

## BIO-JET FUELS: PROYECTOS

Actualmente, los viajes en avión son los responsables de, aproximadamente, el 3% de las emisiones mundiales de CO<sub>2</sub> y, además, el continuo crecimiento del tráfico aéreo podría hacer que este porcentaje se duplicase en el futuro sino se toman las medidas adecuadas. Ante esta situación, la Organización de Aviación Civil Internacional (ICAO) propone que en 2050 las emisiones de gases efecto invernadero se fijen a la mitad de las emisiones registradas en 2005. Para alcanzar este objetivo, parece que el uso de combustibles de origen biológico (bio-jet fuels) es la medida más prometedora y, probablemente, la única a corto y medio plazo que permitirá a la industria aeronáutica reducir sus emisiones de CO<sub>2</sub>.

Los primeros vuelos comerciales en que se utilizaron bio-jet fuels tuvieron lugar en 2008. En ese año, un Airbus A380 viajó de Filton (Inglaterra) a Toulouse (Francia) alimentado con biocombustible procedente de aceites vegetales y grasas animales y un Boeing 747 de la compañía aérea Virgin Atlantic hizo la ruta Londres-Ámsterdam usando un bio-jet fuel en uno de sus cuatro motores. Desde entonces, más de 150000 vuelos han utilizado biocombustibles.

Sin embargo, hoy en día, tan solo existe distribución regular de bio-jet fuels en cinco aeropuertos del mundo (Bergen, Brisbane, Los Ángeles, Oslo y Estocolmo) y en 2018 su producción fue inferior al 0.1% del combustible total utilizado en aviación. Todo ello indica la necesidad de un desarrollo más rápido de estos productos para poder conseguir los niveles de producción requeridos por la industria aeronáutica. Hasta el momento, la ASTM (*American Society for Testing and Materials*), reconocida internacionalmente, ha certificado seis vías de producción de bio-jet fuels (Tabla 1), pero la única que está disponible a nivel comercial es la de ésteres y ácidos grasos procesados (HEFA-SPK).

**Tabla 1.** Procesos certificados por la ASTM para la producción de biocombustibles de aviación

Procesos	Materia Prima	Año de certificación	% máximo en la mezcla
Fischer-Tropsch Synthetic Paraffinic Kerosene (FT-SPK)	Biomasa (residuos forestales, residuos sólidos urbanos, residuos agrícolas)	2009	50%
Hydroprocessed Esters and Fatty Acids Synthetic Paraffinic Kerosene (HEFA-SPK)	Aceites vegetales, grasas animales	2011	50%
Hydroprocessed Fermented Sugar-Synthetic Isoparaffins (HFS-SIP)	Azúcares	2014	10%
Fischer-Tropsch Synthetic Paraffinic Kerosene plus Aromatics (FT-SPK/A)	Biomasa (residuos forestales, residuos sólidos urbanos, residuos agrícolas)	2015	50%
Alcohol to Jet Synthetic Paraffinic Kerosene (ATJ-SPK) from isobutanol	Azúcares, maíz, residuos forestales	2016	30%
Catalytic Hydrothermolysis Jet fuel (CHJ)	Aceites vegetales	2020	50%

En Europa, las últimas políticas e iniciativas del sector de la aviación persiguen el objetivo de aumentar la capacidad de producción de los bio-jet fuels. Para ello, se está realizando una importante inversión en el área de la investigación, tanto en búsqueda de materias primas, más baratas que las que se utilizan actualmente, como en el desarrollo de nuevas tecnologías. En la Tabla 2 se recogen los proyectos identificados en la base de datos CORDIS de la Unión Europea dentro del programa Horizon 2020 que actualmente están en curso.

**Tabla 2.** Proyectos europeos pertenecientes al programa Horizon 2020

<b>PROGRAMA HORIZON 2020</b>	
<b>REBOOT: Resource efficient bio-chemical production and waste treatment</b>	
<b>Fecha de inicio:</b> 01-01-2020 <b>Coordinador:</b> Aarhus Univ (Dinamarca)	<b>Fecha de finalización:</b> 31-12-2024
<b>eCOCO2: Direct electrocatalytic conversion of CO2 into chemical energy carriers in a co-ionic membrane reactor</b>	
<b>Fecha de inicio:</b> 01-05-2019 <b>Coordinador:</b> Agencia Estatal Consejo Superior de Investigaciones Científicas (España)	<b>Fecha de finalización:</b> 30-04-2023
<b>Participantes:</b> <ul style="list-style-type: none"> <li>• Univ Oslo (Noruega)</li> <li>• Univ Politecnica Valencia (España)</li> <li>• Rheinisch-Westfaelische Technische Hochschule Aachen (Alemania)</li> <li>• Hera Holding Habitat, Ecología y Restauracion Ambiental SL (España)</li> <li>• Cemex Research Group AG (Suiza)</li> <li>• Arcelormittal Belgium NV (Bélgica)</li> <li>• Shell Global Solutions International BV (Holanda)</li> <li>• .....</li> </ul>	
<b>ALTERNATE: Assessment on alternative aviation fuels development</b>	
<b>Fecha de inicio:</b> 01-01-2020 <b>Coordinador:</b> Univ Politécnica Madrid (España)	<b>Fecha de finalización:</b> 31-12-2022
<b>Participantes:</b> <ul style="list-style-type: none"> <li>• Centre Internacional de Mètodes Numèrics a l'Enginyeria (España)</li> <li>• AIRBUS</li> <li>• ONERA (Francia)</li> <li>• Hasselt Univ (Bélgica)</li> <li>• Beihang Univ (China)</li> <li>• Tianjin Univ (China)</li> <li>• The Second Research Institute Civil Aviation Administration of China (China)</li> <li>• .....</li> </ul>	
<b>FlexJET: Sustainable Jet Fuel from Flexible Waste Biomass</b>	
<b>Fecha de inicio:</b> 01-04-2018 <b>Coordinador:</b> Univ Birmingham (Inglaterra)	<b>Fecha de finalización:</b> 31-12-2022
<b>Participantes:</b> <ul style="list-style-type: none"> <li>• Fraunhofer Gesellschaft Zur Foerderung der Angewandten ForschungEV (Alemania)</li> <li>• Alma Mater Studiorum - Univ Bologna (Italia)</li> <li>• Sterling Power Ltd (Inglaterra)</li> <li>• WRG Europe Ltd (Reino Unido)</li> <li>• Green Fuels Research Ltd (España)</li> <li>• Hygear BV (Holanda)</li> <li>• Acondicionamiento Tarrasense Associacion (España)</li> <li>• .....</li> </ul>	
<b>BIO4A: Advanced sustainable BIOfuels for Aviation</b>	
<b>Fecha de inicio:</b> 01-05-2018 <b>Coordinador:</b> Consorzio per La Ricerca La Dimostrazione Sulle Energie Rinnovabili (Italia)	<b>Fecha de finalización:</b> 30-04-2022
<b>Participantes:</b> <ul style="list-style-type: none"> <li>• Total Raffinage Chimie (Italia)</li> <li>• Skyenergy BV (Holanda)</li> <li>• Fundacion CENER (España)</li> <li>• ETA - Energia, Trasporti, Agricoltura SRL (Italia)</li> <li>• Camelina Company Espana SL (España)</li> <li>• JRC -Joint Research Centre- European Commission (Bélgica)</li> <li>• Total Raffinage France (Francia)</li> </ul>	

### ABC-SALT: Advanced Biomass Catalytic Conversion to Middle Distillates in Molten Salts

**Fecha de inicio:** 01-04-2018

**Fecha de finalización:** 31-03-2022

**Coordinador:** Rijksuniversiteit Groningen (Holanda)

**Participantes:**

- Aston University (Reino Unido)
- Norges Miljø-Og Biovitenskaplige Universitet (Noruega)
- Univ Gent (Bélgica)
- Deutsches Zentrum Fuer Luft - Und Raumfahrt EV (Alemania)
- Rise Innventia AB (Suecia)
- Univ Degli Studi Di Roma La Sapienza (Italia)
- Ayming (Francia)
- B.T.G. Biomass Technology Group BV (Holanda)

### KEROGREEN: Production of Sustainable aircraft grade Kerosene from water and air powered by Renewable Electricity, through the splitting of CO<sub>2</sub>, syngas formation and Fischer-Tropsch synthesis

**Fecha de inicio:** 01-04-2018

**Fecha de finalización:** 31-03-2022

**Coordinador:** Stichting Nederlandse Wetenschappelijk Onderzoek Instituten (Holanda)

**Participantes:**

- Karlsruher Institut Fuer Technologie (Alemania)
- Vlaamse Instelling Voor Technologisch Onderzoek N.V. (Bélgica)
- Ceramic Powder Technology AS (Noruega)
- Hygear BV (Holanda)
- Ineratec GMBH (Alemania)

### ENABLEH2: ENABLING cryogEnic Hydrogen based CO<sub>2</sub> free air transport

**Fecha de inicio:** 01-09-2018

**Fecha de finalización:** 31-08-2021

**Coordinador:** Cranfield University (Inglaterra)

**Participantes:**

- Participantes:
- Chalmers Tekniska Hoegskola AB (Suecia)
- London South Bank University LBG (Inglaterra)
- GKN Aerospace Sweden AB (Suecia)
- Safran SA (Francia)
- European Hydrogen Association (Bélgica)
- Heathrow Airport Limited (Inglaterra)
- Arttic (Francia)

### REWOFUEL: RESidual soft WOOD conversion to high characteristics drop-in bioFUELS

**Fecha de inicio:** 01-06-2018

**Fecha de finalización:** 31-05-2021

**Coordinador:** Global Bioenergies (Francia)

**Participantes:**

- AS Graanul Invest (Estonia)
- Sekab E-Technology AB (Suecia)
- Neste Engineering Solutions OY (Finlandia)
- Energie Institut an der Johannes Kepler Universitat Linz Verein (Austria)
- Technip France SAS (Francia)
- SkyNRG BV (Holanda)
- Repsol SA (España)
- .....

### JETSCREEN: JET Fuel SCREENING and Optimization

**Fecha de inicio:** 01-06-2017

**Fecha de finalización:** 31-05-2020

**Coordinador:** Deutsches Zentrum Fuer Luft - und Raumfahrt EV (Alemania)

**Participantes:**

- Arttic (Francia)
- Airbus Operations Limited (Inglaterra)
- MTU Aero Engines AG (Alemania)
- IFP Energies nouvelles (Francia)
- Manchester Metropolitan University (Inglaterra)
- Politecnico di Milano (Italia)
- Safran SA (Francia)
- .....

# PATENTES BIOENERGÍA

Biocombustibles sólidos (pellets, biochars, bio RDFs, bio SRFs, etc.)		
Nº Publicación	Solicitante (País)	Contenido técnico
WO2020002471	Constructions Ind de la Mediterranee (FR)	<b>Installation and method for producing energy.</b> In order to produce energy in an optimum manner from two different fuels, the plant according to the invention comprises a first steam generating system, having a first combustion unit for biomass and a first boiler including both a vaporizer and a superheater. The plant also comprises a turbine unit in order to turbine the superheated steam produced by the superheater in order to produce energy, in particular electrical energy. The plant further comprises at least a second system for generating steam and/or superheated water, which is coupled to the first system, wherein the or each second system comprises a second combustion unit for a fuel other than biomass, and a second boiler producing steam and/or superheated water which are sent to the first boiler so as to supply the superheater in conjunction with the steam produced by the vaporizer. The first boiler includes a balloon which is adapted to collect in a same internal volume of the balloon both the steam produced by the vaporizer of the first boiler and the steam and/or superheated water produced by the second boiler, the balloon also being adapted to supply the superheater of the first boiler with the steam contained in the internal volume of the balloon.
EP3620716	Froeling Heizkessel und Behaelterbau Ges MBH (AT)	<b>Boiler for burning fuel.</b> A boiler for burning fuel, in particular pellets, with a combustion chamber, with a fuel feed for feeding the combustion chamber with fuel, the fuel feed an intermediate container for the fuel, a burn-back protection with a shut-off device, in particular slide, and a drive for actuating the shut-off device, and with one shown in the combustion chamber air supply, which has at least one device with a drivable actuator, in particular air slide, for adjusting the air volume. In order to achieve improved operational safety of the boiler, it is proposed that the drive of the burn-back protection also actuates the actuator of the device for adjusting the air volume.
EP3599267	Global Service SRL (IT)	<b>Pellets realized by aggregants of coffee refuse and natural additives.</b> The present invention relates to a particular type of natural fuel for heating use obtained from the conversion into pellets of woody material and solid residue of coffee grounds characterized by a high calorific value and reduced ash content. These characteristics allow it to be used in stoves manufactured for standard pellets without having to make any changes. The type of pellet fuel of the present invention is obtained through the mixing of woody material and solid residue of coffee grounds, in which the concentration of solid residue of coffee grounds is included in the range 69.5% - 70, 5%, more preferably about 70%, by weight per volume and in which the concentration of woody material ranges from 29% to 30% by weight per volume.
PL426490	Maczka Natalia Venma (PL)	<b>Heating boiler with an aerated combustion chamber for combustion of solid fuel, in particular pellet type.</b> The subject of the application is a heating boiler with an aerated combustion chamber, especially for burning ecological fuels of pellet type. Heating boiler with an aerated combustion chamber, especially for burning solid fuel of pellet type in a cuboid-shaped casing formed from connected sets of the combustion part with an exhaust fan supplying oxygen, sucking exhaust gas, burner with a ceramic igniter and combustion chamber and passing into a combustion chamber encased with bulkhead plates, exchanger heat and oblique charging pipe automatically dispensing fuel into the combustion chamber, burner, controlled by a temperature sensor, and below the combustion chamber there are ash pan chambers, characterized by the fact that the boiler is equipped with a burner similar to an "hourglass" with conical overhead holes in the side walls and is connected through a burner plate with a ceramic catalyst mounted on it with an internal channel similar to an "hourglass" and has boc arranged in the outer walls longitudinal aeration channels with orifice nozzles and in the lower part has a channel through which the chute passes to the burner, in addition, the exchanger has lower and upper flue gas swirlers with mounted augers which are mounted on a movable arm and installed in vertical pipes of the exchanger.

Nº Publicación	Solicitante (País)	Contenido técnico
US2020071191	Morningside Venture Investments Ltd (MC)	<b>Systems and methods for water reclamation.</b> A system for processing wastewater includes a wastewater source, a biomass burner, and a first heat exchanger. The biomass burner is configured to receive biomass from a biomass source, combust the biomass to produce heat and ash, receive a thermal transfer fluid, and heat the thermal transfer fluid using the heat produced from the combustion of the biomass. The first heat exchanger is configured to heat the wastewater to produce steam. The first heat exchanger includes a first inlet, a second inlet, a first outlet, a second outlet, and a third outlet. The first inlet is configured to receive the wastewater from the wastewater source. The second inlet is configured to receive the thermal transfer fluid from the biomass burner. The first outlet is configured to discharge the steam. The second outlet is configured to discharge the thermal transfer fluid.
WO2020035751	Perera Bethmage Malinda Thivanka (LK)	<b>Organic mixture for a fuel source.</b> A mixture for a natural fuel package is provided, having essentially a mass of combustible wood particles and particles of organs of a plant in the Cinnamomum genus as constituents which are bonded by compression, whereby upon ignition the said particles undergo decomposition to liberate the moisture, releasing an aromatic cinnamon fragrance and flavor which can be inhaled by persons present at the time of burning and tasted or consumed through the food cooked on such fuel resulting in medicinal and therapeutic effects.
WO2020044065	Stupnisek Mladen (HR)	<b>Wood-burning stove.</b> A wood-burning stove with an upright combustion chamber enables a more complete wood burning by the method of top down burning with an embedded system of sheet metal ducts, enabling pre-heating and distribution of additional air through holes for secondary combustion in the upper part of the combustion chamber, which contributes to a more complete wood burning. By doing so, the emission of hazardous gases (carbon monoxide CO and unburned hydrocarbons CxHy), soot and fine particles in flue gases is reduced. A fine particle separator, comprising a centrifugal gravity cyclone and an electrostatic filter, contributing to the reduction in the emission of fine particles in flue gases, is added to an outlet flue pipe. An added heat exchanger heats fresh outside air, whereby the additional thermal efficiency of flue gases is achieved as well as natural room ventilation by outside air, which is heated without the need for a fan. A spiral turbulator embedded in a flue pipe and serpentine baffles embedded in an air tube increase heat transfer to supplied outside air, increasing thus the thermal efficiency. The fine particle separator and the heat exchanger can also be located in an adjacent room by means of a short intermediate pipe through a partition wall.
WO2020053926	Taiheiyo Cement Corp (JP)	<b>Pellet-form biomass fuel, and pellet-form biomass fuel production method.</b> Provided is a pellet-form biomass fuel having excellent mechanical strength, and containing a biomass derived from the palm oil industry. The pellet-form biomass fuel according to the present invention contains a palm oil industry derived biomass (A) and a waste clay (B), the mixing ratio (A:B) of the palm oil industry derived biomass (A) and the waste clay (B) being 98:2 to 84:16 in mass ratio.
WO2020044696	Ube Industries (JP)	<b>Biomass solid fuel manufacturing method and biomass solid fuel manufacturing device.</b> Provided is a biomass solid fuel manufacturing method which has a heating step of carbonizing, in an external heating type rotary kiln, a biomass molded body which is formed by molding raw material biomass, wherein the rotary kiln has an unheated zone that is provided on an upstream side of the kiln body and does not have a heating part on the outer periphery thereof, the unheated zone has a spiral blade on the inner peripheral surface, and in the heating step, the biomass molded body is introduced into the unheated zone of the kiln body.
EP3604921	Zardi Angelo (IT)	<b>Biomass heat generator for domestic use.</b> Biomass heat generator for domestic use, comprising: a main box-like casing inside of which a reaction chamber and an overlying combustion chamber are arranged; a secondary box-like casing branching off from the main box-like casing at the reaction chamber, the secondary box-like casing having an open end for introducing the biomass and forming a preestablished angle with respect to the main box-like casing in such a way as to allow the biomass to descend by force of gravity; at least a first inlet for the air inside the reaction chamber; at least a second inlet for the air inside the combustion chamber; a first grille located in the main box-like casing to collect the biomass coming from above; a second grille located between the combustion chamber and the reaction chamber so as to concentrate the gases.

## Syngas

Nº Publicación	Solicitante (País)	Contenido técnico
BR102012017638	Air Prod & Chem et al. (US)	<p><b>Additive systems for biomass gasification.</b> The present embodiments provide additive systems for biomass gasification reactors. For example, in one embodiment, a biomass gasification system includes a feedstock preparation system configured to generate a biomass feedstock having a biomass fuel and a tar cracking additive. The system also includes a gasifier configured to receive the biomass feedstock and gasify the biomass fuel in the presence of the tar cracking additive to generate first and second mixtures. The first mixture has producer gas and the second mixture has the tar cracking additive and ash. The biomass gasification system further includes an additive recycle system configured to receive the second mixture and to separate at least a portion of the tar cracking additive from the ash to generate a recycled additive feed for the feedstock preparation system.</p>
WO2020016183	Concord Blue Patent GmbH (DE)	<p><b>Method and device for producing active carbon.</b> The invention relates to a method and to a device for producing active carbon in a gasification process. The first process step comprises thermal decomposition of a carbon-containing raw material, in particular biomass, in a first reaction zone, producing pyrolysis coke and pyrolysis gas, wherein at least part of the pyrolysis gas produced is transferred out of the first reaction zone into a second reaction zone, and at least part of the pyrolysis coke is transferred out of the first reaction zone into a third reaction zone. A second process step comprises production of a product gas that can be used to activate the pyrolysis coke from the pyrolysis gas in the second reaction zone, wherein the product gas is transferred into the third reaction zone. The third process step comprises activation of at least part of the pyrolysis coke to form active carbon with the aid of the product gas in the third reaction zone.</p>
US2020040259	Energysnet US Holdings Inc (US)	<p><b>Biomass processing devices, systems, and methods.</b> Biomass processing devices, systems and methods used to convert biomass to, for example, liquid hydrocarbons, renewable chemicals, and/or composites are described. The biomass processing system can include a pyrolysis device, a hydroprocessor and a gasifier. Biomass, such as wood chips, is fed into the pyrolysis device to produce char and pyrolysis vapors. Pyrolysis vapors are processed in the hydroprocessor, such as a deoxygenation device, to produce hydrocarbons, light gas, and water. Water and char produced by the system can be used in the gasifier to produce carbon monoxide and hydrogen, which may be recycled back to the pyrolysis device and/or hydroprocessor.</p>
WO2020054063	Eureka Eng Inc (JP)	<p><b>Synthetic gas production system for low-carbon FT synthetic oil production.</b> This synthetic gas production system for low-carbon FT synthetic oil production is provided with: a biomass-derived gasified gas supply device which supplies a gasified gas that contains at least a biomass-derived gasified gas; a hydrogen separation device which separates the aforementioned gasified gas that contains at least a biomass-derived gasified gas into hydrogen and a first off-gas; a carbon monoxide separation device which separates the first off gas into carbon monoxide and a second off gas; and a mixing device which obtains a synthetic gas by mixing the hydrogen separated in the hydrogen separation device and the carbon monoxide separated in the carbon monoxide separation device such that the molar ratio of hydrogen to carbon monoxide is a target value.</p>
US10589999	Hago Wilson et al. (US)	<p><b>Conversion of flue gas to valuable products.</b> A process is disclosed that converts flue gas carbon dioxide to liquid fuels with the aid of biomass and methane. This process incorporates biomass pyrolysis, and gasification of the renewable carbon obtained from this pyrolysis with carbon dioxide and methane in two separate gasification reactors. The gasification reactions occur optionally in the presence of microwave energy. Water, liquid fuels and a sequesterable carbon are expected to be the primary products in this carbon negative process.</p>
WO2020035492	Scandi Energy AS (NO)	<p><b>Method and system for processing organic waste.</b> A method for processing organic waste comprises two steps. Step one comprises separating water from the organic waste to produce liquid, slurry and solid matter, and step two comprises gasification of the slurry and solid matter. A system for processing organic waste and generate energy comprises a screw-press solid separator adapted for receiving the organic waste and expel liquid from the organic waste to produce water, slurry and solid matter, and a multi-stage gasifier for gasification of the slurry and solid matter.</p>

Nº Publicación	Solicitante (País)	Contenido técnico
EP2641958	Stadtwerke Rosenheim GmbH & Co KG (DE)	<b>Biomass gasifier.</b> The gasifier has a gasification reactor including a pyrolysis unit, an oxidization unit, and a reduction unit. A supplying unit supplies biomass into the pyrolysis unit. A conveying unit conveys the biomass by the pyrolysis unit. An opening supplies gasification agent into the oxidization unit. A dissipation unit drives off product gas e.g. hydrogen gas, from the reduction unit of the gasification reactor. A supplying unit is opened to supply the gasification agent in a middle part of the oxidization unit.
EP3621942	TNO (NL)	<b>Production and isolation of monocyclic aromatic compounds from a gasification gas.</b> The present invention concerns a process and system for producing and isolating a fraction of monocyclic aromatic compounds from a gasification gas. The process comprises (a) contacting the gas with a catalyst capable of converting ethylene and possibly other unsaturated hydrocarbons into monocyclic aromatic compounds; and (b) isolating monocyclic aromatic compounds from the gas originating from step (a). The present invention is ideally suited for treatment of gas from coal, biomass or waste gasification, which comprises substantial amounts of ethylene as well as monocyclic aromatic compounds. Treatment according to the invention first converts the ethylene into further monocyclic aromatic compounds, and the entire fraction of monocyclic aromatic compounds is isolated to obtain a valuable product.
US2020056784	Univ Nanjing Forestry (CN)	<b>Stable and environmentally friendly combustion method for biomass gasification, combustible gas, and environmentally friendly combustion chamber.</b> An environmentally friendly combustion chamber for stable combustion of biomass gasification combustible gas. The combustion chamber is divided into a first stage cavity body and a second stage cavity body by a honeycomb-shaped heat storage body. A combustion pipe is connected to a biomass gas inlet and a primary air distribution pipe, the combustion pipe is connected to the first stage cavity body, and an ignition gun and a thermocouple T1 are arranged on the first stage cavity body. A secondary air distribution pipe, opposite the honeycomb-shaped heat storage body, and a thermocouple T2 are arranged within the second stage cavity body, and the second stage cavity body is connected to an outlet high temperature flue gas pipe. The primary air distribution pipe, a primary air volume adjustment valve, the secondary air distribution pipe and a secondary air volume adjustment valve are connected together to an air supply fan, and a controller is connected to the thermocouple T1, the thermocouple T2, the primary air volume adjustment valve, the secondary air volume adjustment valve and the air supply fan. The combustion chamber solves the problems of unstable combustion flames in traditional combustors, and high nitrogen oxide amounts in tail flue gas.
BR112014016143	Wuhan Kaidi Eng Tech Res Inst (CN)	<b>Externally heated microwave plasma gasifier and synthesis gas production method.</b> The present invention relates to an externally heated microwave plasma gasifier and a synthesis gas production method, comprising mainly a vertically arranged cylindrical gasifier main body, a feeder apparatus in communication with the main body and arranged at the middle-section of the gasifier main body, an upper-layer steam nozzle arranged at a clearance area, a lower-level carbon dioxide/steam nozzle arranged at a bed-layer area, a synthesis gas outlet at the top part of the gasifier main body, a monitoring unit arranged on the outlet, and a microwave plasma generator arranged in the clearance area and on the upper end of the upper-layer steam nozzle; also provided is an external heating apparatus utilizing an external heat source for heating the gasifier main body, where the external heating apparatus is arranged integrally with the gasifier main body or arranged separately from the gasifier main body. Because the external heat source is used to supply heat, the amount of biomass chemical energy converted into thermal energy is reduced, so much so that no additional oxidizer is added for oxidation reaction, this allows for high effective ingredient content in the synthesis gas, for highly efficient and economic subsequent utilization process, and for comprehensive utilization in combination with various forms of energy.

## Biogás

Nº Publicación	Solicitante (País)	Contenido técnico
US2020047111	Air Liquide (FR)	<b>Method to control the extraction rate in a membrane based biogas upgrading plant.</b> A facility and method for membrane permeation treatment of a feed gas flow containing at least methane and carbon dioxide that includes a compressor, a gas analyser, at least one valve, and first, second, third, and fourth membrane separation units for separation of CO <sub>2</sub> from CH <sub>4</sub> to permeates enriched in CO <sub>2</sub> and retentates enriched in CH <sub>4</sub> , respectively. A pressure of the feed gas flow is adjusted according to a CH <sub>4</sub> concentration of the second retentate.



Nº Publicación	Solicitante (País)	Contenido técnico
CO2020001304	Ind Agroecologicas Biohercas SAS (CO)	<b>Método para la obtención de materiales reutilizables, biogás y energía limpia a partir del tratamiento de residuos sólidos y la planta de tratamiento para llevar a cabo el mismo.</b> La presente invención se refiere, en términos generales, a un método para la obtención de materiales, biogás y energía limpia a partir del tratamiento de residuos sólidos y la planta de tratamiento para llevar a cabo dicho método. El método de tratamiento inicia con la recepción de la materia prima que corresponde a basuras orgánicas, inorgánicas, húmedas y/o secas, las cuales son recibidas en la tolva del equipo incinerador para su tratamiento térmico. El gas requerido para iniciar la combustión en el equipo incinerador es obtenido de la misma planta, particularmente del equipo biodigestor. De este tratamiento térmico se obtienen dos corrientes: una de cenizas, calizas y/o biocarbons para producción de fertilizantes de cultivos y otra corriente de composición gaseosa que se somete a estabilización de gases en el equipo estabilizador para luego pasar a biodigestión hasta la transformación de gases de combustión en biogás. Finalmente, dicho gas se pasa a operaciones de compresión, licuado y envasado final en pipetas. La planta de tratamiento posee como aparatos esenciales un equipo incinerador con tolva de recepción de basuras, conectado el equipo incinerador con un equipo estabilizador de gases y este a su vez conectado con un equipo biodigestor. Los tres equipos juntos y su interconexión particular conforman un sistema único y simple de tecnología limpia para procesamiento de altos volúmenes de basuras.
RO133839	Institutul Nat de Cercetare Dezvoltare Pentru Inginerie Electrica (RO)	<b>Process for enzymatically pre-treating algal biomass for producing biogas.</b> The invention relates to a process for pre-treating algal biomass used as a fermentation substrate in anaerobic reactors for biogas production. The process, as claimed by the invention, consists in exposing the algal biomass <i>Ulva intestinalis</i> for 24 h to the biological action of an enzymatic mixture secreted by six types of filamentous fungi of the species <i>Trichoderma reesei</i> , <i>Trichoderma versicolor</i> , <i>Penicillium chrysosporium</i> , <i>Fusarium solani</i> , <i>Chaetomium thermophile</i> and <i>Myrothecium verrucaria</i> , prepared by cultivation in nutritive salt solution, and inoculum of bovine dejections type, in a thermostated enclosure at 27 ... 29°C and relative humidity of 90%, resulting in a mixture of conditioned enzymatically treated organic substrate which reduces fermentation time and increases the production of biogas in anaerobic fermentation processes.
WO2020010430	logen Corp (CA)	<b>Method and system for producing a fuel from biogas.</b> A method for providing a fuel includes removing hydrogen sulfide and/or carbon dioxide from biogas to provide partially purified biogas, which is filled in a mobile storage system. The partially purified biogas is transported to a centralized processing facility, in the mobile storage system, by truck, rail, or ship. At the centralized processing the partially purified biogas is further processed, either to produce a fuel that is renewable or has renewable content, or to produce renewable natural gas, which is used to produce the fuel that is renewable or has renewable content.
WO2020000214	Jiangsu Hongda Environmental Protection Tech Co Ltd (CN)	<b>Wastewater recycling treatment apparatus.</b> A rural wastewater recycling treatment apparatus, comprising: a biogas digester, a grid pretreatment unit, an underground anaerobic tank, a biofilter tower, and a subsurface flow constructed wetland. Methane generated from the biogas digester can be used for denitrification and sulfate reduction under anaerobic conditions. Using methane as a carbon source can enhance anaerobic biochemical treatments, and the warming effect of methane can improve treatment efficiency. A reflux process is provided after the biofilter tower to increase the denitrification rate. The invention can effectively remove organic matter, nitrogen and phosphorus, has a small area footprint, low operating costs and good adaptability to local conditions, and realizes recycling and reuse of waste.
EP2927308	Meissner Jan A (CH)	<b>Biogas system and method for generating biogas from straw.</b> The present invention relates to a biogas plant and to a process for the production of biogas from ligneous renewable resources, in particular straw. There are provided means for pretreating the ligneous renewable resource in order to bring about a chemical, thermal and/or mechanical digestion of the same before being introduced into a fermenter, where an anaerobic bacterial fermentation takes place.
EP3613708	Three Es SRL (IT)	<b>Process for the biological methanation of gaseous substrates by hydrodynamic cavitation.</b> A process and a plant for biological methanation, wherein the process comprises the steps of: a) providing a biomass; b) providing H <sub>2</sub> and CO <sub>2</sub> ; c) disintegrating the biomass by hydrodynamic cavitation and obtaining a disintegrated biomass; d) causing anaerobic digestion of the disintegrated biomass in an anaerobic digester and obtaining a biogas and a digestate, and said process is characterized in that, during the disintegration step, the biomass is mixed with at least H <sub>2</sub> and CO <sub>2</sub> by hydrodynamic cavitation.



Nº Publicación	Solicitante (País)	Contenido técnico
US2020048121	Univ Nanyang Tech (SG)	<b>Hyper-rate anaerobic digestion system for enhanced bio-solids reduction.</b> Disclosed herein is a process for the treatment of wastewater for biosolids reduction and biogas (i.e. methane) generation where a wastewater is provided to a first reactor which is operated under anaerobic conditions, a hydraulic/solids retention time of from 0.1 to 1 day, a temperature of from 30 to 70° C. and a pH of from 6.5 to 10, with the effluent of the first reactor passing to a second reactor which is operated under anaerobic conditions, a hydraulic/solids retention time of from 3 to 10 days and a temperature of from 30 to 70° C. The process may further comprise feeding an effluent produced from the second reactor to a third reactor operated under anaerobic conditions, a hydraulic/solids retention time of from 3 to 20 days and a temperature of from 30 to 70° C.
EP3613709	Veolia Water Solutions & Tech (FR)	<b>Granular sludge reactor system comprising an external lamella separator.</b> The invention relates to a method for treating an aqueous fluid comprising a biodegradable organic substance in an installation comprising an upflow bioreactor containing a sludge bed comprising biomass, and an external separator, comprising- feeding the aqueous fluid into a lower part of the bioreactor, contacting the fed fluid with the biomass, thereby forming biogas from the biodegradable organic substance;- withdrawing the fluid that has been contacted with the biomass from an upper part of the bioreactor, which withdrawn fluid comprises biomass; and-feeding the aqueous fluid comprising the biomass into the external separator comprising a separation chamber provided with tilted internals wherein the aqueous fluid comprising the biomass is separated into a liquid phase, which has a reduced biomass content or is essentially free of biomass, and a fluid phase enriched in biomass, which fluid phase is returned to the bioreactor.

### Bioalcoholes (bioetanol, biometanol, etc.)

Nº Publicación	Solicitante (País)	Contenido técnico
EP2906706	Butamax Advanced BiofuelsLLC (US)	<b>Processes and systems for the production of fermentation products.</b> The present invention relates to processes and systems for the production of fermentation products such as alcohols. The present invention also provides methods for separating feed stream components for improved biomass processing and productivity.
EP2294228	Compagnie Ind de la Matiere Vegetale, CIMV( FR)	<b>Method for pretreating plant starting material for the production, from sacchariferous and lignocellulosic resources, of bioethanol and/or of sugar.</b> The invention proposes a method for pretreating plant starting material for the purpose of producing bioethanol and/or sugar by means of a common chamber (12), characterized in that: -during one period, the plant material (MP), introduced into the common pretreatment chamber, is a lignocellulosic plant starting material, the pretreatment of which is aimed at separating the cellulose, the hemicelluloses and the lignins so as to obtain a pretreated plant material that can be hydrolysed and fermented for the production of bioethanol; -during another period, the plant material (MP), introduced into the common pretreatment chamber, is a sacchariferous plant starting material, the pretreatment of which is aimed at extracting therefrom, by diffusion, a sugar juice for the production of sugar and/or of bioethanol.
WO2020023890	Danisco US Inc (US)	<b>Increased alcohol production from yeast producing an increased amount of active CRZ1 protein.</b> Described are compositions and methods relate to modified yeast that, in addition to native endogenous CRZ1, produces a modified CRZ1 transcriptional activator involved in the calcineurin stress response pathway. Such yeast is well suited for use in fuel alcohol production to increase yield.
US2020024619	DSM (NL)	<b>Improved glycerol free ethanol production.</b> The invention relates to a recombinant cell, preferably a yeast cell comprising one or more genes coding for an enzyme having glycerol dehydrogenase activity, one or more genes coding dihydroxyacetone kinase (E.C. 2.7.1.28 and/or E.C. 2.7.1.29); one or more genes coding for an enzyme in an acetyl-CoA-production pathway and one or more genes coding for an enzyme having at least NAD <sup>+</sup> dependent acetylating acetaldehyde dehydrogenase activity (EC 1.2.1.10 or EC 1.1.1.2), and optionally one or more genes coding for a glycerol transporter. This cell can be used for the production of ethanol and advantageously produces little or no glycerol.

Nº Publicación	Solicitante (País)	Contenido técnico
EP3541489	Hamrick Edward Brian (US)	<b>Methods and apparatus for separating ethanol from fermented biomass.</b> A method for separating ethanol from fermented biomass is provided. Fermented biomass that is rich in ethanol is used directly as packing material in a distillation column, and a small amount of water at the bottom of the column is used to efficiently transfer heat to the biomass at the bottom of the column. The fermented biomass packing has a high ratio of surface area to volume, making an efficient packing material. As vapor condenses on the biomass, diffusion of ethanol/water vapor from the body of the biomass enriches the ethanol concentration at the surface of the biomass. Droplets containing lower concentrations of ethanol drip downwards from the biomass, and vapors containing higher concentrations of ethanol rise upwards from the biomass, resulting in a higher concentration of ethanol at the top of the column than was initially in the biomass.
US2020048661	Institut National de la Recherche Scientifique Centre Eau Terre Environnement (CA)	<b>Process for the production of bio-butanol by fermentation of glycosidic waste matter.</b> An efficient, rapid ex-situ detoxification has been developed to reduce inhibitor concentration and enhance acetone-butanol-ethanol (ABE) production from brewery industry liquid waste (BLW) and brewery spent grain (BSG). About 80±2.0% extraction of furan derivative and more than 95±2.0% extraction of phenolic compounds and almost no extraction of reducing sugar from simulated synthetic media as well as real waste hydrolysate have been obtained. Ex-situ extraction of microbial inhibitors from BLW and BSG hydrolysates using bis-(2-ethylhexyl) sebacate as solvent leads to high production of ABE of 12.67 g/L and 11.23 g/L respectively. Lower power consumption (0.081 W/L) and reuse of the extracting solvent made this detoxification technique extremely useful for improving production of bio-butanol from agro-industrial waste.
US2020048595	Locus IP Company LLC (US)	<b>Efficient production of bioethanol in mobile reactors.</b> The subject invention provides systems and methods for producing bioethanol. More specifically, the present invention includes biological reactors, equipment, and materials for converting carbohydrate sources into alcohol products for use as biofuels and/or sources of electricity in, for example, remote areas.
EP3423584	Novozymes AS (DK)	<b>Combined use of at least one endo-protease and at least one exo-protease in an ssf process for improving ethanol yield.</b> Improved processes for producing ethanol from starch-containing materials by the combined use of at least one endo-protease and at least one exo-protease in an SSF process are disclosed. More particularly the exo-protease should make up at least 5% (w/w) of the protease mixture.
US2020017887	Renescence AS (DK)	<b>Non-pressurised pre-treatment, enzymatic hydrolysis and fermentation of waste fractions.</b> The present invention relates to a process for production of fermentation products, including bioethanol by non-pressurised pre-treatment, enzymatic hydrolysis and fermentation of waste fractions containing mono- and/or polysaccharides, having a relatively high dry matter content. The process in its entirety, i.e. from non-pressurised pre-treatment over enzymatic hydrolysis and fermentation to sorting of fermentable and non-fermentable solids can be processed at a relatively high dry matter content in a single vessel or similar device using free fall mixing for the mechanical processing of the waste fraction.
EP2379646	Xyleco (US)	<b>Processing biomass.</b> Biomass (e.g., plant biomass, animal biomass, and municipal waste biomass) is processed to produce useful products, such as fuels. For example, systems are described that can use feedstock materials, such as cellulosic and/or lignocellulosic materials and/or starchy materials, to produce ethanol and/or butanol, e.g., by fermentation.

## Biodiésel

Nº Publicación	Solicitante (País)	Contenido técnico
US10533198	Biopetrolia AB (SE)	<b>Methods and products for production of wax esters.</b> The present invention relates to the provision of genetically modified fungal cells, such as yeast cells with an improved ability for producing different fatty acids and specifically fatty acid ethyl esters (FAEE), the main components of biodiesel. An increased in fatty acid production, and hence in FAEE, is obtained in the first place by expressing different heterologous polypeptides in combination with the down-regulation, attenuation, deletion or over-expression of specially selected genes, wherein said genes encode enzymes involved in the fatty acids synthesizing pathway, fatty acid consuming pathways, carbohydrate biosynthesis pathways or enzyme acting as wax ester transporters or a combination thereof. The methods and products of the invention would allow large-scale production of FAEE with carbohydrates as the only externally-supplied substrate.

Nº Publicación	Solicitante (País)	Contenido técnico
US2020080022	Commw Scient Ind Res Org et al. (AU)	<b>Processes for producing industrial products from plant lipids.</b> The present invention relates to methods of producing industrial products from plant lipids, particularly from vegetative parts of plants. In particular, the present invention provides oil products such as biodiesel and synthetic diesel and processes for producing these, as well as plants having an increased level of one or more non-polar lipids such as triacylglycerols and an increased total non-polar lipid content. In one particular embodiment, the present invention relates to combinations of modifications in two or more of lipid handling enzymes, oil body proteins, decreased lipid catabolic enzymes and/or transcription factors regulating lipid biosynthesis to increase the level of one or more non-polar lipids and/or the total non-polar lipid content and/or mono-unsaturated fatty acid content in plants or any part thereof. In an embodiment, the present invention relates to a process for extracting lipids. In another embodiment, the lipid is converted to one or more hydrocarbon products in harvested plant vegetative parts to produce alkyl esters of the fatty acids which are suitable for use as a renewable biodiesel fuel.
EP3607027	Eni Spa (IT)	<b>Hydrotreatment of feedstock from renewable sources using catalysts with a high content of active phase.</b> The present invention relates to a process for obtaining hydrocarbons by the hydrotreatment of feedstocks from renewable sources, comprising mixtures of fatty acid esters and/or free fatty acids of biological origin, where said hydrocarbons may be used as fuels or components of fuels, in particular diesel fuels.
WO2020022143	Fujitusyo Co Ltd et al. (JP)	<b>Method for producing biofuel.</b> To provide a method for producing a biofuel that involves reacting a lower alcohol and an animal/vegetable fat/oil raw material that includes free fatty acid in the presence of a solid acid catalyst, wherein the amount of lower alcohol used is kept low and an esterification reaction of the free fatty acid and the lower alcohol is conducted selectively to reform the animal/vegetable fat/oil. [Solution] A method for producing a biofuel that involves using, as a solid acid catalyst, a catalyst selected from SiO <sub>2</sub> /Al <sub>2</sub> O <sub>3</sub> solid acid catalysts, SiO <sub>2</sub> /Al <sub>2</sub> O <sub>3</sub> solid acid catalysts in which some of the aluminum has been introduced into mesoporous silica, Al <sub>2</sub> O <sub>3</sub> /B <sub>2</sub> O <sub>3</sub> solid acid catalysts, and sulfated zirconia solid acid catalysts, the method being conducted at a molar ratio of free fatty acid and lower alcohol of 1-6.
AT513799	Klaus Mag Schell (AT)	<b>Method for producing a biodiesel fuel having a specially designed reactor and "autocatalytically" active nanoscale structured material surface of the reactor.</b> The invention relates to a method for economical production of biodiesel specifically from free fatty acids, as are present in particular in used cooking oils, used cooking fats, different animal fats and biological fats or oils, wherein the raw material, in admixture with a monovalent alcohol, preferably methanol, is fed to a reactor that is specially constructed from "[autocatalytically]" active material having a nanoscale surface structure and is correspondingly designed, and is reacted at a defined temperature at relatively high pressures. The method is characterised in that the method is carried out without an external catalyst (liquid or solid) and the products diesel and glycerin occurring during the transesterification therefore accumulate substantially free from metallic impurities. The resulting products comply with the relevant quality standards.
US2020017785	Neste Oyj (FI)	<b>A multicomponent diesel composition.</b> The invention discloses novel diesel fuel compositions including a renewable paraffinic diesel component, a fossil diesel component and an oxygenate component, as well as methods for manufacture and use of a combination of a renewable paraffinic diesel component, and an oxygenate component for reducing NO <sub>x</sub> emissions.
US10526623	Poet Res Inc (US)	<b>Oil composition and method of recovering same.</b> The present invention generally relates to oil compositions and methods of producing such oil compositions. More particularly, the present invention relates to an oil composition recovered from a fermentation product as well as methods of recovering such oil compositions for use in various processes such as bio-diesel production as well as in various edible applications.

Nº Publicación	Solicitante (País)	Contenido técnico
EP3008200	Renewable Energy Group Inc (US)	<b>Production of biodiesel and products obtained therefrom.</b> Methods and devices for economically producing a purified biodiesel product from feedstocks. Some embodiments of the methods comprise using at least one of a crude feedstock pretreatment process and a free fatty acid refining process prior to transesterification and the formation of crude biodiesel and glycerin. The crude biodiesel is then subjected to at least one biodiesel refining process which, in conjunction with feedstock pretreatment and free fatty acid refining produces a purified biodiesel product that meets multiple commercial specifications. A wide variety of feedstocks may be used to make biodiesel that otherwise would not meet the same commercial specifications, including corn oil, used cooking oil, poultry fats, fatty acid distillates, pennycress oil, and algal oils. The combination of feedstock refining and biodiesel refining processes is necessary to reduce problems associated with feedstocks having waxes, high free fatty acid levels, unacceptable color, high unsaponifiables levels, and high sulfur levels.
WO2020034038	SBI Fine Chemicals (US)	<b>Catalyst for the production of carboxylic acid ester.</b> Catalysts and methods for use in conversion of glycerides and free fatty acids to biodiesel are described. A batch or continuous process may be used with the catalysts for transesterification of triglycerides with an alkyl alcohol to produce corresponding mono carboxylic acid esters and glycerol in high yields and purity. Similarly, alkyl and aryl carboxylic acids and free fatty acids are also converted to corresponding alkyl esters. Catalysts are capable of simultaneous esterification and transesterification under same process conditions. The described catalysts are thermostable, long lasting, and highly active.
US10584361	Univ Akron et al. (US)	<b>Algae having intracellular lipid particles and high lipid content.</b> A method for increasing the lipid content of algae includes combining algae and a lipid-precipitating addition in a growth-inhibitive medium, the growth-inhibitive medium being deficient in at least one nutrient that is necessary for reproductive growth of algae, thus frustrating algae reproduction, the lipid-precipitating addition selected from hydroxyl-containing compounds and amine-containing compounds. An organic acid addition may also be combined with the lipid-precipitating addition and algae in the growth-inhibitive medium, the organic acid addition including compounds containing carboxylic acid functionality. Direct production of biodiesel is also achieved by the use of particular lipid-precipitating additions and organic acid additions.

## Bio-jet fuels

Nº Publicación	Solicitante (País)	Contenido técnico
JP6635594	- (JP)	<b>Manufacturing method of bio jet fuel and manufacturing apparatus.</b> PROBLEM TO BE SOLVED: To provide a manufacturing method of a bio jet fuel, which can improve a recovery rate of a bio jet fuel while saving an installation space according to a manufacturing apparatus and suppressing an installation cost when a bio jet fuel is manufactured from a biomass resource. SOLUTION: A manufacturing method of bio jet fuel includes a gasification step P1, an FT synthesis step P3 for FT synthesizing a gas, a first distillation step P4 for respectively separating an off-gas, a light oil and a residual component containing a fuel raw material component, a second distillation step P6 for separating under normal pressure a solid content and a fuel raw material component from a residual component separated by the first distillation step P4, and an isomerization step P5 for isomerizing a fuel raw material component separated by the first distillation step P4 and/or the second distillation step P6, and a jet fuel is obtained by passing at least an isomerization step P5.
ES2742527	Corbion Biotech Inc (US)	<b>Manufacturing of tailored oils in recombinant heterotrophic microorganisms.</b> Methods and compositions for the production of oil, fuels, oleochemicals, and other compounds in Prototheca are provided, including oil-bearing microorganisms and methods of low cost cultivation of such microorganisms. Prototheca cells containing exogenous genes encoding, for example, a lipase, a sucrose transporter, a sucrose invertase, a fructokinase, a polysaccharide-degrading enzyme, a fatty acyl-ACP thioesterase, a fatty acyl-CoA/aldehyde reductase, a fatty acyl-CoA reductase, a fatty aldehyde reductase, a fatty aldehyde decarbonylase, and/or an acyl carrier protein are useful in manufacturing transportation fuels such as renewable diesel, biodiesel, and renewable jet fuel.

Nº Publicación	Solicitante (País)	Contenido técnico
HUE045930	Chevron Lummus Global LLC (US)	<b>Conversion of triacylglycerides-containing oils to jet fuel range hydrocarbons.</b> A process for converting triacylglycerides-containing oils into crude oil precursors and/or distillate hydrocarbon fuels is disclosed. The process may include: reacting a triacylglycerides-containing oil-water-hydrogen mixture at a temperature in the range from about 250° C. to about 525° C. and a pressure greater than about 75 bar to convert at least a portion of the triacylglycerides and recovering a reaction effluent comprising water and one or more of isoolefins, isoparaffins, cycloolefins, cycloparaffins, and aromatics; hydrotreating the reaction effluent to form a hydrotreated effluent.
US2020010767	Gevo Inc (US)	<b>Conversion of mixtures of C2-C8 olefins to jet fuel and/or diesel fuel in high yield from bio-based alcohols.</b> The present disclosure provides methods and materials for oligomerization of lower olefins (e.g., C2-C8) to transportation fuels including diesel and/or jet fuel. The oligomerization employs, in certain embodiments, tungstated zirconium catalysts. Surprisingly, the oligomerizations proceed smoothly in high yields and exhibit little to no sensitivity to the presence of significant amounts of oxygenates (e.g., water, lower alcohols such as C2-C8 alcohols) in the feed stream. Accordingly, the present disclosure is uniquely suited to the production of fuels derived from bio-based alcohols, wherein olefins produced from such bio-based alcohols typically contain high levels of oxygenates.
JP6635362	Hibd Laboratory Ass et al. (JP)	<b>Production method for bio-jet fuel.</b> This production method for a bio-jet fuel includes a reaction step in which a crude oil, obtained by deoxygenating a raw material oil which contains a triglyceride and/or a free fatty acid, is hydrogenated, isomerized, and decomposed in a hydrogen atmosphere by using a hydrogenation catalyst and an isomerization catalyst, under the conditions of a reaction temperature of 180-350°C and a pressure of 0.1-30 MPa.
KR20200001265	Korea Res Inst Chem Tech (KR)	<b>Catalyst for the synthesis of jet fuel range hydrocarbon through deoxygenation reaction manufacturing method thereof.</b> The present invention is for the production of aviation oils including SBA-15 or SBA-16 carriers having rod-shaped mesopores having a minor axis diameter: a major axis diameter of 1: 1 to 3 and nickel and aluminum carried on the SBA-15 or SBA-16 carrier. A catalyst for preparing an aviation oil using a catalyst, which can produce a hydrocarbon mixture in a range of aviation oil in a high yield in a deoxygenation reaction from a vegetable oil.
CN110741069	Neste Oyj (FI)	<b>Fuel composition and method for producing a fuel composition.</b> A multipurpose fuel composition is disclosed comprising petroleum derived jet fuel component and renewable jet fuel component, wherein the multipurpose fuel composition has a freezing point of -40°C or below, and a cetane number more than 40, preferably more than 45, more preferably more than 50.
BRPI0920155	Neste Oil Oyj (FI)	<b>Deoxygenation of materials of biological origin.</b> The present invention relates to a method for the deoxygenation of materials of biological origin and particularly to the removal of oxygen from biomass derived organic compounds with carbon monoxide, to yield linear and branched hydrocarbons suitable as biofuels or as blending stocks or components for biofuels, such as gas, gasoline, diesel fuel and aviation fuel, as well as solvents. The method comprises contacting a feedstock with carbon monoxide in the presence of a catalyst comprising a metal selected from a group consisting of iron, ruthenium, manganese, rhodium, rhenium, osmium, iridium, molybdenum, copper, zinc, palladium, platinum and cobalt, in the presence of water, under alkaline conditions at a temperature from 150 to 350°C and under a pressure from 0.1 to 150 bar, to produce hydrocarbons.
EP3292187	Shell Inst Research (NL)	<b>Reduced emissions aromatics-containing jet fuels.</b> Reduced emissions in a jet fuel having aromatics content can be achieved by incorporating a quantity of an aromatic kerosene fuel blending component, preferably a bio-derived synthetic aromatic kerosene, comprising at least 90 wt.% of aromatics, less than 10 wt.% of indanes and tetralins and less than 1 wt.% of naphthalene into a jet fuel in a manner to meet the aromatic content specification for jet fuels. A jet fuel having aromatics content having reduced number-based nvPM emissions compared to equivalent total aromatics content petroleum-derived kerosene jet fuel is obtained.

## Otros biocombustibles (bio-hidrógeno, bio-oils, biopropano, etc.)

Nº Publicación	Solicitante (País)	Contenido técnico
WO2020021127	Eni Spa (IT)	<b>Process for the production of bio-oil and biogas from biomass.</b> The present invention relates to a process for the production of a liquid fuel and of a gaseous fuel from biomass. The biomass is sent to a pre-treatment section to form a homogeneous phase that can be moved and/or pumped, where inert parts are separated from the biomass, and the biomass is shredded and/or ground to reduce its size. The homogeneous phase obtained is then subjected to subcritical hydrothermal liquefaction at a temperature between 240°C and 310°C to form a liquefied phase. Said liquefied phase, the output of liquefaction, is then subjected to a separation. After separation, the process continues in two alternative and mutually exclusive modes. In the first mode, the first aqueous phase is subjected to an anaerobic reaction with multiple stages producing biogas; the oily phase coming out of the separation is then separated into a bio-oil and a solid residue. In the second mode, the separate mixed phase is then subjected to a separation by different density or dynamics forming a first aqueous phase, bio-oil and a gaseous phase. The first aqueous phase is then subjected to a multiple-stage anaerobic reaction from which biogas, a muddy current and a second aqueous phase are produced.
US10544368	Ensin Renewable (US)	<b>Rapid thermal conversion of biomass.</b> The present invent provides improved rapid thermal conversion processes for efficiently converting wood, other biomass materials, and other carbonaceous feedstock (including hydrocarbons) into high yields of valuable liquid product, e.g., bio-oil, on a large scale production. In an embodiment, biomass material, e.g., wood, is feed to a conversion system where the biomass material is mixed with an upward stream of hot heat carriers, e.g., sand, that thermally convert the biomass into a hot vapor stream. The hot vapor stream is rapidly quenched with quench media in one or more condensing chambers located downstream of the conversion system. The rapid quenching condenses the vapor stream into liquid product, which is collected from the condensing chambers as a valuable liquid product. In one embodiment, the liquid product itself is used as the quench media.
EP3466881	Fibria Celulose SA (BR) et al.	<b>Integrated process for the pre-treatment of biomass and production of bio-oil.</b> The present invention aims to provide an integrated process for the pre-treatment of biomass and its use as a feedstock in a process for the production of biochemicals and biofuels, said integrated process preferably allowing the obtaining of quality bio-oil from a biomass such as wood, forest residues, and residues from the sugar-alcohol and energy cane industry.
US2020071619	Mura Tech Ltd (GB)	<b>Method and apparatus for producing biofuel.</b> The present invention relates to the field of renewable energy. More specifically, the present invention relates to the production of biofuel from biomass including, for example, polymeric materials.
EP3415233	Res Triangle Inst (US)	<b>Catalytic biomass pyrolysis system.</b> Described herein are processes for converting a biomass starting material (such as lignocellulosic materials) into a low oxygen containing, stable liquid intermediate that can be refined to make liquid hydrocarbon fuels. More specifically, the process can be a catalytic biomass pyrolysis process wherein an oxygen removing catalyst is employed in the reactor while the biomass is subjected to pyrolysis conditions. The stream exiting the pyrolysis reactor comprises bio-oil having a low oxygen content, and such stream may be subjected to further steps, such as separation and/or condensation to isolate the bio-oil.
WO2020008621	Tsubasa Eng Service Co LTD et al. (JP)	<b>Method for producing hydrogen using biomass as raw material.</b> A method for producing hydrogen from a biomass raw material, the method being characterized in that: after generation of a first pyrolysis gas in an inner cylinder of an external-combustion rotary kiln by heat generated in an outer cylinder of the external-combustion rotary kiln and introduction of a biomass raw material supplied to the inner cylinder into the outer cylinder, water vapor and at least one of oxygen and air are combined in the outer cylinder and introduced into the outer cylinder such that the ratio of the number of mol of water vapor relative to the number of mol of oxygen gas component is 0.4-4; the temperature inside the outer cylinder is controlled to 640-740°C to obtain a second pyrolysis gas; some of the second pyrolysis gas is introduced into a reforming furnace, the temperature in the reforming furnace is raised to obtain a crude reformed gas having an increased hydrogen content, and the hydrogen is recovered; and the remainder of the second pyrolysis gas is introduced into a combustion furnace, the biomass raw material is dried utilizing the combustion exhaust gas as a heat source, and surplus combustion exhaust gas is utilized to generate power.



Nº Publicación	Solicitante (País)	Contenido técnico
WO2020023452	Univ Columbia (US)	<b>Methods and systems for the generation of high purity hydrogen with CO2 capture from biomass and biogenic wastes.</b> A system for producing hydrogen gas from biomass is disclosed that includes a first reaction chamber having one or more hydroxides, a Ni/ZrO2 catalyst, and a source of moistened seaweed biomass therein. A heat source is in communication with the first reaction chamber. One or more product streams exit the first reaction chamber including, hydrogen gas, a carbonate, or combinations thereof. A recycle stream provides recycled hydroxide to the first reaction chamber and the product stream is produced as a result of reaction of the seaweed biomass source with the one or more hydroxides in the presence of the Ni/ZrO2 catalyst.
US10577544	Univ Iowa State Res Found Inc (US)	<b>Low temperature, low pressure upgrading and stabilization of bio-oil or bio-oil fractions.</b> The present application discloses low temperature, low pressure methods (LTLP) for upgrading and/or stabilizing bio-oil or a bio-oil fraction. One method comprises providing a bio-oil or bio-oil fraction and hydrogen, which are reacted in the presence of a catalyst at a temperature of less than 150° C. and a pressure of less than 100 bar (absolute) to produce a hydrogenated liquid oil at a carbon yield of over 75%. Another method comprises providing a bio-oil or bio-oil fraction, providing oxygen reducing reaction conditions, and reacting the bio-oil or bio-oil fraction under the oxygen reducing reaction conditions at LTLP to produce an upgraded bio-oil product containing fewer carbonyls than the bio-oil or bio-oil fraction. Yet another method comprises providing a bio-oil or bio-oil fraction and a solution comprising one or more fermentation organisms and a sugar source. The solution and bio-oil or bio-oil fraction are combined to obtain a fermentation mixture, which is incubated at 15° C. to 30° C. for 16 to 72 hours to produce an upgraded bio-oil fermentation product containing fewer carbonyls than the bio-oil or bio-oil fraction.
WO2020026883	Univ Shinshu et al. (JP)	<b>Method for producing hydrocarbon and method for producing biocrude.</b> Provided are: a method for producing a hydrocarbon whereby the hydrocarbon can be efficiently produced using a biomass while minimizing a loss in a carbon source; and a method for producing a biocrude. A method for producing a biocrude, said method comprising: a mixing step for mixing a biomass with a solvent containing an oxygen-containing aromatic compound to give a mixture; and a solvolysis step for heating the mixture to 190-250°C to thereby solvolyse the mixture.
US10577242	Univ Tsinghua (CN)	<b>Device and method for generating high-purity hydrogen by biomass pyrolysis-chemical looping combustion.</b> The present invention discloses a device and method for generating high-purity hydrogen by biomass pyrolysis-chemical looping combustion. The device comprises a biomass pyrolysis unit, a chemical looping hydrogen generation unit and a waste heat recovery unit; the biomass pyrolysis unit comprises a vertical bin, a screw feeder, a rotary kiln pyrolysis reactor and a high temperature filter; the chemical looping hydrogen generation unit comprises a path switching system of intake gas end, at least one packed bed reactor and a path switching system of tail gas end, wherein the packed bed reactor is composed of three parallel packed bed reactors I, II and III, which are continuously subjected to fuel reduction-steam oxidation-air combustion stages (steam purging stage) successively; the waste heat recovery unit comprises a waste heat boiler, a cooler and a gas-liquid separator. According to the present invention, a process flow of generating hydrogen from biomass is short, high-purity hydrogen can be obtained by simple condensation and water removal of a hydrogen-containing product that is generated after entrance of a pyrolysis gas into the chemical looping hydrogen generation unit, no complex gas purification device is employed, and the costs for hydrogen generation are low.



# PATENTES BIOPRODUCTOS

Biomateriales (de construcción, medicina, embalaje, etc.)		
Biocomposites y biofibras		
Nº Publicación	Solicitante (País)	Contenido técnico
EP3624935	Agency Science Tech & Res (SG)	<b>Composite structure and method of forming the same.</b> A method of forming one or more composite structures is provided wherein one or more carbon structures is formed from a carbon source via a hydrothermal process. Said carbon source is a biomass material including glucose and glucosamine hydrochloride. In particular, the method further comprises introducing a seeding additive of potassium or phosphate salt, preferably monopotassium phosphate to the carbon source. The method includes introducing iron onto the carbon structures to form the one or more composite structures including carbon and iron.
EP3622027	Cioli Marco et al. (IT)	<b>Superficially coated vegetable fibers, process for their production, and use thereof in the production of manufactured articles.</b> A process is described for coating the surface of a particulate of natural fibers, such that the resulting fibers can be compacted to form manufactured articles at pressures of an order of magnitude lower than the pressure values currently used for this purpose and at reduced temperatures, or may be incorporated into composites with polymeric materials without the need of using compatibilizing compounds or treatments.
EP3594393	Faurecia Interieur Ind (FR)	<b>Wood fiber-based interior trim component for a vehicle.</b> The application concerns a method for producing an interior trim component comprising the steps consisting of: a) mixing polypropylene fibers, wood fibers and polyethylene terephthalate fibers in order to obtain a fiber mixture comprising: - from 35 to 60% by weight of polypropylene fibers, - from 35 to 60% by weight of wood fibers, and - up to 30% by weight of polyethylene terephthalate fibers, then b) needling the fiber mixture in order to obtain a needled mat, c) heating the obtained needled mat at a temperature above the softening point of the polypropylene fibers, d) optionally laminating the heated needled mat with a decor layer, then e) press-molding the needled mat and the optional decor layer in order to obtain the interior trim component, and the obtainable interior trim component for a vehicle.
EP3402665	First Quality Nonwovens Inc (US)	<b>Nonwoven composite including natural fiber web layer and method of forming the same.</b> A composite structure including at least one natural fiber web layer and at least one nonwoven web layer. In an exemplary embodiment, the natural fiber web layer is made of cotton fibers and the nonwoven web layer is a spunbond or spunmelt layer. The composite structure may be used to form components of an absorbent article, such as top sheets or back sheets of a diaper.
WO2020042066	Jiangsu Gemeigao Dev Co Ltd (CN)	<b>Coconut fiber composite fabric.</b> Disclosed is a coconut fiber composite fabric. The coconut fiber composite fabric consists of the following components in parts by weight: 8-12 parts of viscose yarn, 8-12 parts of mulberry silk, 21-39 parts of glass yarn, 22-26 parts of coconut fibers, and 23-29 parts of filament yarn. The invention has a good elasticity and feltability, has a good hand feeling and a soft luster, and is not prone to wrinkling.
EP3613573	Motherson Innovations Company Ltd (GB)	<b>Lining component for lining an interior of a passenger transport means and method for the production of such a lining component.</b> The present invention relates to a trim component for covering an interior space of a means for transporting passengers, in particular a vehicle, wherein the trim component includes a compressed natural fiber composite element with at least one side that is visible from the interior space of the means for transporting passengers and that forms a natural fiber surface with a structure of natural fibers, and a protective varnish layer applied onto the natural fiber surface and surrounding the natural fibers, with the protective varnish layer being designed such that the structure of natural fibers can be felt. Furthermore, the invention relates to a method for producing such a trim component and a means for transporting passengers having such a trim component.

Nº Publicación	Solicitante (País)	Contenido técnico
WO2020045510	National Univ Corporation Kanazawa Univ (JP)	<b>Composite material derived from lignocellulose biomass and method for producing same.</b> The purpose of the present invention is to obtain a novel composite material that has more excellent flexibility and more excellent thermal formability, while using a lignocellulose biomass as a starting material. A composite material which is obtained by esterifying some of the hydroxy groups of a lignocellulose biomass, and which is characterized in that the esterified moiety has a short-chain acyl group having 2-4 carbon atoms and a long-chain acyl group having 3-18 carbon atoms.
EP3601415	NNRGY BV (NL)	<b>Method for processing a mix of lignocellulose fibers for the production of a bio-based composite.</b> The invention relates to a method for processing a mix of lignocellulose fibers, such as miscanthus or sorghum fibers, for the production of a bio-based composite, comprising the steps of: harvesting lignocellulosic crops and processing the harvested lignocellulosic crops to obtain a raw mix of lignocellulose fibers, separating the raw mix of lignocellulose fibers, such as by sieving or grinding, into a first fraction (f1) comprising a mix of fibers having a fiber size of approximately < s1 and having first physical/chemical properties and a second fraction (f2) comprising a mix of fibers having a fiber size of approximately > s1 and having second physical/chemical properties being different from the first physical/chemical properties, mixing the fibers of the first fraction (f1) or the fibers of the second fraction (f2) with a binding agent (3), letting the binding agent harden, to obtain the bio-based composite.
EP3590970	Oji Holdings Corp (JP)	<b>Fibrous cellulose, fibrous cellulose-containing composition, fibrous cellulose liquid dispersion, and production method for fibrous cellulose.</b> It is an object of the present invention to provide ultrafine cellulose fibers capable of exhibiting favorable dispersibility even in an organic solvent. The present invention relates to cellulose fibers having a fiber width of 1000 nm or less and having phosphoric acid groups or phosphoric acid group-derived substituents, wherein the content of the phosphoric acid groups or phosphoric acid group-derived substituents is 0.5 mmol/g or more, and the supernatant yield measured by a measurement method (a) is 70% or less.
US2020087553	Univ Louisiana at Lafayette (US)	<b>Production of adhesives and other glue-like materials from sewage treatment plant sludges, animal manures and animal manure-based sludges, and bacterial/fungal cells and cell components s derived from culturing operations.</b> A system and method for treatment of biomass originating from wastewater treatment biosolids to obtain valuable adhesives and composite materials is described herein. Some embodiments do not require purification of a biomass product or residue to produce an adhesive. Some embodiments comprise a treatment of post extraction biomass residue configured to produce an adhesive. Use of post extraction biomass residue adds value to alternative energy produced by extracting oil from biomass.

## Bioplásticos

Nº Publicación	Solicitante (País)	Contenido técnico
US10563052	CJ Cheiljedang Corp (KR)	<b>Bioplastic composition comprising wheat bran and bioplastic film using the same.</b> The present invention relates to a bioplastic composition comprising wheat bran that is a food byproduct and a bioplastic pellet/film using the same. More particularly, the present invention relates to a bioplastic composition comprising wheat bran and a bioplastic film using the same in which the properties of the composition are enhanced to secure the improved properties of the bioplastic film prepared from it, thereby showing a carbon reduction effect and providing a substitute for the conventional petroleum-derived bioplastic products.
US2020015612	Huang Chien Chung (TW)	<b>Biodegradable drinking straw.</b> A biodegradable drinking straw is made of plant fiber powder and at least one polymer. The at least one polymer is polylactide (PLA), polybutylene succinate (PBS), or polypropylene (PP). As an alternative of drinking straws made of traditional plastic materials, the biodegradable drinking straw when buried in landfills can be degraded by microorganisms and decay, eventually becoming a part of the nature again. Besides, the biodegradable drinking straw is made of neither non-petrochemical materials nor silica, so its production avoids excessively consuming the finite resources, thereby being contributive to energy conservation and environmental protection.

Nº Publicación	Solicitante (País)	Contenido técnico
EP3608415	Kaneka Corp (JP)	<b>Polyhydroxyalkanoate particles and aqueous dispersion of same.</b> Provided are PHA particles which are excellent in dispersibility in an aqueous dispersion and have excellent film formation capability, in which odor of a molded body obtained from the PHA particles or an aqueous dispersion of the PHA particles is suppressed, and whose color tone is good, and an aqueous dispersion of the PHA particles. Polyhydroxyalkanoate particles including polyhydroxyalkanoate having a particle shape and peptidoglycan covering a portion of or an entire surface of the polyhydroxyalkanoate. In this polyhydroxyalkanoate particle, a content of polyhydroxyalkanoate is 98.0% by weight or more, and a content of peptidoglycan is 0.1% by weight or more and 1.0% by weight or less.
WO2020037394	Moharram Venturas Inc (CA)	<b>Biodegradable polymer composition and method of producing the same.</b> A biodegradable polymer composition, according to the present invention, comprises polyhydroxybutyrate and poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) blended with thermoplastic starch, one or more compatibilizers selected from the group consisting of dihexyl sodium sulfosuccinate and maleic anhydride, and one or more additives selected from the group consisting of microcrystalline cellulose and cellulose. Methods of producing a biodegradable polymer use processed cannabis waste as a carbon source.
US10550264	Pilipski M (US)	<b>Elevated glass-transition temperature polymeric polylactic acid and methods of making same.</b> A novel thermoplastic material including polylactic acid (PLA) and calcium hydroxide is provided, the material having an elevated glass transition temperature (Tg). Methods of making this novel material, and articles of manufacture made from it are also provided.
EP3601419	Sealed Air Corp (US)	<b>Method and formulation for renewable polyethylene foams.</b> A method of making a foam using a renewable resource and a foam thereof is disclosed. The foam is made using green polyethylene polymers made from renewable sugarcane ethanol. The use of these polymers to make foam has the potential to reduce carbon dioxide gas emissions by more than half. The foam can be used in a variety of applications and can also be made with blends of renewable LDPE and non-renewable LDPE
WO2020034959	Tin Yusang (CN)	<b>Wear-resistant plastic packaging bag and process for processing same.</b> Disclosed are a wear-resistant plastic packaging bag and a process for processing same. The packaging bag comprises an inner environmentally-friendly substrate layer, a middle interlayer and an outer wear-resistant layer, wherein wear-resistant protrusions are further uniformly distributed on a surface of the wear-resistant layer, the wear-resistant layer and the wear-resistant protrusions are both made from a special wear-resistant material, and the wear-resistant layer is integrally formed with the wear-resistant protrusions. The processing process comprises: a step S1 of preparing the environmentally-friendly substrate layer; a step S2 of preparing the wear-resistant layer and the wear-resistant protrusions; a step S3 of preparing a plastic film; and a step S4 of cutting, edge heat sealing and processing by stamping to obtain a wear-resistant plastic packaging bag. The environmentally-friendly substrate layer of the plastic packaging bag is made from polylactic acid, and the production process for polylactic acid is pollution-free, moreover, the product is biodegradable, nontoxic to human bodies and environmentally friendly, and food can be stored therein. The outer wear-resistant layer has an excellent wear-resistant effect, can prolong the service life of the plastic packaging bag and has low production costs.
EP3187590	Tokyo Inst Tech et al. (JP)	<b>Method for producing polyhydroxyalkanoate copolymer from saccharide raw material.</b> The purpose of the present invention is to provide a method for enhancing the production quantity of poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) (P(3HB-co-3HH)) having a high fraction of 3-hydroxyhexanoate (3HH) using a saccharide or glycerol as a starting material. The present invention provides: a method for producing a P(3HB-co-3HH) copolymer including performing transformation by homologous recombination of a crotonyl-CoA reductase gene in a chromosome of a recombinant strain of <i>Cupriavidus necator</i> endowed with the ability to produce P(3HB-co-3HH), or performing transformation by introducing an autonomous replication vector in which the crotonyl-CoA reductase gene is incorporated in the aforementioned strain, and cultivating the transformant in a medium containing a saccharide or glycerol as a carbon source; and a method for enhancing the production quantity of the copolymer and/or the fraction of 3HHx in the copolymer.

Nº Publicación	Solicitante (País)	Contenido técnico
EP3587478	Viana Octavio (PT) et al.	<b>Process for obtaining a bioplastic film and graphene oxide and/or graphene.</b> The bioplastic film and graphene and/or graphene oxide is characterized by having high strength, excellent waterproofing and high antibacterial performance. Thus, it can be used in the manufacture of garbage bags, bottles, capsules and packaging for the distribution of foodstuffs, liquids or substances intended for human consumption or animals, in particular medicinal products. In addition to the advantages described above, the present invention provides a bioplastic film with improved strength and mechanical performance compared to current bioplastic film solutions, thus allowing the current polyethylene terephthalate packaging solutions to be replaced by a fully biodegradable and compostable bioplastic. This invention is characterized by adding graphene and/or graphene oxide to the bioplastic (through a melting process) in which the graphene and/or graphene oxide are dispersed fairly homogeneously within the bioplastic ensuring the properties and characteristics described above, which in the current state of the art are not possible to obtain.
WO2020036638	Wisys Tech Foundation Inc (US)	<b>Polylactic acid and lignin composite thermoplastic for 3d printing.</b> A polylactic acid (PLA) composite material includes biodegradable and/or renewable materials such as purified lignin recovered as a byproduct in organosolv processes. The result is a material suitable for additive printing, with improved properties but that is still environmentally friendly. A coupling agent such as silane, diisocyanate crosslinking agent, and reactive extrusion agent may improve the blending of polylactic acid and purified lignin. Additional filler materials such as fibers or their powders may be added to significantly improve the mechanical properties of three-dimensional printed objects.

## Bioproductos químicos (biofertilizantes, biocosméticos, biofarmacéuticos...)

### Biofertilizantes y biocosméticos

Nº Publicación	Solicitante (País)	Contenido técnico
US10555885	Amorepacific Corp (KR)	<b>Low viscous cosmetic composition using a natural emulsifying agent.</b> The present invention relates to a low-viscosity cosmetic composition and methods using a natural emulsifying agent. More specifically, the present invention relates to a cosmetic composition using a naturally derived saccharide-based surfactant in place of a chemical surfactant and realizing a low-viscosity formulation to offer safety to the skin, feel good on the skin with fast absorption, give stability to the formulation and add luster to the skin in an effective manner.
US2018305589	Cargill Inc (US)	<b>Bio-based binder systems.</b> An environmentally friendly, bio-based binder system that is useful for the formation of fiberglass insulation, the system includes: A) an aqueous curable binder composition, which includes a carbohydrate and a crosslinking agent; and B) a dedust composition, which includes a blown, stripped plant-based oil and optionally at least one emulsifying agent. The bio-based binder system is typically heated to form a cured binder system.
US2018327329	Cool Planet Energy Systems Inc (US)	<b>Biochars and biochar treatment processes.</b> Treated biochar and methods for treating biochar are provided. The method for treating the biochar includes forcing, assisting or accelerating the movement of an infiltrant into the pores of the biochar, whereby the treatment affects properties of the biochar that provide for a more reliable and predictable biochar for use in various applications, including, but not limited to, agricultural applications.
EP3617244	Henkel Ag & Co KgaA (DE)	<b>Bio-based reactive polyurethane hotmelt adhesive.</b> The present invention relates to a moisture curable hotmelt adhesive composition comprising at least one polyurethane prepolymer obtained from the reaction of a) at least one polyether; b) at least one (meth) acrylic resin; c) at least one crystalline polyester; d) at least one amorphous polyester; e) at least one isocyanate compound; in a presence of a catalyst, wherein at least one of said polyether, crystalline polyester and amorphous polyester is partially or completely bio-based material.

Nº Publicación	Solicitante (País)	Contenido técnico
US2020022904	I&B Guangzhou Biological Tech Co Ltd (CN)	<b>Food-grade lip balm and preparation method thereof.</b> The present invention relates to a food-grade lip balm and the preparation method thereof, and belongs to the field of skin care products. The food-grade lip balm of the present invention comprises the following components: 1-30 parts by weight of rice bran wax, 10-80 parts by weight of shea butter, 1-60 parts by weight of a hydrogenated vegetable oil, 2-50 parts by weight of a naturally derived emollient oil, 0.1-30 parts by weight of a naturally derived aromatic oil, and 0.1-10 parts by weight of tocopherol. The components of the lip balm of the present invention are all naturally derived. It is safe and has good lip-protecting effects. The food-grade lip balm is of natural origin, safe and moisturizing; it has good ductility and moisture retention ability, could effectively tackle the drying and peeling of the lip skin, and provides a good user experience.
EP3597608	Kurita Water Ind Ltd (JP)	<b>Aerobe treatment method.</b> Provided is an aerobic biological treatment method for treating water to be treated with aerobic organisms by dissolving oxygen in the water to be treated within a reaction tank 3 using an oxygen dissolution membrane module 32 disposed in the reaction tank 3, wherein a bioadhesive carrier within the reaction tank 3 is suspended or fluidized to prevent adhesion of organisms to the oxygen dissolution membrane module 32.
EP3614857	Nat Res Council Canada (CA)	<b>Enzymatic-based process for the extraction of value added products from raw biomasses.</b> An enzymatic-based process of extracting value added products from oil seed and grain biomasses is described. The process comprises an alkaline pretreatment step followed by treatment with a proteolytic enzyme, and provides increased product yield and solubility. The products obtained can be soluble protein/peptide and purified dietary fiber. The use of such a process in the production of a food, drink, cosmetics, feed or feed additive product is also described.
US10533031	Nutech Ventures (US)	<b>Methods of making and using lignin derivatives.</b> The lignin presents an enormous opportunity for the development of renewable biomaterials to replace non-biodegradable petroleum-based products, and the present disclosure provides for commercially-viable and inexpensive methods of making reactive lignin that can be used to make a wide variety of lignin-based products.
EP3318119	Obrist Eng GmbH (AT)	<b>Method for improving soil fertility.</b> The invention relates to a method for reducing CO2 in the atmosphere comprising the following method steps: a) Harvesting wood in a forest by a harvesting unit to form an open area for growing plants, in particular trees; b) Shredding the harvested wood by a shredding unit; c) Coking the shredded wood by a coking unit to form biochar; d) Inserting the biochar by an insertion unit into the soil of the open area formed in step a; wherein at least steps a - d are performed continuously within a mobile vehicle, the mobile vehicle comprising at least the harvesting unit, the shredding unit, the coking unit and the insertion unit.
WO2020013507	SK Chemicals Co Ltd (KR)	<b>Bio-based polycarbonate ester resin for eyeglass frame.</b> The present invention relates to a bio-based polycarbonate ester resin for an eyeglass frame, the resin being environment-friendly by not containing types of bisphenol, and exhibiting excellent heat resistance, transparency, strength, hardness, dimensional stability and chemical resistance. In addition, various colors may be painted and coated on during post-processing, a separate additive is not required during a molding process, and processing is undergone at a temperature lower than that for conventional plastic materials for an eyeglass frame, and thus manufacturing costs may be reduced.

## Biofarmacéuticos

Nº Publicación	Solicitante (País)	Contenido técnico
EP3595637	Apharm SRL (IT)	<b>Combination of active ingredients, compositions comprising it and their use in the treatment of sarcopenia.</b> Subject-matter of the present invention is a novel combination of active ingredients, in particular a combination of 3-hydroxy-3-methylbutanoic acid or a pharmacologically acceptable salt thereof, a grape seed extract, a withania extract and optionally ornithine alpha-ketoglutarate. The combination of the invention is useful in the treatment of sarcopenia and in general in the diseases causing a loss of muscle mass and as anabolic agent. Further subject-matter of the invention is a pharmaceutical or nutraceutical composition comprising the combination mentioned above, together with conventional excipients and vehicles.

Nº Publicación	Solicitante (País)	Contenido técnico
EP3608395	European Molecular Biology Laboratory (DE)	<b>Directed evolution of a mutualistic community of organisms for the production of a nutrient or a nutraceutical.</b> The present invention relates to a method of production of a nutrient or a nutraceutical compound, a method for the generation of an improved nutrient-producing or nutraceutical compound-producing organism or community of organisms, and nutrient-producing or nutraceutical compound-producing organisms or communities of organisms.
US2020016184	Gao Song (US)	<b>Compositions containing enriched natural crocin and/or crocetin, and their therapeutic or nutraceutical uses.</b> The invention relates to unique compositions containing enriched and purified natural crocin and/or crocetin for prevention and/or treatment of cancers and other conditions and diseases. Compositions comprise mainly enriched or purified natural crocin or crocetin or combination of both and possible other active phytochemicals. A composition is used as functional food, drink, dietary supplement, or therapeutic dosage to a human orally or through other appropriate way (parenteral, percutaneous, rectal, mucosal, intranasal or topical administration). A method of natural crocin and crocetin enriching and purification is revealed.
EP3604342	Jiangsu Rongtai Biotech Co Ltd (CN)	<b>Fusion protein, preparation method therefor and application thereof in preparing ophthalmic disease treatment, anti-inflammation and anti-tumor medicament.</b> The invention discloses a fusion protein, a preparation method thereof and application thereof in preparing ophthalmic disease treatment, anti-inflammation and anti-tumor medicament, and belongs to the field of biopharmaceutical technology. The present invention uses a flexible (F) or rigid (R) linker to fuse two polypeptides to respectively obtain two bifunctional fusion proteins, namely two multi-functional fusion protein macromolecules obtained by linking antiangiogenesis polypeptides HM-3, IL-4 and immunoglobulin Fc fragments via an amino acid linker, which can improve drug efficacy, prolong half-life and enhance stability, has the characteristics of strong effect, low toxicity and the like, and can be used for the prevention and treatment of solid tumors and various types of inflammations and neovascular ophthalmic diseases. The fusion protein is expressed in a eukaryotic cell by a genetic engineering method and purified by affinity chromatography or the like.
EP3595691	Kerala Ayurveda Ltd India (IN)	<b>Herbal composition.</b> The present invention generally relates to an herbal composition effective in management of disorders related to metabolic syndrome. More particularly, the invention relates to an herbal composition effective in the management of disorders related to metabolic syndrome such as Type 2 diabetes mellitus, obesity and lipid profile management and a process for the preparation of such an herbal composition. The invention further relates to the use of the herbal composition in preparation of food supplements, pharmaceuticals and nutraceuticals for the management of disorders related to metabolic syndrome. The herbal composition effective in management of metabolic syndrome related disorders comprises of herbs selected from Curcuma longa, Emblica officinalis, Vernonia anthelmintica, Tinospora cordifolia, Trigonella foenum-graecum, Ixora coccinea and Syzygium cumini. Also provided is the use of herbal composition for the treatment of disorders related to metabolic syndrome. Also provided is a method of treating disorders related to metabolic syndrome comprising administering to a subject in need thereof a therapeutically effective amount of the herbal composition of the present invention.
US10561674	Lipogen Ltd (IL)	<b>Processes for the preparation of phospholipid-enriched dairy products as nutraceuticals for the formulation of functional foods.</b> The present invention discloses processes for the preparation of phospholipid-enriched dairy products as nutraceuticals for the formulation of functional foods, the processes include the steps of: combining a non-dairy-based PL-containing material, having phosphatidylserine (PS) and/or phosphatidic acid (PA) in the PL-containing material, wherein the PS and/or PA is derived in part from an enzymatically-processed lecithin as a PS-calcium and/or -magnesium salt and/or a PA-calcium and/or-magnesium salt via transphosphatidylation with phospholipase D in the presence of L-serine and a calcium and/or magnesium salt, with water and an oil component to form a paste; removing an excess amount of the water from the paste to form a PL-oil solution; and mixing the PL-oil solution with a dairy component, thereby obtaining a PL-enriched dairy product. Alternatively, the PL-oil solution has a weight-to-weight (w-w) concentration of at least about 0.01% of a residual amount of the water to the PL-containing material.



Nº Publicación	Solicitante (País)	Contenido técnico
EP3358968	Mchugh Elizabeth (US)	<b>Compositions and methods to create natural curing foods.</b> A natural food composition or nutraceutical compositions comprising a compound or a mixture of compounds selected from the group consisting of organic super foods, without any genetically 5 modified or toxic ingredients, all prepared mechanically, thereby, these nutraceutical compositions act as medicine, to control symptoms, prevent, and treat a broad range of health issues. In addition to providing daily nutritional value, needed in the human body, to promote general well-being, my invention is distinguished from prior art, in the way, my methods of integrative approaches use manufactured thought-out mechanical processes, without high temperatures, that protect food 10 from losing their nutrients and medicinal properties, whereby, becoming disease preventive food as dietary and culinary interventions with real food or mechanically processed food designed as a safe and cost-effective alternative to drugs. This is a brilliant solution for prevention and intervention -focused food against chronic diseases in the world.
WO2020026186	Pharmanutrition R&D SRL (IT)	<b>Oral nutraceutical composition for use in the treatment of metabolic syndrome.</b> Oral composition comprising Berberis aristata with a minimum titre of 50% in berberine chloride, Cynara Scolimus extract with a minimum titre of 2.5% in caffeoylquinic acids, a polyoxyethylenate sorbitan ester, Piper nigrum extract with a minimum titre of 80% in pipeline content. This oral composition in particular in the form of a nutraceutical formulation is in particular suitable for the treatment of the metabolic syndrome.
EP3599897	Specchiasol SRL (IT)	<b>Method for realization of dried extracts, hydro-alcoholic extracts and protein powders derived of leaves and plant seeds of moringa oleifera.</b> A method for realization dried extracts of Moringa oleifera seed and leaves to be used for nutraceutical products or supplements, comprising the following steps: providing Moringa oleifera plant seeds and/or leaves and grinding said seeds and leaves so as to obtain a fine powder, treating said powder with aqueous solution at fixed temperature, said solution containing water and ethanol so as to obtain extracts comprising standardized and stables active molecules such as Glucosinolates, and subjecting said extracts to a spray-drying treatment.
US2020054059	Whole Nutraceuticals Llc (US)	<b>Nutraceutical formulation for bone health.</b> A nutraceutical formulation used to militate against bone loss, while also facilitating bone growth, is disclosed herein. The nutraceutical formulation used to therapeutically treat humans includes kale, broccoli, mushroom, raisin, and prune. The nutraceutical formulation also omits ingredients that would otherwise diminish bone density or inhibit the inhibitory effects of the other ingredients in mitigating bone loss.

## Bioaditivos alimentarios

Nº Publicación	Solicitante (País)	Contenido técnico
EP3207807	CJ Cheiljedang Corp (KR)	<b>Ginseng powder-containing beverage composition and method for preparing same.</b> The present invention relates to a beverage composition containing a ginseng powder. More specifically, the present invention provides a ginseng powder-containing beverage composition and a method for preparing the same, wherein the beverage composition is capable of improving powder precipitation and layer separation using a natural stabilizer and a natural emulsifier, containing particular compositions, without using a synthetic stabilizer and a synthetic emulsifier.
US10524492	Corn Products Dev Inc (BR)	<b>Thermal-reversible gelling starch.</b> A thermal-reversible gelling agent derived from the modified starch of a waxy corn variant having an endosperm genotype with one or two doses of the recessive amylose-extender gene (ae). The starch may be modified enzymatically, physically, or by acid hydrolysis. Such gelling agents exhibit properties that may be useful in thickening or providing otherwise unique textures to foods.
WO2020038685	Gelita AG (DE)	<b>Protein bar.</b> The invention relates to a protein bar which is formed from a shapeable mass that contains proteins and/or protein hydrolysates. The shapeable mass contains a collagen hydrolysate having an average molecular mass of up to 1700 Da as a protein hydrolysate.



Nº Publicación	Solicitante (País)	Contenido técnico
WO2020004052	J Oil Mills Inc (JP)	<b>Whippedcream.</b> Provided is a whipped cream comprising component (A) that is a starch having an amylose content of 45 mass% or more and a degree of swelling in cold water of 3.5-15 inclusive and component (B) that is a gelling agent, wherein: the content of component (A) in the whipped cream is 0.05-5 mass% inclusive relative to the total whipped cream; and the content of component (B) in the whipped cream is 0.05-2.8 mass% inclusive relative to the total whipped cream.
US2020000114	Nestle SA (CH)	<b>Dried hydrogel co-gel.</b> The present invention relates to a food grade powder comprising a dried hydrogel co-gel comprising a first biopolymer capable of forming a thermoreversible elastic gel upon cooling to 25° C. or above and a second biopolymer capable of forming a glassy matrix upon drying. The food grade powder may provide controlled release of aroma, the aroma being encapsulated in the hydrogel co-gel. Further aspects of the invention are a food product comprising the food grade powder, a method of making a food grade powder providing controlled release of an aroma and the use of a hydrogel co-gel to control the release of an aroma.
WO2020037368	V2 Food Pty Ltd (AU)	<b>Food ingredients.</b> The present disclosure generally relates to protein-carbohydrate composites for use as food ingredients, to processes for the preparation of said composites, to their use in the preparation of food products, and food products comprising said composites. In some embodiments the disclosure relates to the use of protein-carbohydrate composites and processes for their production for use in the preparation of meat mimetic food products.
WO2020029599	Qingdao Bright Moon Seaweed Biological Tech Co Ltd (CN)	<b>Seaweed vegan meat and producing method therefor.</b> Seaweed veganmeat and a producing method therefor, relating to the technical field of food processing. The producing method comprises: first pouring alginate and a thickening and stabilizing agent in water, stirring to obtain a uniform solution, then sufficiently and uniformly mixing the uniform solution with a gel salt and a slow release agent, pouring the mixture into a container, placing same for shaping, performing packaging and freezing so as to obtain a finished product; or after the freezing step, performing unfreezing, squeezing to remove water, cutting, and packaging so as to obtain a seaweed vegan meat finished product. The seaweed vegan meat may be directly eaten by a consumer after being unpacked. The present formula is safe and healthy, the production process is feasible, the vegan meat tastes like real meat, and is tenacious and chewy; by means of a reticular structure, cooking soup can be more easily absorbed and the meat is more tasteful; the seaweed vegan meat may be made into cold dishes, or may be stir-fried and hotly instant-boiled, has the efficacy of controlling weight due to light calorie, moisturizing the intestines and removing heavy metals in intestinal tracts, is a novel marine healthy food, and has great market prospects.
EP3445180	Sola IP LLC (US)	<b>Natural sweetener.</b> A repressive sweetener composition comprising at least two sugar alcohols, monk fruit, a rheology modifier, and tagatose wherein the repressive sweetener composition has a glycemic index that is less than a sum of the glycemic index of each component of the repressive sweetener composition. A sweetener composition prepared by: (i) dry blending in a fluidized bed a rheology modifier, tagatose, stevia extract, xanthan gum, a flavor blend, erythritol, and a second sugar alcohol to form a first mixture; (ii) spray depositing water onto the first mixture to generate a wet mixture; and (iii) removing excess moisture from the wet mixture to generate granules.
EP3012264	Suntory Holdings (JP)	<b>Plant extract containing diketopiperazine and method for producing same.</b> Provided are a diketopiperazine mixture suitable for mixing with a food or drink and a method for producing the mixture. High-temperature and high-pressure treatment of plant peptides in a liquid allows production of a plant extract containing a high concentration of diketopiperazines including cyclo-leucyl-leucine and cyclo-leucyl-phenylalanine. The present invention can provide diketopiperazines having excellent flavor derived from a plant natural product and can produce a food or drink provided with the functions of the diketopiperazines by directly mixing the diketopiperazines with the food or drink.
CA2800385	Unilever PLC (GB)	<b>Ice confection comprising gelatin.</b> An ice confection comprising gelatin, locust bean gum and xanthan gum, a process for the manufacture of the ice confection and a frozen confectionery product comprising such ice confection are provided. A method of reducing foaming in the production of an ice confection comprising gelatin is also provided as is a use of a combination of locust bean gum and xanthan gum for reducing foaming in the production of an ice confection.

## Bioproductos alimenticios para animales

Nº Publicación	Solicitante (País)	Contenido técnico
EP3620063	Animal Food Solution Latvija SIA (LV)	<b>Method for the production of feed starch syrup from starch-containing plant raw materials.</b> The present invention relates to the production of feed additives for productive animals. More specifically, the present invention relates to the production of concentrated feed additives with high contents of glucose and other easily digestible carbohydrates, namely, feed starch syrup, from the starch-containing grain and grain legumes by the enzymatic method. The invention makes it possible to increase the environmental safety and stability of the process, ensures complete starch processing, and affords a product with a high content of simple carbohydrates suitable for long-term storage without additional treatment. The method for the production of feed starch syrup from starch-containing plant raw materials comprises the cavitation treatment of water in a disperser, introduction of ground starch-containing plant raw material at a weight ratio of water to starch-containing raw material of 1 : 0.4-0.6 and liquefying amylolytic enzymes, gelation and liquefaction of plant starch; introduction of the second part of the starch-containing raw material pretreated with IR radiation in an amount sufficient for reaching the total weight ratio of water to starch-containing raw material of 1 : 0.9-1.1 and liquefying amylolytic enzymes, gelation and liquefaction of plant starch, introduction of saccharifying amylolytic enzymes, and saccharification of starch.
US2020068822	Avocet IP Ltd (GB)	<b>Method of growing seeds.</b> There is provided a method of growing seeds in a hydroponics apparatus to provide animal feed, wherein the hydroponics apparatus includes a plurality of elongate trays for receiving seeds, an environmental control arrangement for controlling in operation a temperature and humidity of the plurality of elongate trays, and a nutrient solution supply arrangement for providing a nutrient solution to the seeds on the plurality of trays, characterized in that the method includes: (i) preparing the seeds by removing loose chaff therefrom, and removing remnants of husks and broken seeds; (ii) exposing the prepared seeds from (i) to gaseous ozone in a sealed gaseous exposure chamber, wherein the ozone is provided to the prepared seeds in either a) a concentration in a range of 5 p.p.m.v. to 10 p.p.m.v. for a period in a range of 50 minutes to 60 minutes or b) a concentration in the range of 10 p.p.m.v. to 20 p.p.m.v. for a period in a range of 1 minute to 30 minutes, in a condition of relative humidity in a range of 40% to 95%, and at an ambient temperature in a range of 12°C to 28°C; and (iii) providing exposed prepared seeds from (ii) to the plurality of elongate trays for growing the exposed prepared seeds to provide grown plant material for use in producing the animal feed.
WO2020011299	Biogastechnik Sued GmbH (DE)	<b>Apparatus and method for processing animal feed.</b> Animal feed such as grass, hay, barley, maize, alfalfa, silage maize, herbs, etc. are sometimes hard to digest so that essential nutrients cannot be absorbed during digestion. An apparatus for processing animal feed by way of cavitation allows cell wall structures to be disrupted and the nutrients enclosed therein to be released or to be made more accessible to digestion.
EP3462902	Cargill Inc (US)	<b>Fish feed prepared from oilseed plants producing omega-3 fatty acids.</b> Fish feeds that contain omega-3 fatty acids derived from modified oilseed plants such as Brassica and others, in some cases in place of or in addition to omega-3 fatty acids derived from marine oil.
US2020022384	Gross Martin et al. (US)	<b>Mineral supplementation in algae.</b> A method of producing mineral-rich algae by growing algae with an algae biofilm growing apparatus, wherein the algae is fed a mineral-rich feed stock. Furthermore, the mineral-rich algae is harvested and used as a foodstuff for human and animal consumption.
US10561160	Hills Pet Nutrition Inc et al. (US)	<b>Animal food composition and process for production.</b> An animal food composition comprising a protein source and corn starch, wherein native high-amylose corn starch comprises at least 50% of the corn starch. The composition can be used to treat or prevent a food allergy in an animal. Also, a process for the preparation of an animal food composition comprising mixing a protein source, corn starch and water to form a mixture and heating the mixture; wherein native high-amylose corn starch comprises at least 50% of the corn starch.

Nº Publicación	Solicitante (País)	Contenido técnico
WO2020045295	Kaneka Corp (JP)	<b>Vegetable protein for animal feed and method for manufacturing same.</b> The purpose of the present invention is to provide a vegetable protein for an animal feed having a high feed efficiency. The present invention pertains to a vegetable protein for an animal feed, said vegetable protein having an endothermic peak temperature of 40-80°C in differential scanning calorimetry and/or an exothermic peak temperature of 120-160°C in differential scanning calorimetry.
US2020068941	Nutri Foin Systeme Inc (CA)	<b>Hay-based material free of respirable dust emission: process for its preparation, use and associated machine.</b> A process for preparing a hay-based material for feeding a horse is provided. The process comprises chopping/blending together hay and a binding agent or dust-trapping agent. A machine for conducting the process of the invention is also provided. The hay-based material of the invention may be used to feed horses to improve their general health, particularly horses with severe asthma.
WO2020018013	Shizenature PTE (SG)	<b>Shrimp feed additive and method for producing the same.</b> A method for producing a shrimp feed additive, comprising a first process of preparing a pre-condition mixture of germinated soy beans; a second process of preparing an activated bacillus subtilis; a third process of adding the activated bacillus subtilis to the pre-condition mixture of germinated soy beans to produce a first mixture; a fourth process of removing an activated soy bean stock from the first mixture; a fifth process of combining the activated soy bean stock and an acidified fructose solution to sterilized shrimp shells to obtain a second mixture, fermenting the second mixture to produce a fermented mixture; and a sixth process of removing a top layer of the fermented mixture.
EP3622825	Sultanxodjaev Amanulla Asadullaevich et al. (UZ)	<b>Method for producing feed from secondary resources from the rice processing industry.</b> Technical field: the invention relates to the field of agriculture, and more particularly to the production of feeds from non-fodder raw material, specifically waste from the rice processing industry. Aim: to expand the range of raw materials for producing feeds for farm animals, in particular cattle, and to produce a nutritious feed from secondary resources from the rice processing industry not hitherto used for this purpose, which can be used as a complete feed and also as a novel ingredient in the production of compound feed for cattle. Essence of the invention: a method is proposed for producing feeds from rice processing industry waste, which involves grinding a plant matter and subjecting same to biofermentation treatment using an active culture of <i>Trichoderma lignorum</i> , where in the main plant matter used is rice hulls and rice flour, which is ground to 0.2-0.5 mm and then hydrothermally treated at a temperature of 110-120°C to a moisture content of 50-60% at a pressure of 1-2 atm for 1.5-2 hours, whereupon a biofermentation mass (" <i>Trichoderma lignorum</i> 19") is added to the plant matter in an amount of 5-15% of the mass of the raw material undergoing processing, the mixture is directed to a sealed bin for implementation of a microbiological process of impregnation and build-up of protein mass for 24-48 hours, then the resulting biomass is dried at a temperature of 50-60°C to 13-14.5% moisture content to produce a finished product.

**NIPO: 116-19-007-8**



**Boletín elaborado con la colaboración de:**

**Ministerio de Ciencia,  
Innovación y Universidades**

Paseo de la Castellana, 162  
28047 Madrid  
Tel: 91 603 83 99  
E-mail: [consultas.sgecpp@mineco.es](mailto:consultas.sgecpp@mineco.es)  
[www.mineco.es](http://www.mineco.es)

**OEPM**

Paseo de la Castellana, 75  
28071 Madrid  
Tel: 91 349 53 00  
E-mail: [carmen.toledo@oepm.es](mailto:carmen.toledo@oepm.es)  
[www.oepm.es](http://www.oepm.es)

**Bioplat**

C/ Doctor Castelo 10, 4ºD  
28009 Madrid  
Tel.: 91 074 54 28  
E-mail: [secretaria@bioplat.org](mailto:secretaria@bioplat.org)  
[www.bioplat.org](http://www.bioplat.org)

**CIEMAT**

Avda. Complutense, 40  
28040 Madrid  
Tel: 91 346 08 99  
E-mail: [uip@ciemat.es](mailto:uip@ciemat.es)  
[www.ciemat.es](http://www.ciemat.es)



Esta publicación está bajo licencia Creative Commons Reconocimiento, No comercial, Compartir igual, (by-nc-sa). Usted puede usar, copiar y difundir este documento o parte del mismo siempre y cuando se mencione su origen, no se use de forma comercial y no se modifique su licencia. Más información: <http://creativecommons.org/licenses/by-nc-sa/3.0/>