PRESS RELEASE

Wound dressings made from bacterial alginate

Researchers establish a biotechnological process to produce bacterial alginate for use as the raw material for fibre-based medical products

BOENNIGHEIM, ZWINGENBERG, KELHEIM (27.07.2016) **In a joint project called "AlBioTex", researchers at the Hohenstein Institute, B.R.A.I.N AG ("BRAIN AG"; ISIN DE0005203947 / WKN 520394) and Kelheim Fibres GmbH have successfully developed wound dressings made from bacterial alginate. The aim of the project (sponsorship ID 031A126, in the Federal Ministry of Education and Research (BMBF) BioIndustrie 2021 programme) was to develop a biotechnological process to produce alginate and then process it into fibre-based products for use in wound dressings. The soil bacterium *Azotobacter vinelandii* was used as a natural alginate resource. This means that the conventional, time-consuming process of obtaining the biopolymer from brown algae can be avoided and replaced by a sustainable biotechnological process.**

The organisations involved in the research partnership were the Hohenstein Institut für Textilinnovation gGmbH in Boennigheim (William-

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Küster-Institut for Hygiene, Environment and Medicine), the bioeconomy company BRAIN AG in Zwingenberg, the world's leading manufacturer of special viscose fibres Kelheim Fibres GmbH, and the producer of highly specialised materials for medical engineering, rökona Textilwerk GmbH in Tübingen. Thanks to the interdisciplinary collaboration between the research partners, they have succeeded in mapping out for the first time a complete production and treatment process, from using biotechnology to produce bacterial alginate, right through to producing fibres and manufacturing textile materials.

Alginate is a biopolymer (polysaccharide) that consists of the glycosidically bonded monomers, guluronic and mannuronic acid. The range of industrial applications for the biopolymer is determined by the sequence and ratio of these two sugar components. Alginate is particularly suitable for use in wound dressings because of its excellent biocompatibility, enormous liquid-absorption capacity and good healing properties.

The conventional alginate that is obtained from algae varies greatly in the composition of its sugar components, because of environmental factors. A time-consuming preparation process is required to obtain the ultra-pure and biochemically defined alginate that is needed for medical applications, for example. Using biotechnology to produce alginate, on the other hand, offers the option of synthesising biopolymers which have defined properties and are of consistent quality for use in medical products.

Research work that began in 2013 has been able to establish, optimise and standardise the cultivation of the soil bacterium and the biotechnological process for producing and isolating bacterial alginates. By working specifically on optimising the bacterium's alginate biosynthesis, the researchers succeeded in improving the composition, and therefore the

properties and yield of the alginate. This meant that they could make customised alginates that are particularly suitable for producing fibres for use in medical products. In a pilot production facility, the research partners were able to spin fibres from alginate and alginate-viscose, and turn them into innovative nonwoven materials and wound dressings within the established process. When the new wound dressings were tested in use, the alginate product that had been made using biotechnology was impressive for its liquid absorption capacity, which was significantly better than that of commercially available marine alginate-based wound dressings. The bacterial wound dressings absorbed up to 70% more liquid than marine-based dressings.

"The results that were achieved from this successful research project will form the basis for incorporating bacterial alginate in industrial production," declared Dr. Guido Meurer, a member of the Management Board of BRAIN AG. "Now our next goal for the future is to identify other areas of application for bacterial alginate and so open up new sales markets for customised 'special alginates'," added Dr. Daniela Beck from Kelheim Fibres. "Until now it has been impossible, or very difficult, to vary and optimise the material properties of alginate. Thanks to biotechnology, there is now nothing to prevent the targeted use of alginate in specialist textiles," said a delighted Prof. Dirk Höfer of the Hohenstein Institute.

Companies interested in alginate products made using this biotechnological process are invited to share in the success of the research partnership. There are a range of possible areas of application for which the technology could be licensed.

About the Hohenstein Institute

Founded in 1946 as a family business, the Bönnigheim-based Hohenstein Institute is the leading independent research and testing facility in the textile sector, with a total of approximately 650 employees and over 40 offices worldwide. Its core competency is the practical research and development of innovative products and processes on one upon by numerous clients from trade and industry as a reliable basis for decisions regarding product development and marketing.

Through the interdisciplinary cooperation of textile engineers, chemists, physicians, biologists and physicists, the Hohenstein Institute is able to offer their customers a comprehensive, customised and complete service along the entire textile value chain, interweaving sectors depending on individual needs, all from a single source – from consultation to research and testing, through to education and training.

Research and development at the Life Science Department of Hygiene, Environment and Medicine is concerned with textilrelated health issues. The focus is on the interaction of metals and products with people and the environment.

www.hohenstein.de

About BRAIN

BRAIN AG is one of Europe's leading technology companies in the field of industrial biotechnology, the core discipline of the bioeconomy. BRAIN identifies previously untapped efficient enzymes, microbial producer organisms and natural substances in complex biological systems that can be put to use by industry. Innovative solutions and products derived from "Nature's toolbox" are already being successfully used in the chemical, cosmetics and food industries. BRAIN AG's business model is now based on two key pillars: "BioScience" and "BioIndustrial". The "BioScience" line of business is about collaborations - normally on the basis of exclusive licence agreements - between BRAIN AG and industrial partners. The second line of business, "BioIndustrial", is about developing and marketing BRAIN AG's own products and active product components.

www.brain-biotech.de

About Kelheim Fibres GmbH

Kelheim Fibres is the world's leading manufacturer of specialty viscose fibres. Kelheim combines advanced technology with technical expertise and outstanding customer service. Around 90.000 tons of viscose fibres are produced and tested at the Kelheim plant every year, which are then applied in a variety of product sectors. These highquality fibres are exported to 44 countries across 5 continents. Innovation is the central focus.

Kelheim Fibres promotes development partnerships with its clients and uses the pilot plant in Kelheim to create perfectly tailored fibres. Manufacturers of various end products - from high-tech clothing, to hygiene products, to specialty paper - rely on these fibres and search alongside Kelheim Fibres for future-oriented solutions.

www.kelheim-fibres.com

Fig. 1: Alginate-viscose fibres produced using bacterial alginate.

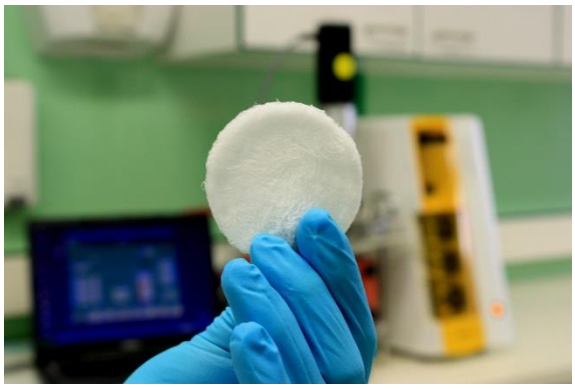

Fig. 2: Wound dressing (nonwoven/fleece) made from alginate fibres derived from bacteria. Bacterial alginate nonwoven materials absorb up to 70% more liquid than marine alginate nonwovens.

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