VT BIOMASA PARA LA BIOECONOMÍA 44

NIPO: 116-19-007-8 PATENTES

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BOLETÍN BIOENERGÍA Y BIOPRODUCTOS

Nanocristales de celulosa: Patentes

Los nanocristales de celulosa (CNC), material nanométrico obtenido a partir de la hidrólisis ácida de las fibras celulósicas convencionales, han atraído un gran interés durante los últimos años. Es un material que es abundante, renovable, relativamente barato y, además, extremadamente pequeño. Estas nanopartículas son cristales cuyo diámetro varía entre 3-20 nm y su longitud entre 100-600 nm. Su morfología depende del material de partida y de las condiciones de hidrólisis. Mientras que los nanocristales extraídos del algodón o la madera tienen, generalmente, una longitud de 100-300 nm y diámetros de 5-20 nm, los nanocristales obtenidos a partir de celulosa bacteriana pueden tener varios micrómetros de longitud y diámetros de 5-50 nm.

Los nanocristales de celulosa se caracterizan porque no sólo tienen la estructura básica y las propiedades de la celulosa, sino que también poseen una gran superficie específica, una alta cristalinidad (>70 %), alta hidrofilia, alto módulo de Young, alta resistencia (7500 MPa), una estructura ultrafina, alta transparencia, grupos hidroxilo para funcionalización, estabilidad coloidal, baja toxicidad y propiedades químicas estables. Todo esto hace que su aplicación sea potencialmente importante en campos muy diversos como la medicina, la electrónica, la alimentación, en el desarrollo de materiales compuestos, etc. Por ejemplo, entre las aplicaciones en ingeniería, destaca su uso para el desarrollo de sensores, catalizadores, materiales para el tratamiento de aguas residuales, etc. En medicina cabe destacar su contribución como nanomateriales híbridos, en la ingeniería de tejidos, en la liberación de fármacos, en las soluciones antibacterianas y en los vendajes para heridas. Además, hay que destacar que la utilización de CNC coloidales puede ayudar en la reducción del dióxido de carbono que es responsable del calentamiento global y el cambio climático.

En este apartado se va a abordar cuál es la situación actual de las patentes en el área de los nanocristales de celulosa. Para ello, se hará uso de la herramienta Global Patent Index con acceso a las bases de datos de la EPO (Oficina Europea de Patentes).

En la etapa comprendida entre Enero de 2017 y Diciembre de 2021, se identificaron más de 800 nuevas familias de patentes relativas a nanocristales de celulosa. El 72% pertenecen a solicitantes chinos que solo solicitaron protección en China. Unicamente, el 13 % de las familias totales poseen una solicitud internacional y/o una solicitud europea. En la Tabla 1 se recogen algunos ejemplos de solicitudes internacionales o europeas, pudiendo accederse a los textos completos de espacenet haciendo doble click sobre los números de publicación.

Tabla 1. Ejemplos de solicitudes internacionales o europeas de patente

Nº Publicación	Título	Solicitante	País
WO2020163948	Nanoredispersible microparticles of dried cellulose nanocrystals and method of production	Anomera Inc	Canadá
WO2020227814	Microparticles comprising cellulose nanocrystals aggregated with proteins and cosmetic uses thereof	Anomera Inc	Canadá
WO2017049021	Compatibilizers for polymer-nanocellulose composites	API IP Holdings LLC	EE.UU.
WO2021170770	Conductive cellulose composite materials and uses thereof	Asociacion Centro de Investig Cooperativa en Nanociencias	España
WO2021116367	Cellulose nanocrystal effect pigments for cosmetic applications	Basf Colors & Effects GmbH	Alemania
WO2020212291	Glue stick composition	Soc BIC	Francia
WO2018085916	Lithium salt grafted nanocrystalline cellulose for solid polymer electrolyte	Blue Solutions Canada Inc	Canadá
WO2020172738	Dispersion of cellulose nanocrystals (CNCS) in monoethylene glycol and process of preparing same	Celluforce Inc	Canadá
WO2017015761	Processes for preparing amine-functionalized cellulose nanocrystals and nitrogen doped carbon nanofibers	Celluforce Inc	Canadá
WO2018100065	Cosmetic composition comprising nanocrystalline cellulose, method and use thereof	Chanel Parfums Beaute	Francia
EP3608342	Method for producing cellulose nanocrystals (CNCs)	CLS Providentia SrL et al.	Italia
WO2017066540	Nanocrystalline cellulose and polymer-grafted nanocrystalline cellulose as rheology modifying agents for magnesium oxide and lime slurries	Ecolab USA Inc	EE.UU.
WO2021113975	Tunable shear-responsive emulsions stabilized by cellulose nanocrystals	FPInnovations	Canadá
WO2020051682	Piezoelectric materials and structures based on cellulose nanocrystals	FPInnovations	Canadá
WO2020164893	Process for preparing individual cellulose nanocrystals, and cellulose nanocrystals and use thereof	Fraunhofer-Gesllschaft Zur Förderung der Angewandten Forschung EV	Alemania
WO2019026071	Antimicrobial coating material comprising nanocrystalline cellulose and magnesium oxide and method of preparation thereof	IMI Tami Institute for Res and Development Ltd et al.	Israel
WO2018126959	Cellulose type II nanocrystalline particle and manufacturing method and application therefor	Inst Metal Research, CAS	China
EP3202978	Method for producing nanocrystalline cellulose from linter	Kaya Muhammet	Turquía
WO2017171317	Method for preparing non-acid-treated eco-friendly cellulose nanocrystal, and cellulose nanocrystal prepared thereby	Korea Res Inst Chemical Tech	Corea del Sur

Nº Publicación	Título	Solicitante	País
WO2018119837	Cat feed containing nanocrystalline cellulose	Liu Wen	China
WO2018110720	Method for preparing porous titania thin film by using cellulose nanocrystal	Nat Inst Forest Science	Corea del Sur
WO2021116917	Oral composition with nanocrystalline cellulose	Nicoventures Trading Ltd et al.	Gran Bretaña
WO2019082023	Composition containing a silicone-based adhesive and cellulose nanocrystals, and methods and articles	3M Innovative Properties Co	EE.UU.
WO2021078086	Modified nanocrystalline cellulose and preparation method thereof	Petrochina Co Ltd	China
WO2017165377	High internal phase emulsion foam having cellulose nanoparticles	Procter & Gamble	EE.UU.
WO2019050819	Continuous roll-to-roll fabrication of cellulose nanocrystal (CNC) coatings	Purdue Research Foundation	EE.UU.
WO2017151455	Functionalized cellulose nanocrystal materials and methods of preparation	Purdue Research Foundation	EE.UU.
WO2021234595	Films for flexible applications using cellulose nanocrystals (CNC) and resilin-CBD	Smart Resilin Ltd	Israel
WO2019058019	Nanocrystalline cellulose containing dental material	Stick Tech OY	Finlandia
WO2019157767	Nanocrystalline cellulose (NCC) reinforced rubber material and preparation method therefor	Taicang Rongnan Seal Tech Co Ltd	China
WO2021117662	Cellulose nanocrystal dispersion liquid and cellulose nanocrystal-containing coating liquid	Toyo Seikan Group Holdings Ltd (JP)	Japón
WO2020250738	Resin composition containing cellulose nanocrystals	Toyo Seikan Group Holdings Ltd (JP)	Japón
WO2019183166	Transparent and homogenous cellulose nanocrystal-lignin uv protection films	Univ Auburn (US)	EE.UU.
WO2018208663	Strong, rebondable, dynamic cross-linked cellulose nanocrystal polymer nanocomposite adhesives	Univ Case Western Reserve	EE.UU.
WO2017079497	Nano-emulsion and nano-latexes with functionalized cellulose nanocrystals	Univ Case Western Reserve	EE.UU.
WO2021009640	Therapeutic potential of curcumin/ cyclodextrin/cellulose nanocrystals in the treatment of peripheral neuropathies	Univ Limoges	Francia
WO2017074983	Method for preparing modified nanocrystalline cellulose	Univ New York State Res Found	EE.UU.
WO2021101989	Aqueous mixtures comprising cellulose nanocrystals and sulfonated polyester	Univ North Carolina State et al.	EE.UU.
WO2018068491	Cellulose nanocrystal modified ceramic green body and manufacturing method therefor	Univ Wuhan Tech	China
WO2017199252	Modified nanocrystaline cellulose materials and formulations and products made therefrom	Yissum Res Dev Co of Hebrew Univ Jerusalem Ltd et al.	Israel

En la Figura 1 puede observarse cuáles son los códigos CPC (Cooperative Patent Classification) más representativos de las solicitudes de patente realizadas por vía internacional o europea. Su significado y posición en el ranking se muestran en la Tabla 2. El análisis minucioso de la Figura 1 y de la Tabla 2 nos permite dilucidar las áreas a las que se dirigen las patentes. Los códigos CPC que aparecen en más del 10% de las solicitudes son C08L1 (Compositions of cellulose, modified cellulose or cellulose derivatives), C08B15 (Preparation of other cellulose derivatives or modified cellulose, e.g. complexes), B82Y30 (Nanotechnology for materials or surface science, e.g. nanocomposites), C08J3 (Processes of treating or compounding macromolecular substances), C08J23001 (Characterizing the main polymer used in a working-up process by the use of cellulose, modified cellulose or cellulose derivatives), D21H11 (Pulp or paper, comprising cellulose or lignocellulose fibres of natural origin only), C08K5 (Organic macromolecular compounds; their preparation or chemical working-up; compositions based thereon. Use of organic ingredients), C08J5 (Manufacture of articles or shaped materials containing macromolecular substances), A61K9 (Medicinal preparations characterised by special physical form), A61K8 (Cosmetics or similar toilet preparations) y A61K2800 (Properties of cosmetic compositions or active ingredients thereof or formulation aids used therein and process related aspects).

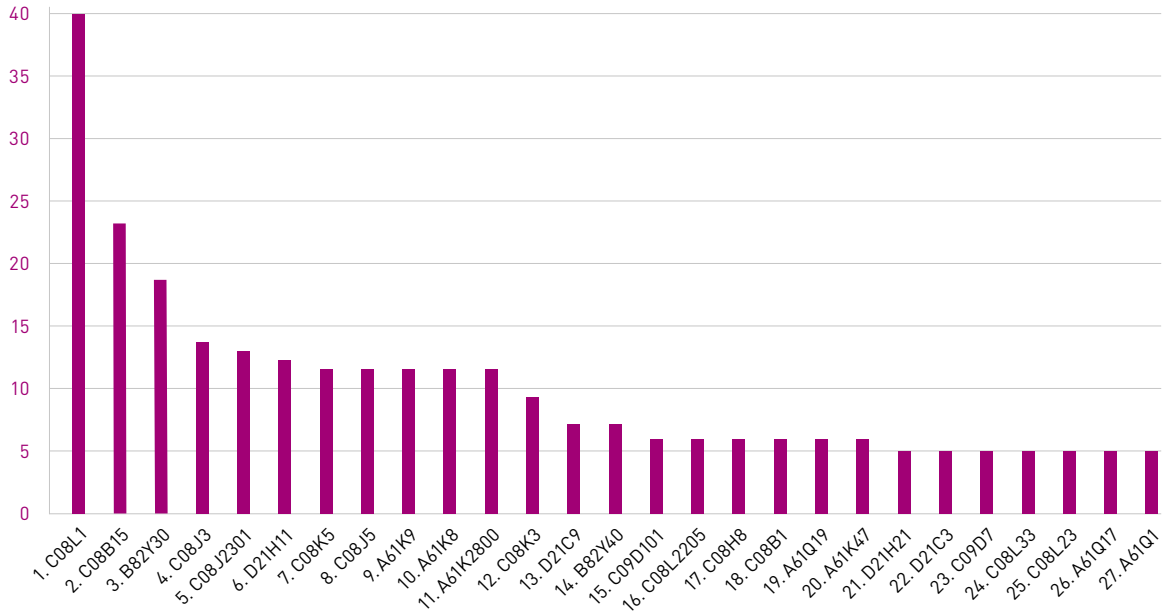

Figura 1. Códigos CPC más representativos (% solicitudes de patente)

Tabla 2. Significado de los códigos CPC más representativos y posición en el ranking de la Figura 2

#	CPC	Significado
10	A61K8	Cosmetics or similar toilet preparations
9	A61K9	Medicinal preparations characterised by special physical form
20	A61K47	Medicinal preparations characterised by the non-active ingredients used, e.g. carriers or inert additives
11	A61K2800	Properties of cosmetic compositions or active ingredients thereof or formulation aids used therein and process related aspects
27	A61Q1	Make-up preparations, body powders, preparations for removing make-up
26	A61Q17	Barrier preparations. Preparations brought into direct contact with the skin for affording protection against external influences, e.g. sunlight, X-rays or other harmful rays, corrosive materials, bacteria or insect stings
19	A61Q19	Preparations for care of the skin
3	B82Y30	Nanotechnology for materials or surface science, e.g. nanocomposites
14	B82Y40	Manufacture or treatment of nanostructures
18	C08B1	Preparatory treatment of cellulose for making derivatives thereof
2	C08B15	Preparation cellulose derivatives or modified cellulose, e.g. microcrystalline cellulose
17	C08H8	Macromolecular compounds derived from lignocellulosic materials
4	C08J3	Processes of treating or compounding macromolecular substances
8	C08J5	Manufacture of articles or shaped materials containing macromolecular substances
5	C08J2301	Characterizing the main polymer used in a working-up process. Characterised by the use of cellulose, modified cellulose or cellulose derivatives
12	C08K3	Organic macromolecular compounds. Their preparation or chemical working-up. Compositions based thereon. Use of inorganic substances as compounding ingredients
7	C08K5	Organic macromolecular compounds. Their preparation or chemical working-up. Compositions based thereon. Use of organic ingredients
1	C08L1	Compositions of cellulose, modified cellulose or cellulose derivatives
25	C08L23	Compositions of homopolymers or copolymers of unsaturated aliphatic hydrocarbons having only one carbon-to-carbon double bond. Compositions of derivatives of such polymers
24	C08L33	Compositions of homopolymers or copolymers of compounds having one or more unsaturated aliphatic radicals, each having only one carbon-to-carbon double bond, and only one being terminated by only one carboxyl radical, or of salts, anhydrides, esters, amides, imides or nitriles thereof. Compositions of derivatives of such polymers
16	C08L2205	Polymer mixtures characterised by other features
23	C09D7	Features of coating compositions
15	C09D101	Coating compositions based on cellulose, modified cellulose, or cellulose derivatives
22	D21C3	Pulping cellulose-containing materials
13	D21C9	After-treatment of cellulose pulp, e.g. of wood pulp, or cotton linters
6	D21H11	Pulp or paper, comprising cellulose or lignocellulose fibres of natural origin only
21	D21H21	Non-fibrous material added to the pulp, characterised by its function, form or properties; Paper-impregnating or coating material, characterised by its function, form or properties

En la Figura 2 aparecen los principales solicitantes que optaron por la vía internacional o europea para la protección de sus invenciones. En primera posición, con 5 solicitudes, se situa la empresa canadiense FP Innovations. Tras ella, con 4 solicitudes, se encuentran otras dos empresas canadienese y dos estadounidenses, Anomera Inc, CelluloForce Inc, API Intellectual Property Holdings LLC y Grambio Intellectual Property Holdings LLC. En España se encuentran dos entidades vascas el CIC nanoGUNE y la Universidad del País Vasco, que comparten la titularidad del 50% de las dos solicitudes que poseen.

En la Tabla 3 se recogen los códigos CPC más representativos de las solitudes de patente de las instituciones líderes. Con ayuda de la Tabla 2, donde se muestra el significado de los distintos códigos, se pueden identicar las áreas de patentabilidad más relevantes de cada una de ellas. Así, por ejemplo, las patentes de FPInnovations se dirigen hacia la producción de cosméticos u otros productos de tocador similares (A61K8) y productos para la protección de la piel de influencias externas, por ejemplo, de la luz solar, rayos X, materiales corrosivos, bacterias o picaduras de insectos (A61Q17).

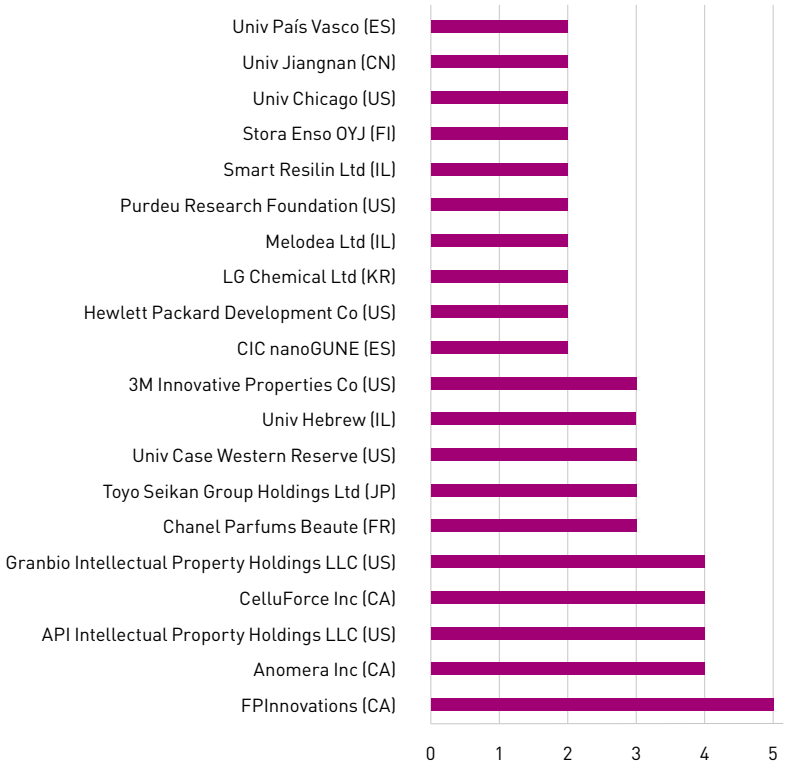

Figura 2. Solicitantes líderes (nº solicitudes)

Tabla 3. Códigos CPC de las patentes de los solicitantes líderes (véase su significado en la Tabla 2)

Instituciones	CPC		
FPInnovations (CA)	• A61K8	• A61Q17	• C08J3
Anomera Inc (CA)	• A61K8 • A61K2800 • A61Q1	• A61Q17 • C08J5	• C08L1 • C09D7
API Intellectual Property Holdings LLC (US)	• C08H8 • C08J5	• C08J2301 • C08L1	• D21C9
CelluForce Inc (CA)	• B82Y30 • C08J3	• C08J2301 • C08K3	• C08L1 • C08L9
Granbio Intellectual Property Holdings LLC (US)	• C08K3 • C08K5	• C08L1 • C08L2205	• D21C3 • D21H11
Chanel Parfums Beaute (FR)	• A61K8 • A61K2800	• A61Q1 • A61Q17	• A61Q19
Toyo Seikan Group Holdings Ltd (JP)	• C08B15 • C08K3 • C08K5	• C08L1 • C08L23	• C09D101 • C09D7
Univ Case Western Reserve (US)	• B82Y30 • B82Y40	• C08B15	• C08L1
Univ Hebrew (IL)	• A61K8 • A61K2800 • B82Y30	• C08B15 • C09D101	• D21H11 • D21H21
3M Innovative Properties Co (US)	• C08J3 • C08K3	• C08L1	• C08L2205
CICnanoGUNE (ES)	• B82Y30 • B82Y40	• C08L1	• D21H11
Hewlett Packard Development Co (US)	• B82Y30 • B82Y40	• C08K5	• C08L1
LG Chemical Ltd (KR)	• C08L33		
Melodea Ltd (IL)	• B82Y30 • C08B15	• C08K5 • C09D101	• D21H11 • D21H21
Purdue Research Foundation (US)	• C08B1 • C08L1	• C08L2205	• C09D101
Smart Resilin Ltd (IL)	• A61K2800 • A61K8	• C08B15	• C08L1
Stora Enso Oyj (FI)	• C08L1 • C09D101	• C09D7 • D21H11	• D21H21
Univ Chicago (US)	• B82Y30 • B82Y40 • C08B15	• C08L1 • D21C3	• D21C9 • D21H11
Univ Jiangnan (CN)	• A61K9 • A61K47 • C08B15 • C08H8	• C08J3 • C08J5 • C08K5	• C08L1 • D21C3 • D21C9
Univ País Vasco (ES)	• B82Y30 • B82Y40	• C08L1	• D21H11

PATENTES BIOENERGÍA

Biocombustibles sólidos (pellets, biochars, bio RDFs, bio SRFs, etc.)		
Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022067450 A1 20220407	Caraball Ugarte Jose Antonio et al. (CL)	**System for washing biological waste to recover same as solid biofuel.** The present invention describes a system, method and specific products for washing biological waste, preferably animal slurry, in particular livestock manure, especially biological waste with high contents of silica, and agroindustrial and forestry waste products, to obtain a purified lignocellulosic product having high calorific value which, when burned, releases low concentrations of harmful gases and in which little or no internal vitrification is generated.
WO 2022120486 A1 20220616	Char Biocarbon Inc (CA)	**Systems and methods for biocarbon production.** The present disclosure provides systems and methods for producing biocarbon. In particular, the disclosure provides systems and methods for producing biocarbon from biomass using supercritical CO2 extraction to reduce impurities.
EP 3995560 A1 20220511	Giese Karl Peter (DE)	**Production of wooden briquets made from heated shrub wood chips for pyrolysis.** The production of wood briquettes from bush chips, which are suitable for pyrolysis, has so far failed due to the high proportion of bark. The compacts disintegrate and are not transportable. By the waste heat of a wood gas engine, it is possible to produce wood briquettes of about 3 centimeters in diameter with a relatively low pressure, which are dimensionally stable and transportable and are suitable for pyrolysis. In the plant, the wood chips are first heated and preformed using a screw press. The briquettes are given their final shape by the hydraulic press.
EP 4019612 A1 20220629	Ingelia SL (ES)	**Apparatus to obtain valuable products from biomass and process thereof.** The present invention relates to a system suitable for the treatment of agricultural, forestry and municipal biomass to produce valuable products such as fatty acids as well as for generating carbonaceous solids having good properties to be used as energy sources or materials, said system comprising thermal desorption device, a separating device, a gas cooler, Pyrolysis reactor and a quenching device (6). The invention also relates to the processes to obtain said fatty acids and carbonaceous solids using the aforementioned system in good yields while reusing the by-products generated during the process by re-feeding them back into the system.
WO 2022091492 A1 20220505	Japan Steel Works Ltd (JP)	**Carbon-based fuel production method and carbon-based fuel production apparatus.** A carbon-based fuel is produced from an organic material using an extruder. A carbon-based fuel is produced through: a first step for providing an extruder provided with a cylinder, screws S1a and S1b that are arranged rotatably in the cylinder and a rotary drive mechanism for rotating the screws; and a second step for supplying an organic waste material OW and a plastic PL from a hopper arranged at an upstream part of the cylinder and kneading a melted product of the organic waste material OW and the plastic PL to carbonize the kneaded product. In the second step, a dry-distilled gas generated as the result of the carbonization is removed using a vacuum pump connected to a cylinder that is connected to the cylinder while pushing the kneaded product through the cylinder using a side vent stuffer. According to this production method, a carbon-based fuel can be produced from an organic waste material with high efficiency while preventing the occurrence of entrainment.
EP 3981254 A1 20220413	Leivon Leipomo OY (FI)	**A method for manufacturing smoking briquettes, a smoking briquette, a package, and utilization of food waste.** Food waste is reduced by utilizing food waste in compressed smoking products. A method for manufacturing compressed smoking products comprises drying and crushing food waste, forming a mixture comprising the crushed and dried food waste and wood-based material, and feeding the mixture to a compressing machine.
WO 2022080218 A1 20220421	Mitsubishi Heavy Ind Ltd et al. (JP)	**Solid fuel crushing device, power generation plant, and operation method for solid fuel crushing device.** The purpose of the present invention is to appropriately operate a solid fuel crushing device when mixing and crushing solid fuels of different properties. A solid fuel crushing device includes a crushing table having an upper surface to which a solid fuel, obtained by mixing biomass pellets and a second solid fuel having a different crushability and water content, is fed; a crushing roller that crushes the solid fuels on the crushing table; a coal feeder (20) that feeds the biomass pellets onto the crushing table; a biomass chip feeding device that feeds biomass chips onto the crushing table; and a control unit that adjusts a mixing ratio of the biomass pellets to the biomass chips on the basis of an operating state.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022090124 A1 20220505	RWE Generation NL BV (NL)	**Processing of torrefaction gas.** The torrefaction gas processing unit allows the chemical recycling of torrefaction gas produced by the torrefaction e.g. from solid recovered fuel (SRF) pellets without the need to burn the torrefaction gas.
WO 2022102296 A1 20220519	Ube Industries (JP)	**Biomass solid fuel manufacturing device.** A biomass solid fuel manufacturing device includes a rotary kiln for carbonizing a biomass molded body obtained by molding raw material biomass. The rotary kiln is provided with: a kiln body; a raw material supply part for supplying the biomass molded body to an upstream end portion of the kiln body; and an inert gas supply part for supplying inert gas to the upstream end portion in the inside of the kiln body.
EP 3995743 A1 20220511	Ungaro SRL (IT)	**Solid fuel biomass stove.** Biomass solid fuel stove comprising an access door and a brazier formed by a bottom grate and walls characterized in that the bottom grate is rotatable or sliding under the walls and that said bottom grate is connected to the access door through connecting means so that each time the access door is opened, the connecting means make the bottom grate slide or turn under the walls.

Syngas

Nº Publicación	Solicitante (País)	Contenido técnico
EP 3988501 A1 20220427	Air Liquide (FR)	**Method and system for producing co-rich synthesis gas by means of partial oxidation.** Proposed are a process and a plant for producing a hydrogen- and carbon oxides-containing synthesis gas by partial noncatalytic oxidation of a fluid or fluidizable carbon-containing input stream of fossil origin as a first input stream in the presence of an oxygen-containing oxidant and optionally a moderator to obtain a CO-rich raw synthesis gas. According to the invention a second input stream including a pyrolysis oil obtained from biomass is reacted simultaneously with the first input stream in the noncatalytic partial oxidation.
WO 2022091152 A1 20220505	ERS eng SRL (IT)	**Process for gasifying an organic material and plant for carrying out said process.** Process for gasifying an organic material, comprising the following steps: subjecting an organic material to a drying phase to reduce its humidity content and obtain dry organic material and steam, and extracting said steam; subjecting the dry organic material to pyrolysis and generating a pyrolysis gas and a carbonaceous solid residue from the dry organic material, the pyrolysis gas containing a tar fraction; separating the pyrolysis gas from the carbonaceous solid residue, wherein separating the pyrolysis gas comprises extracting the pyrolysis gas and conveying it separately from the carbonaceous solid residue generated by the pyrolysis; subjecting the pyrolysis gas to a thermochemical treatment; and, after the thermochemical treatment, causing the treated pyrolysis gas to penetrate through a reducing bed composed of the carbonaceous solid residue generated by the pyrolysis, and producing a synthesis gas. Subjecting the pyrolysis gas to a thermochemical treatment comprises: subjecting the pyrolysis gas to a first combustion with a gasifying agent under sub-stoichiometric conditions by using ejecting nozzles arranged below and upstream of the reducing bed, and obtaining the cracking of the tar fraction contained in the pyrolysis gas; and subjecting the pyrolysis gas to a second combustion introducing an additional gasifying agent in a chamber arranged above and downstream of the ejecting nozzles and upstream of an interface separating the chamber from the reducing bed, and completing the combustion of the tar fraction until the pyrolysis gas is fully converted to CO2, H2O(g) and heat.
WO 2022104314 A1 20220519	Exxonmobil Res & Eng Co (US)	**FCC co-processing of biomass oil.** Systems and methods are provided for co-processing of biomass oil in a fluid catalytic cracking (FCC) system that include recovering an additional source of H2 or synthesis gas from the overhead product gas stream. The additional H2 can be used to partially hydrogenate biomass oil prior to co-processing the biomass oil in the fluid catalytic cracking system. Additionally or alternately, the additional synthesis gas can represent an additional yield of products from the process, such as an additional yield that can be used for synthesis of further liquid products.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022082336 A1 20220428	Zhou Lianhui (CN)	**Comprehensive utilization system and method for forest biomass energy.** A comprehensive utilization system and method for a forest biomass energy. The system comprises a belt drive device, a conveyor belt, a biomass material processing plant, a biomass gasification device, and a biomass power generator set. The belt drive device is used for driving the conveyor belt to transport the forest biomass to the biomass material processing plant by means of the conveyor belt. The biomass material processing plant is used for processing the forest biomass into an available biomass material. The biomass material processed by the biomass material processing plant is separately conveyed to the biomass gasification device and the biomass power generator set for the production of the biomass gas and the electricity generation from biomass by combustion. According to the comprehensive utilization system and method for a forest biomass energy, the biomass other than the living trees in the forest is utilized, the flammable attachments on the ground are greatly reduced, and large-scale fires, major deaths of people and property losses, and catastrophic air pollution are avoided as much as possible. The system and method have certain economic benefits, and the generated fuel gas, electricity, and industrial accessories are available for sale.

Biogás

Nº Publicación	Solicitante (País)	Contenido técnico
EP 3988198 A1 20220427	Air Liquide (FR)	**Device and process for adjusting the equipment of a facility for producing biomethane.** Device for adjusting the equipment of an installation I for producing biomethane from a flow of biogas comprising methane and carbon dioxide, said device comprising:- A control means capable of receiving at least one datum D from the flow of biogas to be treated or of the flow of biomethane and to transmit this datum D in the form of a signal to a processor P,- The processor P implementing an algorithm to:• Compare the datum D with a threshold value,• Determine the difference between the threshold value and the datum D and• Adjust the number of devices of the same type in parallel in the installation I according to the difference determined and/or• Adjust the operating capacity of each device according to of the determined deviation.
EP 4000715 A1 20220525	Airco Process Tech A/S (DK)	**Two step amine absorption process for removal CO2/H2S from biogas.** The present invention relates to a method for upgrading biogas, i.e. a method for removing carbon dioxide and/or hydrogen sulphide from biogas. Particularly the invention relates to a method for upgrading biogas by absorption in two absorbers, where the gas effluent of the first absorber is pressurized and fed to the second absorber and wherein the liquid effluents of the two absorbers are regenerated to form a regenerated absorbtion stream, which is then provided in two absorption streams which is fed to the first and second absorber respectively. It also relates to a system for performing the method.
EP 3985094 A1 20220420	BAT Services BVBA (BE)	**System and process for biogas upgrading.** The present invention concerns a system and process for upgrading biogas and other methane containing gas mixtures to a methane-rich gas. In particular, it concerns an improved upgrading system with water scrubber technology that is integrated with an UV irradiation system for water treatment. More particularly, an UV irradiation water treatment system is integrated between the flash column and the desorption column of the water scrubber for oxidative degradation of methane and/or hydrogen sulphide dissolved in the water. Methane and/or hydrogen sulphide is degraded by photochemical oxidation combined with photocatalytic oxidation so that less methane and/or hydrogen sulphide leaves the desorption column via the off-gas.
WO 2022064159 A1 20220331	Brissaud Maxime et al. (FR)	**Biogas treatment method - Associated plant**. The present invention relates to a biogas treatment method according to which said biogas is passed in the gaseous state through a first membrane stage comprising at least one first separation membrane, the methane permeability of said first separation membrane being greater than its carbon dioxide permeability, the temperature and pressure conditions of said biogas enabling the passage of the methane downstream of said membrane. Characteristically, according to the invention, the gas mixture enriched in carbon dioxide which accumulates upstream of said membrane is collected, a Joule-Thomson expansion is carried out on the latter so as to obtain a liquid carbon dioxide/methane gas mixture and said mixture is distilled under temperature and pressure conditions that make it possible to obtain liquid carbon dioxide and the liquid carbon dioxide is collected. The present invention relates to an associated plant.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022079004 A1 20220421	Hitachi Zosen Inova AG (CH)	**Method for cleaning a gas mixture by adding ozone.** The invention describes methods for cleaning a gas mixture. In a first step a) a gas mixture is provided, the gas mixture comprising a gas selected from the group consisting of a methane-containing biogas which is obtained by fermentation of organic material and which has a methane concentration of at least 40 vol.% and a pyrolysis gas which is obtained by thermal treatment of organic material and which has a carbon monoxide concentration of at least 2 vol.% or a combination thereof. The gas mixture also comprises an impurity from the group of volatile organic compounds (VOC), the gas mixture having a VOC concentration of 0.0001 to 0.2 vol.%. In a second step b), 0.0001 to 12 vol.% ozone is added to the gas mixture, which ozone oxidizes at least part of the VOC in the gas mixture. In a third step d), the gas mixture from the second step is brought into contact with a VOC-adsorbing adsorber selected from the group consisting of activated carbon, activated coke, silica gel, aluminum oxide, molecular sieve and mixtures thereof, in order to clean the gas mixture.
EP 4008424 A1 20220608	Host Holding BV (NL)	**Method and system for biogas polishing.** The invention relates to a method and system for biomethane polishing viaadsorption, in particular temperature swing adsorption, wherein a reactor is applied which comprising at least one sorbent that is selective for carbon dioxide such that polished biogas comprising a carbon dioxide concentration below 200 ppm can be obtained.
EP 4001381 A1 20220525	K-Inn Tech SRL (IT)	**Method for the production of high-purity biomethane.** A method for the production of biomethane from biogas, wherein the biogas is subjected to at least two steps of biogas upgrading, with intermediate removal of H2O, the biogas upgrading step consisting in the direct methanation reaction of the CO2 that is present in the biogas: CO2 + 4H2 CH4 + 2H2O.
EP 4008769 A1 20220608	Krivalec BVBA (BE)	**Device and method for the production of electricity and heat by processing biomass.** The present invention relates to an arrangement for producing electricity and heat comprising a fermentation tank, wherein the fermentation tank comprises an insulated bottom, insulated side walls, a gastight roof, a biomass inlet, a biogas outlet, a digestate outlet and heating pipes, and a cogeneration installation, comprising a gas engine and a generator, wherein the gas engine comprises a gas inlet and a motor shaft, the generator comprising a generator shaft, wherein the gas inlet is coupled to the biogas outlet and wherein the motor shaft is coupled to the generator shaft, wherein the gas engine comprises a cooling circuit, wherein the heating pipes of the fermentation tank are coupled to the cooling circuit of the engine. The invention also relates to a method for production of electricity and heat and to a use of an arrangement or method according to the present invention for production in an industrial company of electricity and heat from biomass.
WO 2022123583 A1 20220616	Vasudevan Venkataramani (IN)	**Anaerobic digestion system for biogas production.** An anaerobic digestion system and kit for producing biogas from organic waste is disclosed. The system includes a feed module having a feed conduit for receiving organic waste and one or more digestion units that extend elongatedly at an inclination and downwardly to receive the organic waste for digestion. The feed conduit is connected to first side of a junction module that facilitates the transfer of the organic waste from the said feed conduits to the one or more digestion units. The junction module opens into the one or more digestion units are connected downstream to a second side of the junction module. One or more gas outlet tubes are connected to a housing to egress the biogas produced. The system is modular, portable and capable of processing entirely solid organic waste to produce biogas.
WO 2022106768 A1 20220527	Waga Energy (FR)	**Method for cryogenic separation of a biomethane-based feed stream, method for producing biomethane that includes said cryogenic separation and associated facility.** Method for cryogenic separation of a feed stream containing methane, nitrogen and/or oxygen, characterised in that the heated stream of vent gas is compressed, the stream of compressed vent gas is cooled, the stream of cooled compressed vent gas is subjected to at least one membrane separation to partially separate the methane from the oxygen and the nitrogen.
WO 2022087755 A1 20220505	Xebec Adsorption Inc et al. (CA)	**System for recovering methane from a biogas.** A system for recovering methane from a biogas comprises a pressure swing adsorption (PSA) unit, a biogas inlet, a gas mixer and a surge tank. The PSA unit recovers methane from the biogas and directs one fraction of the recovered methane toward a product gas outlet. The PSA unit directs another fraction of the recovered methane toward a recycling line and directs remaining gases to an exhaust. The biogas inlet receives biogas from a biogas source. The gas mixer is fluidly connected to the biogas inlet, to the recycling line and to the PSA unit, forms a combination of the biogas received at the biogas inlet and of the recycled methane, and supplies the combination to the PSA unit for methane recovery. The surge tank is in one of the recycling line or in an exhaust line and reduces a pressure in the PSA unit to improve methane recovery efficiency.

Bioalcoholes (bioetanol, biometanol, etc.)		
Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022093606 A1 20220505	Dow Global Technologies LLC (US)	**Foam control agent.** A foam control agent and method of controlling foam for bioethanol processing by use of a foam control agent, wherein the agent comprises at least a branched alcohol.
WO 2022082121 A2 20220421	Granbio Intellectual Property Holdings LLC (US)	**Processes for reducing chemical use and equipment corrosion in biomass conversion to sugars, biochemicals, biofuels, and/or biomaterials.** In some variations, a process for preparing a biomass feedstock for conversion to a sugar, a biofuel, a biochemical, or a biomaterial, comprises: providing a biomass feedstock containing cellulose, hemicellulose, and lignin; optionally, introducing the biomass feedstock and a first vapor stream to a biomass-heating unit, thereby generating a heated biomass stream; introducing the biomass feedstock and a first liquid stream to a liquid-addition unit, thereby generating a wet biomass stream, wherein the first liquid stream contains a pretreatment chemical; introducing the wet biomass stream to a mechanical conveyor operated to physically remove liquid from the wet biomass stream, thereby generating an excess-liquid stream comprising the pretreatment chemical and a solid discharge stream comprising the biomass feedstock and the pretreatment chemical; recycling at least a portion of the excess-liquid stream to the first liquid stream; and recovering or further processing the solid discharge stream. Many variations are disclosed.
FR 3115538 A1 20220429	IFP Energies Now (FR)	**Process for treating lignocellulosic biomass.** The invention relates to a process for the pretreatment of a lignocellulosic biomass, which comprises:- a stage A of impregnation of the biomass,- a stage B of solid/liquid separation, in order to obtain a separated impregnated biomass,- a stage C of transfer, of the separated impregnated biomass obtained in step B, - a first step D of pressurizing and heating in the presence of water vapor of the biomass transferred to step C, - a step E of separation intermediate solid/liquid, while maintaining the pressure level, of the biomass obtained in stage D, - a second stage F of heating, or maintaining at temperature, and maintaining under pressure in the presence of steam from the biomass obtained in step E,- a step G for destructuring/expanding the biomass obtained in step F,- a step H solid/gas separation, in order to obtain a pretreated biomass and a gaseous phase comprising steam of water.
RO 135656 A2 20220429	INCDO INOE 2000 Institutul de Cercetari Pentru Instr Analitica ICIA Cluj Napoca (RO)	**Process for preparing bioethanol from grapevine cordons by simultaneous saccharification and fermentation method SSF.** The invention relates to a process for preparing bioethanol from grapevine cordons by self-hydrolysis pretreatment, delignification for complete removal of lignin, followed by hydrolysis and fermentation of resulting sugars to bioethanol. According to the invention, the process consists in treating a quantity of 100 g of dried and ground grapevine cordons which are subjected to self-hydrolysis with water at a temperature between 165 ... 180°C, at a pressure between 60 ... 80 bar, for 5 ... 10 minutes, followed by delignification with sodium chlorite in 10% acetic acid, at a temperature between 60 ... 80°C, with a reaction time ranging from 1 to 4 hours, followed by enzymatic hydrolysis and simultaneous fermentation in 0.05 M sodium citrate solution, followed by addition of 10 FPU/g biomass of enzymes of Trichoderma reesei ATCC 26924 and 20 U/g biomass of enzymes of beta-glucosidases, inoculum and nutrients, at a temperature between 38 ... 45°C, for 24 ... 72 hours and it is azeotropically distilled with benzene, resulting in an amount of 3 ... 6 g of bioethanol.
RO 135657 A2 20220429	INCDO INOE 2000 Institutul de Cercetari Pentru Instr Analitica ICIA Cluj Napoca (RO)	**Process for preparing bioethanol by fermentation of carbohydrates from grapevine cordons by separated hydrolysis fermentation.** The invention relates to a process for preparing bioethanol by fermentation of carbohydrates from grapevine cordons by separate hydrolysis fermentation method SHF. According to the invention, the process consists in treating a quantity of 20 g of grapevine cordons by drying and grinding, which are then subjected to microwave pretreatment in the presence of water, at a temperature between 150 ... 180°C, for a reaction time between 5 ...10 minutes, followed by delignification with sodium chlorite in 10% acetic acid, at a temperature of 60 to 80°C, with a reaction time of 1 to 2 hours, followed by enzymatic hydrolysis in sodium citrate solution of 0.05 M, after which 10 FPU/g biomass of enzymes of Trichoderma reesei ATCC 26924 and 20 U/g biomass of enzymes of beta-glucosidases are added at a temperature between 37 ... 55°C, with the hydrolysis time between 24 .. .72 hours, followed by fermentation with S. cerevisiae brewer's yeast in a medium of inoculum and nutrients, at a temperature between 30 ... 40°C, with fermentation time between 24 ... 72 hours, followed by distillation and anhydrification, resulting in an amount of 0.8 ... 1.5 g of bioethanol.

Nº Publicación	Solicitante (País)	Contenido técnico
RO 135729 A2 20220530	INCDO INOE 2000 Institutul de Cercetari Pentru Instr Analitica ICIA Cluj Napoca (RO)	**Equipment for processing sorghum stalks.** The invention relates to an equipment for processing sorghum stalks with a view to using the resulting juice in bioethanol preparation. According to the invention, the equipment comprises a pressing block (1), an equipment (2) for chopping the pressed sorghum stalks and a worm press (3), the pressing block (1) having a support (4) on which a case (5) is mounted accommodating five rolls (6, 7, 8, 9 and 10), where the last two rolls (9 and 10) carry out the stalk slitting for pressing and also the final pressing at the last roll (10), in order to substantially reduce the juice reabsorption by the stalks, after their being pressed by the first three rolls (6, 7 and 8).
US 2022098631 A1 20220331	Novozymes Inc (US)	**Cellulolytic enzyme compositions and uses thereof.** The present invention relates to recombinant filamentous fungal host cells producing cellulolytic enzyme compositions and methods of producing and using the compositions.
MY 186713 A 20210812	Univ Malasya Perlis (MY)	**Method for efficient production of biofuel.** The invention discloses a process for efficient production of biofuel comprising the steps of preparing a hydroxyapatite (HAp) biomaterial for use in from of an immobilizer during a fermentation process, mixing the hydroxyapatite immobilizer with a Saccharomyces cerevisiae yeast product to perform physical adsorption, placing the mixture into a bioreactor for performing fermentation of immobilized yeast in presence of the hydroxyapatite (HAp) immobilizer and obtaining bioethanol produced from the fermentation of immobilized yeast in presence of the hydroxyapatite. The present method has several advantages including lower running cost of the operation and easy isolation of the biofuel product.
KR 20220073926 A 20220603	-	**Bioethanol production equipment.** The present invention is a manufacturing apparatus and manufacturing method for pre-treating bio-ethanol using lignin waste liquid produced after the pre-treatment process of the ethanol production process using herbaceous, woody, and marine-based biomass or sugar produced after the saccharification process. It relates to a pretreatment method and apparatus for producing bioethanol, and it has an excellent effect of converting into bioenergy by devising to easily perform acid, heat treatment, or enzyme treatment on herbaceous, woody, and marine algae.

Biodiésel

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022089530 A1 20220505	China Petroleum & Chem Corp Dalian Res Institute of Petroleum and Petrochemicals SINOPEC Corp (CN)	**Liquid-liquid mixer, liquid-liquid reaction apparatus comprising liquid-liquid mixer, and liquid-liquid reaction method using liquid-liquid mixer.** Disclosed is a micro-channel liquid-liquid mixing device, the micro-channel liquid-liquid mixing device comprising a micro-channel assembly and a housing, wherein the micro-channel assembly is fixed in the housing, one end of the housing is provided with an inlet for the feeding of at least two reaction liquid phases, and the other end of the housing is provided with a mixed material outlet; and the micro-channel assembly comprises a plurality of stacked sheets and oleophilic fiber filaments and hydrophilic fiber filaments filled in gaps between adjacent sheets, a plurality of micro-channels are formed between the fiber filaments, and the fiber filaments are tightly clamped and fixed by means of the sheets. The micro-channel liquid-liquid mixing device is used for forming at least two reaction liquid phases into a mixed material, wherein the at least two reaction liquid phases undergo fiber filament cutting and mixing in the micro-channel mixing device to form the mixed material. Further disclosed are a liquid-liquid reaction apparatus comprising the micro-channel liquid-liquid mixing device and a liquid-liquid reaction method, such as an olefin hydration reaction device and method and a reaction apparatus and method for producing biodiesel by means of an interesterification method.
KR 20220042760 A 20220405	Gangneung Wonju Nat Univ Ind Acad Coop Group (KR)	**Method for producing biodiesel from biomass.** The present invention, put the solid catalyst in the cartridge, the first step of manufacturing a cartridge containing the solid catalyst therein; and the second step of a one-step direct process in which the cartridge prepared in the first step is put into a mixed solution containing biomass and a solvent, and the biomass is subjected to lipid extraction and transesterification reaction. The method for producing biodiesel according to the present invention has a simple process, so energy use and process cost can be reduced, the catalyst can be reused, and the waste of the solid catalyst can be reduced by securing the flexibility of the process.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022119062 A1 20220609	Korea Inst Energy Res (KR)	**Solid acid catalyst for producing biodiesel, solid base catalyst for producing biodiesel, methods for preparing same, and method for producing biodiesel using these catalysts.** A solid acid catalyst for producing biodiesel, according to various embodiments of the present invention, may comprise: zeolite; and an acidic material supported on the zeolite. A solid base catalyst for producing biodiesel, according to various embodiments of the present invention, may comprise: zeolite; and a basic material supported on the zeolite. A method for preparing a solid acid catalyst for producing biodiesel, according to various embodiments of the present invention, may comprise the steps of: calcining a zeolite support; stirring the zeolite support by using an acidic solution, and then recovering same; and calcining the zeolite support at a temperature of 450-650 °C. A method for preparing a solid base catalyst for producing biodiesel, according to various embodiments of the present invention, may comprise the steps of: calcining a zeolite support; stirring the zeolite support by using a basic solution, and then recovering same; and calcining the zeolite support at a temperature of 300-600 °C. A method for producing biodiesel, according to various embodiments of the present invention, may comprise the steps of: preparing at least any one of high acid value oil and microalgal oil; reacting the oil in the presence of a solid acid catalyst to obtain a primary product; and reacting the primary product in the presence of a solid base catalyst to obtain a secondary product.
WO 2022118352 A1 20220609	Refuel Solutions SRL (IT)	**Method and device for the use of biodiesel in internal combustion engines with diesel cycle.** A method for using biodiesel fuel in compression ignition internal combustion engines (2) is described, the biodiesel fuel being present in a light oil diesel-biodiesel blend with a percentage of biodiesel greater than 7%, in which this percentage of biodiesel higher than 7% causes an increase in the viscosity of the mixture, the increase in viscosity negatively affecting the cold start of the engine (2); the method reduces the biodiesel concentration to below 7% in the starting phase of the engine (2), the reduction in concentration being achieved by adding light oil diesel to the light oil diesel-biodiesel blend.
WO 2022084281 A1 20220428	Shell Int Research (NL) et al.	**Use of a diesel fuel composition.** Use of a diesel fuel composition comprising (5) vol% or greater of biodiesel for reducing the build-up of deposits in an Exhaust Gas Recirculation (EGR) system of a compression ignition internal combustion engine.
WO 2022098897 A1 20220512	Synthetic Genomics Inc (US)	**Recombinant algae having high lipid productivity.** The invention provides recombinant algal mutants that have a genetic modification to a gene or nucleic acid sequence encoding a WD40 repeat containing protein or domain. The genetic modification of one or more nucleic acid sequences encoding a WD40 repeat containing protein or domain results in a mutant organism with increased lipid productivity and/or higher biomass productivity (as measured by total organic carbon). The genetic modification can be a gene attenuation or functional deletion. The lipid products of these mutants can be utilized as biofuels or for other specialty chemical products. Methods of making and using the recombinant algal mutants and methods of producing lipids are also disclosed.
BR 102020018764 A2 20220322	Univ Estadual Londrina (BR)	**Process of application of rosemary extract as protective in the oxidation of biodiesel in the presence of copper ions.** The present invention aims to use rosemary extract to increase the oxidative stability of biodiesel by delaying the oxidation reaction of biodiesel in the presence of copper ions. the application of ethyl alcohol-free rosemary extract provided a reduction in the oxidative degradation of biodiesel, thus allowing a longer storage period.
BR 102020017681 A2 20220315	Univ Federal Rio Grande Norte (BR)	**Process of obtaining biodiesel through the use of a catalyst from the in natura peel of the ponkan tangerine (citrus reticulata blanco).** the invention comprises the production of biodiesel using bioinorganic residue from the tangerine peel calcined in the range of 500 °C to 1000 °C, thus producing a catalyst, with a viable possibility in the reaction of producing biodiesel from vegetable oil, preferably using the soy oil. the process of obtaining biodiesel involving natural waste material is more economical and cleaner, in the environmental aspect, than the process commonly developed in the industry, which uses homogeneous catalysis, generally with hydroxides, naoh and koh. the catalyst obtained from tangerine peel is easy to separate from the reaction mixture through a separating funnel by decanting, can be reused in up to 5 consecutive reaction cycles, has a reaction yield above 80%, conversion above 90% and minimizes by 90% the saponification capacity of the transesterification reaction, in addition to presenting good thermal stability at temperatures up to 750 °C.
MY 186410 A 20210722	Univ Teknologi Malaysia UTM (MY)	**A catalyst, preparation and use thereof.** The invention provides a catalyst comprising a PV A-alginate-sulfate matrix and a lipase immobilized on said matrix, as well as a method of preparation thereof. The catalyst is suitable for converting waste oil to biodiesel

Bio-jet fuels

Nº Publicación	Solicitante (País)	Contenido técnico
US 2022098500 A1 20220331	Neste Oij (FI)	**Method for producing renewable fuel.** A process for preparing hydrocarbons from an oxygenated hydrocarbon feedstock, such as animal fat, having a high nitrogen impurity is described. The process involves hydrotreatment of the oxygenated feedstock in a first hydrotreating reactor and a further hydrotreatment in a second hydrotreating reactor, where between the two reactors, the gaseous phase is removed. The specific process setup effectively removes nitrogen impurities from the resultant hydrocarbon product causing an improved cloud point after isomerisation.
WO 2022073087 A1 20220414	Petroleo Brasileiro SA Petrobras (BR)	**Method for producing renewable aviation kerosene**. The present invention relates to a process for producing renewable aviation kerosene (bioAVK), which process involves converting ethanol and optionally methanol, CO2, synthesis gas or mixtures thereof, from renewable sources, into a stream of hydrocarbons in the range of aviation kerosene. The stream has mainly alkyl aromatics and can be used as a partial component of aviation kerosene, totally or partially hydrogenated to alkyl naphthenics.
WO 2022087618 A1 20220428	UOP LLC (US)	**Process for producing jet fuel from a biorenewable feed.** The process produces a diesel stream from a biorenewable feedstock by hydrotreating to remove 5 heteroatoms and hydroisomerization to improve cold flow properties. Heavy diesel can be hydrocracked to jet fuel range material or further hydroisomerized to increase its value lower its freeze point while light diesel may be taken as a motor fuel.

Biohidrógeno

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022109256 A1 20220527	Carbon Tech Holdings LLC (US)	**Biomass pyrolysis integrated with bio-reduction of metal ores, hydrogen production, and/or activated-carbon production.** Improved processes and systems are disclosed for producing renewable hydrogen suitable for reducing metal ores, as well as for producing activated carbon. Some variations provide a process comprising: pyrolyzing biomass to generate a biogenic reagent comprising carbon and a pyrolysis off-gas; converting the pyrolysis off-gas to additional reducing gas and/or heat; reacting at least some of the biogenic reagent with a reactant to generate a reducing gas; and chemically reducing a metal oxide in the presence of the reducing gas. Some variations provide a process for producing renewable hydrogen by biomass pyrolysis to generate a biogenic reagent, conversion of the biogenic reagent to a reducing gas, and separation and recovery of hydrogen from the reducing gas. A reducing-gas composition for reducing a metal oxide is provided, comprising renewable hydrogen according to a hydrogen-isotope analysis. Reacted biogenic reagent may also be recovered as an activated carbon product. Many variations are disclosed.
TW 202210425 A 20220316	Fountain Hitech Corp (TW)	**Circular and economical system and method for regenerating energy from industrial waste resources.** The invention relates to a circular and economical system and method for regenerating energy from industrial waste resources. Primarily, organic biomass waste is used to generate hydrogen for power generation within a power generation device, so as to supply power to the power generation device and a heavy metal sludge treatment device. Electroplating sludge and waste pickling liquid are formed as useful compositions such as composite ferrite, alkali, hydrochloric acid, etc. after being treating within the heavy metal sludge treatment device. Accordingly, it not only can completely recycle the waste resources into useful energy, but also does not need to use extra energy or consume other resources for the system equipment. It forms a closed cycle to reduce the consumption of resources and realize zero emission, which makes the ecological environment more optimized, so as to increase the practicality and efficiency for the whole implementation.
KR 20220055987 A 20220504	Hyundai Motor Co Ltd et al. (KR)	**Method for producing hydrogen using biomass.** A method of producing hydrogen using biomass includes: pretreating the biomass using an ionic liquid; and extracting hydrogen by reacting the pretreated biomass with an alkaline substance.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022084703 A1 20220428	Metaplasma SL (ES) et al.	**Structural configuration and method for environmentally safe solid waste and biomass processing to increase the efficiency of power generation and production of other useful products.** The present invention relates to the method and structural configuration for environmentally safe solid waste and biomass processing to increase the efficiency of power generation and production of other useful products. In the method of the invention, the solid waste and biomass are loaded, crushed, then subjected to vacuum and temperature drying and shredded. The shredded solid waste and biomass are accumulated, then supplied to the fast plasma gasification reactor, where subjected to fast plasma gasification. The obtained steam-gas mixture is condensed, separating the water steam from the steam-gas mixture. The obtained gas mixture, in the form of pyrolysis gas, is accumulated in turn in two variable volume gasholders. The hydrogen obtained as a result of electrolysis, as well as the pyrolysis gas from the first and then from the second variable volume gasholders are fed in turn, from the beginning to the first and then to the second recirculation Sabatier reactors for conducting a recirculating autothermal Sabatier reaction. These cycles are repeated until there is a complete conversion of the gas mixture into methane. The produced methane is compressed and accumulated. The accumulated methane is used for supplying to external consumers and for the production of electric power and heat. Oxygen obtained as a result of electrolysis is supplied to external consumers.
EP 3992268 A1 20220504	RWE Generation NL BV (NL)	**Conversion of solid waste into syngas and hydrogen.** The method and plant 1 for conversing solid recovered fuel pellets 117 made from municipal solid waste 103 allow the transformation of the municipal solid waste 103 into hydrogen with a high yield instead of landfilling or incinerating the municipal solid waste 103. The hydrogen rich product gas stream 601 can be used as feedstock for chemical reactions or for storing energy in a releasable manner.
WO 2022112311 A1 20220602	Topsoe AS (DK)	**Process for producing hydrogen from co-rich gases.** The invention relates to a process for enriching a synthesis gas in hydrogen by contact-ing said synthesis gas with a water gas shift catalyst, said synthesis gas being a CO-5rich synthesis gas comprising at least 15 vol% CO and at least 1 ppmv sulfur, and the water gas shift catalyst comprising Zn, Al, optionally Cu, and an alkali metal or alkali metal compound; the water gas shift catalyst is free of chromium (Cr) and iron (Fe), and has a pore volume, as determined by mercury intrusion, of 240 ml/kg or higher.
CN 114149816 A 20220308	Univ Changzhou (CN)	**Method for preparing hydrogen-rich fuel gas by catalyzing biomass tar cracking through aluminum smelting waste residues.** The invention discloses a method for preparing hydrogen-rich gas by catalyzing biomass tar cracking through aluminum smelting waste residues, which comprises the following steps: adding the aluminum smelting waste residues into medium strong acid, soaking for 2-4 hours, filtering, and baking the obtained precipitate at 300-400 DEG C for 3-6 hours to obtain pretreated aluminum smelting waste residues; adding the pretreated aluminum smelting waste residues into weak acid, performing ultrasonic treatment, performing centrifugal separation on an aluminum ash solution, baking for 3-6 hours at the constant temperature of 400-500 DEG C in an air atmosphere, and naturally cooling to room temperature to obtain a cracking catalyst; the method comprises the following steps: uniformly mixing a cracking catalyst and biomass according to a mass ratio of 1: 1, adding the mixture into a first-stage pyrolyzing furnace in an N2 atmosphere, and heating from room temperature to 500-900 DEG C to obtain first-stage pyrolyzing gas; and the first-stage pyrolysis gas enters a second-stage pyrolysis furnace for secondary catalytic cracking, and hydrogen-rich gas is obtained. According to the method, the hydrogen yield can be effectively increased by 200% or above, the tar yield is effectively reduced, the liquid yield is controlled to be 11% or below, and heavy components in the tar are greatly reduced.
WO 2022091101 A1 20220505	Univ Ramot (IL) et al.	**Photosynthetic microalgae and use thereof for hydrogen production.** The present invention is in the field of molecular hydrogen (Hi) bio-production, particularly, the present invention provides genetically modified photo synthetic microalgae producing hydrogen in complete growth medium under ambient, continuous growth conditions at cost-effective amounts and to a process for hydrogen production using genetically modified photosynthetic microalga.

Otros biocombustibles (hidrobiodiésel, combustibles marinos, etc.)		
Nº Publicación	Solicitante (País)	Contenido técnico
US 2022195313 A1 20220623	Bass Thomas et al. (US)	**Method of manufacturing renewable diesel from biological feedstock.** A system and method for renewable diesel synthesis utilizes a triglyceride feedstock derived from biological sources. The first step involves hydrolysis of the triglycerides into an intermediate feedstock comprising a mixture of free fatty acids and glycerol (separated from the FFA by decantation and then distilled). The FFA is then further processed in a distillation step to produce a stream free of catalyst poisons and utilized as feedstock for hydrotreatment in a renewable diesel production process. By converting the initial triglyceride feedstock to an FFA feedstock, the need to hydrotreat at typical high temperature that promote the decarboxylation reaction is obviated, thereby reducing the production of CO2, generating a significantly higher proportion of saturated, long chain C14, C16 or C18 hydrocarbons (as opposed to short-chain carbons such as propane), and the more valuable glycerol product is secured.
WO 2022115827 A1 20220602	Exxonmobil Res & Eng Co (US)	**Marine fuel compositions.** Provided are marine fuels or fuel blending compositions, methods of making such fuels or compositions and methods of potentially reducing the life cycle carbon intensity of marine fuels or a fuel blending compositions. The marine fuel or fuel blending composition disclosed herein includes at least 20 vol% of a resid-containing fraction, and from 5 vol% to 80 vol% of one or more renewable fuel blending components. The one or more renewable fuel blending components includes one or more fatty acid alkyl esters. Optionally the one or more renewable fuel blending components may include gas-to-liquid hydrocarbons from renewable synthesis gas, hydrotreated natural fat or oil, hydrotreated waste cooking oil, hydrotreated tall oil, pyrolysis gas oil, or combinations thereof. Optionally, the resulting marine fuel or fuel blending composition can have a BMCI - TE difference value of 15 or less.
WO 2022104313 A1 20220519	Exxonmobil Res & Eng Co (US)	**Renewable diesel producton with heat release management.** Systems and methods are provided for processing a bio-derived feedstock in a commercial scale reactor to form renewable distillate boiling range fractions while managing the heat release. The management of the heat release is achieved in part by introducing 1.0 vol% or more of CO into at least a portion of the reaction environment for hydroprocessing of the bio-derived feedstock. The 1.0 vol% or more of CO can selectively reduce the activity of hydrotreating catalyst for olefin saturation.
WO 2022085163 A1 20220428	JGC Corp (JP)	**Slurry fuel and method for producing same.** Provided is a novel fuel that can be converted into fuel for internal combustion engines, e.g., gas turbines and diesel engines used by ships and in rural areas, e.g., isolated islands. A slurry fuel according to the present invention comprises solid biomass, a liquid component, and additive, and is characterized in that the solid biomass contains semicarbonized biomass, the maximum particle diameter of the solid biomass is less than or equal to 500 μm, the fuel ratio (fixed carbon ÷ volatile component) is at least 0.15, and the solids concentration in the slurry fuel is in the range of 10-70 mass%.
EP 4008835 A1 20220608	Univ Copenhagen (DK)	**Lignin composition.** The present invention relates to a process for producing a lignin composition, which process comprises:- providing a lignin slurry comprising water and a water miscible organic solvent;- subjecting the lignin slurry to extraction at an extraction temperature of less than 100°C for an extraction time of at least 1 minute to provide an extracted slurry;- removing liquid from the extracted slurry to provide an extracted lignin; and- suspending the extracted lignin in a polar organic solvent to provide a lignin composition having a dry matter content of at least 30% by weight.The present invention also relates to a lignin composition comprising hardwood Kraft lignin and a polar organic solvent, which composition has a dry matter content of at least 30% by weight. The present invention also relates to use of the lignin composition as a fuel.
WO 2022076978 A1 20220414	UOP LLC (US)	**Process for producing diesel fuel from a biorenewable feed with recycled sulfur.** The process produces a diesel stream from a biorenewable feedstock by hydrotreating to remove heteroatoms and saturate olefins. The recycle gas is recycled to the hydrotreating reactor without removing hydrogen sulfide, which is needed in the biorenewable feed to keep the hydrotreating catalyst active. A purification unit can be utilized on a purge gas stream to purify the gas and improve hydrogen concentration in the recycle gas when added to the recycle gas.
WO 2022109749 A1 20220602	The Univ of New Brunswick (CA)	**Method for producing a high-phenolic-content biooil.** A method of pyrolysis of Kraft lignin is disclosed, including the steps of providing a microwave generator system, providing a Kraft lignin feedstock in the system, providing a biochar in the system as a microwave receptor, providing nitrogen atmosphere in the system, and heating the feedstock and receptor using microwave energy to make a biooil. A biooil made using the above method is also disclosed as is a biooil having a high phenolic content, in the range of 86.6% to 97.9%.

Nº Publicación	Solicitante (País)	Contenido técnico
KR 20220076561 A 20220608	-	**Manufacturing method for blending fuel of diesel engine by mixing bio-crude oil and liquid fuel.** The present invention is a blending fuel manufacturing method for a diesel engine, a first process of removing moisture, char and polymer substances from bio-crude oil; a second process of performing a catalytic reaction by mixing an alcohol and a solid catalyst with the biocrude from which the moisture has been removed; and a third process of removing the catalyst and mixing biodiesel.

PATENTES BIOPRODUCTOS

Biomateriales (de construcción, medicina, embalaje, etc.)

Biocomposites y biofibras

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022132003 A1 20220623	Baumgarten Thomas (SE)	**Elastomeric biomaterials and their manufacture.** The invention relates to an elastomeric material and its method of manufacture, comprising the consecutive steps of a) providing powdered birch bark; b) removing extractives to obtain a fraction comprising suberin; c) alkaline hydrolysis of the fraction comprising suberin, whereby suberin is broken down to suberin monomers; d) acidification of the fraction comprising suberin monomers, whereby the subein monomers are protonated; e) extraction of the suberin monomers, whereby the protonated suberin monomers are separated from hydrophilic compounds; f) melting the suberin monomers; and g) polymerizing the melted monomers, wherein no added catalyst is present during the polymerization, and wherein a cross-linked elastomer is obtained.
ES 2903291 A1 20220331	Carrero Garcia Marcos (ES)	**Recycling and recyclable product based on vegetable fibers from debris.** Recycling and recyclable product based on vegetable fibers from waste that, with a shape and variable composition according to the use assisting, and which can be for shoe soles, soundproofing plates, thermal insulating plates, bricks, or Others, obtained by compaction of their components through environmentally sustainable processes and machines, compacted vegetable fibers, obtained from debris or unusable residues and, as an agglutinating resins element, which, in turn, are made based on biocomposited materials.
WO 2022065382 A1 20220331	Daikin Ind Ltd (JP)	**Modified natural material and use thereof.** An oil repellent agent capable of imparting satisfactory oil repellency is provided using a natural material that is a biomass material in harmony with the environment. The oil repellent agent has a structure such that a hydrogen atom in a hydroxy group in a natural material having at least one hydroxy group is substituted by an R group. R group: -Y-Z [wherein Y represents a direct bond, -C(=O)-, -C(=O)-NR'- or -C(=S)-NR'- (wherein R' represents a hydrogen atom or a C1 to C4 alkyl group); and Z represents a hydrocarbon group having 1 to 40 carbon atoms and optionally having a substituent or a polysiloxane]. The natural material is preferably a monosaccharide, a polysaccharide, glycerine or polyglycerine.
WO 2022103347 A1 20220519	Izmir Egitim Saglik Sanayi Yatirim AS (TR)	**Long natural fiber reinforced polypropylene composites.** The present invention relates to long natural fiber reinforced polypropylene composites produced through the impregnation method, whose fiber/matrix interface is improved and is suitable for shaping by means of extrusion/injection. In particular, the present invention relates allows for promoting mechanical properties, decreasing the material density and reducing the wall thickness in mass production by means of long fiber use in polypropylene composite material that is employed in various sectors such as automotive, white appliance, electric and electronic.
WO 2022070147 A1 20220407	Keravos Ltd (NZ)	**Method for producing animal fibre-polymer composite products.** The invention generally relates to a method for producing a polymer-fibre composite comprising animal fibres, and use of the polymer-fibre composite as or in forming a feedstock for plastics manufacture. The composite is formed by rapidly heating animal fibres and one or more thermoplastic polymers and compressing, cooling and optionally mechanically processing to produce pellets, shards or powder. The animal fibres in the composite are substantially evenly dispersed throughout a matrix formed by the thermoplastic polymer(s) and the polymer-fibre. The composite has desirable properties for plastics manufacture including good processability in conventional machinery, low density, and improved tensile strength and tensile modulus.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022102671 A1 20220519	Nagoya Inst Tech (JP)	**Titanium oxide-cellulose fiber composite material and method for producing same.** The present invention addresses the problem of providing a method which is for producing a titanium oxide-cellulose fiber composite material and is a low environmental load process, and by which a composite material having higher durability than conventional composite materials is obtained. A method for producing a titanium oxide-cellulose fiber composite material according to the present invention comprises: (P1) preparing a cellulose fiber, and an aqueous solution containing ammonium fluorotitanate, boric acid, and water; and (P2, P3) precipitating titanium oxide on the surface of the cellulose fiber in the aqueous solution.
WO 2022117544 A1 20220609	RIC3D SRL (IT)	**Resin-based biocomposite for 3D printing.** A composition is disclosed comprising one or more commercially available 3D printing resins blended with material of plant origin, in which such composition exhibits improved mechanical properties compared to the corresponding unmixed resin in terms of flexibility, elasticity and resistance to prolonged use, also in contact with physiological solutions. In particular, commercially available resins for 3D printing are polymers suitable in stereolithographic printing (SLA) and in Digital Light Processing (DLP), in particular acrylic resins (homo polyacrylates or co-polymers or mixtures of these) and resins (or rubbers)) silicon. The invention also refers to the preparation of models (mock up) of organs or tissues (10) using the composition found, as well as the models thus prepared.
EP 4019222 A1 20220629	STR Automotive SRL (IT)	**Composite panel structure for motor vehicles and the like made of natural fibres and thermoplastic synthetic fibres.** The present invention relates to a polyfunctional self-supporting panel structure for use in the passenger compartment of a motor vehicle, particularly for lining internal parts of the passenger compartment of a motor vehicle or for providing a frame for the upholstery of a motor vehicle or an accessory for the seats of a motor vehicle and the like. Such panel structure comprises: at least one first panel, which is shaped and made of natural fibres and polypropylene and other synthetic thermoplastic fibres; in said at least one first panel there being defined a first face and one second face juxtaposed to the first face; and at least one second panel, which is shaped and made of natural fibres and polypropylene or other thermoplastic synthetic fibres; in said at least one second panel there being defined a third face and a fourth face juxtaposed to the third face; said at least one second panel comprising at least one portion shaped so as to form, at the fourth face, at least one protuberance carrying connection means so as to allow to connect, in use, said at least one second panel to a support component of a motor vehicle; Furthermore, the at least one first panel and the at least one second panel are mutually joined at at least one respective peripheral area and/or at least one respective inner area so that the first face and the third face face each other, and that the second face is directed, in use, towards the internal of the passenger compartment of a motor vehicle, and that the fourth face faces said support component of the motor vehicle.
EP 4008548 A1 20220608	Tetra Laval Holdings & Finance (CH)	**Barrier-coated cellulose-based substrate, laminated packaging material and packaging container comprising the cellulose-based substrate.** The present invention relates to barrier-coated cellulose-based substrates and to a method of manufacturing such cellulose-based substrates, by dispersion coating of a barrier pre-coating and subsequent vapour deposition coating of a barrier deposition coating. The invention further relates to laminated packaging materials comprising the barrier-coated celluose-based substrates, in particular intended for liquid carton food packaging, and to liquid carton packaging containers comprising the laminated packaging material.
WO 2022069805 A1 20220407	Woodly OY (FI)	**Co-extruded multi-layered cellulose-based film and a method for its manufacture and products manufactured therefrom.** Disclosed is a co-extruded multi-layered cellulose-based film, which comprises at least a first film layer A comprising at least one first cellulose-based polymer and at least one second polymer. The film further comprises at least one sealing layer B being an outer layer and/or a middle layer of said film, and at least one slip additive. Further, the film is produced by a film extrusion process. Disclosed are also packaging materials comprising the film and a method related thereto.

Bioplásticos		
Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022090960 A1 20220505	Biotrend Inovacao e Engenharia em Biotecnologia SA (PT)	**Process for extraction and purification of polyhydroxyalkanoates.** The present invention relates to a process for extraction and purification of polyhydroxyalkanoates (PHAs) from PHA-containing material obtained from different sources. The process comprises reacting PHA-containing material with H2O2 and adding an alkali up to a pH value equal to 9 or higher.
WO 2022092892 A1 20220505	CJ Cheiljedang Corp (KR)	**PHA composition and preparation method therefor.** The present invention relates to a polyhydroxyalkanoate (PHA) composition having improved stability and water resistance, and a preparation method therefor. According to the present invention, the aggregation of water-dispersed PHA particles can be prevented, and re-dispersion is induced so that precipitation can be prevented, and thus the dispersion stability and water resistance of PHA can be improved. In addition, the composition of the present invention minimizes the use of additives to enable recycling of biodegradable PHA, and has excellent compatibility with conventional commercial products and excellent room-temperature stability. Additionally, since overuse of a surfactant and an additional step of forming an emulsion are not required in the preparation of PHA, economic feasibility can be improved.
EP 4015574 A1 20220622	Despriet Gebroeders NV (BE)	**System for recycling polylactic acid in waste streams to obtain lactide.** The current invention concerns a system to produce a pure lactide monomer stream from a polylactic acid based waste stream by recycling the latter to produce the former. The system comprises an assembly of synchronized extruders and a recovery unit. The assembly comprises at least one extruder, and the unit comprises an assembly of vapor collectors and a plurality of traps. Lactide crystals are formed in said traps. The at least one extruder is a virtually infinite extruder. The system is adapted for a continuous process by adapting the recovery traps such that the lactide crystals are formed in some traps, while the lactide crystals are collected in some other traps, and continuously alternating functionally between said traps.
WO 2022113011 A1 20220602	Instituto Tecnologico del Embalaje Transp y Logistica (ES) et al.	**Halogen-free aqueous dispersions of biodegradable polymers and process for preparing the same.** Process for making a halogen-free water-based dispersions of biodegradable polymers having a long-term stability comprising i) providing a biodegradable polymer selected from poly(lactic-co- glycolic acid) (PLGA), poly(lactic acid) (PLA), poly(s-ca prolactone) (PCL), poly(butylene succinate) (PBS), poly(y-glutamic acid) (PGA), polyhydroxyalkanoate (PHA), or a copolymer or a mixture thereof, wherein at least 50% of said biodegradable polymer is in an amorphous state, ii) solubilizing it in a non-halogenated volatile organic solvent, which is at least partially immiscible in water, thus obtaining an oily phase, iii) preparing a water solution of a surfactant, and optionally a polysaccharide, iv) mixing both and homogenizing through ultrasound treatment at a temperature of 10-30°C, until an emulsion is achieved, and v) heating to evaporate the organic solvent. Also water-based dispersion of the biodegradable polymer having a particle size or lower than 600 nm and a dry matter content of at least 12wt% and its use as component of food-grade materials for food packaging.
WO 2022106465 A1 20220527	Nestle SA (CH)	**Cellulose based multilayer packaging with barrier properties for 3D-objects.** The present invention relates generally to the field of food packaging, in particular food packaging. One embodiment of the present invention relates to a three/dimensional cellulose/based food packaging with excellent barrier properties. For example, the present invention relates to a cellulose-based, multilayer, three-dimensional food packaging comprising a bioplastic layer, a barrier paper layer and a moulded cellulose layer. This cellulose-based, multilayer, three-dimensional food packaging has an oxygen transmission rate (OTR) of less than 30 cc/m2/d (23°C, 50%RH) and a water vapor transmission rate (WVTR) of less than 20 g/m2/d (38°C, 90 %RH).
WO 2022090498 A1 20220505	Novamont SPA (IT)	**Sequestered amorphous polyhydroxyalkanoate polymer (SAPP) material derived from cellular biomass and production thereof.** The present invention provides an efficient and cost-effective process to recover highly purified PHA homopolymers and copolymers, producing novel sequestered amorphous polyhydroxyalkanoate polymer (SAPP) materials derived from cellular biomass that are crystal competent. Such resulting materials (e.g., melt-derived solids and crystalline agglomerates), as well as methods of production of the sequestered amorphous polyhydroxyalkanoate polymer (SAPP) materials and subsequent processing, demonstrate cost-effective production of PHA polymer at commercial scale, which is heretofore not been achievable. Moreover, the methods and materials produced make feasible the long-awaited achievement in the industry for competitive commercialization of PHA homopolymers and copolymers from cellular biomass.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022123496 A1 20220616	Pinehurst Associates Ltd (NZ)	**Improved biodegradable composition and their methods for manufacture.** Forms of the technology relate to a biodegradable composition including at least one biobased or partially biobased polymer and at least one filler comprising processed organic matter wherein the filler is adapted to provide mechanical stiffness to the composition and/or provide one or more nutrient(s) to soil upon degradation of the composition in soil. The at least one biobased or partially biobased polymer may comprise a combination of polymers including polybutylene succinate (PBS) and polylactic acid (PLA). The filler may include processed organic matter obtained from animal matter, for example animal carcasses. Forms of the technology relate to the use of such a biodegradable composition for the manufacture of a container for plants.
WO 2022118091 A1 20220609	Splastica SRL (IT)	**Compostable plastic based on milk proteins and preparation process thereof.** Process for preparing a natural polymer-based plastic material, compostable at room temperature, comprising the steps of: a) preparing an aqueous solution containing casein and whey protein; b) heating the aqueous solution and collecting a predetermined volume thereof; c) adding a gelling agent to the predetermined volume of the waste liquid to obtain a primary mixture; d) inducing the coagulation of the casein and whey protein in the primary mixture, said step of inducing the coagulation comprising the addition of an acidic aqueous solution to the primary mixture, so as to obtain an aqueous suspension of the primary mixture having a pH between 3 and 6; e) filtering the aqueous suspension of the primary mixture and collecting the filtrate, to obtain a wet precursor of the plastic material; f) dehydrating the wet precursor of the plastic material by compression, to obtain the plastic material.
WO 2022132053 A1 20220623	Univ Nanyang Tech (SG)	**A method for polyhydroxyalkanoate production.** Disclosed herein is a method for producing a polyhydroxyalkanoate, the method requiring the steps of: (a) providing a bacterial population mixture that has undergone an initialisation process; (b) adding a feed comprising a carbon source to the mixture to generate a feast phase for the bacterial population in the mixture; (c) subsequently subjecting the bacterial population to a famine phase by allowing the carbon source to become depleted and not adding any further carbon source to the mixture for a period of time; and (d) repeating steps (b) and (c) in an alternating pattern in the presence of a light source that has a wavelength greater than 715 nm. The method also involves periodically removing a portion of the mixture and harvesting a polyhydroxyalkanoate from the bacterial population in the removed portion of the mixture, where each periodical removal of a portion of the mixture is conducted during a feast phase before the carbon source is entirely depleted from the mixture. The bacterial population used in this method may be substantially formed from purple phototropic bacteria.
ES 2908750 A1 20220503	Univ Santiago Compostela (ES)	**Process for the production of polyhydroxialcanoats (PHA) and triacylglycerides (Tag).** Process for the production of polyhydroxialcanoats (PHA) and triacilglycerides (Tag). Biotechnological process of a single unit for the simultaneous recovery of polyhydroxialcanoats (PHA) and triacylglycerides (Tag). The present invention refers to a process for the production of biomass in the form of a mixed microbial culture that contains Pha and Tag. More particularly, this process includes certain stages that take place in a single discontinuous sequential reactor.

Bioproductos químicos (biofertilizantes, biocosméticos, biofarmaceúticos...)

Biofertilizantes, bioadhesivos, etc.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022120431 A1 20220616	Agriculture Victoria Serv PTY (AU)	**Biofertilizer endophytes of cannabis.** The present invention relates to novel endophytes of plants of the Cannabaceae family, particularly biofertilizer Enterobacter sp. endophytes, and also to plants and parts thereof infected therewith, and related methods, including methods for conferring biofertilization to plants and for selecting a biofertilizer endophyte of a plant of the Cannabaceae family.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022126242 A1 20220623	Evoco Ltd (CA)	**Plasticizer lignin compositions.** A composition comprised of lignin and plasticizer wherein said lignin is selected from the group consisting of at least one of a pal alkali lignin, a Kraft lignin, a Klasen lignin, a hydrolytic lignin, a lignin sulfite, and a lignin sulfate, wherein said lignin is dispersed in said plasticizer, followed by extracting the soluble lignin portion, filtering off the bulk of the formed unextracted insoluble lignin, and isolating the filtrate containing plasticizer and soluble lignin. Further, a polyurethane elastomer composition includes: (a) an organic diisocyanate, (b) a polyester resin, (c) a chain extender, (d) an optional crosslinker, (e) an optional colorant, (f) a surfactant, (g) a foaming agent, and (h) a composition comprised of a lignin and a plasticizer. Also, a process for the preparation of a polyurethane elastomer comprising mixing (a) an organic diisocyanate, (b) a polyester resin, (c) a chain extender, (d) an optional crosslinker, (e) a surfactant, (f) a foaming agent, and (g) a colorant; followed by mixing said (a), (b), (c), (d) when present, (e), (f) and (g), and a composition comprised of a plasticizer and a soluble lignin, said composition being generated by: forming a dispersion of said lignin and said plasticizer, removing the bulk unextracted insoluble lignin, and isolating the filtrate containing said plasticizer and said soluble lignin.
WO 2022114536 A1 20220602	LG Electronics Inc (KR)	**Adhesive, total heat exchange element and structure comprising dried adhesive layer, and production methods for same.** The present invention can be applied to the technical field of adhesives, and relates to, for example, an adhesive comprising cellulose fibres, a total heat exchange element and structure comprising a dried adhesive layer, and production methods for same. The present invention is an adhesive comprising solid content dispersed in water, wherein the solid content may comprise: nano cellulose fibres; and carboxymethyl cellulose having a carboxymethyl group.
EP 4011999 A1 20220615	Linkflix Inc (KR)	**Eco-friendly biodegradable adhesive composition.** The present disclosure relates to an adhesive composition containing a saccharide compound and a polyol compound, and a method for producing the same, and is capable of water separation and biodegradation while having excellent adhesive force. The substrate to which the adhesive composition is applied can be easily and completely removed from the adherend even in pure water. In addition, it is an eco-friendly adhesive composition that is safe for people, animals, fish, and freshwater organisms when the adhesive is removed, maintains a healthy natural ecosystem without toxicity and damage to soil, water quality, and green plants, and does not cause any concern about secondary environmental pollution.
WO 2022104760 A1 20220527	Nanjing Lishui High Tech Venture Capital Man Co Ltd (CN)	**Biomass-based compound fertilizer and preparation method therefor. A biomass-based fertilizer.** The biomass-based fertilizer mainly comprises the following raw materials in percentage by weight: 40-60% of a compound microbial inoculant, 2-8% of chitosan, 0.1-0.5% of a microbial probiotic, 0.001-0.01% of vitamins, 0.001-0.01% of minerals, 1-5% of an organic acid, and the balance of water. The biomass-based fertilizer contains microorganisms and minerals, and can promote plant growth; the raw materials are environment-friendly and pollution-free, the soil microbial community structure can be adjusted, and a good microenvironment of the soil can be maintained; the preparation method is simple, and is suitable for industrial production.
ES 2903008 A1 20220330	Neoalgae Micro Seaweeds Products SL (ES)	**Fertilizer composition comprising liquid purif and obtaining method.** The present invention describes bioostimulating fertilizer compositions and their obtaining process. Fertilizers are produced from a hydrolysis reaction whose aqueous element is purine from livestock farms and the protein source is biomass of microalgae. The fertilizer has similar or even superior NPK values compared to other fertilizing compositions based on biomass of microalgae lacking purine, and higher concentration of free amino acids, which favors the development of plants.
WO 2022106789 A1 20220527	Saint Gobain Adfors (FR)	**Binder composition based on biosourced ingredients and use thereof for forming non-woven glass-fibre webs.** The invention relates to an aqueous binder composition comprising - 10 to 40% by weight of a hydrogenated sugar, - 25 to 55% by weight of citric acid, - 25 to 50% by weight of a polysaccharide which is dissolved in the aqueous binder composition and chosen from the group consisting of functionalised starches and dextrins having a weight-average molar mass of between 150,000 and 2,000,000 and a solubility in water of between 50 and 85%, and - 1 to 10% by weight, preferably 2 to 6% by weight, of sodium hypophosphite or hypophosphorous acid, said percentages being expressed relative to the total dry weight of the binder composition. It also relates to a method for manufacturing non-woven webs based on mineral or organic fibres using such a composition and the non-woven webs thus obtained.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022097014 A1 20220512	Stora Enso Oyj (FI)	**Lignin-Based Bonding Resin.** The present invention relates to a bonding resin comprising lignin and plasticizer. The invention also relates to a method for producing the bonding resin as well as the use of the bonding resin. The bonding resin is useful for example in the manufacture of laminates, mineral wool insulation and wood products such as plywood, oriented strandboard (OSB), laminated veneer lumber (LVL), medium density fiberboards (MDF), high density fiberboards (HDF), parquet flooring, curved plywood, veneered particleboards, veneered MDF or particle boards. The bonding resin is also useful for example in composites, molding compounds and foundry applications.
EP 3995538 A1 20220511	Swiss Krono Tec AG (CH)	**Sugar-containing binder system for wood material boards, a method for producing a wood material board using this sugar-containing binder system and wood material board obtained by this method.** The present invention relates to a binder system for wood-based panels comprising: a first component comprising at least one sugar, at least one sugar alcohol, at least one starch or a mixture thereof; a second component comprising at least one polyvinyl alcohol; and a third component comprising at least one isocyanate. The invention also relates to a method for producing a wood-based panel using this binder system and a wood-based panel produced by this process.
WO 2022081666 A1 20220421	Univ Arizona (US)	**Modified guayule resin/soy protein blends for bio-based adhesives, associated methods for forming same, and associated structures including such adhesives.** An adhesive composition for use in coupling together two substrates to form a structure, such as for use in coupling together two wooden substrates to form a wooden structure, includes a mixture of a modified guayule resin and soy protein. The modified guayule resin can be a base- solvent modified guayule resin or can be an HiCh-modified guayule resin each respectively formed from an unmodified guayule base resin. The unmodified guayule base resin is obtained in a rubber extraction process of guayule at solvent removal temperatures ranging from 104 to 166 degrees Celsius. The method for forming the adhesive composition includes forming a modified guayule resin and mixing the formed modified guayule resin with soy protein. The adhesive composition, when used in forming structures, provides enhanced wet shear strength as compared with adhesive compositions including soy protein alone.

Biocosméticos, Biofarmaceúticos

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022098210 A1 20220512	Activon Co Ltd (KR)	**Cosmetic composition comprising red rice fermentate and preparation method therefor.** The present application relates to a cosmetic composition comprising a red rice fermentate and a preparation method therefor and provides a cosmetic composition and a preparation method therefor, wherein the composition exhibits excellent stability or safety suitable for use in cosmetic products and has an excellent anti-inflammatory or anti-oxidant effect.
EP 4018994 A1 20220629	Clariant Int Ltd (CH)	**Composition comprising oils, free fatty acids and squalene.** The present invention relates to a composition comprising a triglyceride-containing oil, jojoba oil, a free fatty acid or a salt thereof, and squalene. The present invention also relates to the use of such a composition as a skin conditioning agent.
WO 2022098829 A1 20220512	Inolex Investment Corp (US)	**Biobased glyceryl heptanoate ester compositions and methods of making and using the same.** The present invention relates to biobased glyceryl heptanoate compositions, and preferably glyceryl monoheptanoate compositions, methods of manufacturing the same, as well as applications thereof including the use of the inventive compositions in formulations for cosmetics and other personal care applications. The biobased monoglyceryl monoester (MGME) compositions include a mixture including one or more compounds of Formula (I): R1, R2, and R3 are independently –H or –C(O)-C6 alkyl. The composition comprises greater than about 60 wt% and less than about 98 wt% glyceryl monoheptanoate. The carbon present in the one or more compounds of Formula (I) is biobased. The composition has an ET50 value of >24 hr when tested as a 1% solution in water according to the EpiDerm Skin Irritation Test (OECD 439). The present invention also relates to microbiostatic concentrates (MBCs) including the disclosed composition.

Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022064473 A1 20220331	KDC/ONE Dev Corporation Inc (CA)	**Silicone-free antiperspirant and deodorant compositions.** Described herein are antiperspirant and deodorant compositions which are advantageously free of silicone. Particular embodiments concern silicone-free compositions comprising at least one emollient, at least one structuring agent, and at least one natural or synthetic wax, wherein the at least one emollient comprises isoamyl laurate. Embodiments also concern silicone-free antiperspirant and deodorant compositions comprising a plurality of emollients, the plurality of emollients comprising isoamyl laurate. Also described are methods for making these compositions and others. Also described are uses of the silicone-free compositions for manufacturing antiperspirant sticks or antiperspirant creams, and/or for controlling malodors and transpiration.
WO 2022123167 A1 20220616	Laboratoires de Biologie Vegetale Yves Rocher (FR)	**Cosmetic use of a combination of nasturtium and tetraselmis extracts.** The present invention relates to a combination comprising a nasturtium extract and a tetraselmis extract, as well as to a cosmetic use of the combination for a cosmetic anti-aging action on the skin and/or its appendages and/or mucous membranes. The present invention also relates to a composition comprising the combination of a cosmetically and/or dermatologically acceptable carrier. The present invention further relates to a device comprising the composition or the combination, as well as to a non-therapeutic cosmetic method for improving the appearance of the skin, comprising an application of the composition or the combination on the skin.
WO 2022072060 A1 20220407	Oreal (FR) et al.	**Serums for reducing lipid peroxidation.** Cosmetic compositions comprising high amount of Silybum Marianum Extract, relatively high amounts of skin active ingredients chosen from salicylic acid, ascorbic acid, a cinnamic acid derivative, or a mixture thereof; c) one or more surfactants; d) from about 3 to about 15 wt.% of Propylene Glycol; e) from about 5 to about 18 wt.% of Dipropylene Glycol; and f) water; and wherein the composition has a pH not higher than about 5.
WO 2022094428 A1 20220505	Rea Deeming Beauty Inc Dba Beautyblender (US)	**Methods and systems for producing a bio-based cosmetic sponge and blender.** Systems, devices, and methods for a cosmetic sponge (100, 110) comprising: a prepolymer material and a bio-based material (202), where the prepolymer material and the bio-based material are reacted with an additive component comprising water and bio-based material dissolved in the water (204).
WO 2022093748 A1 20220505	Rikarbon Inc (US)	**Renewable oils: composition, process of making and formulation.** This invention relates to processes for making bio-based renewable oils from non-food biomass sources. Such renewable oils are used for cosmetics formulations. More specifically, disclosed are processes of preparation of furan-based compounds of the formula: (R1-A)a-CH(R2)-CH2-CH(R3)(A-R1)b wherein: a and b are independently 1 or 2 and 0 or 1; A is: independently an unsaturated, a partially hydrogenated, or a fully hydrogenated saturated fur an ring; -(CH2)4-; a saturated fur an ring-opened moiety containing a hydroxyl or a ketonic group: -CH2-CH2-CH2-CH2- OH or -CH2-CH2-CH2-CH=O; or a partially saturated furan-ring opened moiety containing a hydroxyl or a ketonic group: -CH2-CH2- CH=CH-OH or -CH2-CH=CH-CH=O where the position of the double bond is anywhere within the chain; R1, R2, and R3 are: independently selected from H, a furan ring, a tetrahydrofuran ring and alky1 groups having carbon atoms of 1 to 18; and the total carbon content of the compound is from 10 to 40.
WO 2022064406 A1 20220331	Sofar Swiss SA (CH)	**Compositions comprising a vegetable chondroitin or an analogue thereof and the use thereof in the treatment of disorders of the mucous membrane of the oral, pharyngo-laryngeal and/or gastro-oesophageal tract.** The present invention relates to mixtures or compositions comprising a chondroitin sulfate of plant origin or an analogue thereof (algae extract) and to the use thereof in the preventive or curative treatment of diseases and symptoms caused by gastric reflux in the gastroesophageal tract or in extra-oesophageal regions, and ulcers, lacerations and/or inflammations of the mucous membranes or the lining tissues of the various anatomical regions present in the tract from the stomach to the oral cavity, also including the upper respiratory tract.
ES 2914517 A1 20220613	Univ Granada (ES)	**Compuesto para reduccion de tejido adiposo blanco y tratamiento de sobrepeso y obesidad.** La presente invención se refiere al ácido ß-resorcílico, para su uso en la reducción de la cantidad de tejido adiposo blanco. Los inventores han descubierto que el ácido ß-resorcílico causa una reducción selectiva de tejido adiposo blanco sin afectar la masa muscular esquelética. La presente invención permite así el uso terapéutico del ácido ß-resorcílico en la prevención de la acumulación de tejido adiposo blanco o reducción de tejido adiposo blanco La presente invención se refiere también a una composición farmacéutica, al uso no terapéutico del ácido ß-resorcílico y a una composición nutracéutica o alimento funcional, producto dietético o suplemento nutricional.

Bioaditivos alimentarios		
Nº Publicación	Solicitante (País)	Contenido técnico
WO 2022108714 A1 20220527	Corn Products Dev Inc (US)	**Powdered chickpea-protein based emulsifer, uses and methods of manufacture.** The technology disclosed in this specification pertains to a powdered chickpea-protein based emulsifier comprising a soluble chickpea protein and a gelatinized but otherwise unmodified amylopectin. The soluble chickpea protein is not hydrolyzed, and the emulsifier is obtainable by drying the amylopectin and the chickpea protein together. The emulsifier is useful in high oil load and low oil load emulsions and provides emulsions stability against oil separation for at least several months.
WO 2022131453 A1 20220623	Daesang Corp (KR)	**Method for preparing oxidized saccharide composition having antioxidant activity.** One embodiment of the present invention provides a method for preparing an oxidized saccharide composition, comprising a step of converting, into oxidized saccharides, at least some saccharides, which constitute a saccharide composition, by adding a saccharide oxidase to a saccharide composition solution and oxidizing same. The saccharide composition contains 15-35 wt% of glucose and 20-60 wt% of isomaltooligosaccharide on the basis of the total weight of saccharides of the saccharide composition. The oxidized saccharide composition prepared by the preparation method of the present invention has a predetermined acidity and exhibits excellent antioxidant activity. The oxidized saccharide composition according to the present invention can provide multifunctionality such as acidity and antioxidation to foods if used as a food material and can provide multifunctionality such as moisturization and antioxidation to cosmetic products if used as a cosmetic material. Therefore, the oxidized saccharide composition prepared by means of the preparation method of the present invention can be used as a high-value-added material capable of providing multifunctionality in the food and cosmetic industries.
WO 2022117440 A1 20220609	DSM IP Assets BV (NL)	**Compressed tablets comprising HMO.** The present invention relates to compressed (robust) tablets comprising a specific amount of at least one human milk oligosaccharide (HMO).
WO 2022074217 A1 20220414	Dupont Nutrition Biosci APS (DK)	**Gelling composition for plant-based food product.** The present invention relates to a gelling composition to produce a plant-based food product. The composition comprises a mixture of plant-based protein, salts of alginate and a calcium source. In addition, the invention also relates to the plant-based food product containing the composition and the process of producing the same.
WO 2022129124 A1 20220623	Frieslandcampina Nederland BV (NL)	**Synthetic compositions comprising LNFP III AND LSTA.** A synthetic composition comprising a carbohydrate component, a fat component and a protein component, wherein the carbohydrate component comprises lacto-N-fucopentaose III (LNFP III) and sialyllacto-N-tetraose a (LSTa), preferably wherein the weight ratio between LNFP III and LSTa is between 1: 100 and 100:1.
WO 2022109283 A1 20220527	Gen Mills Inc (US)	**Texture-controlled fiber ingredient containing viscous soluble fiber and consumable food and fiber supplement products incorporating same.** A texture-controlled fiber ingredient containing a viscous soluble fiber and a non- crosslinked acid-reversible gel-forming compound is described. The ingredient can be contacted with a divalent cation solution and combined with a food ingredient or edible ingredient suitable for use in a supplement to produce a viscous fiber fortified food or fiber supplement. In some versions of a viscous fiber fortified food or fiber supplement, the viscous soluble fiber remains partially hydrated over shelf life of the food, and maintains a desirable texture over the shelf life. Some versions of a food mix or fiber supplement are in dry form.
WO 2022130309 A1 20220623	Gimber BV (BE)	**Method for preparing a ginger-containing beverage.** The invention relates to a for preparing a ginger-containing beverage, wherein ginger root juice, fruit base and optionally water are subjected to pasteurization to extend the shelf life of a drink obtained from these ingredients, the method comprising the steps of: - heating a first mixture of ginger root juice and optionally water to a temperature for pasteurization, and then pasteurizing the first mixture at said temperature in a first pasteurization step; - adding fruit base to the thus obtained pasteurized first mixture while cooling, thus obtaining a second mixture; - heating the second mixture to a temperature for pasteurization, and then pasteurizing the second mixture in a second pasteurization step, thus obtaining a ginger-containing beverage; and - filling the ginger-containing beverage into one or more containers.
WO 2022114076 A1 20220602	Jujo Paper Co Ltd (JP)	**Additive for use in production of air bubble-containing composition.** Provided is an additive for use in the production of an air bubble-containing composition, which can impart both of high air bubble stability and foaming properties. Carboxymethylated cellulose nanofibers in each of which the carboxymethyl substitution degree is 0.01 to 0.50 per a glucose unit and the crystallization degree of cellulose type-I is 40% or more are combined with a nonionic water-soluble polymer and/or a surfactant to produce an additive for use in the production of an air bubble-containing composition.

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WO 2022128596 A1 20220623	Nestle SA (CH)	**Creamer.** A creamer composition comprising sugar beet pectin, vegetable oil and bulking agent, a beverage capsule comprising such creamer, a beverage system comprising such creamer, a beverage composition comprising such creamer and a method of producing such creamer. Furthermore, the use of sugar beet pectin as an emulsifier in a creamer composition.
WO 2022061419 A1 20220331	Trisco ICAP PTY LTD (AU)	**Food grade thickener and methods for treating swallowing disorders.** The present invention provides a method for providing a food grade thickener, the method comprising the steps of: establishing an aqueous continuous phase of a first polysaccharide, adding a second polysaccharide to the continuous phase thereby forming a gelled mixture, hydrolysing the gelled mixture to reduce the viscosity of the gelled mixture, and adding a gum to the hydrolysed gelled mixture under conditions such that the gum only partially expresses its viscosity, thereby forming the food grade thickener. The invention also relates to a method of treating a subject suffering from a mastication and/or deglutition disease, disorder or condition, comprising the step of administering a foodstuff to the subject, wherein the foodstuff comprises the food grade thickener of the invention. The invention further relates to a storage and delivery system for a food grade thickener, comprising: a.) a container containing the food grade thickener of the invention, and b.) a pump dispenser sealingly attached to the container, wherein the dispenser comprises a valve for inhibiting or preventing drying of the composition in the container.

Bioproductos alimenticios para animales

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WO 2022096831 A1 20220512	Agro Innovation Int (FR)	**Raw material for animal nutrition comprising an organo-mineral complex containing dietary phosphate and a humic substance.** The invention relates to a food-grade raw material for animal nutrition, comprising an organo-mineral complex containing a food-grade phosphate and a humic substance. The raw material improves the digestibility of the ration, absorbs mycotoxins, and increases zootechnical performance.
EP 4014749 A1 20220622	Chongqing Sweet Pet Products Co Ltd et al. (CN)	**Edible pet chew.** An edible pet chew includes a first high density material member (or high-density material portion) and a second low density material member (or low-density material portion). In one aspect of the present invention, an edible pet chew is provided including a high-density tube member and a low-density material member. In another aspect, an edible pet chew includes a high-density sheet member and a low-density material member. In another aspect, an edible pet chew includes a co-extruded plural-layered tube member being formed from a layer portion of high-density tube material and a layer portion of low-density material. In yet another aspect, an edible pet chew includes a co-extruded "plural-layer-structured sheet" member being formed from a layer portion of high-density sheet material and a layer portion of low-density material portion.
WO 2022073142 A1 20220414	Fundacion Fraunhofer Chile Res (CL)	**Fish feed supplements made with polyphenol-rich extracts obtained from agroindustrial byproducts.** Provided is a composition for use in the production of fish feed supplements, which comprises standardised extracts of agroindustry byproducts, including mainly a mixture of olive and grape extracts, rich in phenolic alcohols, secoiridoids, lignans, flavonoids, anthocyanins, proanthocyanidins and resveratrol. The composition according to the present invention comprises a mixture of the described standardised extracts, mixed in certain proportions and micro-encapsulated, and can be used as a feed additive that can be added in the step in which the pellets are coated with oil.
WO 2022081524 A1 20220421	Hills Pet Nutrition Inc (US)	**Pet food compositions.** Described herein are pet food compositions and methods for using them. Such compositions may comprise soluble fiber and certain ratios of linolenic acid to fatty acids. The methods may include feeding the pet an effective amount of the pet food composition. The methods may include increasing the lean mass of a companion animal comprising feeding an effective amount of a pet food composition comprising soluble fiber and certain ratios of linolenic acid to fatty acids.
EP 3984375 A1 20220420	Nukamel NV (BE)	**Use of a low-lactose dairy-based milk replacer for bovines.** The present invention related to a low-lactose dairy-based milk replacer for bovines, for preventing and/or stimulating active immunity against Clostridium perfringens related alimentary tract conditions, especially necro-haemorrhagic enteritis. In addition, the invention relates to a kit of parts for use in preparing the low-lactose dairy-based milk replacer of the invention. Furthermore, the invention relates to a lactase-enriched dairy-based milk replacer for bovines.
EP 3995002 A1 20220511	Samda Co Ltd (KR)	**Feed composition for farmed fish using fermented porcine blood.** A feed composition for farmed fish using fermented porcine blood having an effect of promoting the growth of farmed fish is proposed

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WO 2022119013 A1 20220609	Shin Se Gye (KR)	**Method for producing amino acid animal feed additive using blood from slaughter.** The present invention relates to a method for producing an animal feed additive comprising amino acid separated from blood from slaughtering, an animal feed additive produced thereby, and an animal feed composition, and provides: an animal feed additive that is free of odor and has increased nutritional components, being abundant in amino acids; and a method for producing the animal feed additive. Moreover, waste can be reduced by recycling by-products of slaughtering.
WO 2022061474 A1 20220331	Sustento Inc (CA)	**Food and supplement formulations.** The present invention relates to a companion animal (e.g. pet) food and/or supplement formulations, and more particularly to a novel animal product or by-product -free, naturally based food and/or supplement formulation that has the nutritional profile of those made with animal products (e.g. meat based).
EP 4014750 A1 20220622	Tereos Starch & Sweeteners Europe (FR)	**Croquettes for pets and method for preparing them.** The present invention relates to pet food comprising a mixture of vital wheat gluten and hydrolysed wheat gluten and a process for the preparation thereof.
WO 2022079192 A1 20220421	Tessenderlo Group NV (BE)	**Improved method for producing highly digestible hydrolyzed keratinaceous material.** The invention relates to a method for producing highly digestible, partly hydrolyzed keratinaceous material, preferably from feathers, hair, wool, hooves or nails, comprising the steps of (1) hydrolyzing keratinaceous material in the presence of water, in a hydrolyzer with heat and at a pressure between about 2 bar and about 100 bar to obtain a partly hydrolyzed keratinaceous material; (2) pre-drying the partly hydrolyzed keratinaceous material of step (1) to obtain a semi-dried partly hydrolyzed keratinaceous material having a solids content of about 50wt% or higher, preferably between 60 85wt%; and (3) concurrently drying and grinding the semi-dried partly hydrolyzed keratinaceous material of step (2) in an air turbulence mill, at about atmospheric pressure to obtain dried partly hydrolyzed keratinaceous material; wherein preferably steps (2) and (3) are carried out such that the drop in pepsin and/or ileal digestibility caused by steps (2) and (3) is less than 10%, and/or the pepsin and ileal digestibility of the dried partly hydrolyzed keratinaceous material is higher than respectively 75% and 80%; wherein the resultant dried partly hydrolyzed keratinaceous material comprises at least partly insoluble material, and wherein the average particle size of the dried partly hydrolyzed keratinaceous material (d50) leaving the air turbulence mill is between 20 µm and 0.7 mm and the d90 is below 1 mm as measured with laser diffraction using a dry powder Beckman Coulter particle size analyzer.

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