anaeróbica es una tecnología bioquímica de tratamiento de residuos orgánicos que permite su transformación en biogás (50-70% de metano, 30-50% de dióxido de carbono) mediante la acción de bacterias anaeróbicas. La fermentación seca de biomasa, también denominada digestión anaeróbica seca (*dry fermentation*, *dry anaerobic digestion*, *solid state anaerobic digestion* o *high-solids anaerobic digestion*) es un tipo de digestión anaeróbica con elevado rendimiento de biogás que está suscitando mucho interés en Europa en la última década. Prueba de ello es la intensa proliferación de plantas industriales con esta tecnología desde el año 2005, de modo que el 54% de la capacidad instalada en Europa corresponde a la vía seca. A esta tendencia en auge se suman Asia y EE.UU., siendo China uno de los países pioneros. La fracción orgánica de los residuos sólidos urbanos y los residuos agrícolas son los sustratos principales a los que se está aplicando esta tecnología.

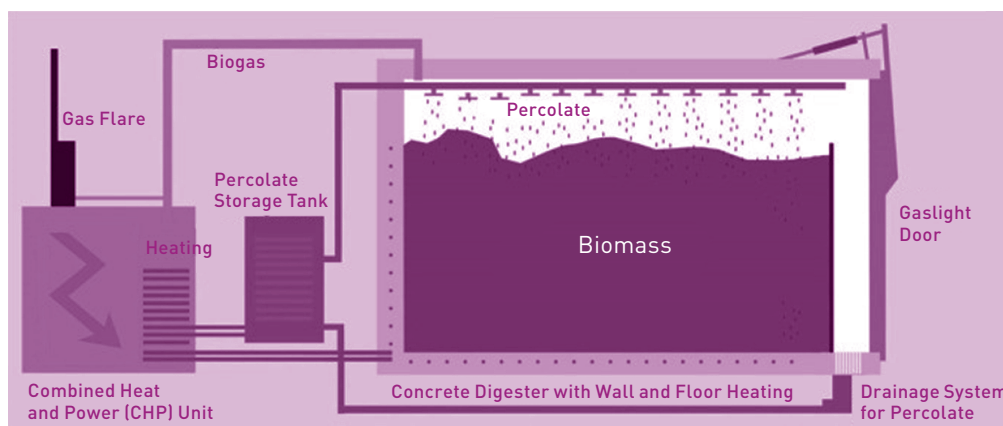


Figura 1. Proceso BEKON de fermentación seca (Fuente: Qian et al. Bioresource Technology, Vol. 217, 2016, 82-89)

La digestión anaeróbica seca se caracteriza, frente a la digestión anaeróbica húmeda, por presentar un contenido de sólidos totales mayor del 15%, siendo el rango habitual el comprendido entre el 15-30%. Los procesos más habituales son la fermentación en lecho fijo con inoculación del digestato y recirculación del percolato (Figura 1), y la fermentación en dos etapas (acetogénesis y metanogénesis) con recirculación del percolato (proceso GICON, por ejemplo). El menor contenido de agua en los sustratos le confiere a esta tecnología sustanciosas ventajas frente a la vía húmeda, como son la reducción del volumen de los digestores, ahorro en costes de agua, una menor demanda energética asociada a los procesos de calentamiento y bombeo, así como una manipulación mínima de la alimentación, cuyo contenido de impurezas, perjudiciales para el correcto funcionamiento de agitadores y bombas, puede ser mayor. Además, la vía seca genera menores cantidades de digestato y éste se puede tratar con facilidad mediante procesos de compostaje y utilizarse como fertilizante, con las limitaciones establecidas en la legislación vigente. Sin embargo, las elevadas concentraciones de sólidos dificultan los procesos de manipulación, bombeo y mezclado de materiales en la vía seca, lo que conduce a numerosos problemas de inhibición por productos de reacción. Así pues, la investigación actual en este campo se dirige a la optimización del proceso mediante el conocimiento preciso de sus limitaciones obtenido a través de las numerosas instalaciones experimentales en funcionamiento, abordándose, entre otros temas, el pretratamiento de la alimentación, la utilización del digestato, el control de la estabilidad del proceso, el diseño de reactores, etc.

Para obtener una visión más detallada de cuáles son los actores (países e instituciones) más relevantes de esta tecnología y en qué medida está aumentando el interés en ella en la actualidad, se procedió a la realización de un análisis bibliométrico de las publicaciones científicas recogidas en las bases de datos de ISI WoK. Así, en la Figura 2 se muestra la evolución temporal del número de artículos publicados a nivel mundial y europeo, observándose que, en ambos casos, los primeros se publicaron en la década de los ochenta y comenzaron a ser más numerosos a partir de 2005.

Los países con mayor número de publicaciones son China y EE.UU. con el 28.4% y 21.3% de las 352 publicaciones mundiales. A continuación, se sitúan países europeos como Francia, Italia, Alemania y España, siendo la aportación de Europa al total el 31.8%. En la Tabla 1 se recogen las instituciones líderes a nivel mundial, encabezadas por el Ohio Agricultural Research and Development Center (OARDC) de la Ohio State University (EE.UU.) y en la Tabla 2 figuran las más prolíficas a nivel europeo, lideradas por el Institut National de la Recherche Agronomique (INRA, Francia) y la Universidad de Cádiz (España). En esta Tabla se muestra, además, el tipo de biomasa objeto de estudio en las publicaciones de cada uno de los centros.

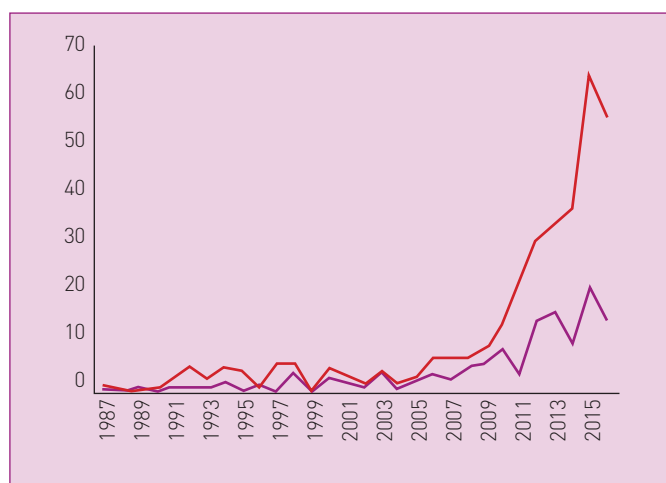


Figura 2. Distribución del número de publicaciones por años (rojo: nivel mundial, azul: nivel europeo)

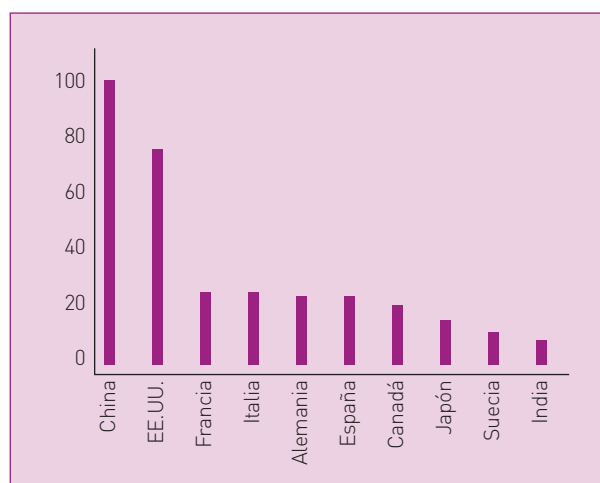


Figura 3. Países líderes

Instituciones	Nº Publicaciones
OARDC, Ohio State Univ (US)	39
Tongji Univ (CN)	14
INRA (FR)	13
Tsinghua Univ (CN)	11
Univ Cádiz (ES)	11
Univ California Davis (US)	10
Agr Agri Food Canada (CA)	9

Tabla 1. Instituciones líderes a nivel mundial

Instituciones	Nº Publicaciones	Tipo de biorresiduo a estudiar
INRA (FR)	13	Lignocelulósicos, OFMSW, residuos verdes
Univ Cádiz (ES)	11	OFMSW
Univ Lyon (FR)	8	OFMSW
Lund Univ (SE)	7	Residuos agrícolas, alimenticios y verdes
Univ Barcelona (ES)	6	OFMSW
Fdn Edmund Mach (IT)	5	OFMSW (aplicación en pilas de combustible de óxido sólido, SOFC)
Politec Torino (IT)	5	
Univ Naples Federico II (IT)	5	OFMSW, paja de arroz, residuos alimenticio
Univ Navarra (ES)	5	OFMSW, agroindustriales

Tabla 2. Instituciones líderes a nivel europeo

**Bibliografía Introducción:** Deng et al., *Journal of Environmental Management* Vol. 177, 2016, 247-252; Qian et al., *Bioresource Technology*, Vol. 217, 2016, 82-89; Cazier et al., *Bioresource Technology*, Vol. 190, 2015, 106-113; Chen et al., *Waste Management*, Vol. 38, 2015, 436-442; Yebo et al., *Renewable and Sustainable Energy Reviews*, Vol. 15, 2011, 821-826.

# ANÁLISIS DE PATENTES

Durante el último trimestre de 2016 se han identificado en la base de datos WPI (World Patent Index) 1337 familias de patentes sobre tecnologías de conversión de la biomasa para la producción de energía. La mayoría de las referencias corresponde a invenciones para las que sólo se solicita protección en países asiáticos (Tabla 3). 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 esta consideración, cabe señalar que el 71.9% de las familias se refiere a las tecnologías termoquímicas. El 22.9% y el 7.9% hacen referencia a las tecnologías bioquímicas y químicas, respectivamente. Las tecnologías de pirólisis y gasificación, en conjunto, son las que cuentan con mayor número de resultados, 41.5% del total.

Tipos de tecnologías de conversión de la biomasa	Nº Familias (Todos los ámbitos de protección)	Nº Familias (Excluidas aquéllas con ámbitos de protección exclusivamente asiáticos)
Tecnologías termoquímicas	1059	182
Combustión directa	481	77
Gasificación/pirólisis	608	105
Tecnologías bioquímicas	217	58
Digestión anaeróbica	152	22
Fermentación de azúcares	66	37
Tecnologías químicas (transesterificación, Fischer-Tropsch, síntesis de metanol)	79	20
<b>Nº total familia de patentes</b>	<b>1337</b>	<b>253</b>

Tabla 3. Número de familias de patentes clasificados por tecnologías

En la Tabla 4 se muestran los países líderes en protección. En primer lugar se encuentran las solicitudes internacionales (PCT), con 97 documentos; en segundo lugar se encuentra EE.UU., con 85. En tercer lugar y muy distanciados, se sitúan los documentos de patente europea (EP), con 19 referencias. En España, en el periodo analizado, se publicaron 4. En la Tabla 5 se recogen los ámbitos de protección más representativos de las invenciones correspondientes a las distintas tecnologías.

	País	Nº Documentos
1	PCT	97
2	EE.UU. (US)	85
3	EP	19
4	Francia (FR)	16
5	Rusia (RU)	13
6	Brasil (BR)	12
	Alemania (DE)	12
7	Turquía (TR)	11

Tabla 4. Ranking por países (excluyendo países asiáticos)

<b>Tipos de Tecnología (Nº Documentos)</b>			
	<b>Termoquímicas</b>	<b>Bioquímicas</b>	<b>Químicas</b>
PCT	64	26	10
EP	17	2	1
Alemania (DE)	9	3	0
Brasil (BR)	5	3	4
Canadá (CA)	5	1	0
Corea (KR)	1	3	0
EE.UU. (US)	66	16	5
España (ES)	1	3	0
Francia (FR)	12	4	1
Polonia (PL)	6	1	1
Reino Unido (GB)	3	1	0
Rusia (RU)	9	3	1
Turquía (TR)	10	1	0
<b>Nº Familias totales</b>	<b>182</b>	<b>58</b>	<b>20</b>

**Tabla 5.** 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
WO2016147023	Babcock & Wilcox Vølund AS (DK)	<b>Incineration plant with superheater.</b> The invention relates to an incineration plant comprising a furnace including movable grates on which fuel is burned. Flue gases are directed through at least a first and a second vertically extending radiation passes and subsequently through a number of convection passes. A first superheater is arranged in one of the convection passes. A second superheater comprises an inner metal pipe, through which the steam is flowing and an outer metal casing enclosing the inner metal pipe. There is provided a spacing between the inner metal pipe and the outer metal casing. The second superheater is arranged for further heating of steam heated in the first superheater and is arranged in at least one of: the furnace, the first vertically extending radiation pass and the second vertically extending radiation pass.
CA2920677		<b>Method and apparatus for removing mercury from a flue gas stream.</b> The present invention relates generally to the field of emission control equipment for boilers, heaters, kilns, or other flue gas-, or combustion gas-, generating devices (e.g., those located at power plants, processing plants, etc.) and, in particular to a new and useful method and apparatus for capturing, oxidizing, lowering the concentration and/or level of, and/or eliminating mercury present in any flue gas and/or combustion gas stream. In one embodiment, the method and/or apparatus of the present invention is applied to boilers, heaters, kilns, or other flue gas-, or combustion gas-, generating devices that have connected thereto at least one type of flue gas, or combustion gas, scrubber device (i.e., a wet scrubber or a dry scrubber).
WO2016183850	Che Zhanbin (CN)	<b>Combustion device for solid fuel. A combustion device for a solid fuel.</b> A material stacking layer is formed between a material feeding opening and a material bearing bottom. An air adjustment structure is disposed in the material stacking layer. The air adjustment structure at least comprises a supporting member extending from an air intake side to a combustion side. The material stacking layer forms an air guide channel under the supporting member, so as to allow air to smoothly pass through the material stacking layer, which helps a volatile matter smooth flow to the combustion side and being ignited as soon as possible.
WO2016189375	Clementi SRL et al. (IT)	<b>Combined heat and power boiler with thermoelectric modules.</b> The object of the present invention is a cogeneration boiler, provided with a plurality of thermoelectric modules for the transformation of part of the thermal energy into electrical energy. Said plurality of thermoelectric modules preferably consists of Peltier cells, arranged with the hot face in contact with the fins of a finned jacket surrounding the combustion chamber of said boiler and with the cold face in contact with special cooling plates within which the water contained in the tank of said boiler flows.
EP3070403	Ecomb AB Publ (SE)	<b>Solid fuel particles supply device for a combustion chamber.</b> The present disclosure relates to a supply device assembly for supplying solid particles 2 and a combustion adjusting fluid to a combustion chamber 4 in a heat generating plant, said combustion chamber being delimited by at least one wall 24. The assembly comprises a tubular supply device 1 having a first end 5, a second end 6 and a longitudinal axis 7, and comprising a tube 8 and/or 9, an opening 13 through the tube at the first end 5, and a supply pipe 17 for supplying the combustion adjusting fluid 30 to the fuel 2. The assembly also comprising a control unit configured for controlling the amount of combustion adjusting fluid 30 mixed with the fuel particles 2 based on sensor measurements from within the combustion chamber 4.

## COMBUSTIÓN DIRECTA

Nº Publicación	Solicitante (País)	Contenido técnico
US2016281544	Farm Pilot Project Coordination Inc (US)	<b>Method and system for processing animal waste.</b> A method and system of processing animal waste is disclosed. In a particular embodiment, the method includes transferring animal waste to a gasifier to burn the animal waste, circulating water through a heat exchanger in a flue stack of the gasifier to generate heated water, and pumping the heated water to either an organic Rankine cycle system to generate electricity, a radiant heater, or any combination thereof. In addition, the method includes circulating the heated water through an evaporator of the organic Rankine cycle system to vaporize a refrigerant, and circulating the vaporized refrigerant from the evaporator, through a turbine to generate the electricity. Also, the method includes using a manure spreader to feed the animal waste to the gasifier at a varying feed rate that is based on contemporaneously calculating a British thermal units (BTU) of the animal waste being fed to the gasifier.
WO2016147201	H S Mukunda (IN)	<b>Sized multi-fuel horizontal continuous combustion device.</b> A sized multi-fuel horizontal continuous combustion device (SM-HCCD). The device comprises a fuel feed zone, at least one air supply duct having air nozzles, a combustion zone and a grate. The fuel feed zone is configured to be horizontal or slightly sloping towards the combustion zone wherein the fuel feed zone facilitates continuous use of fuel in the combustion device. The cross section of the device is filled with at least one air supply duct depending on the power level wherein each of the air supply duct has a specific number of air nozzles with some space at the bottom. The combustion zone of the combustion device extends from the tip of the air nozzles that covers a region right up to the opposite wall of the cross section. The stove has been provided with an ejector device through spaces of which the biomass conversion takes place. The char, also partly converted in this zone moves down to a grate where it is converted at a slower rate.
WO2016141327	Innoverdant LLC (US)	<b>Charcoal ignition fluid.</b> The invention relates generally to a charcoal ignition fluid that is composed of a cellulose ether polymer, butanol, and water. The charcoal ignition fluid has performance characteristics similar to petroleum distillate but is more sustainable. Additionally, the charcoal ignition fluid can include ethanol and/or an alcohol to reduce the water content. Moreover, the charcoal ignition fluid can include an acetate salt to increase the visible flame for safety purposes. The charcoal ignition fluid may also include an organic ester to enhance the odor of the ignition fluid.
WO2016158473	Mitsubishi Hitachi Power Sys (JP)	<b>Combustion burner and boiler.</b> In this combustion burner and boiler, interference of ignition in a flame stabilizer is suppressed and flame stabilization performance is improved by providing: a fuel nozzle which ejects a fuel gas that is a mixture of pulverized coal and air; a combustion air nozzle which ejects a fuel gas combustion air from outside of the fuel nozzle; a secondary air nozzle which ejects secondary air from the outside of the combustion air nozzle; and a flame stabilizer which comprises a first flame stabilizer main body which is arranged at the leading end of the fuel nozzle and separated by a prescribed space from the inner wall surface of the fuel nozzle and which forms a ring shape having as the center an axial line along the ejection direction of the fuel gas.
US2016341421	Northwest Mfg Inc (US)	<b>Biomass boiler system.</b> A biomass boiler system for significantly reducing corrosion and creosote buildup within the interior of a fire container. The biomass boiler system generally includes a primary combustion chamber having an exterior surface and an interior surface, and a water jacket having an inner wall, an outer wall and a water cavity defined between the inner wall and the outer wall. The inner wall is distally spaced from the exterior surface of the primary combustion chamber forming an air chamber. The water cavity contains a volume of liquid heated by thermal conduction of heat from the primary combustion chamber through the air chamber then through the inner wall of the water jacket. The heated liquid may be used for heating, electrical energy generation or other purpose.

## COMBUSTIÓN DIRECTA

Nº Publicación	Solicitante (País)	Contenido técnico
WO2016171076	Okumino Produce Co Ltd (JP)	<b>Emergency power supply device for pellet stove, and pellet stove incorporating emergency power supply device.</b> To provide: an emergency power supply device that is for pellet stoves and that enables safe fire extinction and continuous operation even during a power failure; and a pellet stove incorporating the emergency power supply device. [Solution] An emergency power supply device has: an interruption detection circuit 14 that detects interruption of a commercial power supply; and a delay changeover control unit 15 that outputs, to a changeover switch unit 13, a changeover signal that causes a changeover to a first supply line 16 so as to halt power supply to the pellet stove only for a certain period of time, after the elapse of a predetermined period of time from when the interruption detection circuit 14 detects interruption of the commercial power supply. An amount of stored power remaining in a storage battery 11 after the elapse of the predetermined period of time enables at least the completion of combustion of wood pellets in a combustion chamber.
WO2016173771	Ostbayerische Technische Hochschule Amberg-Weiden (DE)	<b>Gasification device for fuels.</b> The invention relates to a gasification device for fuels, comprising an interior space, a first opening which is designed to allow the supply of fuels into the interior space during operation, and a second opening which is designed to allow the discharge of solid fuel gasification residues from the interior space during operation, wherein at least one wall surface bounding the interior space is configured in such a manner that a volume of at least a partial section of the interior space is increased during the operation of the gasification device.
WO2016176757	The Royal Inst for the Advancement of Learning/McGill Univ (CA)	<b>Electrocyclonic particle collector.</b> An electrocyclonic particle collector (EPC) for removing particulate matter from a gas includes an EPC gas inlet, an EPC gas outlet, and an EPC gas flow path between the EPC gas inlet and the EPC gas outlet. A first section is downstream of the EPC gas inlet and includes a first cyclonic particle collector in the gas flow path for cyclonically removing particles from the gas. A second section is in series with the first section and includes a rotational flow chamber in the gas flow path, and at least a first electrode in the gas flow path for facilitating electrostatic removal of particles from the gas stream in the rotational flow chamber.

## PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
US2016272551	Accelergy Corp (US)	<b>Processes for producing fuels and biofertilizers from biomass and products produced.</b> An IBTL system having a low GHG footprint for converting biomass to liquid fuels in which a biomass feed is converted to liquids by direct liquefaction and the liquids are upgraded to produce premium fuels. Biomass residues from the direct liquefaction, and optionally additional biomass is pyrolyzed using microwave pyrolysis to produce structured biochar, hydrogen for the liquefaction and upgrading, and CO2 for conversion to algae, including blue green algae (cyanobacteria) in a photobioreactor (PBR). Produced algae and diazotrophic microorganisms are used to produce a biofertilizer that also contains structured biochar. The structured biochar acts as a nucleation agent for the algae in the PBR, as a absorption agent to absorb inorganics from the biomass feed to direct liquefaction or from the liquids produced thereby, and as a water retention agent in the biofertilizer. The ratio of cyanobacteria to diazotrophic microorganisms in the biofertilizer can be selected so as to achieve desired total chemically active carbon and nitrogen contents in the soil for a given crop.
EP3093331	Air Liquide (FR)	<b>Method and system for the production and cooling of pyrolysis tar.</b> The method involves providing the biomass in the form of eligible. A heat transfer medium is heated in a heating device in direct heat exchange against a hot flue gas generated by combustion of one or more fuels with an oxygen-containing oxidizing agent. The pyrolysis gas of the pyrolysis tar is separated by a mechanical separation device, and pyrolysis gas is discharged out. The pyrolysis gas is partly recycled as a fuel. The pyrolysis tar before being introduced into a cooling device in a heat exchanger selected from the group comprising plate heat exchangers is recycled.

## PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
US2016326438	Anellotech Inc (US)	<b>Catalytic fast pyrolysis process.</b> The present invention provides an improved catalytic fast pyrolysis process for increased yield of useful and desirable products, while greatly reducing or eliminating fouling of various critical process lines which are likely to transfer heavy hydrocarbons, aromatics and oxygenates. The process comprises steps including feeding a fluid solvent stream having a Snyder Polarity Index of at least 2.4 to one or more of i) the raw fluid product stream from a catalytic fast pyrolysis process fluidized bed reactor to a first separation system, ii) the fluid product stream from the first separation system to a quench vapor/liquid separation system, iii) the vapor phase stream from the quench vapor/liquid separation system to a product recovery system, and, optionally, to the spent catalyst steam stripping system upstream of the catalyst regeneration system.
WO2016166650	Archimede SRL (IT)	<b>Plant for waste disposal and associated method.</b> Described herein is a plant for the disposal of wastes including: - a supercritical water oxidation reactor (SCWO), - a supercritical water gasification reactor (SCWG), - a feeding system configured for feeding at least two organic currents (W1_IN, W2_IN, W3_IN, Wn_IN) of wastes to said supercritical water oxidation reactor (SCWO) and supercritical water gasification reactor (SCWG) and configured for feeding at least one aqueous flow (PW, PLS) within said plant (1), wherein said feeding system is configured for feeding said at least one aqueous current (PW, PLS) with a series flow through said supercritical water oxidation reactor (SCWO) and supercritical water gasification reactor (SCWG) and wherein said feeding system is furthermore configured for feeding said at least two organic currents of wastes with a parallel flow through said supercritical water oxidation reactor (SCWO) and supercritical water gasification reactor (SCWG) and so as to selectively feed each of said organic currents of wastes to said supercritical water oxidation reactor (SCWO) or to said supercritical water gasification reactor (SCWG). Moreover described is a corresponding method for waste disposal. Finally, an extensive description is provided regarding the possibilities of thermal and energy integration in general between the two sections of the plant (gasification and oxidation).
WO2016162355	Borer Josef (CH)	<b>Pyrolysis plant.</b> The invention relates to a pyrolysis plant for the gasification of a mass to be gasified, such as biomass and energetic waste substances, comprising an electrically heated pyrolysis reactor in which a number of guide pipes fitted with conveying devices are arranged horizontally or at a slight inclination, wherein a feed unit is provided to feed an inlet guide pipe with the mass to be gasified, and a gas outlet for conducting away the pyrolysis gas and a conveying device for the discharge of the degassed residue mass are arranged at the discharge end of the outlet guide pipe, wherein at least two, preferably three, guide pipes, each comprising a conveying device, are arranged one above the other and connected via connection shafts, such that the guide pipes can be individually heated, the feed unit comprises an airlock that reduces or prevents the access of incoming air, and the pyrolysis reactor is surrounded by a heat insulating jacket that prevents the influx of external air on all sides.
IE86666	Conleth Ward (IE)	<b>A gasification system and method.</b> The present invention provides a gasification system and method, and in particular a system and method for producing a synthetic fuel gas from waste material such as rubber sourced from used tyres or the like, sewage sludge, wood or other organic waste, or any other suitable waste materials, the method comprising feeding biogenic fuel to a gasifier, effecting gasification of the biogenic fuel to produce a synthetic gas, and effecting Fischer-Tropsch processing of the synthetic gas to produce a liquid biofuel.
WO2016169927	Commissariat Energie Atomique (FR)	<b>Device and method for treating biomass.</b> The present invention relates to a device for treating biomass by hydrothermal liquefaction, which includes: a pump for injecting a biomass fluid and water; a reactor for hydrothermal liquefaction of the fluid, downstream from the injection pump; a separation unit, downstream from the hydrothermal liquefaction reactor, the separation unit including an aqueous phase outlet and an organic phase outlet; an electrolyser, downstream from the aqueous phase outlet of the separation unit; and a connection linking the electrolyser to the injection pump. The present invention also relates to the method for transforming biomass which implements said device.



## PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
US2016272904	Cool Planet Energy Systems Inc (US)	<b>Method for producing negative carbon fuel.</b> A method and process is described for producing negative carbon fuel. In its broadest form, a carbon-containing input is converted to combustible fuels, refinery feedstock, or chemicals and a carbonaceous solid concurrently in separate and substantially uncontaminated form. In an embodiment of the invention, biomass is converted via discrete increasing temperatures under pressure to blendable combustible fuels and a carbonaceous solid. The carbonaceous solid may be reacted to synthesis gas, sold as charcoal product, carbon credits, used for carbon offsets, or sequestered.
US2016298041	Gen Electric (US)	<b>Fuel supply system for a gasification system.</b> A fuel supply system for a gasification system is provided. The fuel supply system includes a gasifier. The fuel supply system also includes and a feed line for routing a substance and a conveyance fluid toward the gasifier. The fuel supply system further includes a separation device located upstream of the gasifier and configured to receive the substance and the conveyance fluid from the feed line, the separation device separating the substance and the conveyance fluid, wherein only the substance is routed to the gasifier.
WO2016175387	Green Science Co Ltd (KR)	<b>Gasification method for generating synthetic gas from waste, gasification apparatus for generating synthetic gas from waste, and power generation system comprising same.</b> The purpose of the present invention is to provide a gasification method and gasification apparatus for generating synthetic gas from waste, capable of minimizing the discharge of environmentally hazardous substances. According to the present invention, provided is a gasification method comprising: a first thermal decomposition step for generating char from waste; and a second thermal decomposition step for gasifying the char generated in the first thermal decomposition and the other products excluding the char, wherein the temperature for performing the second thermal decomposition step is higher than a temperature at which at least one of dioxin and tar starts to decompose.
US9476002	Greyrock Energy Inc (US)	<b>Blends of low carbon and conventional fuels with improved performance characteristics.</b> The present invention provides a blended fuel and methods for producing the blended fuel, wherein a low carbon fuel derived from a renewable resource such as biomass, is blended with a traditional, petroleum derived fuel. A blended fuel which includes greater than 10% by volume of low carbon fuel has an overall improved lifecycle greenhouse gas content of about 5% or more compared to the petroleum derived fuel. Also, blending of the low carbon fuel to the traditional, petroleum fuel improves various engine performance characteristics of the traditional fuel. It is claimed the production of blended fuel which involves converting renewable biomass feedstock into syngas, reacting syngas with catalyst to produce low carbon fuel, and blending 10-95 vol.% low carbon fuel with 5-90 vol.% petroleum diesel fuel.
WO2016158918	Kubota KK (JP)	<b>Gasification furnace, method of operating gasification furnace and biomass gasification treatment method.</b> A gasification furnace 10 that can obtain a synthetic gas comprises the following: a biomass supplying unit 2; a water vapor supplying unit 3; a reaction tower 4 in which a first region R1 and a second region R2 are formed along the gas flow direction and in which biomass supplied from the biomass supplying unit 2 is caused to flow in the first region R1 by an entrained bed formed by the water vapor supplied from the water vapor supplying unit 3 and gas generated in the first region R1 is caused to flow into the second region R2; a plurality of oxygen gas supplying units 5 (5a, 5b, 5c) that supply oxygen gas to the first region R1 and the second region R2 of the reaction tower 4; and a supply amount adjusting mechanism that adjusts the amounts of oxygen gas supplied from the oxygen gas supplying units 5 (5a, 5b, 5c).

## PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
WO2016185631	Oneworld Corp et al. (JP)	<b>Device and method for carbonizing organic substance.</b> [Problem] To provide a device for carbonizing organic substances and a method for carbonizing organic substances, the device and method attaining a further improvement in the energy efficiency of carbonization of the organic substances such as food waste. [Solution] A method which includes accumulating organic waste and carbonizing the organic waste with superheated steam, wherein use is made of a carbonization device comprising: a carbonization oven in which the inner walls have been lined with a porous water-absorbing base material; a superheated-steam generator; and a supply pipe part through which the superheated steam generated by the superheated-steam generator is supplied to the carbonization oven. The method comprises the following steps after introduction of the waste into the oven: a water absorption step for absorption by the porous water-absorbing base material; a first carbonization step; a second carbonization step in which carbonization is conducted at a higher temperature than in the first carbonization step; and an air-cooling step.
US2016319207	Paganessi Joseph E (US)	<b>Biomass gasification/pyrolysis system and process.</b> A system for producing a syngas from a biomass material. The system compacts a loose biomass material to form a compacted biomass material at an entrance of a reactor tube, and then heats the compacted biomass material within the tube to form ash and a fuel gas mixture. The fuel gas mixture is withdrawn from the tube and the ash is removed from the tube through an exit thereof. Ingress of air into the tube is inhibited by forming a plug of the biomass material at the entrance of the tube and a plug of ash at the exit of the tube. A neutral atmospheric pressure is maintained in the reactor tube relative to pressure outside the reactor tube by monitoring and adjusting a volumetric rate of the fuel gas mixture withdrawn from the reactor tube based on pressures at the entrance and the exit of the reactor tube.
US2016304786	Reed Frank (US)	<b>Pyrolysis systems.</b> Systems and methods are disclosed for pyrolysis of waste feed material. Some systems include a main retort and a secondary retort. Syngas is produced by pyrolysis in the main retort, and is then mixed with combustion air and ignited, in some cases to produce energy. Carbon char travels to the secondary retort and is exhausted from the system through an airlock.
WO2016173958	Shell Int Research (NL) et al.	<b>Conversion of biomass or residual waste material to biofuels.</b> The present invention provides a process for producing liquid hydrocarbon products from solid biomass and/or residual waste feedstocks, said process comprising the steps of: a) a first stage of hydrolyzing the solid feedstock in a hydrolysis reactor vessel in the presence of molecular hydrogen and one or more deoxygenation catalysts, producing a product stream comprising partially deoxygenated hydrolysis product, H <sub>2</sub> O, H <sub>2</sub> , CO <sub>2</sub> , CO, C <sub>1</sub> - C <sub>3</sub> gases, char and catalyst fines; b) removing said char and catalyst fines from said product stream; c) a second stage of hydroconverting said partially deoxygenated hydrolysis product in a hydroconversion reactor vessel in the presence of one or more hydroconversion catalysts and of the H <sub>2</sub> O, CO <sub>2</sub> , CO, H <sub>2</sub> , and C <sub>1</sub> - C <sub>3</sub> gas generated in step a), producing a vapour phase product comprising substantially fully deoxygenated hydrocarbon product, H <sub>2</sub> O, CO, CO <sub>2</sub> , and C <sub>1</sub> - C <sub>3</sub> gases; d) condensing the vapour phase product of step d) to provide a liquid phase product comprising substantially fully deoxygenated C <sub>4</sub> + hydrocarbon liquid and aqueous material and separating said liquid phase product from a gas phase product comprising H <sub>2</sub> , CO, CO <sub>2</sub> , and C <sub>1</sub> - C <sub>3</sub> gases; e) removing the aqueous material from the substantially fully deoxygenated C <sub>4</sub> + hydrocarbon liquid; and f) a third stage comprising combining an aliphatic hydrocarbon precursor or an aromatic hydrocarbon precursor with at least a portion of the substantially fully deoxygenated C <sub>4</sub> + hydrocarbon liquid and co-processing the resultant liquid in a hydroprocessing reactor vessel in the presence of hydrogen and one or more hydroprocessing catalysts.

## PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
WO2016178176		<b>Gasification plant.</b> The gasification plant includes: at least one pre-chamber adapted to store biomass to be gasified for obtaining syngas; at least a reaction chamber associated with the pre-chamber and adapted to host the thermochemical gasification processes for the transformation of biomass into said syngas; and at least one user element adapted to receive the syngas from the reaction chamber; further comprising: at least a first conveyor element associated with the reaction chamber and the pre-chamber and adapted to convey the syngas from the reaction chamber to the pre-chamber; and at least a second conveyor element associated with the pre-chamber and the user element and adapted to convey the syngas from the pre-chamber to the user element; in which the flowing of the syngas through the pre-chamber is capable of filtering the syngas by direct contact with the biomass.
WO2016178175	Syn-Gas SRLS (IT)	<b>Reactor for gasification plants.</b> The reactor for gasification plants includes: a first container body adapted to be filled at least partially with biomass to be gasified to obtain syngas, provided with at least an upper portion adapted to receive biomass input, at least a central portion adapted to accommodate the biomass oxidation, with the central portion comprising holes for the input of a gasifying agent, and at least a lower portion adapted to allow the outflow of gasified biomass and synthesis gas; a primary cylinder surrounding said first container body, open at the top for the transit of the gasifying agent towards the holes between the primary cylinder and the first container body, where it is defined at least one syngas cooling interspace which is crossed by the agent gasifying skimming at least partially the upper portion and the central portion; and an auxiliary casing placed inside the cooling interspace that it surrounds at least partially the central portion, linked to the central portion above the holes, provided with at least one opening placed lower to the holes, and adapted to convey the gasifying agent going upwards around the central portion.
US9447325	Tharpe Jr Johnny Marion (US)	<b>Pyrolysis oil composition derived from biomass and petroleum feedstock and related systems and methods.</b> A pyrolysis oil composition that is soluble in hydrocarbon fuel, and related systems and methods for making the composition, are described. In an exemplary embodiment, a process for making a pyrolysis oil composition involves pyrolyzing biomass to generate biomass-derived pyrolysis vapor therefrom, vaporizing petroleum feedstock to generate petroleum feedstock-derived vapor therefrom, blending the biomass-derived pyrolysis vapor and petroleum feedstock-derived vapor together, condensing the blended biomass-derived pyrolysis vapor and petroleum feedstock-derived vapor simultaneously to form a condensate, and collecting the condensate.
US2016289568	UOP LLC (US)	<b>Processes for producing a transportation fuel from a renewable feedstock.</b> Processes for the production of transportation fuel from a renewable feedstock. A gaseous mixture of carbon monoxide and hydrogen is used to deoxygenate and hydrogenate the glycerides to produce long chain hydrocarbons. The hydrocarbons may be isomerized to improve cold flow properties to provide a diesel fuel. Prior to isomerization, the long chain hydrocarbons can be separated or the separation can be after isomerization. Recycle gas streams from the isomerization and the deoxygenation and hydrogenation reactions may be used to supply at least a portion of the gaseous mixture of carbon monoxide and hydrogen. Synthesis gas may also be used to supply at least a portion of the gaseous mixture of carbon monoxide and hydrogen.

## PIRÓLISIS/GASIFICACIÓN

Nº Publicación	Solicitante (País)	Contenido técnico
WO2016166413	Valmet Tech Oy et al. (FI)	<p><b>Catalytic upgrading of pyrolytic vapors.</b> A method for forming catalytically treated pyrolytic vapor product from pyrolyzable material, the method comprising burning fuel in a fluidized bed boiler, thereby heating some particulate material; transferring at least some of the heated particulate material or some other heated particulate material to a pyrolysis reactor to pyrolyze some pyrolyzable material in the pyrolysis reactor; and conveying at least some pyrolytic vapor through a catalyst bed comprising catalyst material; and conveying at least part of the formed side products upstream back to the process; thereby producing the catalytically treated pyrolytic vapor product in a resource efficient manner. In addition, a system configured to produce catalytically treated pyrolytic vapor product from pyrolyzable material. The system comprises a fluidized bed boiler; a pyrolysis reactor; a catalytic reactor; means for conveying some heated particulate material to the pyrolysis reactor; a pipeline for conveying at least some pyrolytic vapor from the pyrolysis reactor into the catalytic reactor and means for conveying at least part of the formed side products upstream back to the process for recovering heat and chemical energy bound to the side products.</p> <p>USE: Method for producing catalytically treated pyrolytic vapor product as substitute for fossil fuels and as feed for biochemical production, from pyrolyzable material such as biomass and residue derived materials.</p>

# TECNOLOGÍAS BIOQUÍMICAS

## Patentes

DIGESTIÓN ANAERÓBICA		
Nº Publicación	Solicitante (País)	Contenido técnico
WO2016174609	Agatos Green Power Lemuria SRL (IT)	<b>Process for treating solid waste containing an organic fraction.</b> Process for treating solid waste containing an organic fraction, comprising an initial step of extrusion pressing the waste with production of a solid fraction and a liquor. The solid fraction is subjected to a milling treatment at a pressure lower than the atmospheric pressure in a rotary mill that produces a sanitized dry solid and water. The liquor is subjected to a treatment of anaerobic digestion in three subsequent steps, with production of biogas and of a digestate that is subjected to evaporation under vacuum to obtain a concentrated compost and steam, re-used in other steps of the process. The sanitized dry solid and the biogas can be used as fuel to produce thermal and electric energy to be used in the process, which also allows surplus energy to be obtained.
WO2016166083	Bekon Holding AG (DE)	<b>Bioreactor with drainage channel.</b> The invention relates to bioreactors in the form of bunker silos which have a drainage channel directly behind the loading and unloading opening. The liquid-permeable cover of the drainage channel must be designed to be very stable because the multi-track loading and unloading device travels over the cover when loading and unloading biomass. According to the invention, a bioreactor is provided with a drainage channel which is better protected against damage to the fluid-permeable cover. The invention further relates to a method for loading the bioreactor with biomass and for unloading the biomass from the bioreactor, wherein the drainage channel is better protected against damage. By providing at least the region of the drainage channel over which the wheels of the multi-track loading and unloading vehicle travel with a stable fluid-impermeable cover, the risk of damage to the cover and the drainage channel is reduced. The remaining region of the drainage channel to the left and right of the two tracks remains covered with a fluid-permeable cover.
EP3085766	Biogts OY (FI)	<b>System for producing and distributing biogas.</b> The invention is related to a system for producing and distributing biogas, the system including - a biogas reactor for producing biogas from biomaterial with dry anaerobic digestion, - first conveyor units for transporting biomaterial, - first handling equipment for unloading biomaterial, - first transfer equipment for supplying biomaterial to the biogas reactor - second transfer equipment for unloading digestate from the biogas reactor, - second conveyor units for carrying away digestate, - biogas recovery equipment, a biogas upgrading unit, a depot and a refueling unit for distributing biogas from the depot to a user. The first conveyor units and the second conveyor units are transfer containers adapted to be transported by lorries, and the system further includes at least one lorry for transporting said transfer containers.
GB2538115	Green Conservation Resources Ltd (GB)	<b>System and method for modular batch production of bio-methane from wet municipal solid waste.</b> A system for a batch production of bio-methane using wet municipal solid waste (MSW), characterised in that the system comprises: a segregator sub-system 100 comprising: a fractionaliser and an air density separator for segregation into a dry, wet and inert fraction; a modular digestion sub-system 300 for converting the wet fraction to bio-methane under anaerobic conditions, comprising: an automatic sealing unit which contains a plurality of digesters which are held in a tank and the space between is filled with water which acts as a jacket; and a collection unit; wherein an automatic sealing unit having an overhead tank coupled with a ball valve, an overflow pipe, a collection tank and a pump; and an automatic purification sub-system 400 that facilitates purification of evolved biogas into 91-93% bio-methane, comprising a housing configured with a balloon, sensors and a purifier. A method for the production of bio-methane from MSW comprises layering wet MSW with mixtures comprising mother culture, water and alkali flakes in a sealed anaerobic digester.

## DIGESTIÓN ANAERÓBICA

Nº Publicación	Solicitante (País)	Contenido técnico
EP3061806	Host BV (NL)	<b>Biomass digester.</b> The invention relates to a biomass digester, comprising: - a container for containing a biomass and/or a digestate thereof, and - a flexible cover for covering the container; wherein said cover comprises a thermal reflective layer for reflecting radiation emitted by said biomass and/or digestate. The invention further relates to a flexible cover arranged and intended for covering a container of a biomass digester.
WO2016179476	Maverick Biofuels Inc (US)	<b>Combined anaerobic digester and GTL system and method of use thereof. A combined anaerobic digester system and gas-to-liquid system is disclosed.</b> The anaerobic digester requires heat, and produces methane. The gas-to-liquid system produces heat, and converts methane to higher-value products, including methanol and formaldehyde. As such, the combination of the two systems results in significant savings in terms of capital and operating expenses. A process for producing bio-formaldehyde and bio-formalin from biogas is also disclosed.
RU2595426	Obshchestvo S Ogranichennoj Otvetstvennostyu Evolyutsiya Biogazovyykh Sistem (RU)	<b>Method of processing organic wastes and biogas plant therefor.</b> FIELD: biochemistry. SUBSTANCE: disclosed is a biogas plant and a method of processing organic wastes. Biogas plant comprises a receiving tank, biomass preprocessing unit, feed pipe, drain pipe, gas holder, a compressor, a group of concurrently operating bioreactors. Inlet pipes of bioreactors are connected to feed pipe through a system of distribution pipelines, outlet pipes of bioreactors are connected with drain pipe via a drain pipeline system. Gas discharge pipes of bioreactors are connected to gas holder via gas pipeline system, wherein drain pipe is equipped with a hydraulic pump and is connected to a drain vessel via a hydraulic lock. Each of bioreactors comprises bearing elements with populated microorganisms. Bearing elements are cylindrical frames. Cylindrical frames are maintained at a distance of 3-6 cm from each other. Method involves preparation of biomass, feeding prepared biomass into a group of single-type bioreactors, creating descending partial streams of biomass and maintaining constant level of biomass in bioreactors. EFFECT: invention increases amount of processed raw materials and increases specific capacity per unit volume of bioreactor. 8 cl, 3 dwg
DE102015004047	Rogmans Maria (DE)	<b>Method for operating a biogas plant.</b> Operating a biogas plant comprises generating biogas in at least one fermenter and feeding it to a combined heat and power plant or a methane feed system. The biogas withdrawn from at least one fermenter is fed to carbon dioxide separation system, so a biogas with increased methane content is present at the exit of the carbon dioxide separation system. The extracted carbon dioxide quantity is fed back to at least one fermenter or to a cultivation plant for carbon dioxide-assisted production of biomass.
WO2016137145	SK Chemicals Co Ltd (KR)	<b>Organic waste high temperature anaerobic digestion method using energy recirculation and energy-saving type continuous thermal solubilization pretreatment.</b> The present invention relates to an organic waste anaerobic digestion method using energy recirculation and energy-saving type continuous thermal solubilization pretreatment and, more particularly, to an organic waste anaerobic digestion method and an apparatus therefore, in which a primary solubilization at high temperature and high pressure and a secondary solubilization using a flash reaction using temperature and pressure differences are executed by applying an energy recirculation method also in thermal solubilization pretreatment before processing organic waste anaerobic digestion, so that the present invention can improve solubilization efficiency and save energy.
MX2014014092	Sustentabilidad en Energía y Medio Ambiente SA de CV (MX)	<b>Accelerated degradation system of organic material through a microbial consortium, thermophilic anaerobic digester with heating via renewable energy and a method of agitation.</b> The present disclosure is related to an accelerated degradation system of organic material, that comprises a tubular-horizontal configuration operated under thermophilic conditions, that is provided with agitation, controlled parameters, heating by means of a renewable energy source, instrumentation and automation which facilitates the control process. The degradation is promoted by the inoculation of a microbial consortium of microorganisms that promote the production of biogas from organic waste.

## DIGESTIÓN ANAERÓBICA

Nº Publicación	Solicitante (País)	Contenido técnico
WO2016180910	Yannco (FR)	<b>Device for anaerobic digestion using solid biomass and corresponding method for producing biogas.</b> The invention relates to an anaerobic digester for producing biogas, comprising a tank that can contain solid biomass and having, in the upper part thereof, at least one region for the admission of the solid biomass and the evacuation of the residual digested solid biomass, over which a roof can open and close, and at least one region for the evacuation of the biogas. The invention also relates to a method for producing biogas and to an anaerobic digestion facility using a main digestion unit particularly for supplying at least one anaerobic digester containing solid biomass with liquid digestate, and for receiving and storing the biogas produced by the at least one anaerobic digester.

## FERMENTACIÓN DE AZÚCARES

Nº Publicación	Solicitante (País)	Contenido técnico
US2016289707	API IP Holdings LLC (US)	<b>Process for biofuel and biochemical production, culture medium and biofuel and biochemical produced.</b> The present invention relates to a process and a culture medium for biofuel and biochemical production by fermentation of lignocellulose biomass. The process describes the use of a solid-liquid mixed blend formed by solid fiber pulp, hydrolysate, and a polypeptide complex. The solid fiber pulp is partially degraded by the polypeptide complex allowing microbe immobilization and, at the same time, releasing substances that affect Clostridium quorum sensing pathways. The present process and culture medium allow the improvement of biofuels and biochemical production, as butanol and acetone in an industrial scale.
US2016304909	Butamax Advanced Biofuels LLC (US)	<b>Increased production of isobutanol in yeast with reduced mitochondrial amino acid biosynthesis.</b> Yeast cells with reduced activity of certain enzymes involved in branched chain amino acid biosynthesis in yeast mitochondria are described. Target enzymes include threonine deaminase, isopropylmalate synthase, and optionally branched chain amino acid transaminase.
WO2016140966	Danisco US Inc (US)	<b>Process for production of bio-alcohol.</b> A process of enhanced bio-alcohol production from molasses is provided herein. The process comprises contacting molasses with sodium benzoate, potassium sorbate or a mixture thereof followed by yeast fermentation resulting in at least 6 % increased alcohol production. Also included within the scope of the present invention is a process for producing co-product containing reduced glycerol.
RU2593724	Fed Gosudarstvennoe Byudzhethnoe Uchrezhdenie Nauki Inst Problem Khimiko-Energeticheskikh Tekh Sibirs (RU)	<b>Method of producing bioethanol from cellulose-containing material.</b> FIELD: pulp industry. SUBSTANCE: invention relates to a method of producing bioethanol from cellulose-containing material. Method involves preliminary processing of raw materials, such as straw, or fruit shells of cereals, or oil crop wastes or silver grass, or pulp of crops with diluted solution of acid with concentration of 1-14 % at temperature of 85-98 °C and atmospheric pressure for 3-18 hours, combined steps of enzymatic hydrolysis and alcohol fermentation, which is performed by means of any types of nonpathogenic ethanol-synthesising yeast, extraction of bioethanol from brew.EFFECT: method increases output of bioethanol.1 cl, 4 ex.
US9463396	Geraets James M et al. (US)	<b>Dual tank heat transfer system and methods of operation.</b> A system for transferring heat from an ethanol and water vapor stream is disclosed as having a first heat exchanger, a valve system coupled to first heat exchanger and a first tank, a second tank coupled to the valve system, a second heat exchanger coupled to first tank and second tank, and a pipe line connecting the second tank to the first heat exchanger. A method for transferring heat is provided and involves intermittently cooling a first media, transferring heat from the first media to a second media, and directing the second media to a valve system. The valve system directs a flow of the second media to the first tank when a temperature of second media is above a temperature set point and directs the flow of the second media to the second tank when the temperature of second media is below the temperature set point.

## FERMENTACIÓN DE AZÚCARES

Nº Publicación	Solicitante (País)	Contenido técnico
US2016312248	Konkuk Univ Ind Coop Corp et al. (KR)	<b>Simultaneous pretreatment and saccharification of biomass using fungal consortium and method of preparing biofuel using the same.</b> Provided are a method of preparing biofuel, in which the method includes obtaining saccharificated products from lignocellulosic biomass in high saccharification yield, and a simultaneous pretreatment and saccharification (SPS), in which the method includes a first step of pulverizing biomass and immersing the pulverized biomass; and a second step of preparing saccharificated products by performing the simultaneous pretreatment and saccharification of the immersed biomass with the enzyme produced by inoculating a fungal consortium in a culture medium and culturing the fungal consortium. In addition, the second step further includes a detoxification of decreasing or removing toxic materials through laccase produced by culturing with a strain producing laccase in the second step.
US2016298146	Korea Inst Sci & Tech (KR)	<b>Hydrolysate of mixture of seaweed biomass and lignocellulosic biomass to improve biochemical and biofuel production, and preparation using the same.</b> The present disclosure relates to a hydrolysate of a mixture of lignocellulosic biomass and seaweed biomass. By mixing seaweed biomass with lignocellulosic biomass and then preparing a hydrolysate, lignocellulosic biomass-derived acetic acid is consumed together with seaweed biomass-derived mannitol. As a result, high sugar productivity can be maintained while reducing fermentation inhibitors. Because the present disclosure can solve the problem of lignocellulosic biomass of decreased fermentation efficiency due to lignocellulose-derived fermentation inhibitors and the problem of seaweed biomass of very low productivity in spite of long fermentation time, the hydrolysate according to the present disclosure may be used to produce biofuels and biochemicals economically.
WO2016138167	Novozymes AS (DK) et al.	<b>Cellobiohydrolase variants and polynucleotides encoding same.</b> The present invention relates to cellobiohydrolase variants. The present invention also relates to polynucleotides encoding the variants; nucleic acid constructs, vectors, and host cells comprising the polynucleotides; and methods of using the variants.
WO2016154631	The Texas A&M Univ System (US)	<b>Conversion of lignin into bioplastics and lipid fuels.</b> The present invention provides methods and compositions for increasing lignin degradation to produce a biological product. Also provided are methods for increasing expression of laccase in a bacterial species to produce increased lignin degradation. Also provided are bacterial cells and commodities or commodity produces produced from such methods.



## FERMENTACIÓN DE AZÚCARES

Nº Publicación	Solicitante (País)	Contenido técnico
ES2587582	Univ Alicante (ES)	<b>Method for producing bioethanol from chitosan using the entomopathogenic fungus <i>Beauveria bassiana</i>.</b> The invention relates to a method for producing ethanol from a chitosan source, comprising the use of at least one of the following fungi: <i>Beauveria bassiana</i> . The invention also relates to the use of said fungus for the degradation of shellfish waste, also obtaining fungal biomass for the agrobiotechnological use thereof.
ES2587451		<b>Method for the production of bioethanol from chitosan using the entomopathogenic fungus <i>Metarhizium anisopliae</i>.</b> The invention relates to a method for the production of ethanol from a source of chitosan, comprising the use of <i>Metarhizium anisopliae</i> , and to the use of said fungi for the degradation of seafood waste, and producing fungal biomass for agrobiotechnological use.
ES2587449		<b>Method for producing bioethanol from chitosan using the nematophagous fungus <i>Pochonia chlamydosporia</i>.</b> The invention relates to a method for producing ethanol from a source of chitosan, comprising the use of <i>Pochonia chlamydosporia</i> , and to the use of said fungus for the degradation of shellfish waste, also producing fungal biomass for the agrobiotechnological use thereof.
US2016326602	UT-Battelle LLC (US)	<b>Gene impacting biomass formation and recalcitrance and methods of use.</b> The invention provides plants having improved biomass properties of increased biomass quantity and density, increased cellulose content and decreased lignin content and improved sugar release efficiency, methods of generating (genetically modifying) and/or selecting (natural variant collections) plants with such preferred attributes of cellulose, lignin and sugar release, and uses of such plants. The inventors have determined that the expression of the gene, Potri.001G375700 (belonging to IQD signaling protein family containing a canonical calmodulin-binding domain) and/or activity of Potri.001G375700, modulates cellulose, lignin synthesis, sugar release and growth in plants.
US2016340702		<b>Heat-stable, Fe-dependent alcohol dehydrogenase for aldehyde detoxification.</b> The present invention relates to microorganisms and polypeptides for detoxifying aldehydes associated with industrial fermentations. In particular, a heat-stable, NADPH- and iron-dependent alcohol dehydrogenase was cloned from <i>Thermoanaerobacter pseudethanolicus</i> 39E and displayed activity against a number of aldehydes including inhibitory compounds that are produced during the dilute-acid pretreatment process of lignocellulosic biomass before fermentation to biofuels. Methods to use the microorganisms and polypeptides of the invention for improved conversion of biomass to biofuel are provided as well as use of the enzyme in metabolic engineering strategies for producing longer-chain alcohols from sugars using thermophilic, fermentative microorganisms.
US2016333362	Wisconsin Alumni Res Found (US)	<b>Recombinant yeast having increased tolerance to ionic liquids and methods of use.</b> The present invention relates to materials and methods for the production of ethanol. More particularly, the present invention provides genetically modified strains of <i>Saccharomyces cerevisiae</i> having enhanced tolerance for ionic liquid (IL) toxicity. Also provided are methods of using such genetically engineered yeast strains for improved IL-mediated hydrolysis of lignocellulosic biomass for industrial-scale production of various fuels, chemical feedstocks, and synthetic polymers.
WO2016160955	Xyleco Inc (US)	<b>Processing of biomass materials.</b> The use of cell matter in fermentation mixtures for producing a product is disclosed. In embodiments, the product comprises carbohydrates, alcohols, or organic acids (e.g., lactic acid or succinic acid), or mixtures thereof. ADVANTAGE: Provided are alternative methods to breakdown lignocellulosic biomass that are high-yielding, inexpensive, and do not destroy the carbohydrate hydrolysis products.

# TECNOLOGÍAS QUÍMICAS

## Patentes

DIGESTIÓN ANAERÓBICA		
Nº Publicación	Solicitante (País)	Contenido técnico
HK1212547	BI05 Technologies Ltd (HK)	<b>Method for preparing biodiesel and ionic liquid catalyst.</b> The present application provides a method for preparing biodiesel and a biodiesel catalyst. The method of the present application utilizes an ionic liquid catalyst to achieve the combination of independent steps of extraction, hydrolysis and esterification in the prior art into a single system and recycling of solvents and the catalyst, thereby providing a simple, cost effective and high yield method for mass production of biodiesel.
WO2016159802	Biotim Spolka Z Ograniczona Odpowiedzialnoscia (PL)	<b>Method and system for the synthesis of biodiesel.</b> A method for synthesis of biodiesel from plant oil comprising transestryfication of plant oil with obtaining fatty acid methyl esters phase and glycerol phase, characterized by processing the glycerol phase by: reacting the glycerol phase in presence of dimethyl sulfate in excess sulfuric (VI) acid as a catalyst within a temperature range of 50 to 55°C to obtain reaction products comprising a polar phase being ether/ester phase and a non-polar phase; separating the polar phase from the non-polar phase of the reaction products; distilling the polar phase to separate ethers from esters; and collecting the ethers and esters in separate tanks.
WO2016168697	Crystaphase Products Inc (US)	<b>Heterogeneous catalyst for transesterification and method of preparing same.</b> A transesterification catalyst that is heterogeneous and a method for preparing said transesterification catalyst are provided. The catalyst can be used in a variety of transesterification reactor configurations including CSTR (continuous stirred tank reactors), ebullated (or ebullating) beds or any other fluidized bed reactors, and PFR (plug flow, fixed bed reactors). The catalyst can be used for manufacturing commercial grade biodiesel, biolubricants and glycerin.
WO2016165859	IFP Energies Now (FR)	<b>Catalyst including a boron-doped active phase.</b> The invention relates to a catalyst containing an active phase including at least one group VIII B metal selected from among cobalt, nickel, ruthenium and iron deposited on a substrate containing silica, alumina, and at least one single spinel $MAI_2O_4$ or an optionally partial mixed spinel $MXM'(1-X)Al_2O_4$ , where M and M' are separate metals selected from the group made up of magnesium, copper, cobalt, nickel, tin, zinc, lithium, calcium, caesium, sodium, potassium, iron and manganese and where x is between 0 and 1, excluding the values 0 and 1, characterised in that said active phase also includes boron, the boron content being between 0.001 wt % and 0.5 wt % relative to the total weight of the catalyst, excluding the value 0.5. USE: Catalyst is used in Fischer-Tropsch synthesis of hydrocarbons (claimed) e.g. coal and biomass used for producing fuel and intermediates used in chemical applications.
WO2016180498	Industrial Management SA (ES)	<b>Process for the production of triacetin, alkyl esters of fatty acids.</b> The present invention relates to a process for the production of triacetin and alkyl esters of fatty acids, wherein said process comprise the following steps: (i) mixing an alkanolic potassium alkoxide catalyst with vegetable oil and/or animal fat for between 1 and 5 minutes; (ii) reacting said vegetable oil and/or animal fat with an alkyl acetate in the presence of said alkanolic potassium alkoxide catalyst, wherein (a) the molar ratio of vegetable oil and/or animal fat to alkyl acetate is from 1:10 to 1:500; (b) the molar ratio of vegetable oil and/or animal fat to potassium alkoxide is from 1:0.01 to 1:1; and wherein the vegetable oil and/or animal fat, alkyl acetate and alkanolic potassium alkoxide catalyst comprise less than 1000 ppm water; and (iii) separating triacetin and alkyl esters of fatty acids from the resulting reaction mixture.

## DIGESTIÓN ANAERÓBICA

Nº Publicación	Solicitante (País)	Contenido técnico
WO2016145023	PH Matter LLC (US)	<b>Chromium-free water-gas shift catalyst and process for making the same.</b> A chromium-free water-gas shift catalyst. In contrast to industry standard water-gas catalysts including chromium, a chromium-free water-gas shift catalyst is prepared using iron, boron, copper, aluminum and mixtures thereof. The improved catalyst provides enhanced thermal stability and avoidance of potentially dangerous chromium. Various embodiment's of a chromium-free water-gas catalyst including iron and boron are disclosed, some of which include copper, or aluminum and copper. The boron may reside substantially at the surface of the catalyst. In another series of embodiment's, a chromium-free water-gas catalyst may include boron and copper, and these embodiment's may further include aluminum or iron.
WO2016164495	Solazyme Inc (US)	<b>Oleaginous microalgae having an LPAAT ablation.</b> Recombinant DNA techniques are used to produce oleaginous recombinant cells that produce triglyceride oils having desired fatty acid profiles and regiospecific or stereospecific profiles. Genes manipulated include those encoding stearoyl-ACP desaturase, delta 12 fatty acid desaturase, acyl-ACP thioesterase, ketoacyl-ACP synthase, lysophosphatidic acid acyltransferase, ketoacyl-CoA reductase, hydroxyacyl-CoA dehydratase, and/or enoyl-CoA reductase. The oil produced can have enhanced oxidative or thermal stability, or can be useful as a frying oil, shortening, roll-in shortening, tempering fat, cocoa butter replacement, as a lubricant, or as a feedstock for various chemical processes. The fatty acid profile can be enriched in midchain profiles or the oil can be enriched in triglycerides of the saturated-unsaturated-saturated type.
WO2016151513	The Hong Kong Polytechnic Univ (CN)	<b>Methods and catalysts for green biodiesel production from unrefined low grade feedstock.</b> This invention provides a catalyst comprising a new form of ZnFe <sub>2</sub> O <sub>4</sub> spinel nanoparticles, and a method for preparing same. The catalyst is useful for catalyzing the esterification of fatty acids or transesterification of triglycerides, wherein the reaction rate and conversion can be enhanced by free fatty acids.
BRPI1102738	Univ Fed do Paraná (BR)	<b>Use of tungsten containing compound as efficient catalysts for preparing biodiesel.</b> The tungsten containing compound helps in increasing yield of transesterification and/or esterification reaction. The preparation of biodiesel involves performing transesterification and/or esterification and/or triacylglycerol oxidation of alcohols and esters. The tungsten containing compound comprises salts or fixed oxides with inorganic porous matrices. The inorganic matrix is made of silica and/or alumina. The fixed oxide is selected from oxides of tungsten, chromium, molybdenum, niobium, nickel, tantalum, cobalt or manganese.
BR102014014140	Univ Federal Pelotas (BR)	<b>Biokerosene starting oil obtained by transesterification of Butia capitata.</b> The biokerosene starting oil is obtained by transesterification of Butia capitata, Butia odorata, Butia catarina, Butia lallemantii, Butia eriospatha, Butia yatayor Butia paraguayensis. It is used as biofuel for civil and military automotive, aviation and navigation, oil for lamps and lighters, automotive products for surface treatment, stain remover for vehicles, boats and aircraft, automotive flavoring, and as eluent for preparing ink, and colorant for various segments of automotive, aerospace and chemical industries. The biokerosene starting oil has high content of fatty acids, long size of chain similar to the kerosene constituents, and thus provides an alternative high value for production of high productivity and profitability oils, and provides lamps and lighters oil with lower emissions.
BR102014032463	Univ Minas Gerais (BR)	<b>Producing biodiesel involves grinding asbestos tile for obtaining powder by using mill rings, and then calcining asbestos tile powder under non-reducing atmosphere.</b> Biodiesel production involves grinding asbestos tile for obtaining powder by using mill rings, and then calcining the asbestos tile powder for 10 minutes to 20 hours, preferably 20 minutes to 5 hours at 300-1200° C, preferably 600-1000° C under non-reducing atmosphere. The calcined asbestos tile powder is added in a reactor with pure or admixture grease feedstock in a mass ratio of 2:1-60:1, and then agitated at 0-5000 revolutions per minute, preferably 0-1000 revolutions per minute. The agitated mixture is refluxed at 20-75° C.

## DIGESTIÓN ANAERÓBICA

Nº Publicación	Solicitante (País)	Contenido técnico
US2016289135	UOP LLC (US)	<p><b>Process for producing diesel fuel and aviation fuel from renewable feedstocks having improving yields.</b> A process for producing aviation fuel and diesel from renewable feedstock is described. This process involves introducing the renewable feedstock into a hydrogenation and deoxygenation zone, and separating the hydrocarbon effluent from the hydrogenation and deoxygenation zone into an aviation boiling range fraction and a diesel boiling range fraction. The aviation boiling range fraction and diesel boiling range fraction are alternately sent to the isomerization and selective hydrocracking zone. This allows for lower severity isomerization and selective hydrocracking zone operating conditions when processing oils that naturally contain medium and long carbon chains (C8-C18), such as coconut or palm kernel oil. The lower severity operation results in decreased cracking, increasing the yield of aviation fuel product.</p>

**NIPO: 088-17-020-4**

# VT BIOMASA

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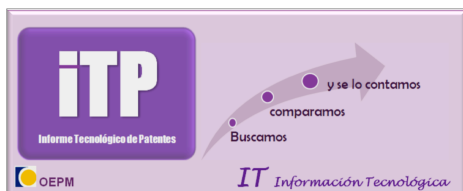
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