Tetex.

EUROPEAN TECHNICAL TEXTILES MAGAZINE

SPRING 2019

ISSN 2514-7463

SMART TARPAULIN
Cut sensors and GPS

INVISIBLE HELMETS
New standards of camouflage

AIRBUS SEAT CONCEPT
Adapts to the passenger's needs

WEARABLE TECHNOLOGY
Jacket always ready for action

VISIT US
STAND
4.1 K59

MEDIA ACCREDITED
TECHTEXTIL AND TEXPROCESS

Dear Readers,

With you in mind, we attend the next edition of the largest international trade fair devoted to technical textiles and nonwovens. Especially for this event, we have prepared a limited edition Tetex magazine, dedicated solely to Techtextil.

This year's edition of the Fair is entitled "Space for Innovation." For this reason, we have started collaboration with Continental, Boeing, Lenzig to be able to offer you first-hand information. More details inside the magazine.

As the accredited media partner of Techtextil and Texprocess in Frankfurt, we cordially invite you all to attend and meet as our tour stand K59 on hall 4.1.

We wish you all a very productive, stimulating and enjoyable time at Techtextil 2019!

See you soon!

Dorota Sakowska-Hunt

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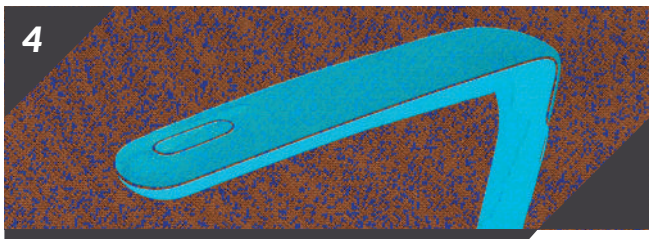


Move LAYER x Airbus

www.layerdesign.com

Benjamin Hubert from the strategic design agency LAYER has designed Move, a prototype of a new concept for economy class seating for Airbus driven based on smart textiles. The use of smart textiles enables passengers to monitor and control various factors – including seat tension and temperature – using the Move app, also designed by LAYER. The concept encourages passengers to move throughout the flight, improving passenger comfort and safety. The lightweight, adaptable seat structure reduces the on-board weight of the aircraft, resulting in significant fuel savings and a greener approach to flying. The Move concept was 18 months in development and is part of an ongoing relationship between LAYER and Airbus dedicated to rethinking the flying experience.

Connected Comfort

Move is a new seating concept designed to improve the experience of economy class in short to mid-haul flying. The prototype comprises a lightweight perforated composite frame with a knitted, one-piece sling seat suspended over it. This innovative seat cover is digitally knitted to form a smart textile with integrated conductive yarn, simultaneously connected to a series of sensors and the Move app. This forms a holistic system that allows passengers to measure and control variables – including temperature, seat tension, pressure and movement – to enable users to easily and intuitively maintain their comfort.

The knitted seat cover has zones of various density knit that offer different levels of support to the body. Throughout the journey, the Move seat automatically adjusts based on passenger weight, size, and movement to maintain optimal ergonomic comfort. It is possible thanks to a current passing through the conductive yarn and varying seat tension. The passenger can make additional adjustments to the seat based on personal preference using the Move app. The Move app can also be used to engage different seat modes, such as “massage”, “mealtime”, or “sleep.”

The smart textile seat cover is constructed from a polyester wool blend - for heat regulation, robustness, and tactility - with integrated conductive yarn. The frame is crafted from aircraft - grade aluminium and carbon fibre. This construction allows for a significant reduction in the use of traditional foams which add weight and are difficult to recycle.

Smart Textiles

Throughout the flight, the Move seat sensors monitor passenger movement and temperature. This data is analysed by the Move app, which then sends targeted messages to the passenger encouraging them to move in order to improve comfort. These messages include prompts to get up and move around the cabin to improve circulation, when and how to do in-seat stretches, and reminders to stay hydrated to regulate temperature.

The position of the seat is fixed – which addresses the issue of "legroom rage". caused by passengers unnecessarily reclining on shorter flights – and ergonomic comfort is instead maintained by allowing passengers to control the tension of the seat and understand how their movements can deliver greater comfort.

This forward-thinking functionality is the result of an extensive research programme conducted with regular flyers to highlight and solve the main "pain points" during a journey.

A lighter way to fly

Move has been designed to improve not only the flying experience for passengers, but also the airline and the environment. Compared to standard economy seating, the knitted seat drastically reduces the weight carried on board, thus improving fuel efficiency. This approach also offers more pleasing visual transparency, reduces the amount of less-sustainable foam materials, and increases the ability of airlines to easily change or update colourways or pattern. The seat cover can also be easily and quickly removed during cabin changeover for washing.

Make it Yours

Move can be configured by both airline and passenger pre-flight to fit a wide variety of passenger and inflight needs. Each seat back has a central island, containing a tray table, optional full Inflight Entertainment System (IFE), and a small pocket for storage of personal items and small digital devices. The safety card information is printed on the reverse of the tray table.

The tray table is uniquely stowed vertically and has various modes. It rotates out to provide a half-size table; folds out to its fullsize; and is height adjustable. This gives passengers additional knee room as needed, and enables different modes of usage for different scenarios – from using the table as a work surface or for eating, to using it as a stand for watching videos on tablet devices, or even as a surface on which to rest while sleeping. This flexible configuration also caters to a wide variety of passenger ages, heights and sizes.

Laptop storage is located between the seats, which offers a secure place to store devices during take-off and landing and more leg room during the flight. The Move app will notify passengers if they have left a device in the pocket after landing through pressure-sensitive yarn.

The Move IFE system is also configurable, enabling airlines to offer different levels of inflight service and product based on cost, weight, and scenario. Options include the integration of a minimal OLED display in the seat back; the ability to plug in a third-party screen; or a connection point for passengers to connect their own tablet device.

The armrests are completely stowable, offering the option of a bench-like seating format for passengers travelling in couples or in groups.

In our words

"At LAYER, we believe good design should be accessible to all. All too often, new concepts for flying are focused on innovation in business class. We were excited to take on this project with Airbus to find ways to improve and add value to the economy class experience – for both the passenger and the airline."

Benjamin Hubert,
Founder LAYER

In detail

• LAYER has designed Move, a new concept for economy class seating for Airbus.

• Move utilises smart textiles (connected to sensors and the Move app) to enable passengers to monitor and control variables, including seat tension and temperature.

• The digitally-knitted sling seat is much lighter than current standard economy seating, drastically improving fuel efficiency.

• The seat can be configured to fit a variety of passengers and modes of application.

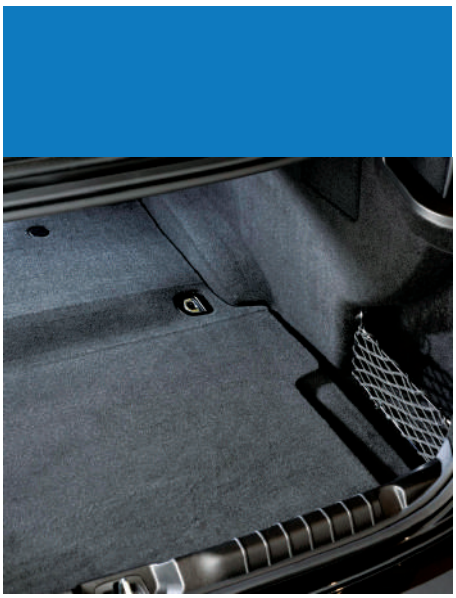
RENOLIT Promoting 100% Recyclable, Lightweight Automotive Interior Material Solutions

RENOLIT GOR S.p.A., with a leading global position in the production of thermoplastic and thermoformable materials for the automotive market, is promoting its extensive range of 100% recyclable, thermoplastic composite material solutions for vehicle interior trim parts.

RENOLIT TECNOGOR is next-generation thermoformable sheet and roll material. It has already gained a leading position in the global automotive interiors market with major OEM end customers. German, Italian, French and Japanese car makers now use **RENOLIT TECNOGOR** for a variety of thermoformed, custom-coated, vehicle interior 3D trim parts. Successful applications include: parcel shelves, load floors, seat back covers, dashboard inserts and trunk trims.

RENOLIT TECNOGOR is a safe, clean, 100% recyclable, glass fiber (GF) reinforced, PP based, lighweight thermoplastic composite material. It has been specifically designed to cost effectively produce automotive interior trim parts. Tier 1 converters are able to combine superior part performance with consistent quality and higher productivity, while also achieving lower production costs as it can be 3D shaped in a 'glue free' one-step-process. The superior stiffness and impact performance of **RENOLIT TECNOGOR** is thanks to the unique, patented, PP/GF composition and extrusion process used. It is also very safe to form and handle, as there are no free floating fibers in the air or exposed glass fibers in the finished molding; all glass fibers are completely encapsulated in the PP polymer matrix during extrusion.

Photo by: www.renolit-tecnogor.com



Like virtually all products in the **RENOLIT COMPOSITES** range, it can be provided with a textile or film applied to the surface. Other 100% recyclable, safe to handle, **RENOLIT COMPOSITES** products for automotive interior include:

RENOLIT GORCELL – sandwich design composite sheet material with a hexagonal honeycomb PP core and a very high stiffness produced in-house by forming and folding PP film, using the ECONCORE production technology. The honeycomb core makes this product especially lightweight, highly increasing stiffness and compressive strength. It is also extremely durable and water-resistant, possessing high thermal and chemical resistance properties.

This highly versatile sandwich product is available in standard 5, 10, 15 and 20 mm core thickness options. Depending on the application, the PP honeycomb core can be combined with a wide variety of textile or film surface skin materials such as: **RENOLIT TECNOGOR, NATGOR or WOOD-STOCK** sheets; high impact or decorative films; scratch protectors; non-woven fabrics. Main application areas include: load bearing floors, parcel shelves, door panelling and seat back covers.

RENOLIT FLEXIGOR – a highly thermoformable, low VOC, composite sheet material based on polyolefin and renewable natural/ mineral raw material fillers. The product is extruded in sheets or rolls, supplied ready to form with the aesthetic surface fabric needed applied to either one or both sides as required. Key application areas include: door inserts/ panels (map pockets), trunk side trims, wheel arch liners.

RENOLIT provide customers with added value technical support and process knowhow to find cost-effective interior trim material solutions. Customized, made to order material options can be rapidly developed, including supplying test materials line, which are produced in-house. On the prototyping thermoforming line.

www.renolit.com

A NEW GENERATION OF REINFORCED ANTI-THEFT TARPAULINS

Anti-theft tarpaulins, reinforced with two steel wires and equipped with an electronic protection, are a new product of SAKO EXPO. The innovative system is a big step forward in the protection of both the fleet and the transported cargo. In an interview with Marek, the dispatcher of the transport company "TRANS SPEDITION", we talked about his evaluation of the SAKOPLAN APP anti-theft tarpaulin system.

T **Where you learn about the new anti-theft tarpaulin system? When did you apply the material to the first trailer?**

D I heard about it at the Techtextil fair in Frankfurt am Main, where SAKO EXPO presented their material made according to the patent of the English company TETEX. At first, we decided to equip our trailers with SAKOPLAN APP tarpaulins that have mechanical protection, which can be later upgraded to an electronic protection system. I wanted to see how they perform in different conditions before we connect the electronic security devices. We started the trial with three trailers and were testing the sets for half a year. After that time, we decided to connect the electronic protections and ordered further sets fully equipped with electronics.

T **What were your first impressions?**

D We were very pleased with the results. First of all, the tarpaulins do not cause any problems during loading and unloading. They are much more flexible than the previous ones and are also resistant to changeable weather conditions. As for the prices – the cost of a tarpaulin without electronic protection, but with the possibility of connecting it in the future, is lower than the cost of standard reinforced tarpaulins. The connection of an electronic alarm system costs about 1300 PLN + VAT. At this reasonable price, we have received a product that significantly increases the safety of not only the transported cargo, but also the driver, tractor and semi-trailer. We are gradually applying the electronic security system in our other vehicles.

T **Do incidents of theft occur frequently?**

D Our company has extensive experience in international transport. However, it is difficult to avoid unpleasant incidents on routes that often pass through the territories of many countries. Thanks to SAKOPLAN APP anti-theft tarpaulins, we can control what is happening with a vehicle. This not only gives comfort and a sense of safety to the drivers, but our whole company has greater control over satellite-secured transport.

T **How do drivers rate new tarpaulins with satellite protection?**

D Our drivers know that if the vehicle is protected by an alarm, they can sleep peacefully. From my perspective, it is a great idea to introduce reinforcement also on the roof of the tarpaulin. There was one situation where thieves tries to get inside through the roof and another where some strangers wanted to get illegal passage. The set of SAKOPLAN APP anti-theft tarpaulins has therefore been additionally equipped with roof reinforcement. Drivers also praise the new solution because of the greater flexibility of the tarpaulins, which is important when sliding down the curtains.

T **Is the alarm easy to connect?**

D Connecting the alarm is easy and does not take much time. We have conducted several training sessions for our drivers on how to operate the additional security. The sensor mounted in the tarpaulin continuously sends information about its status to

a control unit. Any attempt to cut the tarpaulin sends a signal is sent to the control unit, followed by the distribution of satellite alarm information to the selected destinations and activation of a light-and-audio signal.

T **Can the system be easily repaired in the event of wire breakage?**

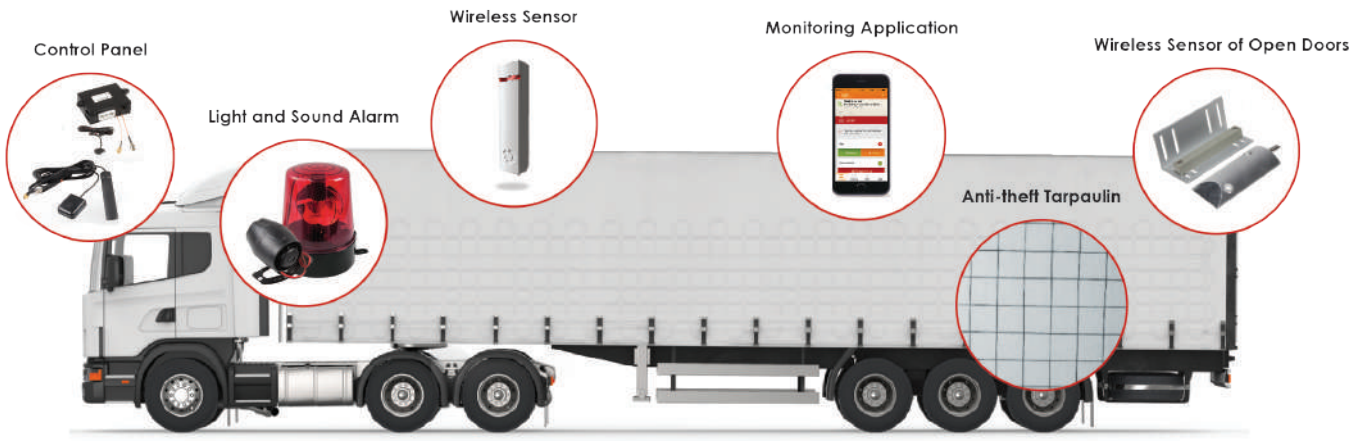
D The system works already when attempting to cut it (short-circuit the wires), but when it happens, it is easy to reconnect the continuity of the circuit. It involves connecting the circuit with electrical fittings. Drivers are able to repair the damaged tarpaulins themselves.

T **Do you employ a security company?**

D We are in the process of searching for an optimal solution, which will allow us to monitor potential incidents more effectively. We are thinking of an external company that would be responsible for immediate reaction in case of receiving the satellite signal.

T **Does the electronic system have additional advantages?**

D Of course, the new generation of a GSM/GPS car alarm can be mounted on the CAN bus. With the help of the car alarm, we can monitor not only the condition of our tarpaulins, but also the opening of the trailer door, which is very important for the safety of the cargo. The system offers full monitoring, as well as the Geofance function, which can send information about leaving a specific zone (which may suggest theft) and about other operations via text message. Another important aspect is a completely free (without any subscriptions) MyJABLOTRON application, thanks to which it is possible to use, among other things, the current register of drivers with the possibility of their identification. It also allows for the identification of vehicles directly on the map and to display information about the current location of each vehicle on the route.



TEIJIN DEVELOPS HIGHLY HEAT-AND IMPACT-RESISTANT PREPREG AS CARBON FIBER INTERMEDIATE MATERIAL FOR AEROSPACE APPLICATIONS

Teijin Limited announced its development of Japan's first prepreg, or carbon fiber sheet pre-impregnated with bismaleimide (BMI) matrix resin that offers high resistance to both heat and impact, making it ideally suited to use in aerospace engine components.

Teijin's new BMI resin pre-impregnated prepreg achieves a high glass transition temperature (Tg) of 280°C and compression after impact (CAI) of 220MPa, a previously difficult combination made possible thanks to Teijin's original resin-composition formulating technology. The new prepreg also maintains its coefficient of linear thermal expansion and high dimensional stability at both low and high temperatures.

Moreover, by adjusting resin viscosity, Teijin also has improved moldability by manipulating the resin flow through preforms in the mold cavity and reduced curing time with its new prepreg, if compared to conventional BMI-based prepregs.

Teijin, having developed technologies to adapt its prepreg for engine components, is now working on other high-heat applications for aerospace. These efforts will be supported with the knowhow and global marketing channels of Renegade Materials Corporation, a provider of highly heat-resistant composites which Teijin recently decided to acquire.

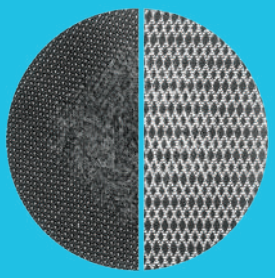
Teijin is rapidly expanding its market for next-generation aircrafts by developing midstream-to-downstream lineups and related applications, such as cost-effective carbon fibers with higher-tenacity and higher-tensile modulus and as well as intermediate materials, including. Moreover, Teijin intends to further strengthen its position as a leading solution provider for aircraft applications, targeting annual sales in this field in excess of USD 900 million by around 2030.

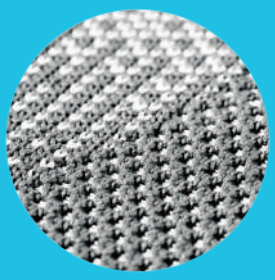
Prepregs, which are intermediate materials for carbon fiber reinforced plastics (CFRPs), are used in fields ranging from aircraft and automobiles to infrastructure and leisure. As such, their prescribed properties differ widely depending on the application. To address specific needs, technologies for various combinations of carbon fiber and matrix resin and for specific processing needs continue to be developed.

Prepregs are generally impregnated with lightweight, high-intensity epoxy resin. Conventional BMI resin-impregnated prepreg is already used for high-temperature applications, such as aerospace engine components, to prevent degradation and deformation. BMI resin, however, loses shock resistance when heat resistance is increased. Also, CFRP made of BMI resin tends to peel apart and crack when subjected to strong impact. In addition, molding BMI resin can be difficult due to its liquidity.

www.teijin.com

Trevira and imat-uve introduce new 3D flat knitting technology for automotive interiors





www.trevira.de

Trevira, one of the market leaders in polyester yarn manufacture, and the development services company imat-uve have jointly achieved a milestone in textiles design: the use of 3D flat knitting technology for automotive interiors. In a jointly developed process that unites innovative yarn technologies with cutting-edge connection and finishing techniques, Trevira and imat-uve have found a way of producing anatomically contoured seat covers and trim components for vehicle interiors. Why is this important? The answer lies in the way it's done. Since the technology uses just one knitting process rather than several, manufacturers can reduce their production and materials costs, as it's no longer necessary to cut and assemble the fabrics. But the new invention is not just cost-effective – the flat knitting technique means that it's now possible to personalise design and function to a much greater degree, representing another important step in the direction of on-demand production.

Trevira and imat-uve are the first companies to develop such a sophisticated application of the knitting process for use in vehicles, thanks to imat-uve's innovative processing and finishing technique which deploys a low-melt yarn specifically developed by Trevira. The collaboration has resulted in a high-performing knitted product which satisfies even the most demanding criteria in terms of quality and comfort. The VDA 230-210 standard velcro test carried out by imat's testing laboratory found that the product exhibited a very high abrasion resistance.The 3D flat knitting technology even means that areas known to be vulnerable, such as the seams on seat covers, can be strengthened in the course of the same single knitting process. Another benefit of the technology is its contribution to sustainable manufacturing. Not only does it work on the zero waste principle, but the knitted fabric itself is manufactured entirely from yarn made from PES recyclates.

Thomas Rademacher, Head of Development at Trevira, explains why the collaboration was so successful. "The development company imat-uve came up with a new breakthrough technology, while here at Trevira, we contributed our own recycled yarns and a new low-melt yarn we've developed based on synthetic fibres, which provides a stabilising effect. Together we have created a highly sought-after, top quality product for automotive interiors. Flat knitting will now be the go-to technology for vehicle interiors – in the future, it will be impossible to imagine life without it."

Hans Peter Schlegelmilch, imat-uve's CEO, pointed out the special benefits of the new technology for vehicle manufacturers and their suppliers. "The 3D flat knitting technology doesn't just make it possible to save time and money on production. It also opens up a whole new world of personalisation for end consumers. We are extremely pleased that with Trevira as our partner, we have been able to take this significant step towards the future of automotive interiors."

FORMABLE TO 3D SHAPES

FORMABLE TO 3D SHAPES

Canatu CNB films and sensors can be thermoformed into extreme shapes. CNB films are highly stretchable, as Carbon NanoBud material stretches more than 200%. The maximum stretch rate depends on the substrate material. The CNB films enable deep draws and sharp bends: bending radius can be less than 1mm.

FORMING AND MOLDING

The CNB films and sensors can be thermoformed, vacuum-formed and pressure-formed according to standard industrial processes. CNB sensors can also be in-molded with multiple resins as well as laminated between different materials and LOCA bonded to glass or display surfaces.

The touch sensor typically consists of a plastic substrate with one or more patterned CNB transparent conductor layers and auxiliary film layers, such as patterned metallic conductor traces. Touch modules with cover glass, mechanics, controller IC, and electronics on the flexible circuit board are manufactured and sold to Canatu's touch module customers. Canatu's sensors are typically designed to meet custom specifications by Original Equipment Manufacturers and Canatu's direct customers.

CNB SENSORS ARE BUILT USING 1 SENSOR LAYER OR 2 SENSOR LAYERS

1-LAYER SENSOR CONSTRUCTION IS USED FOR SWITCHES, BUTTONS, SLIDERS, WHEELS (MUTUAL OR SELF-CAPACITANCE)

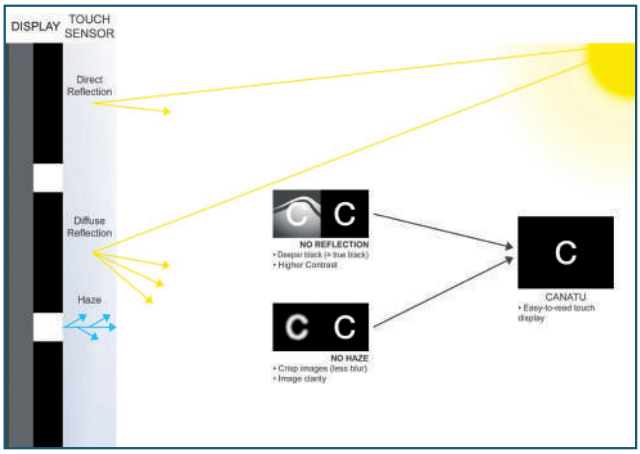
2-LAYER SENSORS ARE FOR MULTITOUCH, WITH SEPARATE TRANSMIT AND RECEIVE LAYERS (MUTUAL CAPACITANCE)

DISPLAY READABILITY

Two special features of Carbon NanoBud® material make CNB™ films great for on-display use:

1. CNB™ film is color-neutral, with almost flat transmittance spectrum. As a result, display colors do not get distorted in the CNB™ sensor. This is particularly important for white color as even small color changes of white are easily discernible by the eye.

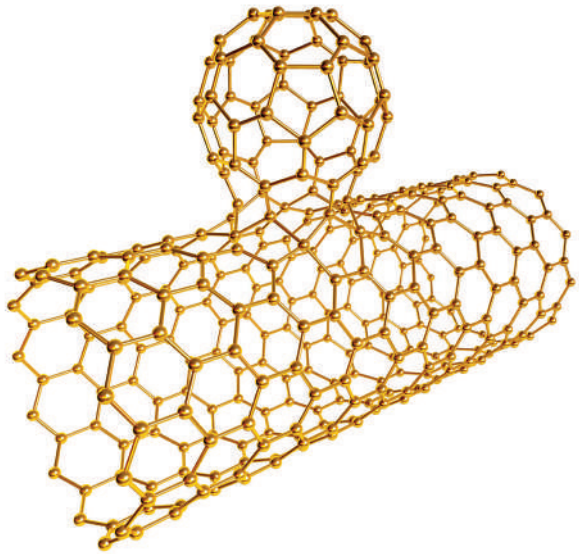
2. Carbon NanoBud® material is pure black: if light falls directly on the NanoBud® molecule, it gets totally absorbed, i.e. gives no reflection. Hence, in an optimized stack with high-performance substrates and bonding layers, CNB films and sensors do not reflect any light and the haze is zero. In practice, CNB sensor reflection is typically 0.0 - 0.3% and haze is 0.1 - 0.5%, both very low values. It leads to touch-displays with deep black and high contrast, even in bright ambient conditions.



NANOBUD®

Canatu has developed a new material, the Carbon NanoBud®, which is a hybrid of single wall carbon nanotubes and fullerenes. The hybridization is achieved directly during the material synthesis process and the resulting material combines the best features of both fullerenes and nanotubes. NanoBud® enables a variety of new components and applications to be developed.

NanoBud® displays tunable electrical conductivity, high strength, low density, high thermal as well as mechanical stability and high electrical and thermal conductivity like traditional carbon nanotubes, but also high reactivity, low work function and chemical functionalizability like fullerenes. In addition, they have been shown to be much superior field emitters than traditional nanotubes and have the added benefit that they need not be aligned for the purpose. This makes NanoBuds® ideal for a tremendous range of applications.



www.canatu.com

Researchers develop 'acoustic metamaterial' that cancels sound

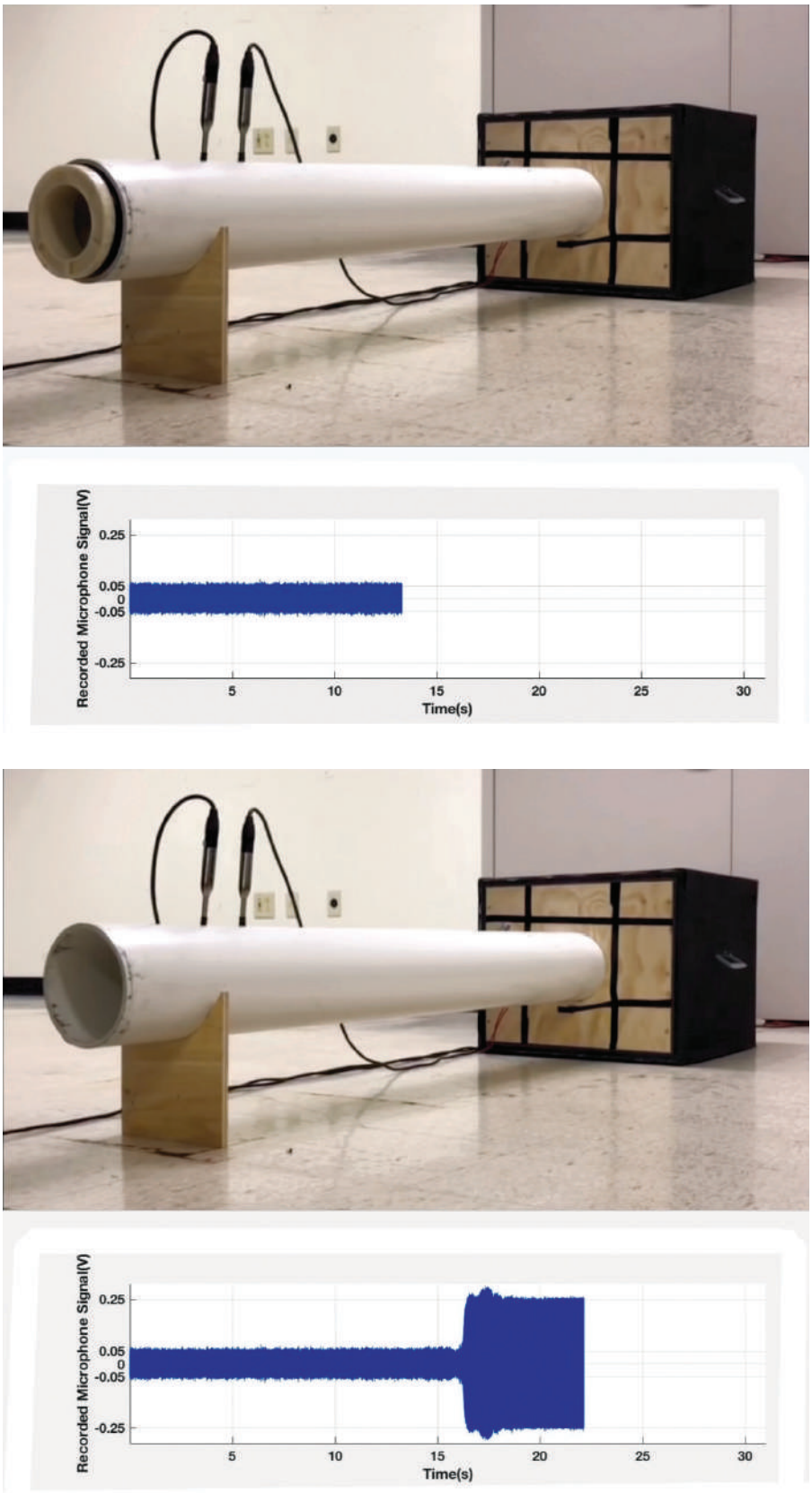
Boston University researchers, Xin Zhang, a professor at the College of Engineering, and Reza Ghaffarivardavagh, a Ph.D. student in the Department of Mechanical Engineering, released a paper in Physical Review B demonstrating it's possible to silence noise using an open, ringlike structure, created in accordance with? mathematically perfect specifications, to cut out sounds while maintaining airflow.

"Today's sound barriers are literally thick heavy walls," says Ghaffarivardavagh. Although noise-mitigating barricades, called sound baffles, can help drown out the whoosh of rush hour traffic or contain the symphony of music within concert hall walls, they are a clunky approach not well suited to situations where airflow is also critical. Imagine barricading a jet engine's exhaust vent – the plane would never leave the ground. Instead, workers on the tarmac wear earplugs to protect their hearing from the deafening roar.

Ghaffarivardavagh and Zhang let mathematics – a shared passion that has buoyed both of their engineering careers and made them well-suited research partners – guide them toward a workable design for what the acoustic metamaterial would look like.

They calculated the dimensions and specifications that the metamaterial would need to have in order to interfere with the transmitted sound waves, preventing sound-but not air-from being radiated through the open structure. The basic premise is that the metamaterial needs to be shaped in such a way that it sends incoming sounds back to where they came from, they say.

As a test case, they decided to create a structure that could silence sound from a loudspeaker.



On one end of the pipe, a loudspeaker blasts a noise. On the other end, the open acoustic silencing metamaterial redirects the sound as long as it's fitted in place.

Based on their calculations, they modeled the physical dimensions that would most effectively silence noises. Bringing those models to life, they used 3-D printing to materialize an open, noise-canceling structure made of plastic.

Trying it out in the lab, the researchers sealed the loudspeaker into one end of a PVC pipe. On the other end, the tailor-made acoustic metamaterial was fastened into the opening. With the hit of the play button, the experimental loudspeaker set-up came oh-so-quietly to life in the lab. Standing in the room, based on your sense of hearing alone, you'd never know that the loudspeaker was blasting an irritatingly high-pitched note. If, however, you peered into the PVC pipe, you would see the loudspeaker's subwoofers thrumming away.

The metamaterial, ringing around the internal perimeter of the pipe's mouth, worked like a mute button incarnate until the moment when Ghaffarivardavagh reached down and pulled it free. The lab suddenly echoed with the screeching of the loudspeaker's tune.

"The moment we first placed and removed the silencer... was literally night and day," says Jacob Nikolajczyk, who in addition to being a study co – author and former undergraduate researcher in Zhang's lab is a passionate vocal performer. "We had been seeing these sorts of results in our computer modeling for months – but it is one thing to see modeled sound pressure levels on a computer, and another to hear its impact yourself."

By comparing sound levels with and without the metamaterial fastened in place, the team found that they could silence nearly all – 94 percent to be exact – of noise, making the sounds emanating from the loudspeaker imperceptible to the human ear.

Now that their prototype has proved so effective, the researchers have some big ideas about how their acoustic-silencing metamaterial could go to work making the real world quieter.

"Drones are a very hot topic," Zhang says. Companies like Amazon are interested in using drones to deliver goods, she says, and "people are complaining about the potential noise."

"The culprit is the upward-moving fan motion," Ghaffarivardavagh says. "If we can put sound-silencing open structures beneath the drone fans, we can cancel out the sound radiating toward the ground."

Closer to home – or the office – fans and HVAC systems could benefit from acoustic metamaterials that render them silent yet still enable hot or cold air to be circulated unencumbered throughout a building. Ghaffarivardavagh and Zhang also point to the unsightliness of the sound barriers used today to reduce noise pollution from traffic and see room for an aesthetic upgrade. "Our structure is super lightweight, open, and beautiful. Each piece could be used as a tile or brick to scale up and build a sound-canceling, permeable wall," they say.

The shape of acoustic-silencing metamaterials, based on their method, is also completely customizable, Ghaffarivardavagh says. The outer part doesn't need to be a round ring shape in order to function.

"We can design the outer shape as a cube or hexagon, anything really," he says. "When we want to create a wall, we will go to a hexagonal shape" that can fit together like an open-air honeycomb structure.

Such walls could help contain many types of noises. Even those from the intense vibrations of an MRI machine, Zhang says.

According to Stephan Anderson, a professor of radiology at BU School of Medicine and a coauthor of the study, the acoustic metamaterial could potentially be scaled "to fit inside the central bore of an MRI machine," shielding patients from the sound during the imaging process.

Zhang says the possibilities are endless, since the noise mitigation method can be customized to suit nearly any environment: "The idea is that we can now mathematically design an object that can block the sounds of anything," she says.

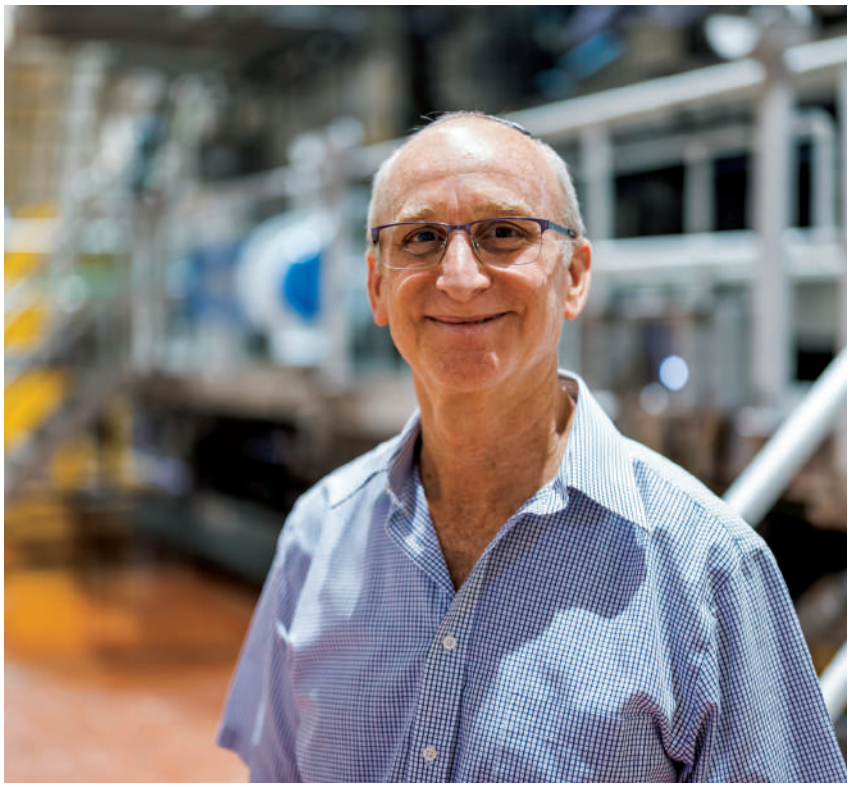
TRÜTZSCHLER'S AQUAJET FOR WEB BONDING

Dimona WLM1: Voith and Trützschler make the efficient manufacture of eco-friendly nonwovens a possibility

With its new nonwovens production line, Albaad, one of the world's largest producers of cosmetic wipes, is banking on Trützschler Nonwovens and Voith, two well-established technology leaders in the field of wet-laid nonwovens.

With their innovative WLS (wet-laid/spunlace) technology, Voith and Trützschler ensure flexible and efficient production of wet-laid and hydro-entangled nonwovens from 100 percent cellulose at Albaad's new WLM1 production line. The client for the project in Dimona, Israel, is Albaad, one of the three largest manufacturers of wet wipes and feminine hygiene products in the world.

Already in the first phase after start-up, the WLM1 completely met Albaad's expectations: the nonwovens manufactured at a speed of over 200 meters per minute exhibited an extremely high product quality. Accordingly, Gadi Choresh, plant manager of Albaad in Dimona, is satisfied with the work by Voith and Trützschler: "The installation and start-up of the machine went very well. With their professionalism and high level of commitment, the team has ensured the success of the project. Albaad appreciates the long term commitment and support to achieve the line properties even when things were not as expected."



GADI CHORESH, ALBAAD PLANT MANAGER IN DIMONA, ISRAEL

VOITH HYDROFORMER FOR WEB FORMING

VOITH-TRUETZSCHLER'S WLM 1 LINE AT ALBAAD

Voith and Trützschler machines for optimum quality

For the wet-in-wet production of its nonwovens, Albaad uses exclusively fibers from cellulose. In the first step, web formation, a suspension highly diluted with water is produced and fed into the Voith HydroFormer. A homogeneous fiber mat forms on the inclined wire of the machine. In many respects, this process is similar to the manufacturing process of paper. Voith has carried its extensive competence in paper machines over into the HydroFormer concept and thus makes it possible to produce high-quality nonwovens in this segment too.

Voith and Trützschler Nonwovens collaborated once again to implement the project. Trützschler was largely responsible for the machines for web bonding and drying. The AquaJet technology is leading the world in the bonding of nonwovens. Directed high-pressure water jets interweave the individual fibers together solely through the momentum of the water. The material thus obtains a high tensile strength and the desired textile feel without the use of any binding agents or bi-component fibers. In Albaad's WLS plant, Trützschler's innovative high-performance Streamliner dryer carries out the bulk of the drying of the nonwoven material. The spiral dryer section significantly increases the air speed and thereby achieves optimal drying performance. With the second drying step comes another component of the system by Voith, the contactless MCB drying system. Its uniform and stable web run ensures the efficient residual drying of the nonwoven material.

Moreover, Voith has equipped the WLM1 with a comprehensive process and quality control system. It monitors all the relevant parameters of production and thus reliably ensures a high product quality.

Simple manufacturing of 100% biodegradable, flushable wipes

The renewable raw material cellulose is very cost-effective and allows the manufacture of high-quality nonwovens with different characteristics. One special product segment is flushable wipes, which disintegrate very quickly in moving water but at the same time have a high strength when wet. Furthermore, these products are completely biodegradable. The hygiene products produced on the WLM1 are therefore perfect as moist toilet paper and can simply be flushed down the toilet. They thus make an important contribution to reducing blockages and faults in our waste water systems. Cellulose-based hygiene products are considerably more environmentally - friendly than those made from oil-based raw materials and ensure that our seas become less polluted with plastic waste.

The second raw material needed for production, water, is also used in an environmentally - compatible manner through the wet-in-wet technology. In a circuit, a filter system treats the white water from the HydroFormer and AquaJet and returns it to the manufacturing process.

www.truetzschler.de

Spider silk could be used as robotic muscle

Spider silk, already known as one of the strongest materials for its weight, turns out to have another unusual property that might lead to new kinds of artificial muscles or robotic actuators, researchers have found.

The resilient fibers, the team discovered, respond very strongly to changes in humidity. Above a certain level of relative humidity in the air, they suddenly contract and twist, exerting enough force to potentially be competitive with other materials being explored as actuators-devices that move to perform some activity such as controlling a valve.

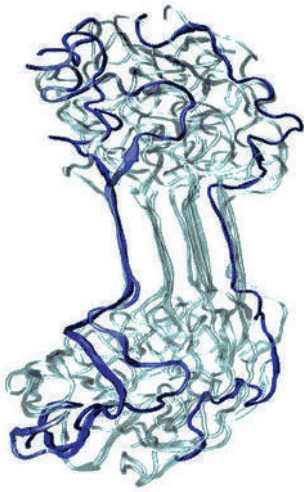
The findings are being reported today in the journal Science Advances, in a paper by MIT Professor Markus Buehler, head of the Department of Civil and Environmental Engineering, along with former postdoc Anna Tarakanova and undergraduate student Claire Hsu at MIT; Dabiao Liu, an associate professor at Huazhong University of Science and Technology in Wuhan, China; and six others.

Researchers recently discovered a property of spider silk called supercontraction, in which the slender fibers can suddenly shrink in response to changes in moisture. The new finding is that not only do the threads contract, they also twist at the same time, providing a strong torsional force. “It’s a new phenomenon,” Buehler says.

“We found this by accident initially,” Liu says. “My colleagues and I wanted to study the influence of humidity on spider dragline silk.” To do so, they suspended a weight from the silk to make a kind of pendulum, and enclosed it in a chamber where they could control the relative humidity inside. “When we increased the humidity, the pendulum started to rotate. It was out of our expectation. It really shocked me.”

The team tested a number of other materials, including human hair, but found no such twisting motions in the others they tried. But Liu said he started thinking right away that this phenomenon “might be used for artificial muscles.”

“This could be very interesting for the robotics community,” Buehler says, as a novel way of controlling certain kinds of sensors or control devices. “It’s very precise in how you can control these motions by controlling the humidity.”



MaSp1 Silk Protein

MaSp2 Silk Protein

The researchers were able to decode the molecular structure of the two main proteins, shown here, that make up spider dragline silk. One of these, MaSp2, contains proline, which interacts with water molecules to produce the newly discovered twisting motion.

Spider silk is already known for its exceptional strength-to-weight ratio, its flexibility, and its toughness, or resilience. A number of teams around the world are working to replicate these properties in a synthetic version of the protein-based fiber.

While the purpose of this twisting force, from the spider's point of view, is unknown, researchers think the supercontraction in response to moisture may be a way to make sure a web is pulled tight in response to morning dew, perhaps protecting it from damage and maximizing its responsiveness to vibration for the spider to sense its prey.

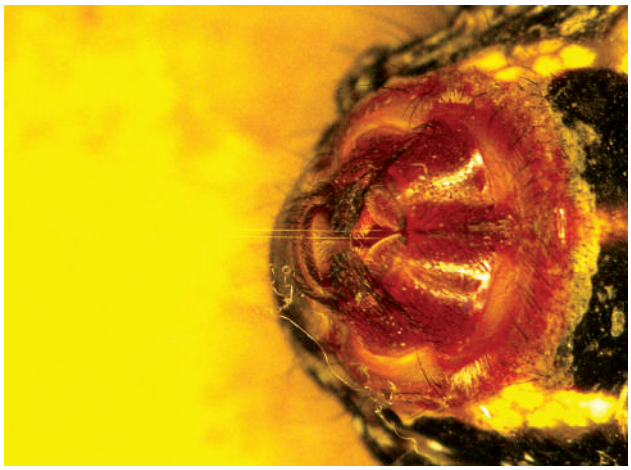
"We haven't found any biological significance" for the twisting motion, Buehler says. But through a combination of lab experiments and molecular modeling by computer, they have been able to determine how the twisting mechanism works. It turns out to be based on the folding of a particular kind of protein building block, called proline.

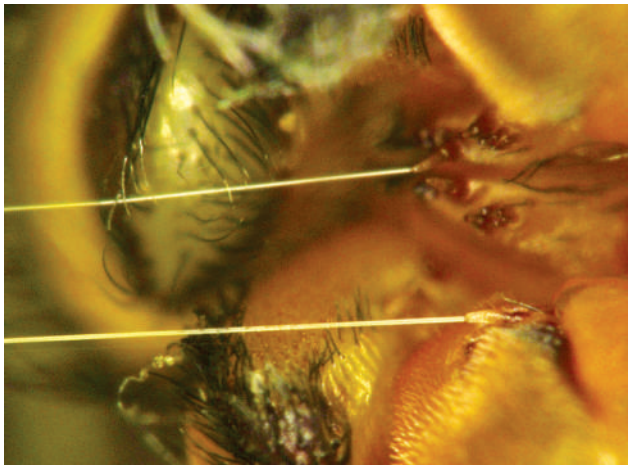
Investigating that underlying mechanism required detailed molecular modeling, which was carried out by Tarakanova and Hsu. "We tried to find a molecular mechanism for what our collaborators were finding in the lab," Hsu explains. "And we actually found a potential mechanism," based on the proline. They showed that with this particular proline structure in place, the twisting always occurred in the simulations, but without it there was no twisting.

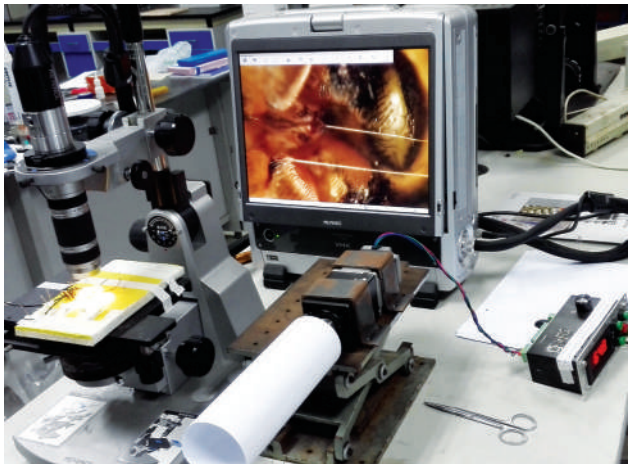
"Spider dragline silk is a protein fiber," Liu explains. "It's made of two main proteins, called MaSp1 and MaSp2." The proline, crucial to the twisting reaction, is found within MaSp2, and when water molecules interact with it they disrupt its hydrogen bonds in an asymmetrical way that causes the rotation. The rotation only goes in one direction, and it takes place at a threshold of about 70 percent relative humidity.

"The protein has a rotational symmetry built in," Buehler says. And through its torsional force, it makes possible " a whole new class of materials." Now that this property has been found, he suggests, maybe it can be replicated in a synthetic material. "Maybe we can make a new polymer material that would replicate this behavior," Buehler says.

"Silk's unique propensity to undergo supercontraction and exhibit a torsional behavior in response to external triggers such as humidity can be exploited to design responsive silk-based materials that can be precisely tuned at the nanoscale," says Tarakanova, who is now an assistant professor at the University of Connecticut. "Potential applications are diverse: from humidity-driven soft robots and sensors, to smart textiles and green energy generators."







It may also turn out that other natural materials exhibit this property, but if so this hasn't been noticed. "This kind of twisting motion might be found in other materials that we haven't looked at yet," Buehler says. In addition to possible artificial muscles, the finding could also lead to precise sensors for humidity.

www.phys.org

SMARTLY DRESSED

Smart materials are edging closer to being useful

Smart devices now encompass much more than just smartphones. Voice-controlled smart speakers and wearable health gadgets are merely a preamble to technology infiltrating the minutiae of our homes and lives. A Market Research Engine report published a couple of weeks ago forecasts the wearable devices market to be worth $67 billion by 2024. Likewise, a piece of market research from Markets and Markets predicts the smart home market to grow from $76.6 billion last year to $151.4 billion by 2024.

Could smart materials also be on the cusp of a similar revolution? Over the past few years, Chemistry World has covered actuators, aerogels, coatings, crystals, hydrogels, plastics and textiles that respond to their environment. Nature is the expert at amplifying nanoscale information into global action; mimicking this concept in artificial systems, however, is far from easy.

Understanding the breadth of stimuli that can induce a response in a system has been, and still is, key to building smart chemical systems. The smart fabric we reported on last month responds to humidity by changing its infrared emissivity in real time. If your home or office thermostat is as erratic as the one at Chemistry World HQ then clothes made from a material that regulates heat exchange with the environment will fly off the shelves.

The self-repairing hydrogel we reported on at the beginning of February, in my opinion, an even more exciting materials milestone. Sure, we've seen self-healing materials before. This new hydrogel, however, responds to mechanical stress much like a muscle would; it doesn't just mend itself – it actually gets stronger. It exemplifies how synthetic materials are no longer confined to being closed systems. They can maintain themselves by exchanging materials with their environment to build up (or break down) their components. And it's important to remember that the physical chemistry of an open system is rather different to that of a closed one. Fields like nonlinear chemical dynamics, that were previously more applicable to biological systems, will soon be much more important for materials chemistry. Molecular dynamics simulations will also need to evolve from being focused on systems with a fixed number of molecules.

The biggest headache I see for materials scientists is building systems that respond to multiple stimuli – single-stimuli materials will be of limited use in today's world. That and developing environmentally responsible ways to manufacture these materials from the outset. In any case, it seems smart materials are set for a kaleidoscope of clever applications that will augment our everyday lives.

www.chemistryworld.com

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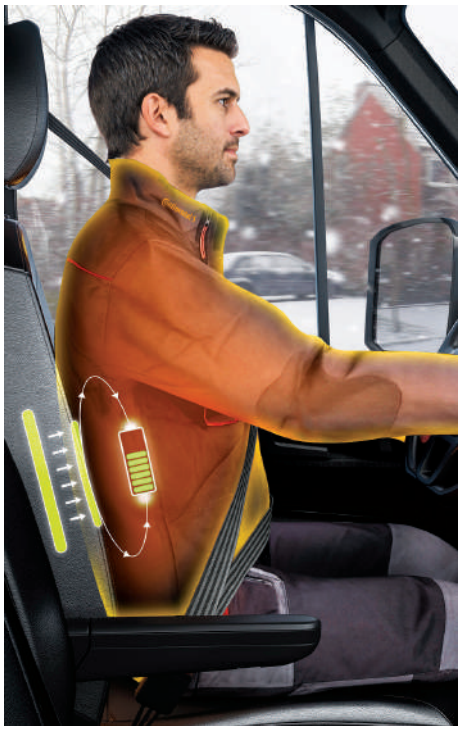
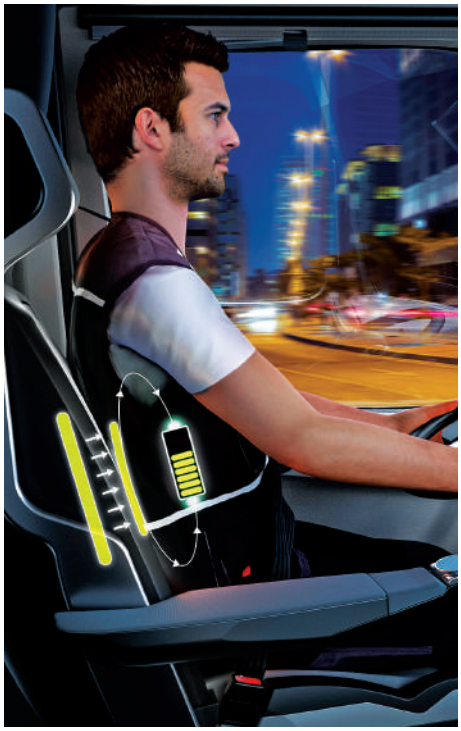
Safety jacket with LED lights for enhanced safety at work

Technology company Continental is unveiling two prototypes for a heated and actively illuminated safety jacket for the first time at the Consumer Electronics Show (CES) in Las Vegas. “Smart wearables such as these will revolutionize the way we use technology in everyday situations and improve safety on the road,” declares Tobias Huber, who is responsible at Continental for developing smart, functional materials. The two applications are inductively charged via a coil incorporated in the driver’s seat.

www.continental-corporation.com



The jacket heating system means the energy consumption for heating the cab can be reduced by up to 90 percent. The driver also does not end up freezing when loading and unloading.



The battery charges inductively while driving. As soon as the driver leaves the vehicle, the jacket automatically lights up.

Photo: Continental

"This concept opens up huge opportunities for the future," says Huber with conviction. Because the interaction with the vehicle electronics can be expanded further. In the future, for instance, sensors in the clothing could determine data such as humidity and temperature and, based on this, actuate the automatic climate control system via the vehicle electronics.

Eye-catching LED lights for safety

Ensuring good visibility at all times – for courier company, emergency services and utility services staff and for truck drivers when loading and unloading that is a significant safety factor because they are more visible to other road users in potentially hazardous situations and in poor weather conditions. The warning jacket with LED lights and an optional heating function protects its wearer against accidents and is activated automatically on leaving the vehicle. The energy-saving LED lights incorporated in addition to the conventional reflectors ensure good visibility in the dark – even when the jacket is not being lit up by an external light source. Furthermore, the light function is automatically activated as soon as the driver leaves the charging station – i.e. the seat.

A coil incorporated in the driver's seat inductively charges the batteries for the LEDs and the integral heating system. This means the jacket is always adequately charged. A flexible second coil in the jacket absorbs the power from the seat coil. Various material layers safeguard the garment's washability and limit radiation of the magnetic field to the driver. A battery powers the LEDs via wires incorporated in the fabric. The battery plus the control electronics can be housed where it is out of the way, for example in the breast pocket.

Enhanced comfort thanks to effective heating concept

"The heating function is also about far more than just improving comfort," declares Huber. "In delivery vehicles, which are increasingly electrically powered, the jacket heating system means the energy consumption for heating the cab can be reduced by up to 90 percent. That adds up to an extended range since the driver is heated rather than the cab."

In the future, electrically conductive materials are to be used to generate the desired warmth in the jacket without having to install a single millimeter of heating filament. This is thanks to a conductive, coatable polymer compound that is incorporated in the material by means of a printing process. If electricity flows through the material, it is directly converted to heat. "Consequently, the surface is fully warmed within seconds at the cost of a relatively low power input," explains Dr. Erhard Barho, who is responsible at Continental for the development of functional surfaces.

Dr. Erhard Barho
responsible at Continental for the development of functional surfaces.

Tobias Huber
is responsible at Continental for developing smart, functional materials.

INVISTA Launches New 'Wolf Gray' CORDURA® TrueLock™ Fiber for Lot-to-Lot Color Consistency in Military, Tactical, and Law Enforcement Applications

INVISTA's CORDURA® brand announces its latest innovation in solution-dyed nylon (SDN) 6.6 fiber technology with mill partner MMI Textiles, a premier supplier and one-stop shop supplying fabric, webbing and elastics in the textile marketplace for more than 21 years. MMI Textiles is the exclusive North American provider of fabrics and webbing made with the new Wolf Gray CORDURA® TrueLock™ fiber.

CORDURA® TrueLock™ fiber is created from INVISTA nylon 6.6 multi-filament fiber that is solution-dyed, locking the color in at the molten polymer extrusion level to create deep, durable color throughout the entire fiber structure. Color consistency is crucial when pairing fabric with other materials, such as webbing and elastic, to create uniform garments and gear.

WOLF GRAY
www.cordura.com

"Gray is one of the most commonly used colors in military/tactical applications, but was previously one of the most difficult to match, with several varying proprietary versions of 'Wolf Gray' on the market," said Nick Rivera, director of operations at MMI Textiles. "One of our customers – TyrTactical – was having challenges matching webbings and fabric and came to us for a solution. We then turned to CORDURA® brand."

"After examining six different shades of gray together, we worked hand-in-hand to create our latest innovative CORDURA® TrueLock™ fiber offering," said Allen Mortimer, North American regional manager and product manager at CORDURA® brand. "The Wolf Gray shade of CORDURA® TrueLock™ fiber offers color that is uniform across the components of gear and apparel, and durable enough to stay true after exposure to the elements and intense military missions."

The color achieved with CORDURA® TrueLock™ fiber has inherent near-infrared (NIR) capabilities, is abrasion and UV-fade resistant and does not bleed or crock. With color-fastness locked in at the fiber level, excellent shade consistency lot-to-lot and across multiple textile components (such as fabric and webbing), UV strength stability, and long-lasting vibrancy are made possible.

The process of color encapsulation used in CORDURA® TrueLock™ fiber also offers several environmental benefits such as reduced water as well as energy consumption*, and reduced dye and chemical usage in textile processing.

The announcement is a major milestone for INVISTA's Camden, S.C. facility, which expanded last year to increase U.S. capacity of high-tenacity, specialty fibers for CORDURA® fabrics. The Camden investment has accelerated progress in the development of new SDN capabilities – which complement the facility's existing high tenacity nylon 6.6 filament fiber manufacturing processes.

In addition to Wolf Gray, solution-dyed CORDURA® TrueLock™ fiber is available in Desert Sand, Tan, Coyote, Ranger Green, Camo Green and Black. Plans currently being put into action at Camden include expansion of the CORDURA® TrueLock™ filament product line to introduce additional standard colors and deniers as well as the flexibility to handle a smaller minimum order quantities and custom colorways. "Throughout our 50-year journey, we've worked to establish a foundation built on durable and long-lasting fiber technologies, including our legacy of solution dyed, high-performancenylon 6.6 offerings," said Cindy McNaull, global CORDURA® brand and marketing director. "The launch of our latest Wolf Gray CORDURA® TrueLock™ fiber is a testament to the strength of supply chain collaboration – a joint effort between an end-user, gear manufacturer, fabric supplier and fiber business." Tyr-Tactical gear in Wolf Gray is currently being put to the test by the Phoenix AZ SWAT Team.

About MMI Textiles

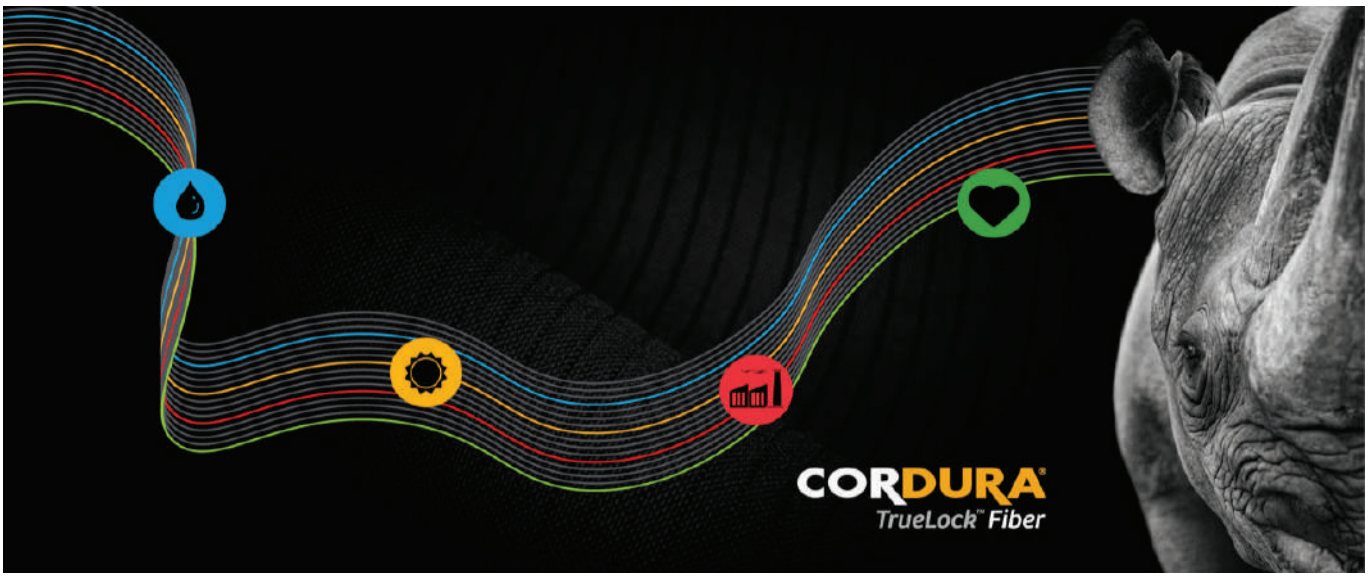
MMI Textiles is a premier supplier to the diverse textile market place. Through our commitment to unmatched service and integrity, we have become indispensable to our partners. MMI Textiles stands for "Me, Myself, & I." The company lives by this motto every day. It illustrates our personal 110% commitment to our customers and the integrity of the products that we sell.

About CORDURA® brand

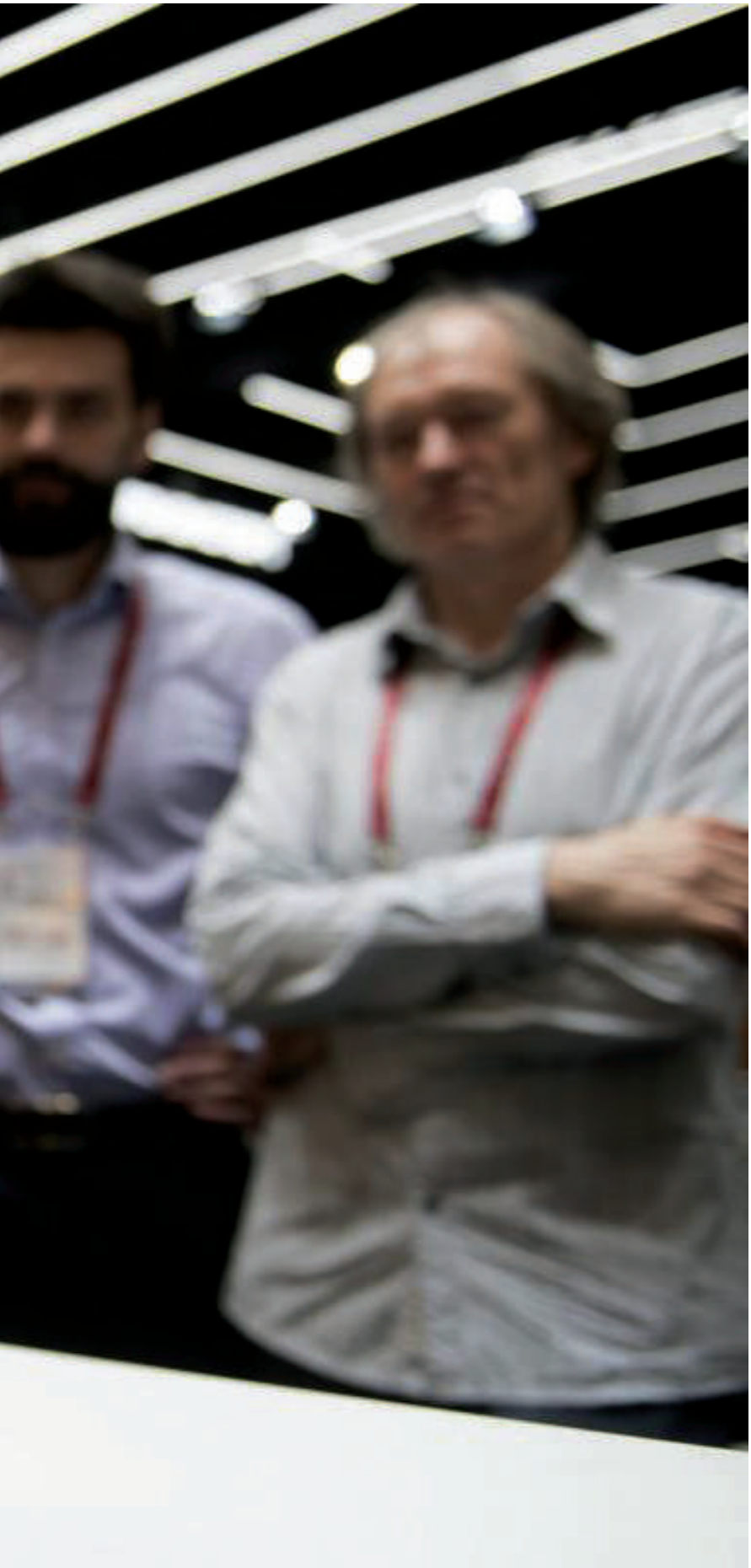
INVISTA's CORDURA® brand essence celebrates individual durability: "As Long As The World Is Full Of Durable People, We'll Keep Making Durable Fabrics™." Known for its resistance to abrasions, tears and scuffs, CORDURA® fabric is a primary ingredient in many of the world's leading high-performance gear and apparel products ranging from luggage, upholstery and backpacks to footwear, military equipment, tactical wear, workwear and performance apparel. The CORDURA® brand is a registered trademark of INVISTA, one of the world's largest integrated polymer, intermediates and fibers businesses.

About INVISTA

With leading brands including LYCRA®, COOLMAX®, CORDURA®, STAINMASTER® and ANTRON®, INVISTA is one of the world's largest integrated producers of chemical intermediates, polymers and fibers. The company's advantaged technologies for nylon, spandex and polyester are used to produce clothing, carpet, air bags and countless other everyday products. A wholly owned subsidiary of Koch Industries and a company in the United States, INVISTA has more than 50 locations around the world.



Helmets of Russian forces made invisible thanks to a new material



The Russian corporation Rostec came up with a new design a textile material that can successfully mask soldiers and military equipment.

Sergei Chemezov, CEO at Rostec, explains that the new material behaves like a chameleon, meaning it adapts to the colour of the surroundings. Initially, the textile will be used for military purposes, with wider applications added in time. The costs to date have not been revealed, but there are rumours saying that it reaches well over $100 million. Rostec is not the only company contributing to the design – it involves also RosElectronics, a leading Russian electronics company, and TsNIITOCHMASH, a major company involved in producing armament for the Russian military and MVD Internal Troops, to name but a few.

According to Chemezov, the need for innovative textiles has grown considerably. With the industrial production of the new material already launched, the experts and designers affiliated with the company focus particularly on a special military helmet. In time, the textile will be used for masking tanks and other types of military equipment. Currently, the scientific team at Rostec strives to improve the material even further, e.g. to enable the textile to present dynamic changes regarding colour intensity.

Viktor Yevtukhov, Deputy Minister of Industry and Trade of Russia, expresses his hope that this development opens the possibilities of designing smart clothing; he says that unique materials will be sought after to produce clothing, especially pieces designed for special purposes, e.g. withstanding extreme conditions.

According to official data, the value of the innovative and smart textiles market in Russia reaches US$ 1.3 billion, though the overall consumption in Russia is two times lower than in developed countries. Rostec is not the only company that wants to expand their activity in this field. The Russian government is eager to support such initiatives as it will make the Russian technical textiles more competitive and in demand.

photo by: www.rostec.ru

DEEP SHEEN

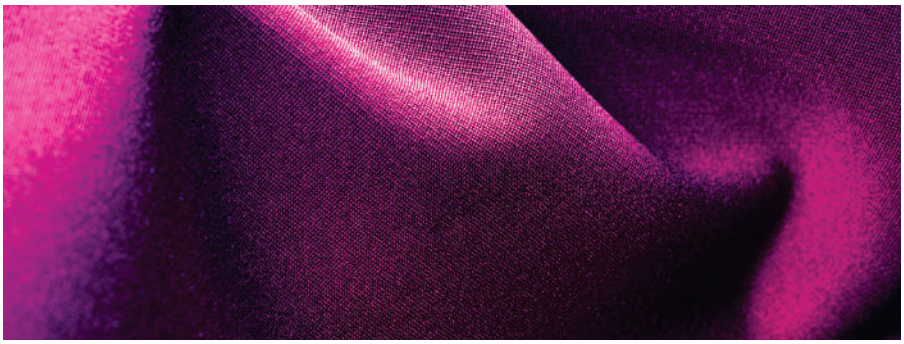
BRILLIANT COLOURING AND GENUINE UPCYCLED PRODUCTS

Schoeller Winter 2021 focuses on a theme of SHIFT, representing movement, change and responsibility. Changing perspectives, optimising the time-honoured, standing out from the crowd and yet never losing sight of sustainability. The durable, super-comfortable high-tech fabrics are eye-catching with their sophisticated sheen, intense colouring and high-quality materials but also stand for responsibly-produced textiles from Switzerland. Upcycled products with ECONYL® yarn and the PFC-free ecorepel® Bio technology, based on renewable raw materials, are just two of the ecological highlights of the 2021 Winter Collection.

01

STEALTHY SHINE

Intense, deep shades such as burgundy or aubergine combined with a seemingly technical satin sheen lend a wintry elegance on the ski slopes with super-comfortable **schoeller®-WB-400** soft-shell functional fabric. An equally sophisticated shimmer is demonstrated by the bi-elastic and water-repelling **schoeller®-shape** llightweight fabric which, tailored into leggings, moulds itself perfectly onto the body. A more sporty-masculine look is presented by the abrasion-proof, chintzed **schoeller®-dynamic** outdoor fabrics in a midnight blue with a subtle sheen.



02

HYPER DENSITY

Brilliant, vibrant colours play a major role in Schoeller's 2021 Winter Collection. Monochrome, high-quality colourings finish the high-tech fabrics with an intensity and depth which are guaranteed to draw all eyes in every outdoor activity. Entirely different fabrics can therefore be perfectly combined and create an arena for new creative silhouettes.

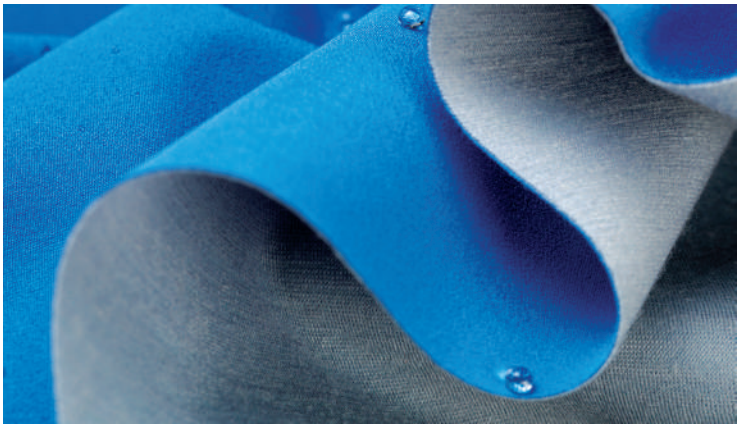
03 SMOKY-GHOSTLY

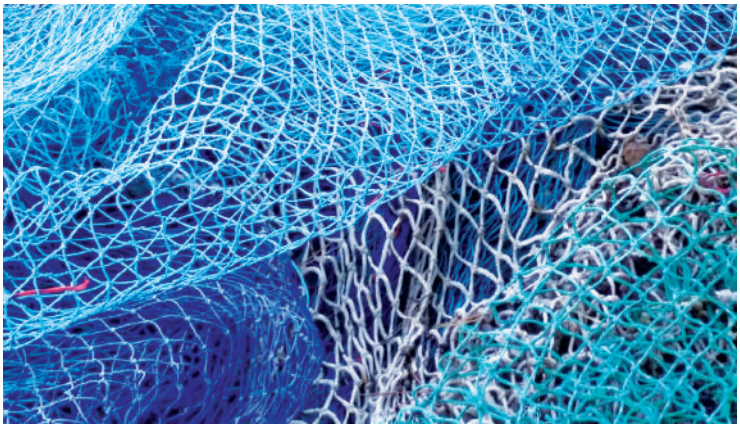
Light, blurred stone grey, jeans blue and camel shades blending technical, high-performance fabrics with a natural look and warming feel-good comfort are showcased in voluminous **schoeller®-WB-400** winter weights with colour-coordinated fronts and reverses. Soft, sophisticated mixes with a brushed, structured fleece backing not only make a big optical impact, but impress with their functionality due to the sustainable, PFC-free **ecorepel® Bio** technology, which also ensures reliable water repellence.

04 ECO CREATED

The textiles manufactured by Schoeller using ECONYL® yarn are genuine upcycled products, created from regenerated materials. The ECONYL® Reclaiming Programme from Aquafil S.P.A. reduces the quantity of waste material worldwide by collecting regenerative resources from waste disposal sites and the oceans and returning them to the production cycle. In terms of quality and appearance, no difference can be detected between the resulting yarn and conventional textiles. These innovations from the Schoeller fabric family featuring ECONYL® yarn are supple **schoeller®-WB-400** soft-shells with mulesing-free, washable merino backings in the shades of the sea. Additional wind and weather protection is provided by the bionic **c_change®** climate membrane, which is also available in combination with a light, recycled jersey backing as **schoeller®-WB-formula**. And the fluorocarbon-free **ecorepel® Bio** technology based on renewable raw materials accounts for the lasting water repelling properties in all qualities.

www.schoeller-textiles.com





B I O C R Y S T A L ®

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Biocrystal® is a perfect answer to our clients' needs to fully renew the consumed and much needed energy. In that way, they can keep up with their active life, ready to fulfil their daily efforts and challenges.

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The ratio and percentages of the crystals in the high-efficiency composite are precisely defined, representing the results of a 9-year research. As an outcome, we discovered the ultimate combination of the crystals that improves the functional state of the body without harmful impact or any contraindications.

Biocrystal® is developed, scientifically tested, and proven to bring the positive influence of crystals into a service of human, animal and plant well-being.

A natural and active crystal composite – Biocrystal® is:

- ✓ POWERFUL
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- ✓ HIGHLY EFFICIENT
- ✓ SCIENTIFICALLY PROVEN

Studies done on different Biocrystal® products by relevant experts showed that a person using it:

- ✓ will experience increased body energy and concentration,
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- ✓ feels more relaxed and tranquil.

In short: Biocrystal® is a one-of-a-kind-product that takes care of the user's organism without getting involved in the process itself, except for when using the product enriched with powerful crystal composite. Crystals have been known for their efficiency for ages and have been used in almost every industry. Therefore, we can freely add that our world would be inconceivable without the technology enabled by the crystals. For example: without the crystals, the manufacturing of watches, electronic equipment, medical devices, computers and many other products of life importance would be impossible.

Reliable and precise as they are, efficiency of crystals in the Biocrystal® composite is reflected through their impact on cells – start point of each living organism.

Enabling the cells to generate the optimum vibration, the crystals in Biocrystal® boost proper metabolic functions (exchanges between nutrients and substances), which protect from harmful external factors and/or decrease their influence.

IMPLEMENTATION POSSIBILITIES

Biocrystal® is suitable for an easy implementation in a wide range of products made for everyday use and intended for life improvement. Today we differentiate two options of Biocrystal® appearance, depending on the implementation potential:

Biocrystal® MIXTURE

Intended for implementation into:

- ✓ FOAM
- ✓ BEDDING PRODUCTS
- ✓ FURNITURE

BIOCRYSTAL® POWDER

Perfectly implementable into:

- ✓ YARN
- ✓ THREAD
- ✓ TEXTILE

BIOCRYSTAL® MIXTURE

The Biocrystal® mixture contains crystal grinded to a size of 0.4-0.1 mm. It is intended for implementation into various kinds of foams for products such as mattresses, toppers, but also products for everyday use, such as sofas, chairs, accessories, textiles, clothing and footwear, sport and exercise equipment, as well as products for horses, pets and plant care. The Biocrystal® mixture upgrades a product into an active one through an active treatment affecting a user's body by:

- ✓ enabling proper cell function,
- ✓ improving energy renewal,
- ✓ providing quality rest and recuperation,
- ✓ ameliorating the functional state of the whole organism.

BIOCRYSTAL® POWDER

Technology advancements have made an additional crushing of Biocrystal® mixture possible which consequently produced Biocrystal® powder – where the crystals are minced into the size of 3 – 6 microns, retaining all the positive effects.

The Biocrystal® powder doesn't deteriorate even at a temperature of 1,500° C.

These characteristics make it perfectly implementable into yarn and thread. Simplicity of implementation combined with the highest efficiency of the Biocrystal® powder make this product ideal for applying in sports equipment, furniture components, textile, bedding industry products, or even products intended for care and breeding of horses and pets.

The Biocrystal powder is applicable for implementation into the basics of almost any product produced within bedding, furniture, textile industry, automotive, etc.

New Ways for Smart Bedding

Outlast® will present its proven technology for proactive temperature management. New product innovations based on sustainable materials and new approaches that offer home textile brands more individuality and differentiation will further strengthen the company's market position as global provider of PCM solutions.

"While all our solutions aim for a natural, healthier sleep in the own comfort zone, each of our customer projects require a unique approach. We always seek the product from our Outlast® portfolio that will best fulfil the requirements of the end use," says Martin Bentz, managing director of Outlast Technologies GmbH. Ranging from coated textiles through viscose or polyester fibers as a filling to foam spraying — for over two decades manufacturers of mattresses, pillows, comforters, and other home textiles worldwide have been trusting in Outlast® technology. "Our focus is always a solution that best supports the brand manufacturer's product promise and messaging," Bentz continues. "For this we constantly work on new, innovative product developments that extend the benefits of smart temperature regulation by additional values. These values support our customers to attract new buyers and react on specific market demands."

1

Sustainability

The PCM expert has now taken the next step towards more sustainability and presents new products based on recycled material as the latest additions to the Outlast® portfolio. Constant reduction of the ecological footprint has always been a focus for technical development. Certifications such as OEKO-TEX® 100 class 1, resource-friendly dyeing and production processes in accordance with the highest quality standards have been a part of the Outlast® technology for many years.

In the new Outlast® products, temperature regulating technology is applied to base material (knitted fabric or nonwoven) which is produced from 100 % recycled polyester textiles or PET bottles, meeting the Global Recycle Standard (GRS). Further products that use renewable materials for other components of the technology are planned to join the portfolio in the near future. With this initiative towards greater sustainability, Outlast® continues to focus on making bedding even smarter.

2

Technology Plus

For bedding products that are targeted at customer segments with an advanced demand for temperature and moisture regulation, Outlast® offers the Xelerate product line. Similar to a “distribution booster”, these fabrics with an additional heat-spreader technology dissipate excess heat much faster and make the PCM process more active and efficient. These innovations will be particularly interesting to bedding manufacturers that want to address specific customer groups with an extra with an addition of technology. Xelerate products are extremely suitable for bedding products for those that suffer from hot flushes and night sweat attacks, as they occur e.g. during menopause.

3

More Individuality

The proven Outlast® technology is also available in new visual variations. To home textile brands, this offers not only more individuality but also new possibilities to differentiate within the own product range as well as from their competition. Color variations, for example, could support the marketing of exclusive bedding programs or help communicating different product lines.

Outlast® is a leading provider of phase-change materials (PCM) for proactive temperature regulation and offers the broadest range of solutions for various end uses. Originally developed for NASA to protect astronauts from temperature fluctuations in space, Outlast® has ever since continued to push the limits of this technology across hundreds of brands and thousands of products.

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✓ *Product presentation*

Product presentation: in our Tetex Magazine we publish information on recent scientific achievements, innovations and many more.

✓ *Social Media*

Social Media: our Facebook page has over 2500 followers and reaches about 10 000 users. We offer graphic, video, carousel and sponsored posts.

✓ *Textile machinery trade*

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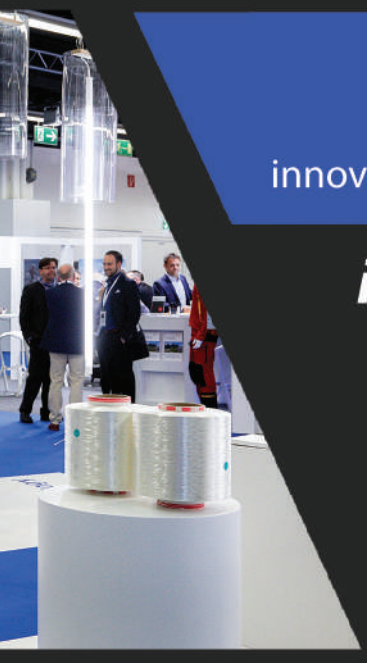

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OEKO-TEX® Launches GMO Test for Organic Cotton

The popularity of organic cotton has grown substantially in recent years. Consumers are increasingly worried about the environment and about harmful substances in the products they buy for themselves and their families. For them, organic foods and textiles are good choices, and are products for which they are willing to pay more. But, in return for that extra investment, consumers expect the organic products they buy to be genuine and verifiable as such. New testing from OEKO-TEX® helps companies throughout the global supply chain to easily test their organic cotton products for GMOs (genetically modified organisms), a molecular-level indicator of whether or not cotton products actually meet a fundamental definition of organic.

Today, about 70% of cotton globally is genetically altered. For example, some forms of cotton have been engineered to be herbicide-resistant. Others have been infused with an insecticide to kill pests, such as boll weevils. While the industry can make strong arguments in favour of these cotton DNA modifications, the producers and consumers of organic cotton reject them. They place greater value on the environmental, social, and product safety paybacks that they perceive as part of organic cotton offers. To qualify as organic and to be marketed as such, cotton must meet a comprehensive list of criteria governing the cultivation, processing, and segregation. One major requirement is that the cotton plants cannot be genetically engineered.

With today's complex, global, multi-sourced supply chain, how can a manufacturer be confident that organic cotton products are not contaminated with non-organic cotton so that customer and consumer expectations as well as regulations are consistently met?

New GMO testing by OEKO-TEX® provides a straightforward manner to test for genetically modified organisms in organic cotton. Samples are analyzed using qPCR (real-time polymerase chain reaction) technology, which can identify known genetically modified materials at a limit of 0.1%. Test results clearly indicate whether these GMOs were detected or not. Organic cotton products seeking STANDARD 100 by OEKO-TEX® certification will be required to undergo GMO testing. GMO testing is optional for other products. Currently, the GMO testing technology is limited to cotton.

"We learned in our 'The Key To Confidence' study that consumers who buy eco-friendly clothing and home textiles are likely to verify claims," says Georg Dieners, OEKO-TEX® General Secretary. "The new GMO testing gives manufacturers and marketers confidence that their organic cotton products meet regulatory and consumer expectations with regards to GMOs as well as the independent, traceable documentation to prove it."

Read about the OEKO-TEX® at: www.OEKO-TEX.com.

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Eastman Offers innovative recycling technology for polyesters

Eastman, one of the world's leading specialty materials companies, announced today its intention to pursue the launch of an innovative advanced circular recycling technology that uses polyester waste which cannot be recycled by current mechanical methods and, as a result, often ends up in landfills and waterways.

Using the process of methanolysis, Eastman's advanced circular recycling technology breaks down polyester-based products into their polymer building blocks. These building blocks can then be reintroduced to the production of new polyester-based polymers, delivering a true circular solution. Eastman was one of the pioneers in developing methanolysis technology at a commercial scale and has more than three decades of expertise in this innovative recycling process. Eastman's experience with methanolysis makes it uniquely qualified to be a leader in delivering this solution at a commercial scale. Advanced circular recycling technology can be an especially impactful solution, as low-quality polyester waste that would typically be diverted to landfills can instead be recycled into high-quality polyesters suitable for use in a variety of end markets, including food contact applications.

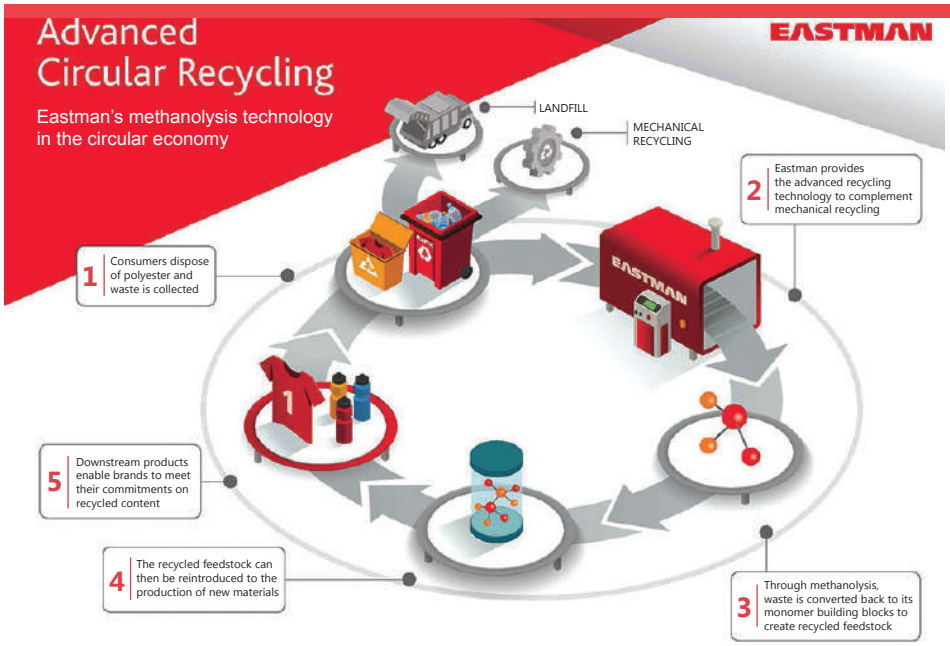
"We recognize that plastic waste is a complex problem that needs advanced solutions. As we have engaged potential partners, it is clear there is high interest across the entire value chain," said Mark Costa, Eastman's Board Chair and Chief Executive Officer. "Our long history of technical expertise in chemical processes, including methanolysis, and our leading position in copolyester chemistry, enables us to provide this innovative solution to address the growing challenges of plastic waste in our environment."

Eastman is currently executing an engineering feasibility study on the design and construction of a commercial scale methanolysis facility to meet the demands of our customers and has engaged in initial discussions with potential partners across the value chain on the development of such a facility. The goal is to be operating a full-scale, advanced circular recycling facility within 24 to 36 months.

Eastman's efforts to find new end-of-life solutions to advance the circular economy align with the company's innovation-driven growth strategy and commitment to create value through sustainability. With a strong focus on issues and opportunities within the environmental, social and governance (ESG) framework, the company has established goals and strategies to address the world's complex challenges.

"We believe we have an obligation to enhance the quality of life in a material way," said David Golden, Senior Vice President, Chief Legal & Sustainability Officer, and Corporate Secretary. "As the desire grows for products that have a sustainable life cycle, Eastman continues to build on its heritage of world-class technology platforms and product innovation to offer solutions at the molecular level. Today, more than ever, the world needs innovation, and Eastman is excited about the possibilities we can achieve by working along the value chain, across industry sectors and with community partners to expand our efforts and make the greatest collective impact."

www.eastman.com



Advanced circular recycling

It complements basic mechanical recycling. Through methanolysis, polyester materials are taken apart to their polymer building blocks. These building blocks can then be reintroduced to the production of new polyester-based polymers, delivering a true circular solution. Advanced circular recycling technology can be an especially impactful solution as low-quality polyester waste that would typically be diverted to landfills can instead be recycled into high-quality polyesters suitable for use in a variety of end markets, including food contact applications.

Do you require more from innovative textiles used in the footwear industry? Maybe would you like bamboo in kids shoes?

The contemporary directions of textile applications in footwear are streaming on the following paths:

1. **Preparing unconventional yarns and knitting fabrics in order to improve the physico–mechanical properties;**
2. **Replacing conventional yarns / knitted fabrics with ones;**
3. **Developing conventional finishing processes of antimicrobial treatment with environmentally friendly technology;**
4. **Examining the thermophysiological properties of textile materials used in footwear in order to create material packages with an ability to improve the comfort sensation.**

Replacing of conventional knitted fabrics - maybe with bamboo?

The Institute of Leather Industry in Poland has been conducting scientific investigations in a field of possibility to improve the comfort conditions of shoes by using innovative materials, including textiles and their configurations for years.

If you are a parent looking for a footwear for your children, you are considering certain factors: quick growth of children's feet, increasing mobility, long wearing time at a kindergarten or school connected with an intense physical activity. So you expect kids shoes to be: comfortable, healthy - without harmful substances - and characterized by optimal hygienic and physicomechanical properties.

Bamboo fibres seem to meet those expectations. They are hypoallergenic, eco-friendly, biodegradable. Moreover, they have antibacterial and hygroscopic properties which is an important factor from a health-related point of view. They are also characterized by higher mechanical properties -especially in the field of flexibility and elasticity.

The following characteristics led to choosing to choose bamboo materials in a research project entitled "The use of fibers and bamboo extract in elements of children's leather, textile and leather-textile footwear" (01.01.2018-29.02.2020). The main result of this research will be a prototype of healthy shoes for children. The second part of this project is a creation of new tanning technology with the use of bamboo extract in order to improve physico-mechanical properties of leather.

The team of scientists headed by Katarzyna Ławińska, PhD, has been examining in the first place the hygienic properties of bamboo materials (woven and knitted fabrics), which can be used as linings and outside layers of the final prototype. The next part was conducting the microbiological analysis by testing their resistance to pathogenic bacteria and fungi. The results can be useful in the future also for sports, tourist and special footwear. The scientists of the Institute of Leather Industry are cooperating with the MAT-2 Beata Żaczek i Spółka tannery, Łódź University of Technology and the Institute of Biopolymers and Chemical Fibres.

This project (fully financed by the National Center for Research and Development, as part of the national LIDER program, edition VIII) has been awarded the Golden Laurel of Innovativeness during the 8th edition of the Stanisław Staszic Competition - organised by the Polish Federation of Engineering Associations FSNT-NOT in 2018. The category of award: textile design and materials engineering.

Examining the thermophysiological properties of textile materials used in footwear in order to create material packages with an ability to improve the comfort sensation.

The Institute of Leather Industry also has developed guidelines for the footwear industry in the area of material selection and methods of their homogenization, thanks to the last two editions of Cornet Initiative supported by the National Centre for Research and Development reservoirs.

- "FOOTyWEAR – Innovating footwear design based on biomechanical and physiological parameters" (2012.12.01. – 2014.11.30),
- "Development of a holistic footwear concept based on user–centred design and integrated self–manag ment tools for elderly (60+)" (2017.01.01 – 2018.12.31).

The most important recommendation from the above-mentioned Cornet's projects is that using the spatial knitted fabrics (based for example on polyester or polyamide fibres) can give a good support in the exchange of biophysical mediums between interior and exterior of shoes. This is because the hydrophobic layer (cotton knitted or microfibers) away from the foot skin is accumulating water and hydrophilic layer (close to skin) is strongly absorbing. It shows that that appropriate choice of lining and outside materials could improve hygienic and utility footwear properties. Because the dominant process in feeling discomfort is sweating of human body, the role of textiles with specific physical and mechanical characteristics have a great influence on health and comfort.

Facing challenges of industry 4.0

The Institute of Leather Industry is also currently implementing projects:

- Erasmus Plus - "Feet in 4.0 - Workplace Inclusion in the Digital Era for Footwear Sector across Europe" - to develop tools that will enable people working in the footwear industry to keep up with the "industrial transformation of the Thursday generation." (2018.10.01 – 2020.09.30)
- Erasmus Plus - Establishment of Leather Hubs in Russia and Mongolia / LEATHUB - to create a "bridge" between leather industry entrepreneurs and universities by strengthening cooperation in research and development. (2019.01.15 - 2022.01.15)

www.ips.lodz.pl

www.lenzingindustrial.com

Smart solutions from botanic origins

The Lenzing Group (Lenzing) introduce LENZING™ at Techtextil Frankfurt as the specialty industrial brand, which provides smart solutions from botanic origins that are made in environmentally sound production processes. The LENZING™ brand covers a broad range of industrial applications ranging from agriculture to engineered products, packaging to protective wear and workwear.

LENZING™ Lyocell fibers – botanic solution for marine applications/aquatic farming.

Annually, about 8 million metric tons of plastics end up in the ocean, resulting in an estimated 165 million tons of plastic debris currently floating in the marine environment, threatening the health and safety of marine life. If the current trend continues, the share of coral catching diseases after coming in contact with plastics will increase from 4% to 89%, and it is expected that the amount of plastic will surpass that of fish (by weight) in our oceans by 2050*. Lenzing AG invention describes the use of wood-based cellulosic fibers, in particular LENZING™ Lyocell fibers, for the construction of ropes and nets for use as supports for the cultivation of marine cultures such as mollusks, particularly mussels and edible seaweed.

Lenzing AG initiated a project in collaboration with two major partners, which are Sächsisches Textilforschungsinstitut e.V. (STFI) and FIUM GmbH & Co. KG – Institut für Fisch & Umwelt (FIUM), in order to develop a sustainable solution for the marine industry, which does not compromise mechanical performance. Sustainability advantages in aquatic farming are particularly evident given the fact that the material is being used directly in the oceanic ecosystem. If pieces of the nets break off, they will harmlessly decompose rather than pile up in the ocean. In order to close the sustainability loop, the nets can be composted after harvesting and processing. The development of wood based mussel nets leads to a significant reduction of the annual plastic quantity in marine environment.

Workwear

LENZING™ Lyocell and Modal fibers contribute to clothing fabrics offering natural comfort in a wide variety of working environments. Their botanic origin, environmentally responsible production processes, and biodegradability reflect Lenzing's commitment to sustainability, while the unique physical properties of each fiber cater to the diverse needs of different occupations.

LENZING™ cellulosic fibers absorb moisture efficiently and support the body's natural thermal regulation mechanisms keeping the wearer's skin cool and dry. The efficient dye uptake penetrating deeply into the fiber structure, together with the smooth surface, leads to impressive color brilliance. The color of LENZING™ cellulosic fibers in synthetic blends remains visually appealing even after several wash and dry cycles.

Protective Wear

LENZING™ FR fibers are inherently flame-resistant cellulosic fibers based on the LENZING™ Modal production process. They are commonly blended with other fibers – particularly aramids – to produce a variety of flame-resistant fabrics engineered to protect against a range of specific hazards. Such blends are designed with the right blending partners, fabric weight and fabric structure to provide the desired properties. Correctly engineered, these fabric blends offer protection and a significant reduction of heat stress in hot climatic regions, largely owing to the unique features of the LENZING™ FR fiber, which enables it to contribute both protective qualities and enhanced comfort to typical blends.

About Propex

Propex GeoSolutions is a global leader in manufacturing geosynthetic and erosion control solutions. Our diverse portfolio of products helps build and rebuild key infrastructure across the globe, supporting the transportation infrastructure and erosion control markets. Our manufacturing and distribution facility in Ringgold, Georgia, boasts the largest global geosynthetic capacity under one roof, with the ability to produce 400 million square meters annually. Propex ships geosynthetic products to customers in 85 countries and has distributors located in 45 counties.

Engineered Earth Armoring Solutions

PYRAMAT® High Performance Turf Reinforcement Mat (HPTRM) is a three-dimensional, lofty, woven polypropylene geotextile. Designed with patented X3® Fiber Technology, it is specially engineered for erosion control on steep slopes and vegetated waterways. PYRAMAT® delivers the highest specification requirements for erosion protection of slopes, banks and channels. This product can be used by itself or as part of a system.

One of the systems that incorporate PYRAMAT® is ARMORMAX®, the most advanced flexible armoring technology available for severe erosion and surficial slope stability challenges. ARMORMAX® combines PYRAMAT® HPTRM and Engineered Earth Anchors to lock soil in place, protect against hydraulic stresses and provide up to 75 years of design life. This system is used in erosion control applications where additional factors of safety are required, including protecting earthen levees from storm surge and wave overtoppping, and protecting stream, river and canal banks from scour and erosion. Most notably, ARMORMAX® has been used by the U.S. Army Corps of Engineers (USACE) to repair and armor over 1 million square yards of earthen levees in Louisiana. In addition, this system is ideally suited to protect storm water channels in arid and semi-arid environments where vegetation densities of less than 30% coverage are anticipated. For slope stability applications, the system provides surficial slope stabilization to resist shallow plane failures.

Product Innovations

Last year, Propex launched SCOURLOK, a robust engineered bank stabilization system designed to resist extreme hydraulic stresses and protect shorelines while promoting vegetation. It was developed for applications that need below water scour protection in addition to slope stabilization and erosion control provided by ARMORMAX® and PYRAMAT® Engineered Earth Armoring Solutions.

SCOURLOK's unique and patented design improves the function of traditional hard armoring solutions by incorporating the vegetated benefits of an Engineered Earth Armoring Solution. The design of the PYRAMAT® HPTRM helps lock seeds in place to promote rapid root mass development, while GEOTEX® Nonwoven geotextile provides unparalleled hydraulic flow and soil retention to support sediment control. Additionally, PYRAMAT is fastened to the rigid cells to form vegetating pockets that can be filled with vegetative media to further promote and sustain plant growth.

PYRAWALL® was also introduced in 2018. This solution offers an engineered wrap-face vegetated solution for constructing reinforced soil walls and steepened slopes. The system consists of PYRAMAT® 75 HPTRM and fiber-composite internal bracing. This system produces reinforced soil mass to resist lateral earth pressures and provides immediate erosion protection upon installation. It also eliminates the need for temporary metal bracing or removable forms to improve installation efficiency. PYRAWALL® is ideal for coastal climates because the components are environmentally inert and not susceptible to corrosion. Featuring flexible setback and alignment, PYRAWALL® can be customized to unique site conditions and geometrics.

www.propexglobal.com

surfaceskins™
anti-bacterial protection

Surfaceskins are innovative antibacterial pushpads and pull handles for doors

They are designed to kill deposited germs in SECONDS and provide users with a continuously disinfected surface to reduce the spread and transmission of germs. They are low-cost, disposable, quick and easy to install. In addition, they are designed to complement existing infection control procedures and improve hand hygiene compliance rates to create a safer and less-contagious environment for all.

In the EU, for example, 6% patients develop healthcare-associated infections (HAI), which equates to 4.1 million patients per year (Centre for Disease Control and Prevention). Sadly, these nosocomial infections (HAIs) cause approximately 147,000 deaths in the EU every year with 24 billion associated economic burden (Infection Control & Hospital Epidemiology). HAIs are also more common in developing countries. As already mentioned, studies show that 5 to 10 percent of hospitalizations in Europe and North America result in HAIs. However, in areas such as Latin America, Sub-Saharan Africa, and Asia, it's more than 40 percent. As medical care becomes more complex and antibiotic resistance increases, the cases of HAIs will grow. The Centre for Disease Control and Prevention indicates that 80% of infections are transmitted by hands. Consequently, health services globally are campaigning for the improvement of hand hygiene awareness and compliance. With hand hygiene being poor across most countries and environments, any area that is frequently touched by multiple users becomes an area of contamination and can become a high risk area. Doors and door handles are main contributors in this area and are considered high risk. Surfaceskins eliminate doors and door handles as an area of contamination and at the same time promote greater hand hygiene awareness and compliance.

This double impact helps ensure a reduction of infectious episodes within any environment in which Surfaceskins are used. Surfaceskins are specifically designed to break the chain of infection in any environment by killing germs and maintaining a sterile contact surface every time you open and close a door, while all the while promoting the message of greater hand hygiene compliance.

The effectiveness of Surfaceskins has been proven. Multiple NHS laboratory trials demonstrate that the Surfaceskins antibacterial pushpads kill harmful bacteria, such as S. Aureus, E. Coli, E. Faecalis and Norovirus, the most common causes of HAIs. World renowned microbiologist, Professor Mark Wilcox, conducted the NHS trials and published the results in the Journal of Hospital Infection, advocating the use of Surfaceskins as a tool in the fight for infection reduction. At the same time, trials that demonstrate that when Surfaceskins are present on doors, hand hygiene awareness and compliance are both increased have also been conducted.

Nonwoven technology is at the heart of this product. The nonwoven core is specifically designed to hold alcohol gel consistently throughout the whole product, whilst preventing pre-mature evaporation of the alcohol gel. The antibacterial pushpads are activated when pressed, which causes secretion of an alcohol gel that leads to self-disinfection, thus protecting every door user, whilst at the same time promoting and complementing existing gel dispensers and hand cleaning. The technology is effective over a period of 7 days or 1 000 activations, after which the Surfaceskin is simply replaced with a new pad maintaining the effectiveness.

Surfaceskins provide a high-value, high-visibility marketing space to deliver key hygiene messages, branding or 3rd party advertising to generate an offset income for any sector. It is this high visibility and touch point which helps deliver the hand hygiene message, but this space can equally be used in the future to deliver other important health messages (stop smoking / give blood) or provide the opportunity for future brand building or advertising.

The product was launched in late 2017 after several years of development from NIRI (Non-woven Institute for Research and Innovation), the global leader in nonwovens engineering and product development. The team included NIRI's Technical Director, Prof. Russell, who has published over 300 papers and patents within the nonwovens field and is author of "The Handbook of Nonwovens." Surfaceskins have received phenomenal global interest, generating over £2.5M of orders and continue to get interest from more countries and market sectors.

www.surfaceskins.com

Suominen Introduces Intelligent Nonwovens

Products Utilizing Artificial Intelligence

Suominen, a leading nonwovens company, is introducing Suominen Intelligent Nonwovens concept to the market as part of its Changemaker strategy. The concept makes it possible to embed digital features into Suominen nonwovens. For example, with Suominen Intelligent Nonwovens, product traceability and product safety can be taken to a new level. It also provides brands with a new kind of sophisticated marketing tool, the company explains.

The concept stems from Suominen's R&D projects that have already led to the launch of High Definition Design Series, a pattern selection for nonwovens. Suominen Intelligent Nonwovens concept adds a new technical capability into the mix and combines artificial intelligence with extremely high - definition patterning. With Suominen Intelligent Nonwovens, all kinds of digital features can be embedded into the substrate without deteriorating other functionalities or aesthetic appearance of nonwovens.

"For instance, if a consumer would want to know the origin of the raw materials of the wipe he just purchased, he could retrieve the data by just scanning the wipe with his smartphone. If the wipes manufacturer notices a flaw in a wipe and wants to track the origin of the nonwoven, that could be done again quickly with a smartphone. It is up to us and our customers to imagine what can be achieved with this technology. It can be applied to virtually any application," explained Markku Koivisto, CTO of Suominen.

"We have already learned that Suominen Intelligent Nonwovens is something our customers have never seen before and I am very proud of the cross-functional team behind the unique concept. This is a leap forward in our Changemaker strategy and it shows that we are able to create nonwovens that others cannot."

Suominen Intelligent Nonwovens was already named as one of three finalists competing for RISE Innovation Award that recognises innovation that creatively used advanced science and engineering principles to solve challenges within the nonwovens and engineered fabrics industry. The winner will be announced tomorrow at the Research, Innovation & Science for Engineered Fabrics Conference in Raleigh, NC.

Suominen manufactures nonwovens as roll goods for wipes as well as for medical and hygiene products. The company employs more than 650 people in Europe and in the Americas.

www.suominen.fi

www.kymira.co.uk

Smart Textile Company Launches Life-saving Bluetooth ECG t-shirt

Cardiac monitoring t-shirt to be rolled out to athletes around the world

KYMIRA, the original producer of human-powered infrared sportswear, has today released an early prototype of their cardiac monitoring t-shirt. The garment wirelessly transmits the wearer's heart rhythm to a mobile device, and can accurately identify an unusual heart rhythm that could cause sudden cardiac arrest.

Officially being launched at the World Trade Centre, New York, on 28th November, the new monitoring t-shirt uses a single lead ECG and movement reducing hardware to offer more accurate reading during exercise, perfect for both professional and amateur athletes alike.

The t-shirt, which is due to be available to sports teams in March next year and to the public by the end of 2020, offers a way to reduce sudden heart attacks among athletes. The scientists at KYMIRA will continue to progress the technology to a 5 and 12 lead ECG version for medical purposes in the future.

Tim Brownstone, CEO and founder of KYMIRA, said: "This is exceptionally exciting for us as it's a product that has been in the making for a long time now. I am thrilled to be able to present the prototype this month and hope to get it into the hands of the sporting elite early next year."

"The possibilities this product offers both sportspeople and the general public is astonishing. We envisage developing this product to be used for clinical applications to allow those who may already suffer with heart conditions enough warning of a heart attack."

How it works

Made from a lightweight infrared emitting fabric using KYnergy infrared technology, KYMIRA products regulate body temperature to improve the wearer's performance due to the active minerals that are embedded into the fabric. The minerals capture the energy produced by the human body during exercise and re-emit it back into muscles, providing increased circulation, increased tissue oxygen levels by up to 20% and pain relief, especially reducing delayed onset muscle soreness (DOMS).

The cardiac device currently has electrodes printed onto KYMIRA's fabrics, which feed into a processing unit that takes the ECG data and transmits it via Bluetooth to the cloud. There, KYMIRA's proprietary algorithms process and clean the data to remove noise and movement artifacts in order to accurately detect irregular heartbeats such as arrhythmia heartbeats.

Scientists Develop First Fabric to Automatically Cool or Insulate Depending on Conditions

University of Maryland researchers have created a fabric that dynamically regulates heat passing through it.

Despite decades of innovation in fabrics with high-tech thermal properties that keep marathon runners cool or alpine hikers warm, there has never been a material that changes its insulating properties in response to the environment. Until now.

University of Maryland researchers have created a fabric that can automatically regulate the amount of heat that passes through it. When conditions are warm and moist, such as those near a sweating body, the fabric allows infrared radiation (heat) to pass through. When conditions become cooler and drier, the fabric reduces the escaping heat. The development was reported in the February 8, 2019 issue of the journal Science.

Photo by: Faye Levine, University of Maryland

The researchers created the fabric from specially engineered yarn coated with a conductive metal. Under hot, humid conditions, the strands of yarn compact and activate the coating, which changes the way the fabric interacts with infrared radiation. They refer to the action as “gating” infrared radiation, which acts as a tunable blind to transmit or block heat.

“This is the first technology that allows us to dynamically gate infrared radiation,” said YuHuang Wang, a professor of chemistry and biochemistry at UMD and one of the paper’s corresponding authors who directed the studies.

The base yarn for this new textile is created with fibers made of two different synthetic materials - one absorbs water and the other repels it. The strands are coated with carbon nanotubes, a special class of lightweight, carbon-based, conductive metal. Because materials in the fibers both resist and absorb water, the fibers warp when exposed to humidity such as that surrounding a sweating body. That distortion brings the strands of yarn closer together, which does two things. Firstly, it opens the pores in the fabric. This has a small cooling effect because it allows the heat to escape. Secondly, and most importantly, it modifies the electromagnetic coupling between the carbon nanotubes in the coating.

www.cmns.umd.edu

"You can think of this coupling effect like the bending of a radio antenna to change the wavelength or frequency it resonates with," said Wang. "It's a very simplified way to think of it, but imagine bringing two antennae close together to regulate the kind of electromagnetic wave they pick up. When the fibers are brought closer together, the radiation they interact with changes. In clothing, that means the fabric interacts with the heat radiating from the human body."

Depending on the tuning, the fabric either blocks infrared radiation or allows it to pass through. The reaction is almost instant, so before people realize they're getting hot, the garment could already be cooling them down. On the flip side, as a body cools down, the dynamic gating mechanism works in reverse to trap in heat.

"The human body is a perfect radiator. It gives off heat quickly," said Min Ouyang, a professor of physics at UMD and the paper's other corresponding author. "For all of history, the only way to regulate the radiator has been to take clothes off or put clothes on. But this fabric is a true bidirectional regulator."

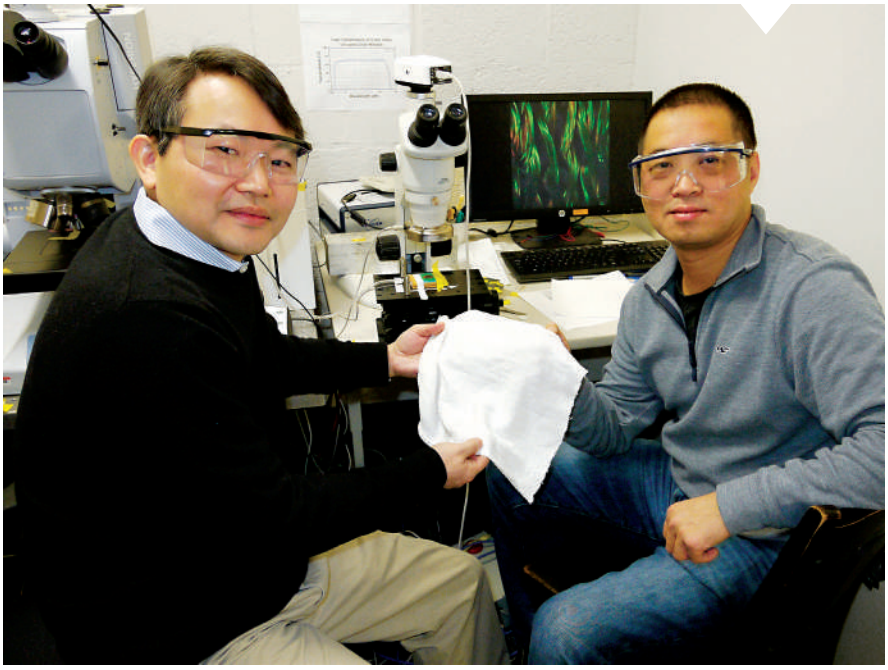
According to the Science paper, this is first textile shown to be able to regulate heat exchange with the environment.

"This pioneering work provides an exciting new switchable characteristic for comfort-adjusting clothing," said Ray Baughman, a professor of chemistry at the University of Texas who was not involved in the study. "Textiles were known that increase porosity in response to sweat or increasing temperature, as well as textiles that transmit the infrared radiation associated with body temperatures. However, no one before had found a way to switch both the porosity and infrared transparency of a textile so as to provide increased comfort in response to environmental conditions."

More work is needed before the fabric can be commercialized, but, according to the researchers, materials used for the base fiber are readily available and the carbon coating can be easily added during standard dyeing process.

"I think it's very exciting to be able to apply this gating phenomenon to the development of a textile that has the ability to improve the functionality of clothing and other fabrics," Ouyang said.

This new fabric being developed by University of Maryland scientists YuHuang Wang and Min Ouyang, is the first textile to automatically change properties to trap or release heat depending on conditions.



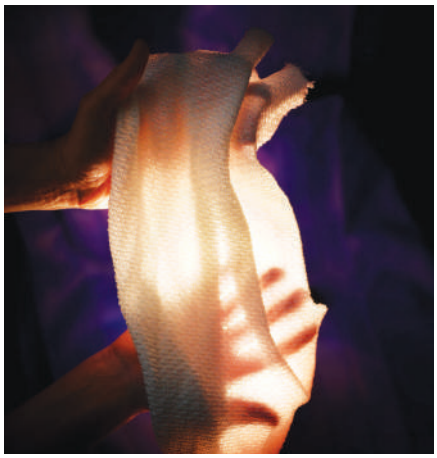


Photo by: Faye Levine, University of Maryland

WEARABLE POLYMER PIEZOELECTRIC SENSORS FOR FASHIONABLE CLOTHING

Fig. 1 Piezoelectric PLLA braided cord sensor.

Photo by: Kansai University

Yoshiro Tajitsu of Kansai University, Osaka, Japan, and Teijin Limited, Japan, have developed innovative wearable piezoelectric PLLA braided cord sensors. This technology can be used as wearable sensors in the fields of fashion, sports apparel, interior design, and healthcare, areas for which conventional wearable sensing devices cannot be used.

Touch panel displays are ubiquitous. It is difficult to imagine using smartphones, personal computers, digital watches, and other modern electronic devices without this form of human-device interface. However, despite the proliferation of touch panel devices, vast research is conducted on the next generation of 'man-machine' devices, which could be worn like clothes, so-called "wearable sensors."

Now, in an innovative approach, Yoshiro Tajitsu of Kansai University, Osaka, Japan, and Teijin Limited, Japan, have developed the world's first wearable piezoelectric fabrics consisting of a conducting carbon fiber yarn core, piezoelectric polyctric poly-L-lactic acid (PLLA) fiber yarn, polyethylene terephthalate (PET) middle sheath and conducting carbon fiber outer shield (Fig.1).

The piezoelectric PLLA braided cords produce electrical signals in response to almost any type of three-dimensional motion, including bending and twisting. Importantly, these coaxial cable type fabrics are woven into piezoelectric braided cords for electromagnetic shielding and high sensitivity, so they will not respond to environmental noise from cells phones and other such electromagnetic interference.

"Our research is aimed at developing functional apparel, sometimes referred to as e-textiles," says Tajitsu. "We believe that wearable human-machine devices will enable people to interface with external devices naturally, without being limited or hindered by having to perform complicated movements, such as focusing on a display panel to rely instructions. Also, e-textiles must be comfortable and fashionable for wide spread acceptance. These ideas led to the development of our wearable sensors shaped like traditional Japanese braided cord or Kumihimo used in kimono."

Applications of piezoelectric PLLA braided cords

Professor Tajitsu and colleagues weaved three types of traditional Japanese decorative knots (Kame, Kicchyo, and Awaji) used as part of traditional kimonos worn by women (Fig.2) with PLLA braided cords. "We analyzed the magnitude of electrical signals that we could expect for each of these three knots," explains Tajitsu. "Our finite element calculation showed that he largest signal would be produced by the Kame and Kicchyo knots, and that the response from the Awaji know would be very small. So we use the Kame and Kicchyo knots for potential applications."

One of the unique wearable applications is for Japanese kimonos (fig. 2) is, for example, turning on a smart phone to take a selfie. "We are working with fashion designers in France and Italy of the design of clothes made with our PLLA braided cords," says Tajistu.

“We are looking into possibilities for traditional Japanese clothing like women’s kimono with partners in Japan.” The piezoelectric PLLA braided cord can be used as wearable sensors, mainly in the fields of fashion, sports apparel, interior design, and healthcare, by utilizing its fashionability and wearability, which cannot be achieved using conventional wearable sensing devices (Fig.3).

Healthcare and monitoring the motion of people are other potential applications of the PLLA braided cords. For example, Tajistu and coworkers have fabricated decorative necklaces with Kame and Kicchyo knots, which were successfully used to monitor the pulse rate due to pressure sensing of the carotid arteries on each side of the neck. Notably, the pulse signal was not affected by movements of the head or other parts of the body (Fig.4). “The subject does not feel any discomfort with the necklace, so it is a very useful portable device for monitoring healthcare,” says Tajitsu. “In our experiments we transmitted the signals to smartphones by Wi-Fi. We have also made laces for shoes to monitor motion. So this is a fashionable and very powerful technology for wide ranging applications.”

www.phys.org

FIG.2. TAKING A SELFIE WITH ‘E-TEXTILES’: TRADITIONAL JAPANESE KIMONO

FIG.3. FASHIONABLE SENSORS FABRICATED USING PIEZOELECTRIC PLLA BRAIDED CORD.

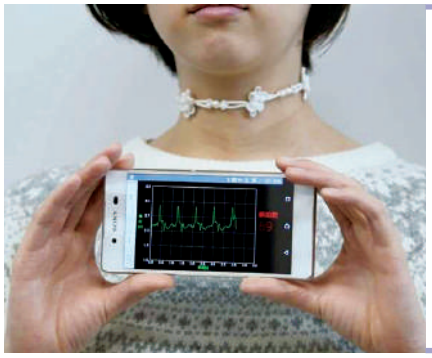
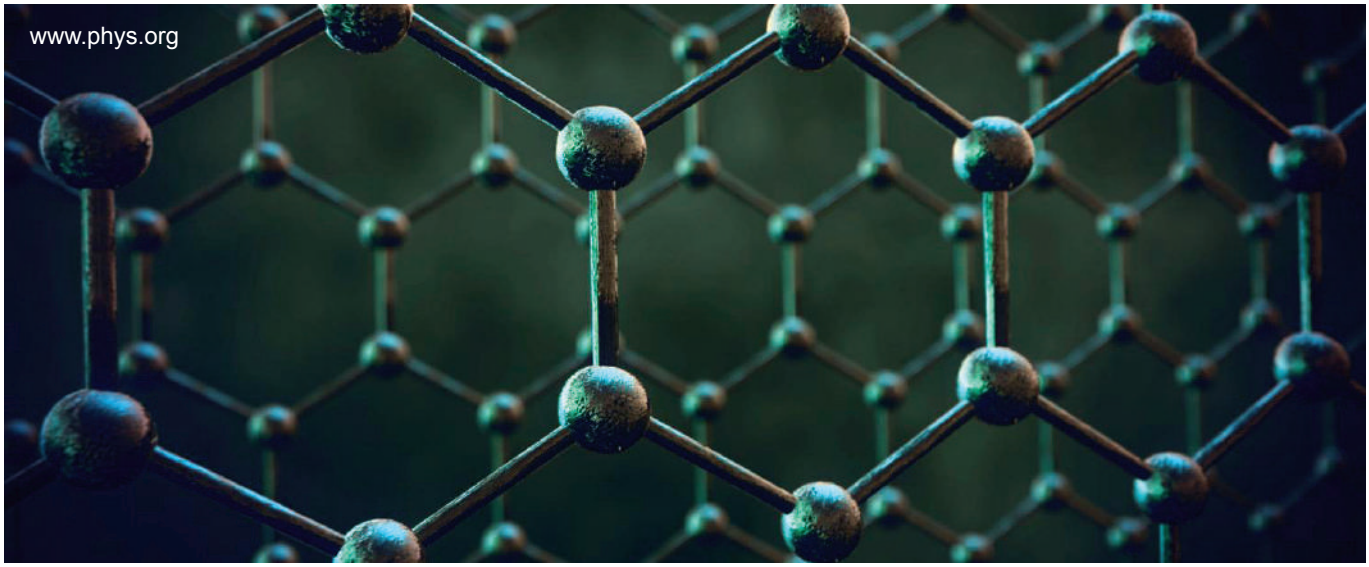


FIG. 4 PULSE WAVE SIGNAL DESCRIBED IN THE TEXT.

Photo by: Kansai University



This visualisation shows layers of graphene used for membranes. Credit: University of Manchester

FIRST SCALABLE GRAPHENE YARNS FOR WEARABLE TEXTILES

A team of researchers led by Dr Nazmul Karim and Prof. Sir Kostya Novoselov at the University of Manchester have developed a method to produce scalable graphene-based yarn.

Multi-functional wearable e-textiles have been a focus of much attention due to their great potential for healthcare, sportswear, fitness and aerospace applications.

Graphene has been considered a potentially good material for these types of applications due to its high conductivity and flexibility. Every atom in graphene is exposed to its environment allowing it to sense changes in its surroundings, making it an ideal material for sensors.

Smart wearable textiles have experienced a renaissance in recent years through the innovation and miniaturisation and wireless revolution. There have been efforts to integrate textile-based sensors into garments, however, current manufacturing processes are complex and time - consuming, expensive, a the materials used are non-biodegradable and use unstable metallic conductive materials.

As published in ACS Nano, the process developed by the team based at the National Graphene Institute has the potential produce in tonnes of conductive graphene-based yarn, using existing textile machineries and without adding to production costs.

In addition to the yarns being manufactured in large quantities, they are washable, flexible, inexpensive and biodegradable.

Such sensors could be integrated to either a self-powered RFID or low-powered Bluetooth to send data wirelessly to a mobile device.

One hindrance to the advancement of wearable e-textiles has been the bulky components required to power them. Previously, it has also been difficult to incorporate these components without compromising the properties or comfort of the material, which has seen the rise of personal smart devices such as fitness watches.

The lead author Dr. Shaila Afroj, who carried out the project during her Ph.D., said “To introduce a new exciting material such as graphene to a very traditional and well established textile industry, the greatest challenge is the scalability of the manufacturing process. Here we overcome this challenge by producing graphene materials and graphene-based textiles using a rapid and ultrafast production process. Our reported technology to produce thousand kilograms of graphene-based yarn in an hour is a significant breakthrough for the textile industry.”

Dr. Nazmul Karim, the other lead author and Knowledge Exchange Fellow (Graphene) from the National Graphene Institute said that “high performance clothing is going through a transformation currently, thanks to recent innovations in textiles. There has been growing interests from the textile community into utilizing excellent and multifunctional properties of graphene for smart and functional clothing applications.”

“We believe our ultrafast production process for graphene-based textiles would be an important step towards realizing next generation high performance clothing.”


avantex
PARIS
High Technology + Fashion Industry
16 – 19 September 2019
Paris Le Bourget
France
www.avantex-paris.com
messe frankfurt

AVANTEX PARIS is part of the six international events simultaneously organized by Messe Frankfurt France for the fashion industry and known as “The Fairyland for Fashion” (Texworld, Texworld Denim, Apparel Sourcing, Shawls & Scarves, Leatherworld and Avantex). Last February, the different fairs gathered in Paris around 1,200 exhibitors and 14,000 visitors from all around the world.

AVANTEX PARIS is the first international trade show dedicated to high technology for the fashion industry. From 16 to 19 September 2019, around 50 exhibitors, covering all the value chain, will offer innovative products and services aiming at allowing companies to take advantage of the latest technologies.

From raw materials to upcycling, including smart textiles, new printing solutions, 4.0 retail devices and services as well as the best of R&D players for the conception of wearables, AVANTEX PARIS will be the place to be to meet all these innovative solution providers.

During the show, promising startups will be highlighted through the Avantex Fashion Pitch, which will be back for this 9th edition of AVANTEX PARIS. The project owners will benefit from a great visibility with professionals from the clothing and textile industry and with investors. This competition will allow the winner to participate in the next February edition of AVANTEX PARIS as an exhibitor. If you are an innovative startup, seize this opportunity and do not hesitate to apply! You can get more information at www.avantex-paris.com.

AVANTEX PARIS is not only an event to meet innovative startups and companies, it also provides high quality prospective content, including interactive round-tables with carefully selected creative and visionary speakers to build the future of fashion and textile industry.

The avant-garde designers’ creations will be showcased through exhibitions and catwalks, and the trend forums will remain unmissable events that will round off the program and give visitors an instant understanding of this constantly evolving industry. Innovation, conferences, trends, networking - AVANTEX PARIS is the trade show for high-technology and fashion industry. Do not miss the occasion to fully immerse yourself for 4 days in the prospective vision of fashion!

Promoting professionalism

The Textile Institute, a registered UK charity, is an international organisation governed by a global Council and legally constituted by a Royal Charter. The success of the Textile Institute depends on the activities of the worldwide Sections and National Committees in many countries and of the Groups covering special occupational interests.

One of many visitors at Techtextil 2019 in Frankfurt, the Institute is excited to be part of a leading international exhibition where it can offer beneficial expertise on the whole of the textile supply chain to everyone. From promoting proficiency across the textile industries, supporting career advancement, offering benefits through our membership options and facilitating the maintenance of educational standards globally, the TI can assist textile professionals worldwide.

It is the mission of the TI to promote professionalism in all areas associated with the textile industries worldwide. The professional expertise of members is diverse and these skills relate to the totality of industrial and commercial operations, from fibre production to the use of products by individual and corporate consumers.

The Textile Institute's role brings together professionals from all countries in an association that sets professional standards, advances knowledge and industrial practice, interactively networks the exchange of ideas and is a social community promoting friendship.

Continuing recruitment of professional talent to the textile industries and its enhancement throughout individual careers is something we are keen to promote. Professionalism that is shown through self-confidence and flair; technical, economic or design capability; rational and systematic thought; creativity and judgement; sensitivity to the environment, and to other professions, nationalities and cultures; appreciation of the global range of textile activities; changing requirements of the market place, and a lifetime commitment to personal education, professional advancement and development. It recognises excellence and achievement in the operation and products of the textile industries as well as encourages creative contributions to not only to the advancement of knowledge and practical technology, but also, marketing, design and education.

The Institute is also keen to maintain the reputation for integrity, excellence and achievement associated with The Textile Institute.

www.textileinstitute.org

within the textile industry

This goal has been achieved by the dedication and service of past and present members. This is also achieved through the TI Professional Qualifications and Accreditations.

The TI Professional Qualifications help to define quality in textile education and training to help young people become professionals and to recognise basic training and practical application. Many people have accomplished professional achievements and contributions which are not recognised through academic qualifications alone. The attainment of a professional qualification is the clearest way of demonstrating possession of a sound knowledge of the industry and a high standard of professional competence.

Acknowledged by many national governments as well as employers, the TI Professional Qualifications establish that the holder has proved their ability to practice.

A wide range of courses around the world within all areas of textiles, clothing and footwear are accredited by the TI. Students who graduate from these courses can apply for their professional qualifications after a shorter period of work experience and in some cases directly after graduation. There are many benefits for organisations, including providing their students with employment opportunities and facilitating the maintenance of educational standards between countries and specialisations.

Membership benefits vary depending on the type of membership purchased. Any member instantly becomes part of an international, professionally diverse network. Our global events and resources provide unprecedented networking opportunities, access to employers, vital career advice, continued learning and high-quality speakers.

Each year, the TI presents its Medals and Awards to individuals globally to recognise exceptional work in various areas, such as: Sustainability, Design, New Materials, Innovation and the Young Persons Award for students and recent graduates. This prestigious event will be held at the Lowry in Salford Quays, UK, on 23 May 2019.

The TI is looking to build on the success of the awards year on year. Sponsorship opportunities were made available this year, which include valuable benefits and further networking opportunities for all concerned. The TI is excited about the growth of its medals and awards and what it will stand for in the future of recognising the accomplishments of hard-working individuals and organisations.

If you want to help shape the future of the Institute, why not apply to join the TI Council? You can also help direct change the textile industries by joining a Committee, Section or Special Interest Group (SIG). The TI has a Polish Section, chaired by Assoc. Prof. Małgorzata Zimniewska, Acting Director of the Institute of Natural Fibres and Medicinal Plants in Poznań. However, wherever you are in the world, we can put you in touch with your nearest contact as there is a worldwide network with Sections.

Basalt fiber in laminated Composites: from theory to practice

In the context of modern requirements towards structural materials, laminated composites attract much attention from professionals working in almost all industries. Laminates have a sandwich structure with separate layers bound in a monolith by a matrix material.

Laminated composites have a huge potential due to almost unlimited reinforcing and matrix materials, and offer the possibility of developing high-strength, corrosion-resistant and lightweight materials, including thin-walled hollow products.

Matrix materials are comprised of metals and alloys, carbon and ceramics, organic and inorganic polymers. The choice depends on the physicochemical and operational properties required for the final product. Combining the most relevant properties of each component, a developer can obtain innovative structural composites with properties surpassing traditional materials.

Well-matched matrix and reinforcing material enable the developers to compensate for the negative characteristics of some components, attaining almost perfect material properties relevant to the application field, given the range and types of expected loads and operating conditions.

The matrix is assigned important roles: to ensure density of the product, to secure its shape and reinforcing materials allocation, to distribute stresses in the composite volume, to provide a uniform load on the filler and to maintain load redistribution upon the destruction of some part of the filler.

Requirements for matrix materials can be divided into:

- operational, which are related to the mechanical and physicochemical properties of the matrix material, ensuring the workability of the composition under various operational factors;
- technological, which ensure efficient joint operation of fibers under various types of loads.

Equally important is the complex of operational and technological requirements, which reinforcing material has to satisfy:

- operational requirements, such as strength, rigidity, density, stability of properties in the required temperature range, chemical resistance;
- technological requirements that determine the feasibility of organising a highly efficient manufacturing process of fiber reinforced products.

Laminated composites are usually reinforced with fiber, bands, fabrics, tows, woven and non-woven textiles. It is also possible to combine different types of materials in one composition. Individual plies of a matrix component can act as dispersed reinforced.

Properties and costs place basalt fiber in the intermediate position between carbon and fiberglass. This is a reason why designers increasingly select it as a filler in hybrid laminated composites, e.g. combining it with carbon and glass reinforcement.

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EVENTS CALENDAR

THE MOST IMPORTANT EVENTS

FROM THE TECHNICAL TEXTILE INDUSTRY

2019

Automotive Interiors Expo

MAY 21 - 23

STUTTGART

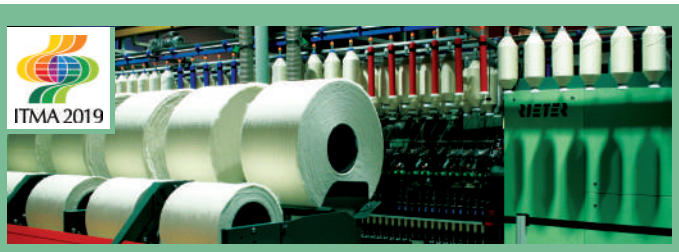
Automotive Interiors Expo 2019 offers visitors an amazing line-up of exhibits showing the latest vehicle interior technologies and services that are designed to ensure that the highest standards are met in terms of product quality, reliability, durability and safety.

AUTEX

JUNE 11 - 15

GHENT

19th World Textile Conference: Textiles at the Crossroads. In 2019, AUTEX will celebrate its 25th anniversary! Each year since 2001, a different member of AUTEX is organising the association's conference, in which hundreds of researchers and companies participate.



ITMA

JUNE 20 - 26

BARCELONA

ITMA is the trendsetting textile and garment technology platform where the industry converges every four years to explore fresh ideas, effective solutions and collaborative partnerships for business growth.

AVANTEX

SEPTEMBER 16 - 19

PARIS

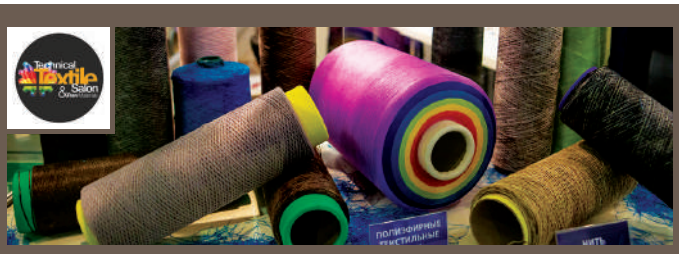
Avantex Paris is the first international tradeshow dedicated to high-tech for the fashion industry. Avantex Paris gathers the best of the innovative companies and startups building the future of fashion and textile industry, from raw materials to upcycling, including smart textiles and new printing solutions.

Heimtextil

SEPTEMBER 17 - 19

MOSCOW

Heimtextil Russia is the only specialized trade fair for home and contract textiles in Russia. During 20 years of its presence on the Russian market, it has become the best place to find suppliers of high-quality textiles in 12 product groups for homes, hotels, restaurants and offices.



Technical Textile & Raw Materials

SEPTEMBER 17 - 20

MOSCOW

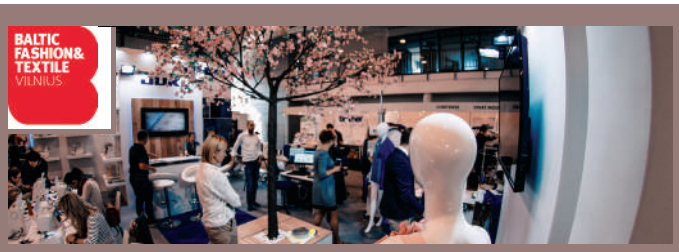
International Salon of Technical Textile, Non-woven Materials, Protection Garment & Raw Materials is held in September in Russia. The comprehensive program traditionally tells the visitors about the innovations in the field of production and application of technical textile.

Intertextile

SEPTEMBER 25 - 27

SHANGHAI

Intertextile Shanghai Home Textiles is Asia's leading home textile. It is a dynamic platform for industry professionals to source and to gain design inspirations through the conveniently structured product displays and the fringe programme.



Baltic Fashion & Textile

OCTOBER 17 - 19

VILNIUS

Baltic Fashion & Textile Vilnius (Int'l Textile and Fashion Fair) takes place in Vilnius, Lithuania, from 17.10 to 19.10.19. In 2014, Baltic Fashion & Textile Vilnius attracted more than 7600 visitors and 232 exhibitors. Trade show is organised by the Lengvosios Pramones Centras UAB.

FILTECH

OCTOBER 22 - 24

COLOGNE

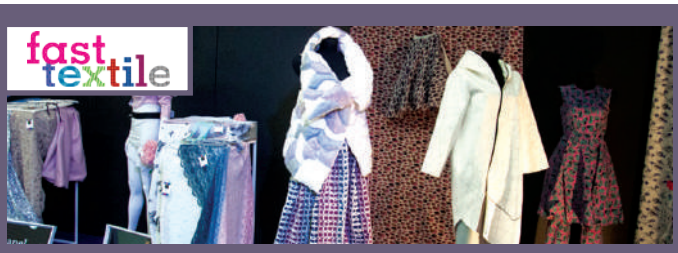
FILTECH is the largest and most important filtration event worldwide. This Exhibition is a must for all those concerned with purchasing, selling, designing, improving or researching filtration and separation equipment and services.

TEXFUSION

NOVEMBER 20 - 21

LONDON

Texfusion, is the first trade show fully dedicated to global textile manufacturers in the UK. Texfusion has grown exponentially in the past 2 years and now includes, beside the historical fashion fabrics, also 3 new halls utterly focused on technical fabrics, denim and garment manufacturers.



Fast Textile

NOVEMBER 20 - 22

WARSAW

The Fast Textile International Textile Fair is the most important event in the Polish world of fabrics and accessories. It was created in response to the market need for such events and it quickly became the largest endeavour of that rank in Central Europe.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