Profile Status: Published

Technology Offer

Novel biotechnological production process of itaconic acid

Summary

A German university developed an innovative way to produce itaconic acid by using genes encoding of unicellular fungi which improves the production process remarkably. The university offers a license agreement as well as a technical cooperation agreement.

Creation Date	17 November 2016
Last Update	16 October 2017
Expiration Date	27 May 2018
Reference	TODE20161107001
Public Link	https://een.ec.europa.eu/tools/services/PRO/Profile/Detail/bc23450a-e29b-43ff-b0c7-80fb16d7476f

Details

Description

Itaconic acid is one of the top bio-based chemical building blocks and thus a promising platform compound for the production of polymers, coatings, chemical compounds and biofuels. It is an important monomer for the synthesis of, e.g. poly-acrylates, rubber, colours, additives, adhesives, emulsifying agents, lipids, pharmaceuticals, herbicides and biodegradable polymers for the packaging industry.
A German university developed an innovative production process of itaconic acid. Currently, itaconic acid is commercially produced by microbial fermentation using filamentous fungi of the genus Aspergillus, such as A. terreus. This itaconic acid producer is well characterized, but has several disadvantages. Filamentous fungi are particularly problematic as their morphology is difficult to be controlled in fermentation systems, thus the synthesis process and the quality of production is varying.
The herewith offered innovative production process of itaconic acid uses genes encoding for the biosynthesis pathway of unicellular fungi from the family of Ustilaginaceae, in particular Ustilago maydis. By modification of these genes the efficiency of itaconic acid production can be markedly improved and enables a more reliable process with less risk of batch failure. Another advantage over A. terreus, which is also classified as a toxin-producing animal pathogenic fungus in certain countries which is limiting its applicability at industrial scale, is that the species Ustilago maydis has a history of safe use. In addition, Ustilago maydis can be easily genetically engineered and grown in liquid culture up to high cell densities and good to handle temperatures of up to 34°C.
The university offers a license agreement as well as a technical cooperation agreement. A technical cooperation could imply the optimization of the already patented process as well as the realization of additional advancements.

Advantages and Innovations

The German university developed an easy to handle biosynthesis with unicellular fungi to produce itaconic acid. Compared to the current proceedings the methodology offers the following advantages:
- More effective biotechnological production process of a basic chemical platform component
- Overexpression of itaconic acid in recombinant host cells
- Novel itaconic production genes and pathway allows more freedom to operate
- Expression cassette and vectors encoding itaconic acid synthesis pathway are available
- Safe use

Stage of Development

Field tested/evaluated

Comments Regarding Stage of Development

Market ready version of a new biotechnological process.

IPR Status

Patent(s) applied for but not yet granted

Comment Regarding IPR status

European Patent Office

Profile Origin

Private (in-house) research

Keywords

Technology

02007014	Plastics, Polymers
05001004	Organic Chemistry
06002001	Biochemistry / Biophysics
06002006	Synthetic Biology
06006011	Fermentation

Market

04004	Other Genetic Engineering
04007	Enzymology/Protein Engineering/Fermentation
08001007	Coatings and adhesives manufactures
08001016	Commodity chemicals and polymers

NACE

M.72.1.1	Research and experimental development on biotechnology

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Issuing Partner

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Open for EOI : Yes

Dissemination

Send to Sector Group

Bio Chem Tech

Client

Type and Size of Organisation Behind the Profile

University

Year Established

0

Already Engaged in Trans-National Cooperation

Yes

Languages Spoken

English
German

Client Country

Germany

Partner Sought

Type and Role of Partner Sought

The university offers a license agreement as well as a technical cooperation agreement. This offer addresses companies from the chemical or biotechnology sector. A technical cooperation could imply the optimization of the already patented process as well as the realization of additional advancements.

Type of Partnership Considered

License agreement
Technical cooperation agreement

Attachments

Profile Status: Published

Technology Offer

Sustainable production of biofuel (bioethanol) from shellfish waste

Summary

A Spanish research group has developed a new process by using fungi to produce bioethanol and fungal biomass from shellfish waste. It is a sustainable alternative to agroforestry crops currently used. The technology uses chitosan as a sole source of nutrients, and it produces bioethanol in profitable, sustainable and environmentally friendly manner. The group is looking for companies interested in acquiring the technology for commercial exploitation by license or research cooperation agreement.

Creation Date	29 April 2016
Last Update	06 November 2017
Expiration Date	15 May 2018
Reference	TOES20160425002
Public Link	https://een.ec.europa.eu/tools/services/PRO/Profile/Detail/49fb16b9-9317-4937-acca-cdc2b87122ff

Details

Description

The decline in oil reserves is raising interest in biofuels as alternative to fossil fuels. Liquid or gas biofuels are obtained from biomass. Biodiesel and bioethanol are the only biofuels currently produced and used on a large scale worldwide. Bioethanol is the most widely used biofuel.

Current biofuel production is mainly carried out by yeast fermentation of plant raw material with high sugar content. Yeasts have high growth potential under fermentative conditions since they tolerate high concentrations of substrate and they are highly resistant to the ethanol than they themselves produce. However, the use of plant raw materials for biofuels means serious economic, social and environmental problems due to the increase in the cultivated area for this purpose. In this sense, the high demand for agricultural biofuels would be a huge effort to produce enough raw material, which would in turn adversely affect food price and availability.

To solve these problems, it is advisable to use alternative substrates to crops that would allow high biofuel production at competitive costs. Agroforestry, industrial or fish waste are potential raw materials for biofuel production. However, most of these residues require pre-treatments (e.g. chemical or enzymatic pre-digestions) prior to yeast fermentation that complicate production and increase costs.

In the other hand, chitin is one of the most abundant biopolymers on the Earth. It is a key component of the exoskeleton of many invertebrates (insects, crustaceans, molluscs,

nematodes), and into the cell wall of some fungi. Shellfish waste (especially crustaceans) is an abundant and readily available (a fishing industry by-product) source of chitin. Since it is nitrogen rich, its disposal has a negative environmental impact, mainly due to ammonia toxicity.

Chitosan is a chitin derivative with high antimicrobial activity spectrum (bactericidal and fungicidal), useful both in medicine and agriculture. However, chitosan has not been used as biofuel raw material, since traditional fermenting organisms (eg. Saccharomyces cerevisiae), are sensitive to chitosan and therefore unable to use it. Consequently, new strategies to use chitin waste which would reduce its negative environmental impact are needed.

The Spanish university research group has developed a novel process for producing biofuel (bioethanol) and fungal biomass for sustainable crop pest management as by-product. This novel process can use waste from the shellfish industry (or other sources of chitin or chitosan), as an alternative raw material to the use of crops or agroforestry residues. This process is a sustainable way to eliminate the pollution caused by shellfish waste. It uses nematophagous and entomopathogenic fungi which are able to grow efficiently in anaerobiosis, producing ethanol from the reducing sugars obtained from chitosan, chitin or their derivatives (produced as a result of the degradation of the shellfish industry waste). These nematophagous and entomopathogenic fungi are:
•Pochonia chlamydosporia
•Beauveria bassiana
•Metarhizium anisopliae

Fungi (as conidia and chlamydospores) are at given concentrations that allow rapid and abundant growth without producing self-inhibition.

It is only needed basic skills in the growth of microorganism. The main application sectors for this technology are:
• Biofuel production (bioethanol) as an alternative to ethanol produced by fermentation processes (using yeast) from plant as raw material.
• Production of fungal biomass for sustainable crop protection.
• Biodegradation and decontamination of shellfish industry waste (the high nitrogen content of this waste leads eutrophication, so that its uncontrolled disposal has serious environmental problems).

The group is looking for companies interested in license agreement for commercial exploitation or technical/research cooperation agreement to adapt the technology to the specific need of the market.

Advantages and Innovations

Advantages:

• Fungi can grow under high chitosan concentrations (more than 2 mg/ml), which are toxic to other microorganisms conditions, thus reducing culture contamination.
• Fungi use chitosan as the sole source of nutrients.
• Fungi produce a large amount of reducing sugars which are fermented into ethanol (bioethanol).
• Fungi can grow under anaerobic conditions.
• Fungi are able to tolerate the amount of ethanol that they themselves produce in the culture medium (no self-inhibition occurs).
• Fungi encode in their genomes zinc-dependent alcohol dehydrogenases and pyruvate decarboxylases that are required to produce ethanol.
• Fungi produce ethanol and fungal biomass from chitosan rich residues of the shellfish industry waste, thus reducing pollution they cause.
• The process is sustainable and environmentally friendly.
• It is profitable process.

Innovations:

It has been developed a new procedure for producing biofuel (bioethanol) using shellfish industry waste and nematophagous or entomopathogenic fungi. It is a sustainable non-food alternative to crops or agroforestry waste processed, instead of the traditional fermentation processes.

Stage of Development

Under development/lab tested

Comments Regarding Stage of Development

It has been obtained under laboratory conditions up to 2% ethanol by growing aerobic and anaerobically nematophagous and entomopathogenic fungi (Pochonia chlamydosporia, Beauveria bassiana, Metarhizium anisopliae) with chitosan as the sole nutrient source.

The research group has the know-how to scale-up and improve their results to pre-industrial level to show their full potential and profitability.

This technology is part of the field of Biotechnology . It is a novel process for ethanol and fungal biomass production as by-product using entomopathogenic and nematophagous fungi and a source of chitosan.

IPR Status

Patent(s) applied for but not yet granted

Comment Regarding IPR status

This technology is protected by a Spanish patent application and PCT (Patent Cooperation Treaty)

Profile Origin

National or Regional R&D programme

Keywords

Technology

04005003	Liquid biofuels
04005006	Solid biomass
06006012	Bioprocesses

Market

04010	Microbiology
06003009	Biomass and Biofuels

NACE

M.72.1.1	Research and experimental development on biotechnology

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Open for EOI : Yes

Dissemination

Send to Sector Group

Bio Chem Tech

Client

Type and Size of Organisation Behind the Profile

University

Year Established

1979

Already Engaged in Trans-National Cooperation

Yes

Languages Spoken

English
French
Spanish

Client Country

Spain

Partner Sought

Type and Role of Partner Sought

The research group is looking for a company interested in acquiring a license agreement for a worldwide commercial exploitation.

Also, it is also seeking companies or entities that are interested in signing a research cooperation agreement to develop new strategies for industrial bioethanol production.

Type and Size of Partner Sought

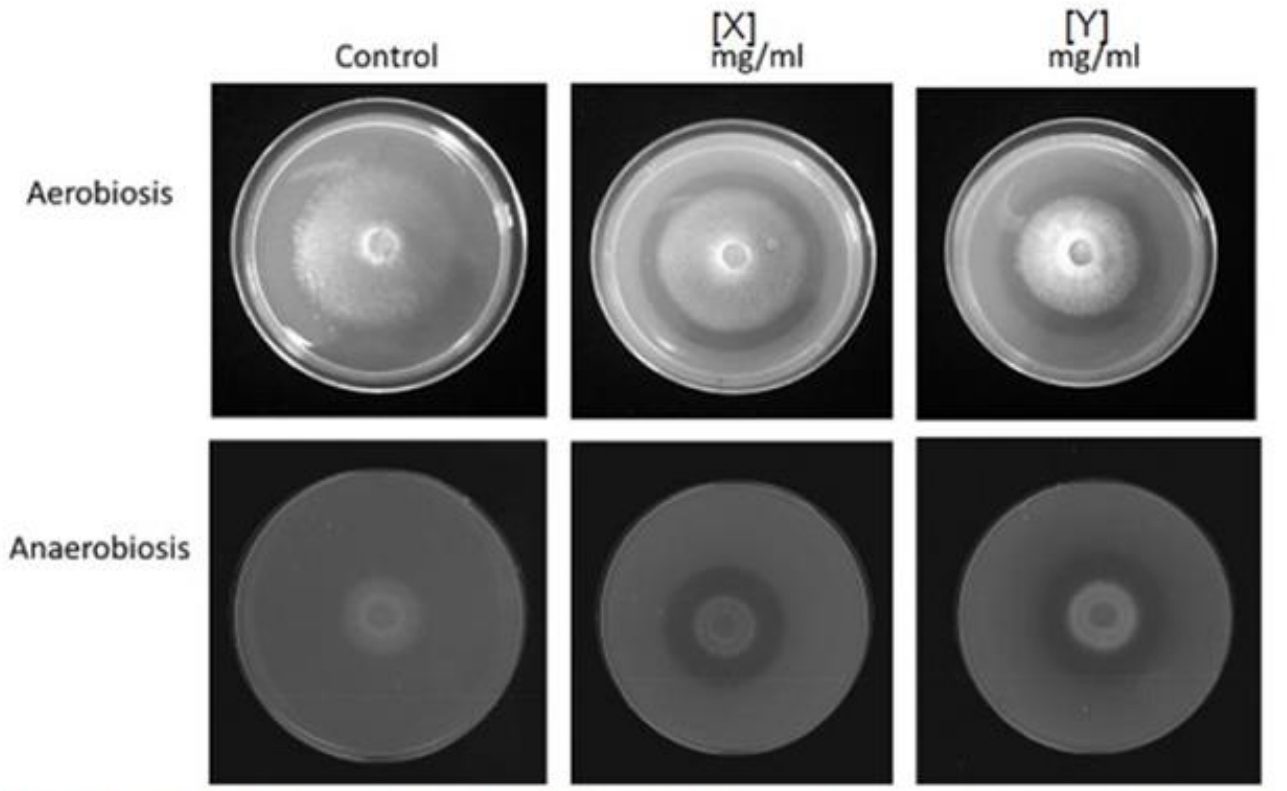
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Type of Partnership Considered

License agreement
Research cooperation agreement

Attachments

Figure.jpg



Appearance of 15 day-old colonies of Pochonia chlamydosporia growing with chitosan under aerobic and anaerobic conditions . The dark halo around the colonies of the fungus corresponds to the degradation of chitosan.

Profile Status: Published

Technology Offer

Finnish diagnostic SMEs offer their Upconverting Nanoparticles (UCNP) technology chemistry and detection tools for out-licensing

Summary

Two Finnish SMEs have developed Upconverting Nanoparticles (UCNP) technology chemistry and detection tools and are now offering them for out-licensing. The companies are looking for development and research partners to utilize the UCNP technology chemistry tools and detection systems for healthcare, environment and pharma assay development. The cooperation is considered to be in the form of license agreement.

Creation Date	07 October 2016
Last Update	10 October 2017
Expiration Date	16 April 2018
Reference	TOFI20161007001
Public Link	https://een.ec.europa.eu/tools/services/PRO/Profile/Detail/e500f5c1-e5b9-4f51-ba72-59321e975c3d

Details

Description

Two Finnish diagnostic industry SMEs have as a joint venture developed Upconverting Nanoparticles (UCNP) technology chemistry and detection tools. The companies have jointly accumulated a combined experience of more than 100 years in developing world leading assay development chemistries and detection tools both for research and In Vitro Diagnostic (IVD) use.

UCNP is a comprehensive concept built around a novel label technology known as photon upconversion. In this unique technology, upconverting nanoparticles (UCNPs) convert near-infrared (NIR) radiation to visible light via a unique process that enables the photoluminescence to be measured entirely free of autofluorescence and scattered excitation light.

UCNP particles are 35 nm sized inorganic crystals that are doped with two kinds of lanthanide ions, [Yb3] Ytterbium [Yb3] as sensitizer ion and erbium [Er3] as activator ion. The Yb3 ion absorbs an NIR photon and transfers the energy to Er3 , which stores the energy in a long lifetime intermediate state. This allows time for the second NIR photon to arrive and “pump” the energy to a higher energy state, after which a single high-energy visible light photon is emitted. This process requires considerably less excitation power than two-photon excitation [TPA] technology owing to the long-lived intermediate energy states of the lanthanide ions.

The UCNP particles are available either as ”ready-to-use” labels with streptavidin coupling, or with an amine reactive surface for use in a specific application.

The developed UCNP detection system is a small footprint, versatile and compact multimode plate reader system, with excellent performance featuring UCNP measurement option and with an ability to be upgraded to contain other commonly needed reference detection modes. Assays and research parameters are easily modified utilizing the instrument own software and tests can easily be added to the instrument menu.

The companies are looking for development and research partners that would utilize the UCNP technology chemistry tools and detection systems for healthcare, environment or pharma assay development. The cooperation is considered to be in the form of license agreement.

Advantages and Innovations

The UCNP particles provide several advantages such as the elimination of autofluorescence due to the NIR-excitation which enables the detection through tissue and even whole blood. The emission is bright, the bands are discrete and they have a long lifetime. When using UCNP particles no photobleaching or self-quenching is seen.

Research institutes developing various bioaffinity assays, SMEs or bigger companies in the life science field developing for example quantitative lateral flow for point-of-care environment, can improve their existing method with a new type of detection system based on UCNP particles and advanced instrumentation.

A small footprint, versatile and compact multimode plate reader, with excellent performance which is the first commercially available plate reader with an UCNP reading option. This new system brings the new UCNP technology into the life science laboratory. Consisting of UCNPs together with a unique microplate reader the system is the first of its kind in the world and offers many benefits over traditional label technologies. With UCNPs by converting near-infrared radiation (NIR) into visible light the emission signal can be measured free of auto-fluorescence and scattered excitation light. The emission signal comes from lanthanide ions being very stable with a long lifetime (from µs to ms). These two factors render the instrumentation simple, yet robust. This scientific collaboration results in the option of measuring up-converting nanoparticles. This offers a possibility to achieve a more than two orders of magnitude better signal to noise ratio versus traditional measurements preformed with Lateral Flow - gold particles.

• Autofluorescence eliminated
• Detection even through tissue and in whole blood
• Measurement without photobleaching or self-quenching

Ideal for
• bioaffinity assays
• quantitative lateral flow tests
• microscopy and imaging

Stage of Development

Already on the market

Comments Regarding Stage of Development

The basic assay/kit development tools i.e. Chemistry upconverting nanoparticles and instrumentation are available. Development support exists. Looking for an assay/kit expert developer.

IPR Status

Patents granted

Profile Origin

Private (in-house) research

Keywords

Technology

06001005	Diagnostics, Diagnosis
06001013	Medical Technology / Biomedical Engineering
06004	Micro- and Nanotechnology related to Biological sciences

Market

05001002	In-vitro diagnostics
05001007	Other diagnostic
05004003	Laboratory equipment
05004004	Medical instruments
05004005	Diagnostic equipment

NACE

M.72.1.1	Research and experimental development on biotechnology

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Open for EOI : Yes

Dissemination

Send to Sector Group

Bio Chem Tech

Restrict Dissemination to Specific Countries

Austria, Belgium, Canada, Croatia, CzechRepublic, Denmark, Estonia, Finland, France, Germany, Ireland, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, UnitedKingdom, USA,

Client

Type and Size of Organisation Behind the Profile

Industry SME 11-49

Year Established

0

Already Engaged in Trans-National Cooperation

No.

Languages Spoken

English
Swedish
Finnish

Client Country

Finland

Partner Sought

Type and Role of Partner Sought

Experienced and networked clinical, diagnostic, environmental or pharma assay developer or determination technology expert looking for a novel improved technology solution.

Type of Partnership Considered

License agreement

Attachments

Photo_2.png



Photo_3.png

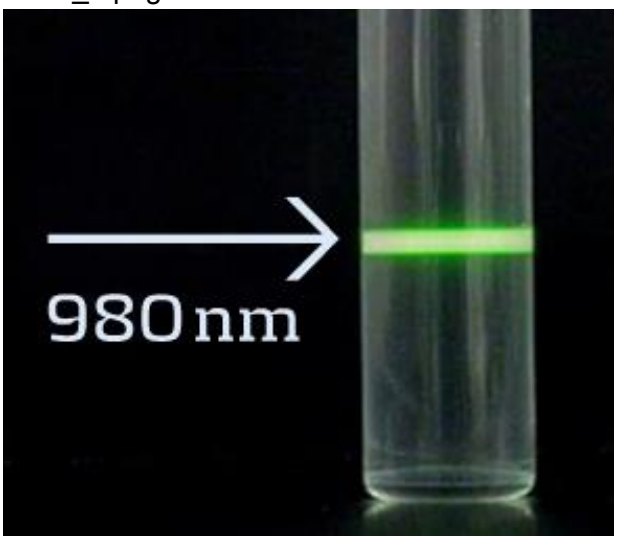


Photo_1.png


Control
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START
TRAY