Aachen
26.-27. November 2015

- Fiber Technology
- Flexible Electronics – Energy from Light
- Bio-inspired Lightweight Constructions
- Bio-based Building Blocks & Biotechnology
- IGF-ZIM Transfer Event: From Idea to Practice

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PRESS INFORMATION

AACHEN DRESDEN
INTERNATIONAL TEXTILE CONFERENCE
Lokale Organisation 2015:
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Content

Press Information - 9. „Aachen-Dresdner“

This year’s Aachen-Dresden International Textile Conference takes place in Aachen on November 26-27. Animated by 2015’s topic “Bio-Boosting Today’s Technology“, experts from the textile industry and textile research institutes will discuss the latest state of research in fiber technology and flexible electronics or exchange opinions concerning the research on bio-based components or lightweight constructions inspired by nature.

Since 2007 the textile research institutes of the Aachen and Dresden area together organize the Aachen-Dresden International Textile Conference. As of 2016 the German Institutes of Textile and Fiber Research Denkendorf (DITF) will join as a new partner. With over 700 participants most recently the conference counts as one of the most important textile conferences in Europe. This year France is the official partner country and will be represented by Yves Dubief, president of Union des Industries Textiles, with a plenary lecture on “Textile innovations 2020 – The French contribution”. In addition to two other plenary lectures, the program of the event will comprise eight invited keynote lectures and 55 contributed talks. Furthermore, the organizers expect about a hundred poster contributions.

This year’s conference addresses a key question of the future technology development:

How can we learn and take advantage of biological principles and how can we tune man-made technology to be in balance with nature?

Nature manages to produce highly complex and extremely durable materials such as wood and spider silk, which provide an ingenious inspiration for sustainable and synthetic materials. Professor Thomas Speck from the University of Freiburg will introduce this subject with a plenary lecture on “Fibres in Nature and Technology: Smart Materials and Structures Inspired by Biology”. This is followed by a compilation of various lectures on remarkable techniques to replace or supplement synthetic components by natural elements, based on the model of nature. In this context, novel approaches on resource-efficient production of reinforcing textiles will be discussed. Inspired by nature’s fascinating answers to lightweight constructions, this research can provide groundbreaking knowledge for aeronautics and serial production in the automotive industry.

Scientists working in the field of flexible electronics will be presenting promising visions of applications for smart textiles and fashion, but also for architecture and printed organic photovoltaics. Professor Karl Leo from the Technical University Dresden will be inaugurating this intriguing topic with a plenary lecture on “Organic Semiconductors: From a Lab Curiosity to Highly Efficient Devices”.

After being successfully established in the past years, the IGF-ZIM transfer event “From Idea to Practice” will again be held as a third parallel session on the first day of the conference. The audience will be introduced to successful examples of products or methods which were developed in joint effort by academia and industry and then implemented by industry.

Aachen, Dresden and Denkendorf, together, lead the International Textile Conference into the Future

Since 2007 the textile research institutes of the regions of Aachen and Dresden have jointly organized the Aachen-Dresden International Textile Conference. Boasting over 700 participants most recently, this conference counts as one of the most important textile conference in Europe. Starting in 2016, the **German Institutes of Textile and Fiber Research, Denkendorf (DITF)** will also be a co-organizer. Thus, the **Aachen-Dresden-Denkendorf International Textile Conference** will take place on a yearly alternating basis at one of the three sites. Parallel to the International Textile Conference, the organizers will respectively launch the **German Textile Colloquium** as a national pendant with changing special themes in the spring.

Nine years after the regional textile conferences in Aachen and Dresden were fused to the 'Aachen-Dresden' conference, the organizers have now widened their national base by extending the existing axis straight through Germany to create the triangle Aachen-Dresden-Denkendorf. Professor Dr. Martin Möller of the DWI—Leibniz Institute for Interactive Materials in Aachen explains, "Within the past decades, the wide assortment of themes in the field of textiles has clearly expanded, and the circle of people interested in textiles has long grown beyond its classical borders. This is true especially for the field of technical textiles. It is exactly this aspect that we wish to better address by means of the widened base." The two-day conferences are directed to experts from the fields of materials science, chemistry, refining and functionalization as well as mechanical engineering, process engineering and composites.

Professor Dr.-Ing. Chokri Cherif of the Institute of Textile Machinery and High Performance Material Technology at TU Dresden of Dresden applauds the "spreading south" into the Denkendorf region: "With this milestone, we are creating important prerequisites for the further internationalization of our conference. In particular, we are pleased to make an important contribution towards pooling the German conference resources. Thus, we can truly meet the wishes of the industry and expert associations expressed over many years."

"The complexity of research projects is increasingly expanding beyond national borders. Therefore, international cooperation is gaining importance", says Professor Dr.-Ing. Götz Gresser, board spokesman of the DITF. "The Denkendorf Expert Colloquia have been established and successful for over 40 years. The DITF would like to introduce this experience with industrial and user-oriented events on a national and international level."

The German Textile Colloquium will be held in Denkendorf in the spring of 2016. Then, the Aachen-Dresden-Denkendorf International Textile Conference will take place in Dresden in late November 2016. Thereafter in 2017, the sites Aachen (German Textile Colloquium) and Stuttgart/Denkendorf (International Textile Conference) will host the events.

TexDepot: Polyelectrolyte Layers as Rechargeable Coatings for Active Ingredients

Deutsches Textilforschungszentrum Nord-West gGmbH
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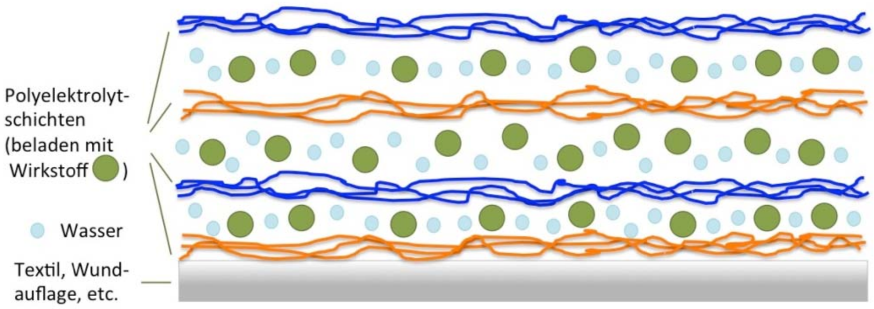
There is an emerging trend in the apparel industry to develop textiles that contains cosmetic agents with the aim to increase the wear comfort or to even achieve skin nurturing effects. Such textiles were dubbed “cosmetotextiles” or “wellness textiles”. In the area of medical textiles, wound management is an important field of application. In Germany, approximately 4.5 Mio people are suffering from chronic wounds. As a result, wound dressings that are able to deliver active agents will become more important, particularly because the number of patients is likely to increase in the future.

With this in mind, this IGF research project is directed at the development of a finishing technology that can act as a depot for the time-dependent delivery of active agents. The finish is based on polyelectrolyte multilayers, because the storage capability of such layers is well-known. In addition, polyelectrolytes bind to a number of different substrates (cotton, polyester, polyurethane, etc.) and a variety of different polyelectrolytes (e.g. polyacrylic acid or polyvinylamine) are available on an industrial scale. Finally, a number of biobased polyelectrolytes are available, which can be employed in medical products as well as in cosmetic textiles.



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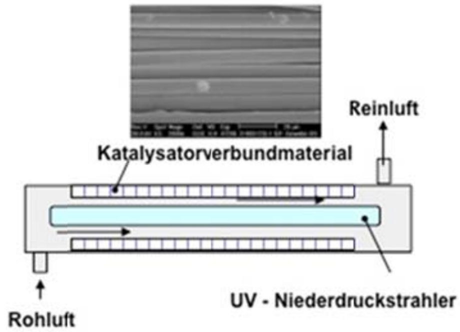
Project Information/Funding:
IGF project Nr. 18532 BG „TexDepot: Polyelektrolytschichten als wiederbeladbare Speicher für Wirkstoffe“, partners: Wissenschaftliches Institut der Forschungsgemeinschaft für die Kosmetische Industrie, Holzminden, and Klinik für Hautkrankheiten, Universitätsklinikum Jena.

Light guiding and emitting textile structures with TiO_2 coating for innovative full-flow filters for photocatalytic air purification

Deutsches Textilforschungszentrum Nord-West gGmbH
Adlerstr. 1 - D-47798 Krefeld



The common concept for photocatalytic air purification is to guide polluted air along carriers - e.g. glass fiber fabrics - coated with TiO_2. Hydroxyl and perhydroxyl radicals are generated by UV irradiation, which clean flowing air due to their strong oxidizing effect. The usual technical concept is to place the catalytic carriers around a UV-emitting tube in a cylindrical geometry as pictured.

This easily attainable solution has two conceptual disadvantages: On the one hand, the free flow of air is hindered by the UV source, which reduces the effective cross-section of the filter. On the other hand, only these surfaces of the catalytic carriers are activated, which are directly illuminated, and only air close to these surfaces is affected by radicals. In consequence of these constraints, only a very confined volume of the whole filter is catalytic active.

The scope of a present research project is to develop textile concepts, which serve to transport UV light into the filter and illuminate the whole volume. This shall allow to use the complete filter volume for air flow and air purification. Fibers are arranged and/or surface modified in a way that UV light is emitted radially along the whole fiber length. Various methods to stimulate radial light emission are studied in the project, a prime example being the coating with light scattering nano-composites. Light emission can also be stimulated by adapted geometry as, e.g., strong bending as shown in the photograph.

The first approach will be to arrange the light-emitting structures alternatively with catalytic carriers in a multilayer concept. However, using an organic-inorganic nano-composite for the optical function as indicated, the perspective to apply the photocatalytic system in an additional coating on the light-emitting textile structure is opened and shall be evaluated as well.

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Research project:
„Einsatz lichtführender textiler Strukturen mit TiO2-Beschichtung zur Entwicklung neuartiger durchströmender photokatalytischer Filter“, project no. IGF-Nr. 18058 BG.
Cooperation with: Institut für Energie- und Umwelttechnik e.V. (IUTA), Duisburg, and Leibniz-Institut für Oberflächenmodifizierung e.V. (IOM), Leipzig.

Hydrophilization of a nonpolar PP fiber by migration of a hydrophobic surface active additive during processing and its conversion to a hydrophilic one at the fiber surface

DWI – Leibniz Institute for Interactive Materials, Aachen (Germany)

There are many benefits to using polypropylene as matrix material because of low costs and a good balance of properties. It is odourless, chemically resistant and skin compatible. PP is easy to handle and can be applied in a wide range of manufacturing processes. In textile industry, by melt spinning produced PP fibers are processed to home textiles, sport wear, carpets, sanitary products, ropes and geotextiles. Because of the hydrophobic characteristics of PP fibers there is no surface finishing possible without additional pretreatment. [1] Surface activation by common physical treatments such as plasma, corona or flame treatment impacts only the top atom layers. Surface dynamics lead to an aging process and at the end the surface is deactivated. Therefore, it would be a great advantage to modify the surface of polypropylene by an additive within the PP matrix migrating to the surface without an additional pretreatment step.

We present a new concept using the high migration potential of a hydrophobic silica precursor polymer Poly(alkoxy siloxane) (PAOS) to the PP surface during processing, which can be subsequently converted into a hydrophilic surface layer by humidity. This concept overcomes the main hindrance of hydrophilic additive migration to a nonpolar surface. The applied highly branched silica precursor is produced following a water and solvent free one pot synthesis [2] and can be modified by various end groups to tailor the hydrophil – hydrophob balance. There are two ways of modification. The so called co-monomer route leads to a non-hydrolysable Si-C end group bonding. By transetherification reaction with alcohols hydrolytic instable Si-O-C bonds are formed. During conversion of the precursor to silica by hydrolysis in contact with humidity, the hydrophobic end groups bonded by Si-O-C bonds at the surface split off forming a hydrophilic silica surface coating.

We present a new developed test to follow the migration of an additive quantitatively. The results of migration test are correlated with surface tension and hydrolytic stability of our precursor modifications.

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References

[1] E. Bauer, S. Brinkmann, T. Osswald, N. Rudolph, E. Schmachtenberg, Carl Hanser Verlag 2013, 461-464
[2] X. Zhu, M. Jaumann, K. Peter, M. Möller, *Macromolecules* **2006,** *39,* 1701-1708

Hierarchical build up Supercapacitors made of porous carbon fibers

DWI – Leibniz Institute for Interactive Materials, Aachen (Germany)

Energy storage is one of the most important and challenging tasks for the energy strategy of the future. Most of the renewable energy, for example from wind and solar power becomes imbalanced over time. Energy storage can help to compensate for time lag in energy production. To store large amounts of energy quickly, supercapacitors (SCs) come into play. SCs are important energy storage devices used in energy recuperation. Compared to standard capacitors or batteries their energy transfer per unit time (*power density*) is higher and they are fully charged and discharged within seconds. SCs store energy in an electrostatic double-layer of electrolyte ions directly at the charged electrode. By increasing the electrode area, more energy can be stored per unit volume or mass (*energy density*).

Here we present the development of a novel energy storage device with the aim to provide high energy density. We produce carbon electrodes with hierarchical porosity and high surface area for improved electrolyte access and adsorption. We produce fiber fleeces from polyacrylonitrile compounded with nano-filler to increase the conductivity of the fibers. Carbonization of the fibers into a conducting electrode material is achieved by using a well-controlled IR laser treatment. The process allows precise control of the carbonization conditions and provides high nanoscale porosity. In comparison with classical thermal carbonization, the laser process produces much higher surface areas and capacitances in the novel carbon electrode materials.

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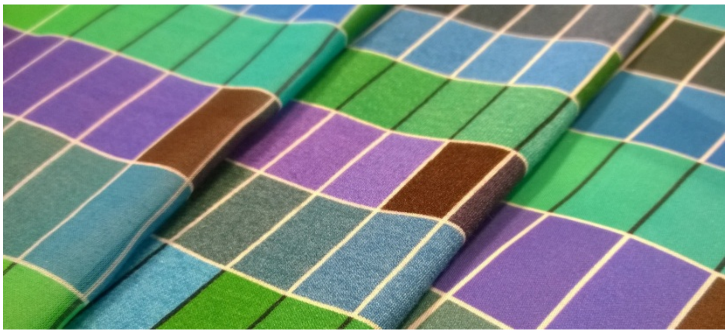
Development of an innovative digital printing unit for digitising the complete process chain in clothing manufacturing using the example of natural fibres

Niederrhein University - University of Applied Sciences, Research Institute for Textile and Clothing (FTB)

The development and implementation of innovative methods and processes along the entire value chain in clothing industry is essential in order to minimize risks and costs for increasingly shorter product development cycles. It becomes more important to sharpen the brand with a significant profile to make a different from competitors and to distinguish from. Digital printing processes e.g. the ink jet printing offer higher speed, cost reduction, quality benefits as also ecological advantages, not achievable with common screen printing processes.

The corporate R&D project focuses on developing a process chain completely based on digital tools. Main focus is on further development and bringing together design and digital printing technology. Referring to individualization- made to measure and highlighting the brand- size depending printing motives are developed using 3D simulation tools and the improved process of panel printing. Simultaneously the digital printing process itself is investigated with regard to its innovative potential and elaborated to a new high-end application. This comes with the development of standards for different backing materials, the evaluation and adoption of process and machinery parameters, a coordinated color management, the suitability and application of needed finishings and inks (reactive and pigment) and the upscaling of all these parameters from prototyping to an industrial production for achieving a tremendous progress in application and daily business.



Color calibrations on different basic materials: Voile, Jersey, Satin (l to r)

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Funding:
ZIM - Kooperationsprojekt KF2233810CJ3
Projektpartner: Bianca-Moden GmbH & Co. KG

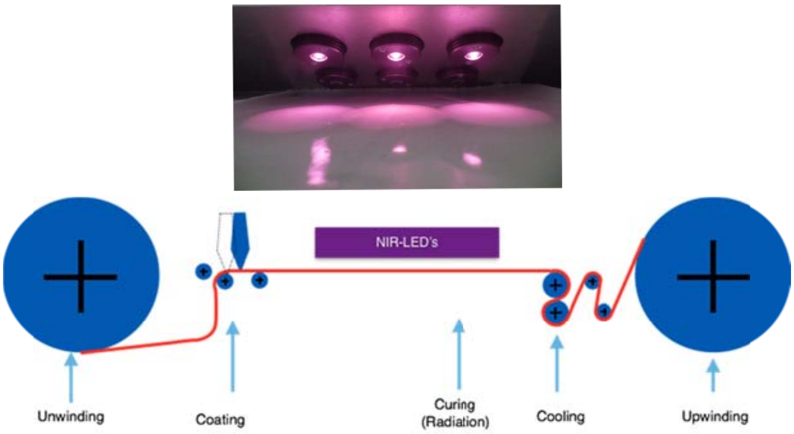
The present research project (project number KF2914003BN2) was funded by the support program "Zentrales Innovationsprogramm Mittelstand" (ZIM) of the German Federal Ministry of Economy and Technology.

Coatings for Textile Applications by Near Infrared (NIR) - Initiated Photopolymerization

Niederrhein University - University of Applied Sciences, Research Institute for Textile and Clothing (FTB)

The aim of this research project is the development of new low-energy coating systems for the use of technical textiles in order thus provides a basis to supplement or substitute conventional textile coatings.

Conventional textile polymer coatings have been often applied as homogeneous solutions or heterogeneous aqueous dispersions using energy intensive thermal drying techniques to solidify the coating. This is either physical drying by removing the coating solvent or chemical curing of the coating components. Nevertheless, both processes require higher temperatures provided by convection dryers and consequently they are cost-intensive and time consuming. An ecological and economical alternative is given by the radiation induced polymerization of textile coatings. Mostly, radiation based polymerization reactions have been initiated by UV radiation. Near infrared (NIR) radiation represents an alternative wavelength range that can be used for this purpose. Further improvement of ecological and economical benefits can be reached by using LEDs as radiation sources. Advantages of NIR-LED arrays can be seen to cure samples with larger depth profile, the possibility to embed UV absorbers or yellow pigments as well as an initiation of thermal events by deactivation of the excited state. Thus, the sensitizer, a polymethine dye used, additionally functions as radiation absorber in coating formulations. Contrary to UV initiated photopolymerization, where a single compound is used as photoinitiator, NIR-photopolymer systems require the use of a redox system comprising a polymethine dye as sensitizer and an iodonium salt as radical initiator to initiate radical polymerization. This additionally requires to develop formulations for typical textile polymer systems based either on urethane acrylates or polyester acrylates that efficiently cure under the radiation setup chosen. In this project, we demonstrate the feasibility to use NIR initiated polymerization as energy saving technique to make/generate different functionalizations on textile substrates.



NIR-LEDs in Betrieb (oben); Prinzipskizze einer Beschichtungsanlage mit NIR-LEDs (unten)

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Project Information/Funding: ZIM - Kooperationsprojekt KF 291400BN2, Projektpartner: Institut für Lacke und Oberflächenchemie, FEW Chemicals GmbH

Development of Self-Reinforced PLA – Process Chain from Meltspinning to Consolidation and Production of Composites

Institut für Textiltechnik der RWTH Aachen University

Fibre reinforced plastics (FRP) are now a days playing a crucial role in the automotive and aerospace industry due to their lightweight construction and possibilities of wide range of functionalization. It allows us to produce the customized products with targeted material structure and choice of materials. A typical FRP in automobile industry is made of a thermoplastic matrix with carbon or glass fibre reinforcement. The reinforcing component delivers the major part of the total strength of the composite while the purpose of the matrix is to provide a shape to the reinforcing component, to protect them from environmental influences and ensure the cohesion effect of reinforcing component. A new aspect of fiber-reinforced plastics is the self-reinforced FRP, wherein both components (fiber and matrix) are made of the same material. The challenge lies in the targeted modification in the material properties of the raw material to use as a reinforcing fiber as well as matrix system. The self-reinforced composites currently available in the market are fossil fuel based. Due to limited resources of petroleum oil and petrochemicals, interest is growing up in finding new alternatives for petrochemically based polymers in form of bio-based ones. Such "biopolymers" can be considered as novel materials having unique features like biocompatibility and possibly biodegradability. This provides the advantage of a wide scope of plastic properties in variable applications. Till date the textile based products made of biopolymers are very less in numbers due to their higher price and insufficient understanding of processing conditions of these particular polymers.

An important member of this class of polymers is polylactic acid (PLA). The lactic acid, the monomer of the PLA, is mostly obtained by fermentation of sugars and starches. PLA is particularly characterized by its biodegradability, biocompatibility and wide range of properties. Due to the chemical structure of its starting monomer, it is available in many isomers with variable properties. Target of various research projects is to develop a fully bio-based, self-reinforced FRP made of PLA. To realize this, the PLA granulate is melt spun to produce filament yarns, followed by constructing a hybrid yarn (combination of two elementary yarns) made of a low and a high-melting PLA filament yarn. The hybrid yarns are woven and subsequently pressed in a hot press. The matrix melts and so whole structure is embedded in the form of a PLA based self-reinforced composite.

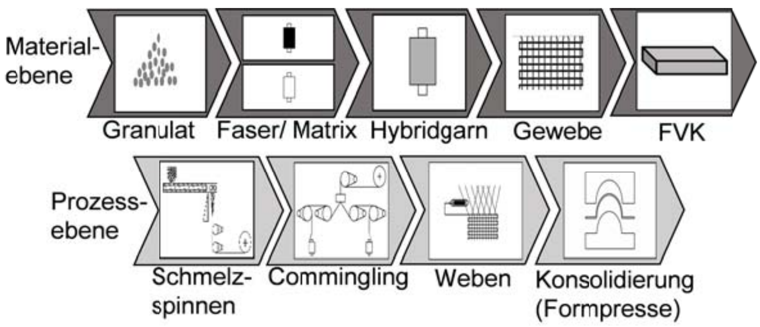

Abbildung 1: Material- und Prozessebene bei der Herstellung garnbasierter FVK

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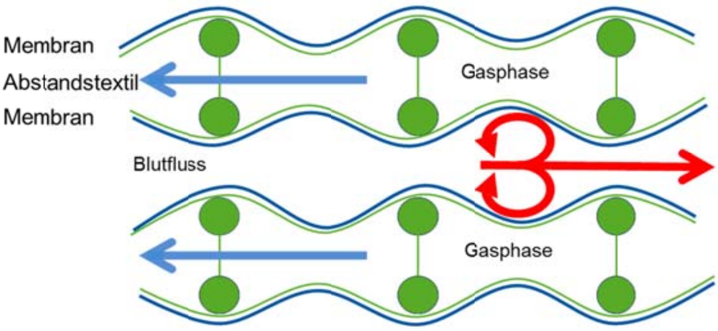
EndOxy – Textile-based membranes for oxygenation

Institut für Textiltechnik der RWTH Aachen University (ITA)

The development of an implantable artificial lung is still not possible today because of the limited application time of current oxygenators. This is because protein deposition, a limited long-term hemocompatibility or bleeding, that is induced by the necessary anticoagulation therapy. To increase the operation time of oxygenators, one approach is to apply endothelial cells onto the membrane surfaces. In the highly interdisciplinary IZKF project EndOxy an endothelialized flat membrane oxygenator is developed. Flat membranes are used although they show lower gas transfer rates, because the cells are too easily rubbed of the membranes while using the more common type of hollow fibre membranes.

The at ITA developed membrane assemblies consist of a sandwich-like structure containing two flat membranes with a textile spacer structure in between. To find the most appropriate spacer different textile structures are evaluated within the project. Furthermore a process to imprint hollows into the membrane surfaces is developed to increase oxygen transfer rates by induced vortices in the otherwise laminar flow of blood, the so-called Bellhouse-effect.



Principle of EndOxy membrane assembly

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Project Information/Funding:
IZKF-Projekt: EndOxy
Projektpartner: Institut für Angewandte Medizintechnik (AME), RWTH Aachen

- LuF Tissue Engineering & Textile Implants
- LuF Kardiovaskuläre Technik

Leibniz-Institut für Interaktive Materialien (DWI), Aachen

Publications:

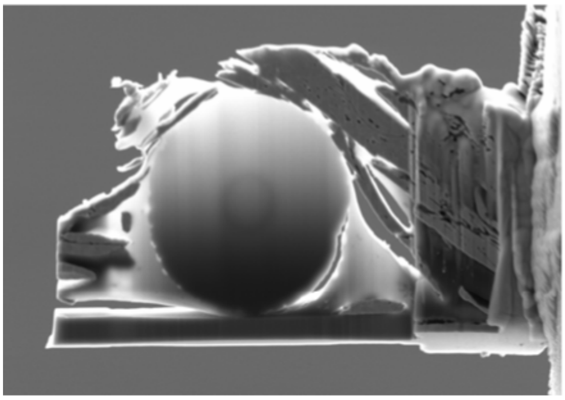
Neußer, C., Bach, C., Doeringer, J., & Jockenhoevel, S. (2015). Processing of membranes for oxygenation using the Bellhouse-effect. Current Directions in Biomedical Engineering, 1(1), 108-111.

Poster Aachen-Dresden ITC: Christine Neußer, Felix Hesselmann, Christian Cornelissen, Thomas Gries, Stefan Jockenhövel, EndOxy – Textile-based membranes for oxygenation

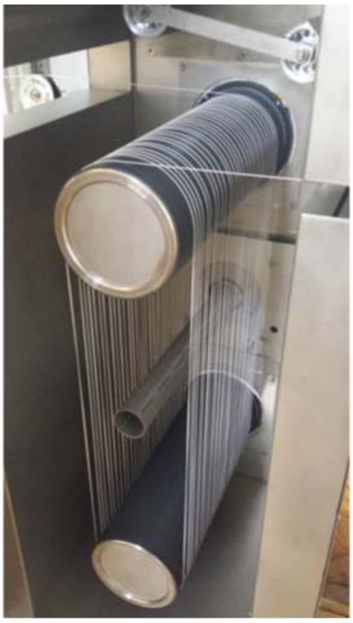
Process and technology development for the production of precursors of carbon fibers

Institut für Textilmaschinen und Textile Hochleistungswerkstofftechnik, TU Dresden

The steady growth of world population leads to a significant increased demand for energy, water, food, clothing, communication and mobility. Under the aspect of the global tendencies like demographic changes, migration, urbanization, economic development and environment new technologies and materials are required. The mobility, individualized lifestyles thereby represents a major challenge for the R&D of the 21st century.



Herein, the modern lightweight construction with carbon fibers offers a key technology to reduce the moving mass. Polyacrylonitrile (PAN), a suitable polymeric material, has established itself in the last few years as a suitable precursor for carbon fibers and it is expected that the PAN as carbon precursor will keep its position in the market for the next few years. Nearly 90 % of the carbon fiber in the world is made from polyacrylonitrile precursor. The quality of the carbon fibers and thus the components made from can be highly influenced by the properties of the precursor and its process parameters of thermal treatment. The properties of the precursor can be specifically adjusted by different process parameters. The orientation of the polymer chains, the failures in form of voids and cracks in the structure of the fibers as well the cross section and the evenness of the PAN fibers has the most important role to define the quality of the final products. The production of carbon fibers is a closed process, which is just controllable throughout the deep understanding of many parameters.



We would like to thank the European Union (EFRE) and Freistaat Sachsen for the finan-cial support of the research (SAB EFRE 100062605).

Europa fördert Sachsen.
EFRE
Europäischer Fonds für regionale Entwicklung

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Further Information:

Lecture: Kirsten, M.; Hund, R.-D.; Cherif, Ch.
Prozess- und Technologieentwicklung zur Herstellung von Precursoren von Carbonfasern

Development of acoustically effective partition systems and ceiling elements for furnishing of offices and public spaces

Institut für Textilmaschinen und Textile Hochleistungswerkstofftechnik, TU Dresden

The goal of the research was the development of close-to-production prototypes of acoustically effective modular partitioning systems for flexible furnishing of offices and public spaces. This applies to the product-related requirements of acoustic effectiveness, fire behaviour and weight and the use-properties (resistance to soiling, UV resistance, functional integration, assembly, storage). The acoustic modules fixed by lightweight frames, can be placed anywhere in the room and be combined manifold depending on the space requirement. A sound-reflecting attaching of the acoustic modules on ceilings or walls is not required by the characteristics of acoustic absorber system. For the developed absorber elements a sound absorption coefficient according to DIN EN ISO 11 654 of 0.8 (Class B) was confirmed.

In order to achieve the acoustic objective criteria (sound absorption coefficient $\alpha > 0.7$ in the frequency range 250-3000 Hz - partition system standing alone in the room) sound-transparent (woven fabric), sound-absorbent (foam) and sound reflecting (aluminum foil) materials were positioned suited to each other. More than 20 variants of fabrics were prepared, and tested, differently in terms of fibrous (PES, PVDF, PTFE, GF), yarn fineness, yarn densities fabric weaves and coatings.

Comparisons of measurements in a reverberation room and computer simulations on a model space have shown that with the use of modular absorber systems a significant improvement can be achieved both in terms of reduction of reverberation time and the avoidance of unwanted communication between different use areas within the space.

Reverberation chamber

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Project Information/Funding: ZIM-Projekt-Nr. KF2048937VT2
Projektpartner: aeronautec GmbH, Seeon, Spengler & Fürst GmbH & Co. KG, Crimmitschau

Recent Publications:

Patentanmeldung EP 15183 084. Technische Universität Dresden. (01.09.2014). Krzywinski, Haase, Klochkova, Krumpolt, Häntsch. Pr.: DE 10 2014 112 556.8

Eintragung der Designanmeldung 40 2014 101 166.4. aeronautec GmbH, Häntsch, Krumpolt, Spengler & Fürst GmbH, Technische Universität Dresden. (17.07.2015)

Paper Aachen-Dresden ITC 2015 Fitz, J.; Krzywinski, S.; Haase, E.; Klochkova-Schiefer, M.; Bräuninger, E.: Development of acoustically effective partition systems & ceiling elements for furnishing of offices & public spaces

Further Information: The already several times presented partition systems meet great interest due to the modularity, the low weight and the acoustic parameters.

Proteins as new components for functionalised textile surfaces

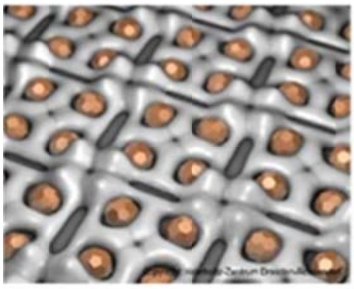
Sächsisches Textilforschungsinstitut e.V. (STFI)

Until now, the functionalisation of textiles is mainly carried out by application of chemicals in form of a finish or coating. To improve effects, the classic textile finishing is increasingly combined with nano-technologies. By application of bacterial surface proteins (S-layer proteins, SLP) new options of functionalised textile surfaces are offered. Due to their intrinsic characteristic to reorganize very regularly on surfaces of different materials (depending on several conditions) even after isolation, the proteins disclose new ways to structure textiles in nano- and microscale, respectively.

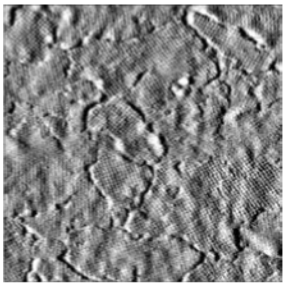
Within a R&D project both the application of S-layer proteins on textile surfaces and the subsequent functionalisation of these protein coated textile surfaces (hydrophilic and oil repellent properties, antimicrobial and catalytic activities) were investigated.
Nonwovens with different chemical composition (PP, PE/PP, PET, PA/PET) were coated with S-layer proteins and then

- antimicrobially functionalised with silver nano particles,
- catalytically activated with palladium nano particles,
- hydrophilically functionalised with polyurethane or carboxylic acid based chemicals,
- oleophobically functionalised with fluorocarbons,
- coated with water-based polyurethane dispersions.

From the results of these basic investigations further promising R&D content with regard to industrial application can be derived, e. g. improvement of adherence of textile surfaces or functionalising of textile filters for both air and water purification (adsorption of contaminants).



Scheme of a protein layer with square (p4) lattice symmetry (grey) with embedded functionalities((brown) (Copyright: HZDR)



PP, coated with S-layer-proteins (shown area: 1 µm², AFM-phase image)

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Project Information/Funding:
INNO-KOM Ost VF 110032
Projectpartner: Helmholtz-Zentrum Dresden-Rossendorf e.V. (HZDR)

Lecture Aachen-Dresden ITC:
Marco Sallat: Proteine als neue Bausteine für die Funktionalisierung textiler Oberflächen
Further Information:
http://www.stfi .de/filead min/news/documents/Kurzber_Projekt_VF 110032. Pdf

Center for Textile Lightweight Construction

Sächsisches Textilforschungsinstitut e.V., Chemnitz

The building of a new, 1500 sqm technical center concentrates and enhances the competences of the Saxon Textile Research Institute in Chemnitz as a "Center for Textile Lightweight Construction".

The following technologies can be realized in a semi-industrial standard:

- Transfer of dry textile waste high-performance materials in different layout and origin, especially of carbon, into applicable fibre layouts for further processing with textile technologies (up to 150 kg per hour).
- Carding technologies for the processing of high performance fibres into mechanically consolidated nonwovens, realized using roller carding machine, needle machine, stitch-bonding machine and/or spunlace technology (working width 100 cm).
- Random nonwoven technology for the processing of high performance fibres into mechanically consolidated nonwovens, using airlay random nonwoven carding machine, needle machine and/or stitch-bonding machine (working width 100 cm).
- Formation of ribbon- or thread-like structures with unidirectional single fibre layout, technically implemented in a laboratory line consisting of carding, ribbon and thread formation unit.
- Manufacturing of component-specific semi-finished materials made of carbon, glass, aramid or basalt fibres on a multiaxial unit.

Furthermore, the manufacturing of test specimen and elements made of fibre compounds and composites can be realized by means of:

- Binder application and activation
- Near net shape cuttings of flat semi-finished products with NC cutter
- Stack formation of plane laminate structures
- Preform manufacturing under heat and pressure discontinuously in a press or continuously in a moulding tool
- Laminating process for testing stations and elements (injection or press process) (hydraulic presses, RTM unit)

An integrated testing laboratory for the specific requirements of textile lightweight structures and the compounds and fibre-reinforced materials derived therefrom completes the "Center for Textile Lightweight Construction". Textile-physical basic tests like fibre length distribution, tensile strength, size, and mass per unit area can be carried out at site on these special fibres, fabrics or composites.

Neues Zentrum für Textilen Leichtbau am STFI im Aufbau

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http ://www.stfi.de/aktuell/details/article/zentrum-fuer-textilen-leichtbau.html

Energy-efficient pultrusion process for production of fiber composite components with thermoplastic matrix in series applications - TPult

Institut für Textil- und Verfahrenstechnik ITV

Thermoplastic matrix systems are workable and tough and can be welded and recycled. Unlike thermosets thermoplastic matrix systems for various applications provide advantages (rapid manufacturing processes, formability, toughness, weldability, recycling), which will be increasingly used in future. For this purpose, especially textile fabrics or braided structures have to be produced at lower cost as well as the impregnation with the matrix material must be improved.

For the production of elongated profiles (eg chassis and suspension parts) the pultrusion process (process for producing fiber-reinforced plastic profiles in continuous flow) is an energy-efficient and cost-effective method for mass production. In the pull braiding variable angle and thus specifically adjustable mechanical properties of the fiber composite profiles can be achieved by means of an upstream braiding. Directly after braiding the already matrix-equipped fiber material is heated and formed to the component in the tool, cooled and the finished profile is deducted from the endless caterpillar haul. Up to now only profiles with a single braiding layer could be produced. For many cases of mechanical load this is not sufficient enough and several braiding layers are needed.

For this, the thermoplastic pull braiding technology must be designed so that in a single pass multiple braided, thermoplastic and therefore postformable lightweight fiber composite profiles can be produced and adapted to variable mechanical requirements. Here, a newly developed precisely controlled and energy-efficient infrared heating technology guarantees a very good pre-heating of the fiber strands and thus the necessary and good fiber impregnation.

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Project Information/Funding:
BMBF Projekt O2PJ2180
Projektpartner: Steinhuder Werkzeug- u. Apparatebau Helmut Woelfl GmbH; Körting Nachf. Wilhelm Steeger GmbH & Co. KG; Thomas GmbH + Co. Technik + Innovation KG; Heraeus Noblelight GmbH; Volume Graphics GmbH; DYNAmore Gesellschaft für FEM Ingenieurdienstleistungen mbH

Associated Partner:
ms Antriebstechnik GmbH; Daimler AG

Lecture Aachen-Dresden ITC:
Dr. Simon Küppers, Dr. Markus Milwich, Prof. Dr. Götz T. Gresser

Fabrics with moisture sensory and heating functions for mold prevention in buildings

Institut für Textil- und Verfahrenstechnik ITV

Mold typically grows in buildings due to a permanently increased humidity of more than 80%, especially when water condenses. On exterior walls, the temperature of the indoor side of the walls decreases due to heat conduction. Therefore the relative humidity increases close to the wall. This effect is enhanced in particular by sealing the space e.g. with the installation of modern windows. When furniture is set near exterior walls, hidden problem zones can occur. The growth of mold is also influenced by the heating and ventilation of rooms. These complex impacts and their interactions are difficult to convey to the inhabitant.

This topic has been addressed by ZIM-Project MucorPrevent. Yarns and fabrics with moisture sensory and heating functions were developed, whereby problematic zones in rooms can be detected. Does the humidity close to the yarn change, the capacitance of the sensory fabric structure changes. When exceeding a critical moisture level the heating function is activated and raises the temperature in the wall region by a few °C. Thus, the relative humidity drops to an uncritical level. With this technology different fabrics, addressing different application areas, can be produced. The system was tested on walls of old buildings.

Project Information/Funding:
ZIM Projekt KF 2009168 CJ3
Projektpartner: ITV Denkendorf; F.A. Kümpers GmbH & Co. KG, Rheine

Lecture Aachen-Dresden ITC:
B. Baesch, J.-D. Kümpers, C. Riethmüller, G. T. Gresser: Feuchtesensorische und heizende Gewebe zur Schimmelprävention in Gebäuden

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  Textile machine modifications, Construction of special machinery
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  Modeling and simulation
  Automated composite component manufacture
  Applications (vehicular engineering, automotive, wind power plants, aeronautics, ...)
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- **Protective and functional textiles**
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  Testing, standardization, certification

- **Megatrends**
  Electromobility, Industry 4.0, Health, Architecture, Environment

- **Polymer materials, and functionalization of textile structures for fiber composite materials, safety textiles and megatrends**
  Development and modification of polymers
  Functionalization, Finishing, and Coating
  Surface and interface design, breaking behavior, characterization

- **Transfer Session „From Idea to Practice“**
  Presentation of innovations (e.g. products, technologies, processes) transfered into the industry from research co-operations, especially by IGF/ZIM.

Deadline Call for Papers: January 31, 2016

Ansprechpartner für 2016: Annett Dörfel
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Further Information:
www.aachen-dresden-itc.de

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IPF, Leibniz-Institut für Polymerforschung Dresden e.V.

ITA, Institut für Textiltechnik der RWTH Aachen

ITMC, Institut für Technische und Makromolekulare Chemie der RWTH Aachen

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