Technical TEXTILES international

Autumn 2023
Volume 32, Number 3

Informing the industry worldwide

The future of textile manufacturing showcased at *ITMA*

Coating silicon carbide fibres for high-performance composites

INSIDE:

ITMA Asia + CITME returns to Shanghai after postponement

Polylactic acid for the production of fibres

Lightweight and comfortable chemical-protective suits

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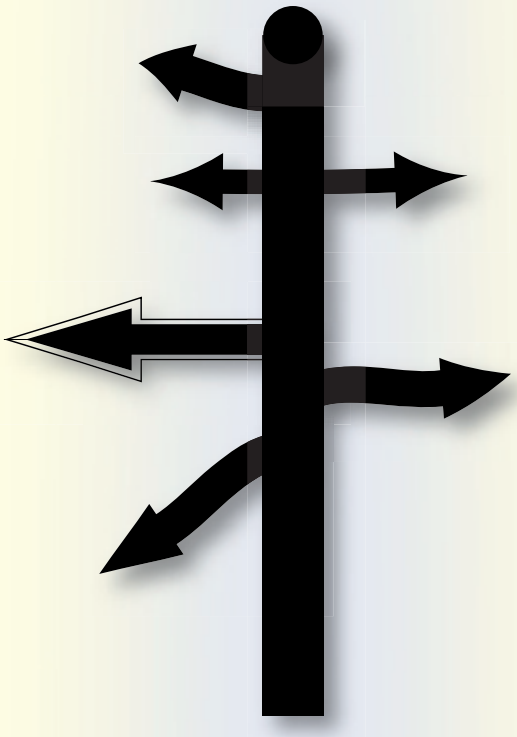

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Autumn 2023
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In the Editor's opinion

On 14 June 2023, the doors to the exhibition halls of Fiera Milano Rho in Italy were closed, marking the end of another edition of *ITMA*. For anyone who has not been lucky enough to attend the show, its sheer scale, and the constant hustle and bustle of the halls, is difficult to convey in words. Reflecting on the show for my review, starting on page 11, it is hard to describe as anything other than a great success, especially given the current geopolitical circumstances.

Walking the halls of the show, it was clear that textile machinery manufacturers are doing much to help their customers reduce the environmental impact of their operations. A significant number of technologies launched there have been developed with savings in energy, water and materials in mind, as well as recycling and circular production. This is partly driven by legislation, such as the European Union (EU)'s *Strategy for Sustainable and Circular Textiles*, which calls for textile products sold in the EU to be more durable, and easier to re-use, repair and recycle. It is also driven by simple economics; what is good for the environment can also be good for the bottom line. There was also the feeling, however, that the textiles industry realises that it must be the driver of its own change. For all concerned, this is hugely encouraging.

Of course, the huge number and variety of innovations on show at *ITMA* cannot all be covered in a single feature article. Our coverage and analysis of the exciting developments presented at the show will continue in the pages of future issues of this magazine and on our sister website, technical-textiles.net.

Further, there is still much to look forward to in the remainder of 2023. The impact of *Strategy for Sustainable and Circular Textiles* will be a key topic of discussion at the 62nd edition of the *Dornbirn Global Fibre Congress (GFC)*, which takes place in Austria on 13–15 September 2023. The plenary lectures will address aspects of this legislation.

The Chief Executive Officer (CEO) of Lenzing, Stephan Sielaff, will cover the development of a circular economy from the perspective of the cellulose fibre industry. The Director General of the European Apparel and Textile Confederation (EURATEX), Dirk Vantyghem, will provide an overview of the strategy and what it means for companies operating in Europe. Our editors will be there to cover the conference, but in the meantime, you can read about the progress made by a regular participant, IFG International Fibres Group, in its quest to manufacture fibres from the biopolymer polylactic acid (PLA), starting on page 21.

In addition, on 19–23 November 2023, *ITMA Asia + CITME* returns to Shanghai, in China, following the postponement of the 2022 editions. The mood of participants at the shows will be buoyed by the potential for improvement in the Chinese economy. The International Monetary Fund (IMF) recently revised its forecast for the growth of China's gross domestic product (GDP) in 2023, from 4.4% to 5.2%. You can read our preview, starting on page 17, and we will of course provide updates on the plans of the exhibitors as they are revealed on technical-textiles.net.

Technical TEXTILES international

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ITMA served to showcase the innovations, such as this MicroPunch line from Dilo, that will shape the future of textile manufacturing. James Bakewell's review of the show starts on page 11

AMRC Technical Fellow Steffan Lea processing coated silicon-carbide fibres for the reinforcement of cermic-matrix composites on a three-dimensional weaving loom (see also, page 10)

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Further information at https://www.technical-textiles.net

Teijin Frontier introduces nonwoven microcarriers for cell culture

Teijin Frontier's nonwoven microcarriers for the rapid and large-scale culture of a wide range of high-quality cells.

Nonwoven microcarriers that enable the rapid and large-scale culture of a wide range of high-quality cells has been developed by Teijin Frontier of Osaka and the University of Fukui, both in Japan.

The company says that the structure of the microcarriers enables cells to grow along its constituent fibres in three dimensions, and facilitates the circulation of the culture medium and oxygen necessary for cell growth. The microcarriers can, for instance, be used to culture mesenchymal stem cells, which could be used in regenerative medicines to create such as nerves, muscles and bones.

Traditional methods for cell-culture generally rely on two-dimensional (2D) planar substrates, such as culture dishes and T-flasks. These apparatuses, however, have small cell-adhesion areas, hundreds of them are required to culture a few grammes of tissue, and the methods used are equipment- and time-intensive.

Bioreactors can culture a large quantity of cells efficiently. The nonwoven microcarriers can be used in fixed-bed and agitation bioreactors; the shaking of the culture using mild shear forces enables them to culture a large number of cells within a week without the need to change the culture medium.

Further, the highly porous structure of the microcarriers creates a large surface area, which allows more cells to be cultured than with the use of conventional scaffolding materials, according to Teijin Frontier. The company's research has demonstrated that they can increase the number of cells cultured by 30% over four days, when compared with conventional bead-type microcarriers used in bioreactors.

Teijin Frontier will start to ship samples of the nonwoven microcarriers to research institutes and universities, and manufacturers of pharmaceuticals and cosmetics, in July 2023. It will increase its efforts in marketing the microcarriers in 2024 and hopes to achieve global sales of ¥100 million in its 2026 fiscal year.

Teijin Frontier is part of the Teijin Group of Tokyo, Japan.

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Award for developers of biodegradable synthetic fibres and nonwovens

The developers of a technology that enables the production of biodegradable polyolefins for use in nonwovens for hygiene applications have received an I*nnovation Award* from INDA at the *World of Wipes 2023 International Conference*.

Polymateria Global of London, UK, has developed a proprietary formulation for the production of biodegradable plastics, which it calls Biotransformation technology[(1)]. In March 2023, Indorama Ventures (IVL), of Bangkok, Thailand, secured exclusive rights to use the technology for ten years to help its customers create biodegradable fibres and spunmelt nonwoven products, such as wipes and face masks[(2)].

Biotransformation is supplied as a masterbatch that is tailored to a given base resin and is added as the resin is converted into an end-product. The company says that the technology lies dormant during the service-life of the end-product and does not affect its functionality. Once disposed of and exposed to weather and microbial life, the end-product will turn into a wax-like material that is no longer a plastic and is not harmful to the environment. Under mesophilic/ambient temperature conditions, the wax is broken-down into carbon dioxide, water and biomass through mineralisation by bacteria and fungi found in natural environments.

Polymateria Global says that polyethylene (PE) and polypropylene (PP) films, and rigid packaging produced using Biotransformation technology biodegrade fully in 1–2 years.

The Chief Executive Officer (CEO) of IVL's Hygiene Group, Shachar Rachim, says: "If the product comprising the Biotransformation technology is not exposed to the triggering conditions of sunlight, heat, air and moisture, then it can be recycled by readily available means."

The *World of Wipes 2023 International Conference* took place in Atlanta, Georgia, USA, on 17–20 July.

See also: [(1)]*Partners to develop biodegradable synthetic fibres and nonwovens*, https://www.technical-textiles.net/node/76193

[(2)]*Indorama Ventures and Polymateria sign exclusive partnership*, https://www.technical-textiles.net/node/77095

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Freudenberg launches strong, smooth fabric for packaging parts

As shown here, Evolon Ultra Smooth is hydrophobic and has a point-sealed patterned white surface that is very different from standard Evolon packaging textiles.

A low-linting, strong, smooth and hard-wearing microfilament fabric for the packaging of industrial parts has been launched by Freudenberg Performance Materials of Weinheim, Germany.

Called Evolon Ultra Smooth, the fabric provides low-friction sliding behaviour during the packing and handling of parts. Further, it is hydrophobic and available in different weights. The fabric has a point-sealed, patterned white surface that is very different from standard Evolon packaging textiles, which makes it easily identifiable.

Using Freudenberg's process for producing Evolon fabrics, bicomponent filaments are spun before being split to generate microfilaments that are then hydroentangled using high-pressure water jets. Unlike staple fibres, filaments cannot release fibres or lint because they are virtually endless. At the same time, extremely fine microfilaments do not create micro-scratches on sensitive parts.

Evolon fabrics have a highly durable, soft and smooth surface that is scratch-resistant, breathable and completely lint-free, preventing damage to moulded plastic parts, delicate paint-work and highly complex components. Further, a large proportion of the polyethylene terephthalate (PET) from which the fabrics are made can be sourced from recycled material.

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Synthetic muskox wool could be used as insulation for Arctic environments

Initial research conducted by researchers in the USA indicates that raw wool fibres from muskoxen such as these – a material also known by the indigenous term qiviut – can be used to improve the thermal insulation provided by textiles.

The use of synthetic variants of muskox wool as insulation in military uniforms for Arctic environments is being explored by researchers at the Air Force Research Laboratory (AFRL) at Wright-Patterson Air Force Base, Ohio, USA, and their partners.

Initial research conducted by the researchers indicates that raw muskox-wool fibres – a material also known by the indigenous term qiviut – can be used to improve the thermal insulation provided by textiles. When combined with natural or synthetic polymers, such as polyamide (PA), through electrospinning, qiviut could be used to create a textile that is lighter, stronger and more environmentally sustainable than the merino-wool cold-weather garments traditionally used by US Air Force personnel.

Research Biomedical Engineer at AFRL, Mark Tyler Nelson, says: "Most of the cold-weather garments that the United States military uses are simply not graded to a level as cold as the Arctic might get. For a while, goose-down filler was sort of the gold standard in terms of providing warmth, but there are a lot of ethical concerns surrounding its utilisation. It is also ineffective if it gets wet. The other common alternative, merino, dominates the wool industry, but it is expensive."

Merino wool is costly in part because the vast majority – roughly 81% – is imported to the USA from Australia. It also gets very heavy when wet.

A Materials Science Engineer at AFRL's sister organisation, the Air Force Life Cycle Management Center (AFLCMC), Braden Li, says: "We want the fabric to be breathable, because if they start sweating in all of this heavy clothing, as soon as they take it off and get hit with an Arctic chill, they can get frostbite, maybe even freeze to death. So, it is a matter of balancing thermal insulation with sufficient weight, dexterity and breathability. Muskox-wool keratin has the potential to allow us to create a textile that offers all of those properties."

While qiviut shows potential, it, like merino, is expensive to source, and owing to the limited number of herds, creating an adequate supply chain for muskoxen wool in the USA is not feasible.

Geneticist and Associate Professor at Cornell University's Department of Animal Science in Ithaca, New York, USA, Jay Huson, says: "In the wild, an Alaskan muskox only produces maybe one offspring every one-to-three years — perhaps more on a domesticated farm."

Huson has been collecting samples of deoxyribonucleic acid (DNA) from a herd of domesticated muskoxen for her own research for more than 15 years.

Through a contract with AFRL, Huson provided samples of raw muskox wool to researchers in the Biomaterials branch, who tested the material to establish that its thermal insulating properties are analogous to merino.

"It is not a secret that when you compare qiviut to merino sheep's wool, muskoxen have finer, stronger fibre that is at least as warm, if not warmer, than merino, which makes it an ideal cold-weather material," Huson says, "but muskoxen populations are limited."

The research team's focus therefore shifted to how they might recreate a synthetic version of qiviut – a material that could essentially mimic all the qualities of natural muskox-wool fibres – by recombinantly expressing muskox fibre proteins in *Escherichia coli* bacteria.

AFRL researcher Blake Stamps says: "Our scientist essentially isolated the keratin gene, one of the structural components of that muskox fibre, and then another scientist took that and stuck it into a bacterium, and *E. coli* is making it now. We can ferment synthetic muskox keratin fibre in bacteria, purify it, and get that material over to the electrospinning scientists."

Researchers can potentially use the electrospinning process to tailor the properties of the synthetic material, combining it with other polymers such as PA, to create a textile that meets their specifications for warmth, weight, flexibility and breathability.

The team now plans to scale-up their method for producing keratin protein in the laboratory and hopes to be able to work with the textile industry to develop the technology further.

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Durable groundcover fabric is made using recycled material

A durable interwoven polypropylene (PP) groundcover fabric for weed-control has been launched by Beaulieu Technical Textiles of Comines-Warneton, Belgium.

Called Recover, the fabric contains 30%-by-weight post-industrial waste sourced from Beaulieu's recycling unit, reducing carbon dioxide emissions associated with the production of the fabric by 35%, according to a life-cycle analysis (LCA) conducted by the company.

Beaulieu's Sales Manager Agrotextiles, Maarten Balcaen, says that Recover is unique among groundcover fabrics, owing to the performance it delivers and the amount of recycled content it contains. He adds that less virgin PP is required to manufacture the fabric than would otherwise be needed and that it can be recycled at the end of its working life.

Groundcover fabrics are typically used for a minimum of ten years and face repeated heavy mechanical stress and friction from vehicles, temperature fluctuations that can cause instability and shrinkage, and significant exposure to ultraviolet (UV) radiation over this period.

The Beaulieu Technical Textiles team with its Recover fabric on the floor and background.

According to Beaulieu, Recover demonstrates a good balance between strength and elongation, and is highly resistant to friction. The fabric is also resistant to UV radiation (up to 900 kilo langley) and maintains its stability during fluctuations in temperature. Its dense structure prevents visible light from passing though it, while its black-and-white design limits the amount of heat it absorbs and makes it easier to position pots and plants accurately on top of it.

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Converting waste polyester textiles into metal–organic frameworks

A method for converting dyed scrap polyethylene terephthalate (PET) clothing into fire-resistant, antibacterial or wrinkle-preventing coatings that could then be applied to textiles is being developed by researchers at Cornell University in Ithaca, New York, USA.

The method comprises cutting textiles into pieces and chemically depolymerising them to yield 1,4-benzenedicarboxylic acid (H2BDC), also known as terephthalic acid, a building block of carboxylate-based metal–organic frameworks (MOFs), before an acidic copper solution is added. The component parts of PET share an affinity with the copper, and selectively link together metal compounds to form MOFs.

Prior to this research, it was believed that dyes and other impurities would interfere with the process of producing MOFs from waste PET, but this proof-of-principle of the method – known as controlled crystallisation – shows that the PET-derived linkers can seek-out and attach to metal compounds in solution, in spite of contaminants.

The MOFs can then be used to make coatings, the structures of which can be tailored to achieve specific functionalities. These might include coatings that prevent textiles from wrinkling and coatings for making clothes fire-retardant.

Professor of Fiber Science & Apparel Design and Director of the Textiles Nanotechnology Laboratory in Cornell's College of Human Ecology, Juan Hinestroza, says: "One goal of my laboratory is to create a universal coating that will serve all these purposes, though we are still far away from that."

See also: *Industrial & Engineering Chemistry Research*, Volume 62, Issue 14, pp 5771–5781, *Upcycling of dyed polyester fabrics into copper-1,4-benzenedicarboxylate (CuBDC) metal–organic frameworks*, https://doi.org/10.1021/acs.iecr.3c00226

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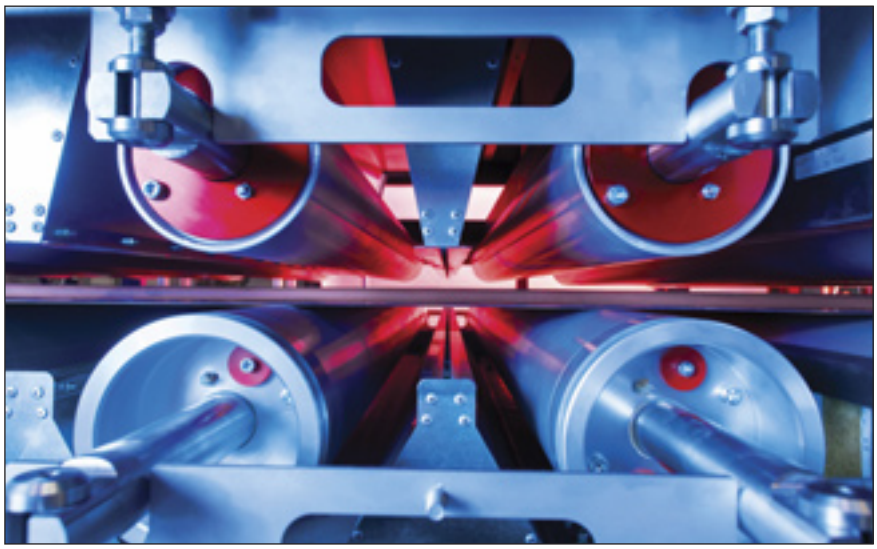
Double-belt presses and precision scattering systems shown in Milan



IPCO says that the modular design of its ThermoPress press systems enables a range of production steps – including polymerisation, curing and cooling – to be conducted in a single, continuous process.

A range of double-belt presses based on steel and polytetrafluoroethylene (PTFE) belts, or combinations of the two, for the manufacture of composites were shown by IPCO, of Fellbach, Germany, at *ITMA*.

The company says that the modular design of its ThermoPress press systems enables a range of production steps – including polymerisation, curing and cooling – to be conducted in a single, continuous process. A choice of belt types and pressure modules enables the presses to be configured to meet virtually any requirements with regard to the heat and pressure they generate.

At IPCO's centre of excellence, a 1600-m^2 test and demonstration centre near Stuttgart in Germany, a full range of processes can be assessed, from consolidation/calibration, lamination and impregnation, to tempering and cooling.

The centre can be used to evaluate, for instance, the consolidation of pre-laminated sheets and the impregnation of fibres with resin. Resin can also be applied in powder, film or liquid form onto nonwoven or felt materials.

A complete set of pilot systems, including a recently installed ThermoPress SB steel belt line, a ThermoPress TB (PTFE) unit and a CB (combination) unit, enables IPCO and its partners and customers to cooperate on the research and development (R&D) of thermoplastic composites and produce prototypes that can be scaled for production.

IPCO also produces a range of high-precision systems that can be incorporated into production lines to scatter powder, granulate or fibres for the manufacture of products for the automotive, textile, composites and construction industries.

ITMA took place in Milan Italy on 8–14 June 2023.

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Polyvinyl chloride-free, fire-retardant fabrics

A range of fire-retardant, coated polypropylene (PP) fabrics that are free from polyvinyl chloride (PVC) were showcased at *Techtextil North America (TTNA)* by Renegade Plastics.

The company, of Golden, Colorado, USA, says that it employs a proprietary technology to render the fabrics fire-retardant without using brominated or halogenated additives. The fabrics meet the California Title 19[1] and the European toy safety[2] standards.

Further, the company claims that the fabrics can be cleaned using strong chemicals such as bleach and acetone without degrading their coatings and can be recycled at the end of their lives.

The fabrics could be used to produce play mats, gym mats and mattresses.

TTNA took place in Atlanta, Georgia, USA, on 10–12 May 2023.

See also: [1]California Title 19 sets-out minimum standards for the prevention of fire, and for the protection of life and property against fire, explosion and panic.

[2]BS EN 71-3:2019+A1:2021, *Safety of toys - Migration of certain elements,* https://knowledge.bsigroup.com/products/safety-of-toys-migration-of-certain-elements-3/standard

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Textile mimics the functions of polar-bear fur and skin

Inspired by the fur and skin of polar bears, researchers in the USA are developing a textile that can absorb heat from visible wavelengths of sunlight and suppress the dissipation of body heat.

Many polar animals use sunlight to maintain their body temperatures in the freezing conditions in which they live. The hollow, translucent fur of polar bears, for instance, transmits solar radiation to the black skin of the animals, where it is absorbed as heat. The fur of the polar bear also prevents heat-loss from radiation.

To mimic these two mechanisms, researchers from the University of Massachusetts Amherst have created a bilayer textile.

The top layer of the textile comprises a polypropylene (PP) fabric that, like polar-bear fur, conducts solar radiation down to the lower layer, which is made of polyamide (PA) and is coated with a dark layer of poly(3,4-ethylenedioxytiophene) (PEDOT) that absorbs warmth.

The researchers claim that a jacket made from their bilayer textile would be 30% lighter than the same jacket made from cotton, but would keep its wearer comfortable at temperatures 10°C lower, assuming that the sun is shining, or the room is well lit.

The lead author of a paper[1] describing the work, Wesley Viola, says: "While our textile really shines as outerwear on sunny days, the light-heat-trapping structure works efficiently enough to imagine using existing indoor lighting to directly heat the body. By focusing energy resources on the 'personal climate' around the body, this approach could be far more sustainable than the status quo."

Viola recently completed his PhD in chemical engineering at the University of Massachusetts and now works at a start-up founded by an Associate Professor of Chemistry at the University, Trisha L. Andrew. The start-up, called Soliyarn and based in Boston, Massachusetts, has begun production of the PEDOT-coated PA textile.

Andrew has previously used PEDOT and vapour-deposition processes to create electrically heated fabrics[2] and fabrics that can store electrical charges[3].

See also: [1]*ACS Applied Materials Interfaces*, Volume 15, Issue 15, pp 19393–19402, *Solar thermal textiles for on-body radiative energy collection inspired by polar animals*, https://doi.org/10.1021/acsami.2c23075

[2]*Polymer coating for heating fabrics*, https://www.technical-textiles.net/node/73661

[3]*Vapour coating method for charge-storing garments*, https://www.technical-textiles.net/node/74500

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A decade of development: Polylactic acid and the fibres industry

2023 sees IFG International Fibres Group is celebrating the ten-year anniversary of its launch of a fibre made from the biopolymer polylactic acid (PLA). Here, the company describes the benefits of the biodegradable thermoplastic for the production of fibres, the research and development work it has undertaken over the last ten years, and the role that PLA could play in the future of the technical textiles industry.

The use of petroleum-based plastics is ubiquitous, and it is commonly understood that the irresponsible disposal of household and commercial plastics is causing considerable damage to the environment. There are a vast number of unmanaged waste streams that are polluting our planet, and the longevity of many petroleum-based plastics in the natural environment is well documented, with many infiltrating our water systems as microplastics. Polylactic acid (PLA) can be used as an alternative to these petroleum-based plastics in a wide variety of applications, ranging from clothing to housing, transportation to health and medicine, and in packaging for food and drink.

PLA is a bio-based thermoplastic that can be made from renewable resources such as corn, sugarcane and cassava. Carbohydrates from these crops are fermented to yield lactic acid that can be polymerised to create PLA. The carbon footprint of PLA is smaller than that of traditional polymers and it is biodegradable in industrial composting conditions, and therefore can be used for products that need to have a longer working lifetime than those made from biopolymers that degrade within days.

IFG International Fibres Group (IFG; see also, outside back cover) first started working with PLA for commercial applications in 2013 and has invested heavily in the research, trialling and development of fibres made from the biopolymer.

IFG is based in Huddersfield, UK, and specialises in the global supply of polyolefin staple fibres, as well as polyamide (PA), biopolymer and recycled fibres. The company focusses on research and development (R&D) in order to create innovative fibres that meet the exact demands of its customers. Technical textile markets for the fibres include automotive, geotextiles, sports and leisure, filtration and construction. The Group includes three European fibre companies:

The research and development line at IFG Asota in Linz, Austria.

- IFG Drake of Huddersfield;
- IFG Asota of Linz, Austria;
- IFG Exelto of Zwijnaarde, Belgium.

IFG's PLA fibres are meltspun from a sustainable, bio-based raw material that is compostable under industrial conditions (when assessed according to the criteria laid-out in DIN 13432[(1)]). The company's PLA fibres have, for instance, been used to produce geotextiles for the stabilisation of ground (turf, grass and sand). The geotextiles do not affect the natural drainage properties of the ground. IFG is also creating fibres for use in wet-laid nonwovens and is looking into their use as a binder in natural fibre-reinforced composites.

When the company first introduced its PLA fibres at *Techtextil* (11–13 June 2013), however, there was scepticism within the technical textiles industry. Head of R&D and Product Safety at IFG Asota, Andreas Weinberger, recalls: "Early research and development work was challenging. We had to get to know the polymer and learn how to process and handle it. Initial customer reactions were positive, but the price was too high at the time. PLA is difficult to process; traces of humidity can cause PLA to degrade before its time, and in turn can lead to fibres with

reduced properties. IFG had to learn to process it and fine-tune the fibre-spinning machines and conditions."

Technical Manager at IFG Drake, Jim Woo, continues: "While PLA has some characteristics similar to polypropylene [PP], it is significantly different chemically and therefore requires extensive modifications to handling and the extrusion/spinning process to make a commercial product."

With significant investment in R&D, and collaborations with industrial partners wishing to reduce the environmental impact of their products, Woo says, PLA has come a long way over the last decade, and has been continuously improved for the spinning of fibres. He explains: "Our ongoing work is focused on recyclability and faster biodegradation of PLA fibres."

Through its work, IFG's team has reduced the diameters and increased the tenacities of the fibres it can produce from PLA. It can currently manufacture fibres with titres of 2.2–140 dtex and cut lengths of 5–90 mm, straight or with 0.5–5 crimps per centimetre.

While there are questions to be answered regarding the biodegradability of PLA in natural environments, IFG believes that the thermoplastic can play a key role in reducing the environmental impact of the production of fibres. According to the waste hierarchy laid-out in the European Union (EU's) *Waste Framework Directive* to establish an order of preference for managing and disposing of waste, the most favourable option is the prevention of waste in the first place. In the fibres industry, the best approach for achieving this is to increase the lifetime of the products for which they are used. PLA is durable and maintains its properties over extended periods of time. The next option in the hierarchy is recycling. Here, PLA also excels; it can be easily recycled and spun into a new fibre. Composting should only be considered as a last resort. It is always preferable to collect waste in a managed way. By doing this, one can control recycling and industrial composting of PLA.

The Head of Sales and Marketing at IFG Asota, Harald Tischler, concludes: "PLA is becoming increasingly important for us. It not only helps us on our way to a sustainable future, but also sets us apart from other fibre producers. This gives us access to new customer groups and makes us less dependent on mass applications. We see the future in profitable niche markets and PLA is part of that."

The Fibres Research Centre

In September 2022, IFG opened a research centre at its Asota site in Linz, Austria. The new facility, called the Fibres Research Centre (FRC), houses IFG's state-of-the-art, semi-industrial meltspinning line (the SF1000 Pilot Line), which allows the Group's companies to test and evaluate new and emerging polymers, and to develop and engineer fibres to meet the bespoke requirements of their customers. The FRC allows IFG's research and development (R&D) team to host customers and demonstrate the pilot line in action. IFG says it welcomes approaches from others for collaborative research projects, particularly those who wish to test and develop sustainable alternatives to fossil-based polymers and additives.
Group R&D Director Simon Riepler said at the time that the FRC will be an international centre of competence for thermoplastic fibres: "The goal is to create a place where state-of-the-art fibre R&D can happen. Together with our suppliers, customers and development partners, we work on the sustainable fibre solutions, where bio-based, biodegradable and recycled materials are key."
In addition, the FRC hosts a laboratory offering customers a wide range of testing services including: assessing raw materials; measuring titre and spin-oil content; determining thermal shrinkage; ultraviolet (UV) and Fourier transform infra-red (FTIR) testing; differential scanning calorimetry (DSC).

References

[1]DIN EN 13432, *Requirements for packaging recoverable through composting and biodegradation - Test scheme and evaluation criteria for the final acceptance of packaging*, https://www.en-standard.eu/din-en-13432-requirements-for-packaging-recoverable-through-composting-and-biodegradation-test-scheme-and-evaluation-criteria-for-the-final-acceptance-of-packaging-english-version-of-din-en-13432

Further information

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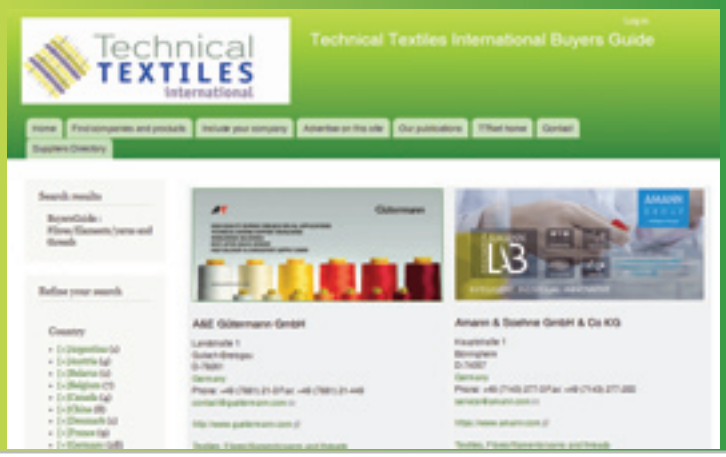

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Kim Nicholson, AATCC;
Tel: +1 (919) 549-8141
education-dept@aatcc.org;
https://aatcc.org/events

Dornbirn Global Fiber Congress
13–15 September 2023
Dornbirn, Austria
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dbrown@nineteengroup.com;
https://www.emergencyuk.com

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Research, Innovation and Science for Engineered Fabrics (RISE) 2023
26–27 September 2023
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mayers@inda.org;
https://www.riseconf.net

October 2023

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FiltXPO
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Textile Rental Services Association (TRSA) 110th Annual Conference
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alison.willis@easyfairs.com;
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Tel: +49 (162) 256-7382
andreas.wibowo@redcabin.de;
http://redcabin.de

Hygienix
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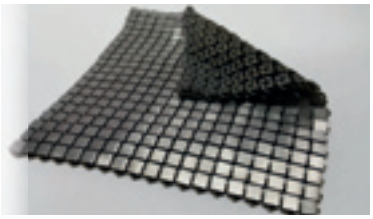
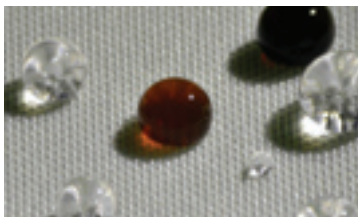

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Fibres, filaments and yarns

Artificial silk door-pulls feature on Mercedes-Benz concept car

Novel, sustainable door-pulls made from artificial silk fibre are being used by Mercedes-Benz of Stuttgart, Germany, in its latest concept car, the Vision EQXX.

The carmaker has designed Vision EQXX to highlight ways in which luxury vehicles can be produced using technologies that are more environmentally sustainable than conventional approaches.

The artificial silk fibre is called Biosteel and is produced by AMSilk of Planegg, Germany. The company says that the fibres are biodegradable and recyclable, and no waste is generated during their manufacture. It adds that Biosteel demonstrates mechanical properties

The door pulls for the Vision EQXX concept car from Mercedes-Benz are made from Biosteel artificial silk fibres.

Highlights this month: full contents listing on page 2...

Methods for determining the effects of strains and stresses on carbon nanotube fibres are being developed by researchers at Rice University 2

A single vented tumble dryer can discharge up to 120 million microfibres into the air each year, according to a pilot study 5

A range of durable fabrics made from pre-consumer recycled polyamide (PA) 66 fibres has been launched by Invista through its Cordura brand 3

A fibre-laying process that enables the efficient production of composite footplates and toe caps for use in footwear has been launched by Coats 7

A dual-action thermoregulating finish that reduces the temperature of surfaces to which it is applied by up to 3°C has been launched by HeiQ 4

A long, fibre-based lithium-ion battery that could be woven into fabrics is being developed by researchers at the Massachusetts Institute of Technology 10

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