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Bioplastics World

The journal of biodegradeable, renewable and sustainable plastics

News

Bioplastics World provides independent analysis and exclusive primary market data on sustainable and renewable packaging trends, markets and technologies. Each issue provides exclusive reporting of latest material and product launches, trials and breakthroughs.

Bio-based polyester polyol used to make new synthetic leather

Flokser Textile, an Instanbul-based producer of leather, suede and polyurethane fabrics, has introduced a bio-based polyurethane faux leather that uses bio-based materials supplied by DuPont Tate & Lyle Bio Products and BioAmber.

The new Sertex synthetic leather fabric made its *debut in June 2015* and uses polyester polyol made from BioAmber's Bio-SA bio-based succinic acid, and DuPont Tate & Lyle Bio Products' Susterra bio-based 1,3-propanediol. The fabric is suitable for all faux leather applications, including clothing, home and commercial interiors, and outdoor and marine uses. It is currently being introduced to several reputable brands, Flokser says.

The faux leather fabric has 70% renewable content, and delivers improved scratch resistance and a softer touch than synthetic leather fabrics made with petroleum-derived chemicals. In addition to being phthalate-free, the Sertex brand of fabrics are water-resistant, easy to clean, abrasion-resistant and antibacterial, according to the company.

As Flokser is producing the synthetic leather from the base material stage, the mechanical properties of the fabric can be modified on demand, which allows for improved durability, adds company spokesperson Alp Sarici. He explains that Sertex can match the mechanical properties of leading polymer-based synthetic leathers, while offering a clear advantage in terms of carbon footprint.

Ekin Tükek, a Flokser board member, says: 'We have been working over the years on sustainability and have made remarkable steps, including being the first in Turkey to produce phthalate-free artificial leather polyurethane systems. We strive to work with global best-in-class companies to shape the future.

'Working with BioAmber and DuPont Tate and Lyle has helped us to generate fresh ideas, and develop new products that offer a unique combination of performance and sustainability for our industry.'

BioAmber is contributing its bio-based succinic acid (Bio-SA) to the Flokser Sertex product. Penetration of the polyurethanes market is part of the Montreal-based company's strategy to accelerate the adoption of green chemistry in existing petrochemical supply chains.

Sertex synthetic material has a 70% bio-based content and can be converted into a range of faux leather goods, including furniture

Source: Flokser Textile

Other industry news

● Belgian team pioneers method for lower cost PLA formulation

A paper has been published in the journal *Science*, outlining a mechanism for fabricating the biopolymer polylactic acid (PLA) for a fraction of its current cost.

The process based on a *shape-selective zeolite catalysis* has been developed by researchers at the Leuven University's Centre for Surface Chemistry and Catalysis in Belgian.

Project leader professor Bert Sels notes current procedures are expensive because of multiple steps that are needed to move from crop feedstocks like maize to useable PLA resin. He explains: 'First, lactic acid is fed into a reactor and converted into a type of pre-plastic under high temperature and in a vacuum. This is an expensive process.

'The pre-plastic – a low-quality plastic – is then broken down into building blocks for PLA. In other words, you are first producing an inferior plastic before you end up with a high-quality plastic. And even though PLA is considered a green plastic, the various intermediary steps in the production process still require metals and produce waste.'

The company has been working over the last five years on the use of bio-succinic acid in polyurethanes, according to BioAmber chief commercial officer Babette Pettersen. The sustainable chemical has been commercialised in multiple polyurethane applications, including cast polyurethanes, since 2014.

Considering its latest applciation, Pettersen says: 'This new eco-friendly artificial leather fabric from Flokser demonstrates the performance that bio-based materials can offer in technically challenging applications. The artificial leather made with our Bio-SA and DuPont Tate & Lyle's Susterra outperforms standard products, bringing better abrasion resistance and softer touch.'

The global addressable market opportunity for bio-based polyester polyols in artificial leather is estimated at 150 million kg (150,000 metric tonnes) - a 75 million kg market for bio-succinic acid and a 75 million kg for bio-1,3-propanediol, according to BioAmber.

The company adds that, when expanded to other polyurethane applications, the market potential is greater than 500,000 tonnes per year. Bio-succinic acid can replace adipic acid in the production of synthetic leather, wood and metal coatings, elastomers, and foams.

The Sertex polyurethane leather also includes DuPont Tate and Lyle's Susterra 1,3-propanediol as one of its sustainable building blocks. The chemical is certified 100% bio-based and is suitable for a variety of product applications targeting renewable content. In polyurethane this includes coatings, adhesives, sealants, and microcellular elastomers, thermoplastic polyurethanes, and aqueous polyurethane dispersions. Susterra 1,3-propanediol can be used in a polyester polyol and as a chain extender.

Susterra was used as the crosslinker in the production of Flokser's polyurethane fabric. The chemical's environmental benefits include a reduction in greenhouse gas emissions by 40% and using 40% less non-renewable energy in its production versus petroleum-based glycols.

Steve Hurff, vice president of marketing and sales for DuPont Tate & Lyle Bio Products, says: 'We are pleased with this new product launch in a major industrial segment of the polyurethane market, and we believe that working with Flokser, an industry leader, will drive market adoption.'

Other industry news (continued)

By introducing zeolites as a catalyst to the reactor phase, the Belgian team can accelerate and simplify this transformation. Zeolites are porous minerals and by controlling the size of their pores larger molecules can be excluded, eliminating the need to remove larger molecule byproducts in a pre-plastic phase, and minimising waste. A 'selectivity of nearly 80%' is reported by the authors for the zeolites.
If the new approach could be scaled it would cut the production costs, lowering cost barriers to commercialising PLA-based bioplastics in multiple applications.
This is already well advanced, according to Sels. He says: 'The Leuven University patent on our discovery was recently sold to a chemical company that intends to apply the production process on an industrial scale.
'Products made of PLA can now become cheaper and greener. Our method is a great example of how the chemical industry and biotechnology can join forces.'
The *full paper* on the zeolite process is available online from *Science*.
Sector(s): Bioplastics

● MHG debuts biodegradable fresh water fishing lure

US bioplastics innovator MHG has teamed up with a sports fishing supply company to produce an ecologically friendly fishing lure.
The new product is being shown for the first time to delegates at the *International Convention of Allied Sportfishing Tradeshow (ICAST)* in Orlando, Florida on 14-17 July. It has been developed in partnership with Bill Lewis Lures, an established company in the segment.
The angling aid made of MHG's polyhydroxyalkanoate (PHA) is in the form of Bill Lewis's existing Rat-L-Trap lure and is *certified to decompose* in a freshwater environment.
Paul Pereira, CEO of MHG, says: 'Fishing is a $73 billion (€67 billion) industry and the freshwater division makes up 82% of it. Partnering with Rat-L-Trap to make these popular lures in a biodegradable form is a big step in reducing plastic pollution produced by the fishing industry.'
Wes Higgins, president of MHG's latest collaborator, says: 'The PHA has a lot of potential and I am very excited about what we have seen so far. I am honoured to have our name associated with research that could lead to conservation of our fishing resources.'
MHG is entrenching its position in the state of Florida. On 7 July, the Georgia-headquartered company opened *new offices in Miami*, to better connect it to potential customers across the Americas and further afield.
Sector(s): Bioplastics

Researchers convert chitosan into aerosol foam to stop wounds haemorrhaging

A potentially life-saving emergency medicine based on a bio-derived material has been developed by academics working at the University of Maryland.

The research team has formulated a sprayable foam using chitosan that rapidly stops bleeding. The hydrophobically modified chitosan (hmC) works to form connections between blood cells in a wound 'via hydrophobic interactions.'

In tests conducted on a pig's liver, the team reports the hmC foam, which can be sprayed directly into an open wound using an aerosol, arrested bleeding 90% faster than control methods.

Chitosan is a biopolymer that is formulated from building blocks common nature in the shells of insects and crustaceans. To produce chitosan the naturally occurring chitin in these structure needs to undergo deacetylation using sodium hydroxide. The most ready feedstock for the University of Maryland foams and related products is already available in the carapaces of shrimp and other shellfish. It is estimated that *250 billion tonnes* **of such waste shells are discarded by the fishing industry worldwide.**

The new haemostatic treatment will be especially useful for combat medics and emergency workers dealing with traumatic injuries, like those to the torso, where compression cannot be applied to reduce blood loss.

Chitosan-impregnated haemostatic bandages have already been field tested by British and US forces serving in Afghanistan. Alternative technologies and products already exist to do this, but these can involve a strong exothermic reaction that may cause additional trauma to the patient and medical personnel.

The new foam research was summarised in a paper *Sprayable Foams Based on an Amphiphilic Biopolymer for Control of Hemorrhage Without Compression*, published in the journal *ACS Biomaterials Science & Engineering* **on 29 May.**

Remedium Technologies, a company spun-off from the University of Maryland, announced further progress on the commercialisation of chitosan-based clotting agents on 15 July. It has *received approval* **from the federal Food and Drug Administration (FDA) for the use of its Hemogrip Patch.**

The patch uses the same clot-boosting properties to control bleeding in veins arteries in hospitals during surgery.

Chitosan-based aerosols are promising a fast-acting spray to allow medics to stem blood loss in critically injured patients

Source: Remedium Technologies

Other industry news

● Mitsubishi biopolymer turned into smartphone screen

In Japan a bioplastic is replacing glass in the high-profile application of smart device screens for the first time.

The new Aquos Crystal 2 handset from Sharp will *carry a front panel* formed of the Durabio brand bioplastic developed by Mitsubishi Chemicals. This uses plant-derived isosorbide as its feedstock.

The use of the biopolycarbonate resin in this high-performance application is testament to the material properties of Durabio – specifically to balance shatter resistance and high transparency, which has not previously been possible, even with mainstream polycarbonates.

These good material qualities have also been shown in a separate collaboration with car manufacturer Mazda. It is using the Mitsubishi bioplastic to form the moulded outer panels of its MX5 model sports cars (see *Bioplastics World* 3.1, 19 January 2015).

As the lifetime for smart devices decreases, the pressure to employ more sustainable materials is likely to rise in this high-value segment (see *Bioplastics World* 3.8, 30 April 2015). Virgin Mobile and US accessories company Sprint are among the firms already using bioplastics for the moulded outer casing of smart devices.

Sector(s): Bioplastics

Remedium board member Tim Askew says: 'This is a significant regulatory milestone for us. It shows that the FDA is comfortable with this new technology platform and opens the door for us to raise money, build out the product pipeline, and enter into distribution relationships.'

As the non-military medical applications for chitosan develop, it will build the market in an application that can accept the current high cost of its conversion from chitin feedstocks.

Data from Transparency Market Research notes that, in 2013, biomedical and pharmaceuticals accounted for slightly under a quarter of a total world market for chitosan it *valued at $1.35 billion* **(€1.24 billion). Demand is set to rise steeply to the end of the decade at an annual rate of 17.7%, however, yielding a market forecast to be worth $4.22 billion in 2020.**

Other industry news

● Odour-defeating nanocellulose film developed by Swedish researchers

A team of academics from Sweden has published a paper describing progress in designing a food packaging film that eliminates odour from aromatic foods like onions and cheese.

The researchers are employing cellulose nanofibrils (CNF) – a nanostructured preparation of wood fibres – to create flexible films that trap the sulphur often responsible for bad smells. Analysis showed that the CNF–zeolite films were able to reduce the levels of negative odours below the level detectable by the human olfactory system.

The work is described in the paper *Nanocellulose–Zeolite Composite Films for Odor Elimination*, published in the journal *ACS Applied Materials & Interfaces* on 10 June.

Sector(s): Advanced packaging; Bioplastics; Food contact