Hannover Messe and TechTextil

BIOTEXFUTURE showcasting results

BIOTEXFUTURE on stage: At two occasions, at the international TechTextil trade fair in Frankfurt as well as during the world famous industry trade fair, Hannover Messe, we were delighted to showcast the results of a number of projects, having been completed in the first half of 2024.

The following projects from the BIOTEXFUTURE innovation space were presented at the two trade fairs:

- **BioTurf** - The artificial turf of the future is green.
- **Co2Tex** - Innovative elastic yarns that bind CO2.
- **DegraTex** - Biodegradable geotextiles.
- **BioBase** - Functional sports textiles become bio.
- **LightLining** – Lightweight super-insulating nonwoven for sportswear.

BIOTURF – The artificial turf of the future is „green“ again

The aim of the BIOTURF project is to develop an artificial turf structure made of bio-polyethylene (PE) that is similar in it´s main properties to petroleum-based PE and has a mono-material structure enabling high-quality material recycling. Moreover, the new artificial turf structure does not require the addition of polymer infill granules, solving the current microplastic problem of artificial turf pitches.

Nowadays, municipalities and local authorities are increasingly opting to build artificial turf pitches instead of natural grass due the low maintenance requirements. Compared to natural grass, they offer an intensively usable, weed-free and weather-independent surface that does not need to be watered or fertilized and requires a minimum of maintenance by personnel.

On the other hand, the raw material, the structure and the incorporation of microplastic granulate pose various challenges. For example, the multi-layer structure of artificial sports turf, consisting of various components, is usually based on fossil raw materials. In addition, the numerous materials in the pile and base layers or in the carrier layer are difficult to recycle, and finally, there is a risk of microplastic infill material being released into the environment through rain, wind and other weather conditions. Due to this high environmental risk, the EU will ban „intentionally added“ material. Therefore, we successfully established a bio PE-based sport turf, without any need for further infill material. Already being in full use at the RWTH Aachen University Sport Center.

CO2TEX – Lifestyle compression stocking with TPU yarns, containing recycled CO2

In the CO2Tex project, we developed TPU yarns on an industrial melt spinning systems using polymers with a renewable content of up to 18 per cent by weight. With elongations of up to 600 per cent, diverse and innovative applications can be developed, such as the lifestyle compression stocking exhibited at the TechTextil trade fair.

As background: Elasticity is the ability of a textile to stretch or recover when required. This has a direct effect on functionality. Currently, elasticity in textiles is almost exclusively provided by so-called „elastanes“. Elastanes are elastic filament yarns, usually made from fossil-based elastomeric polyurethanes. The estimated production volume is around 1.22 million tonnes per year. The elastomeric character requires the use of dry spinning technologies for yarn production, which leads to challenges such as low production speeds and therefore comparatively expensive yarns.

In addition, potentially hazardous and environmentally harmful solvents are currently used in the production process – an appropriate occupational safety concept is therefore essential. At the end of the product life cycle, dry-spun elastanes impair recycling because the individual components of the textile cannot be separated with technically and economically justifiable effort. These challenges can be solved by using elastic, bio-based or CO2-containing TPU filament yarns.

DEGRATEX – Biodegradable Geotextiles

Geotextiles successfully fulfill a variety of functions such as separation, filtration, reinforcement, and erosion control. This diversity is reflected in the numerous applications of geotextiles, including insulation, dikes, slopes, mining, landfills, road construction, forestry, and landscaping. Each year, over 1.4 billion square meters of geotextiles are installed worldwide, with the market currently dominated by products made from petroleum-based plastics. Only 2% of current geotextiles are based on renewable Given the increasing ecological challenges, we have faced in recent years, particularly due to extreme weather conditions and heavy rainfall, geotextiles are expected to play an even more significant role in the future. There is likewise a need for permanent and temporary solutions, such as their use in protective walls and dikes or the temporary reinforcement of slopes or road construction.

The evironmental challange of geotextiles is their „durability“ as they are designed to last around 100 years. This meets the requirements for permanent structures, such as seawalls. However, for temporary applications, typically lasting one to two years, this durability is excessive and extends beyond the auxiliary function of the textile. In these cases, the materials remain in the soil without serving any further technical purposes. The goal of „DegraTex“ is to develop bio-based, biodegradable solutions for geotextiles intended for short-term applications, such as the temporary securing of soil structures or vegetation protection. These materials perform their function until they can be taken over by natural components, such as soil-stabilizing or ground-covering plants.

BIOBASE – Interior textiles made from biopolymers

The key challenge in the production of man-made fibres based on synthetic polymers is the dependence on fossil raw materials, which are subject to various ecological and, in the long term, economic and political risks, due to their finite nature. Polymers based on renewable raw materials represent an alternative. The aim of the project BioBase is establish biobased polymers in the textile industry and to demonstrate their full potential.

In the framework of BioBase we addressed home textiles as an application field, In this framework we developed interior textiles from biopolymers. In order to investigate the substitution potential of various biopolymers, an established, petroleum-based product is being recreated using polymers from renewable raw materials. For this purpose, commercially available bio-based polymers are selected, melt-spun into filament yarns, then air-textured and further processed into fabrics. In the manufacturing processes we adapt the machine settings along the textile value chain aacording to the respective material behavior of the biopolymers. Using this method, fabrics made from four different (partially) bio-based polyamides were successfully realized for use as interior textiles.

LIGHT LINING – Aerogel Fibres and textiles

Insulation materials are used in almost all areas. Today, they are often made from non-sustainable materials such as polyester, glass wool or foams. In most cases, these products have to be disposed of at great expense and are difficult or impossible to recycle. The use of bio-based aerogel fibre insulation materials should help to make a wide range of applications more sustainable and thus reduce the overall carbon footprint of the product while increasing it insulation performance.

Aerogels offer innovative solutions for a wide range of applications. In the textile and construction industries, for example, aerogels provide the possibility to minimize heat loss and thus improve the energy efficiency of textiles and buildings. The disadvantage of these aerogel products are that their production is very resource- and time-intensive and they are difficult to handle and process due to their brittleness. In addition, they can only be recycled to a very limited extent and are therefore not sustainable. To date, aerogel-based insulating materials have only been niche products, as they cannot compete with conventional insulating materials in terms of price. The project Light Lining has succeeded in developing a cost-effective and industrially scalable manufacturing process for insulating textiles made from 100 percent aerogel fibers. Cellulose aerogel textiles are not only sustainable, but also very flexible and drapable compared to conventional rigid or brittle aerogel products, so that they can also be processed on conventional textile machines. This development promises a new, globally unique, sustainable, highly efficient insulation material that combines the advantages of textiles (flexibility & good processability) with those of aerogels (very low weight & very good thermal insulation).

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