AACHEN DRESDEN
INTERNATIONAL TEXTILE CONFERENCE

Dresden
November 27-28, 2014

Partner Country: South Korea

- Composites
- Protective Textiles
- Textile Construction with Membranes and Textile-reinforced Concrete
- Chemistry for Composites, Protective Textiles, and Textile Construction
- IGF-ZIM Transfer Event: From Idea to Practice
- Saxomax - Textile Innovations

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PRESS INFORMATION

AACHEN DRESDEN
INTERNATIONAL TEXTILE CONFERENCE

Local Organization 2014
Institute of Textile Machinery and
High Performance Material Technology
TU Dresden
01062 Dresden
Dipl.-Ing. Annett Dörfel
E-Mail: annett.doerfel@tu-dresden.de
phone +49 351-463-39321

CONTENT

As of November 25th, 2014, 705 attendees have registered to participate in this year's 8th Aachen Dresden International Textile Conference 2014 at the International Congress Center in Dresden.

The international involvement in the conference will amount to about 20 % (more than 150 attendees from 25 countries). More than 45 % of the participants are representatives from various industries and industrial organizations.

For a long time now, "Aachen Dresden" has been the textile industry's synonym for the Aachen Dresden International Textile Conference, marking the importance of the event in the calendars and schedules of national and international professional and scientific experts alike.

The textile research institutes of the Aachen and Dresden regions have been joining their efforts to organize the conference since 2007, arranging the event alternatively in Dresden and Aachen. Invaluable support in the creation of the program was given by representatives of renowned companies and industrial associations. Special notice should be taken of the contributions of the Forschungskuratorium Textil e.V. and the Gesamtverband Textil + Mode e.V. The Institute of Textile Machinery and High Performance Material Technology at TU Dresden and the DWI Leibniz Institute of Interactive Materials in Aachen are responsible for the organization of the conference.

This year's conference will offer an ambitious program in three parallel sections with talks from top-class national and international speakers from industry and research. The following special symposia will be held for experts from the areas of material, chemistry, finishing and functionalization of materials and machines, processing and composites:

- Fiber-reinforced composite materials / Composites
- Protective textiles
- Textile construction with membranes and textile concrete
- Chemistry for fiber-reinforced plastics, protective textiles and textile construction
- IGF-ZIM transfer session "From Idea to Practice"
- Saxomax - Textile Innovations

For the plenary talks, the organizers could win outstanding and internationally prestigious speakers.

Mr. Bernd Mlekusch (AUDI AG, Ingolstadt) will shed light on the use of lightweight construction in automotive engineering as a key factor in the reversal of the weight spiral. In his talk, he will focus on the optimized use of the different materials (e.g. steel, aluminum, and fiber-reinforced composites) used in automobile construction. Body work constructions in multi-material mixtures are introduced, in which "the right material in the right place" is the decisive factor, helping the promising principle of mixed construction in multi-material designs break ground in the automobile construction industry, especially in the high-volume production of high-price products.

Bionic design and construction principles for complex fiber-based structures in architecture are presented by Professor Jan Knippers of the Institute of Building Structures and Structural Design at Stuttgart University. The talk will include the entire length of the process chain, examining the biological inspirations and computer-based modeling as well as statistical analysis and automated generation of winding paths. The resulting lightweight structures are not only highly efficient but allow a new architectural language, leaving behind the limits of conventional typologies of structural design.

In his plenary talk, Professor Vladimir Dyakonov of the Bavarian Center for Applied Energy Research e.V. (ZAE Bayern) in Würzburg will introduce energy-efficient solutions in textile architecture. Professor Dyakonov will use the example of the Energy Efficiency Center, a research and demonstration building in Wüzburg, whose textile roof is an integrative part of the energy concept of the edifice. The innovations and synergy effects of the contributing scientific and industrial research partners achieved by the textile roof, which consists of translucent, PTFE-coated glass fiber fabric and transparent EFTE foils with sun protection print, are presented in the talk.

South Korea has been selected as the partner country of the 8th Aachen Dresden Conference. Current developments from that high industrialized country, together with fascinating contributions from Germany and abroad will inspire and motivate the attendees, laying the groundwork for co-operations with representatives from industry and science. By including annually changing partner countries in the Aachen Dresden International Textile Conference, the organizers offer a platform for research co-operations and networks beyond Germany. Recent developments and high-tech applications from our partner country South Korea will be the subject of numerous talks and posters at the 8th Aachen Dresden International Conference. In a plenary talk by the Ministry of Trade, Industry and Energy, the attendees will be given a comprehensive overview of the future objectives of the Korean textile industry.

For the first time, this year's conference was preceded by the invitation of a delegation from our partner country South Korea, which traveled Germany prior to the event. This journey offered representatives from various Korean research institutions and companies an insight into internationally renowned German research institutes in Aachen (DWI Leibniz Institute for Interactive Materials and Institute of Textile Technology of RWTH Aachen University) and Dresden (Institute of Textile Machine and High Performance Material Technology and Institute of Lightweight Engineering and Polymer Technology, Leibniz Institute for Polymer Research Dresden, e.V.) The delegation's journey led the participants to a number of cultural institutions in Aachen and Dresden.

The internationally and technically oriented conference tries to use its annually changing topic foci to include a growing number of inter-industry cross-over subject matters, in order to fully utilize the development potential of textile materials for the wide variety of applications, and to display the useful synergies for manufacturers, suppliers and users from the various disciplines.

In the section "Chemistry for fiber-reinforced plastics, protective textiles, and textile construction", application-oriented polymer and fiber material developments as well as functionalizations and coatings will be presented. In their talks, experts from Germany and abroad will introduce resin systems for thermoset and thermoplastic composites, sustainable nano applications in the textile business, nonwoven-based gas diffusion layers for fuel cells, and the newest fire barrier layers and photochemical fireproofing equipment, to name but a few examples.

Trends and recent developments for high-performance materials, textile 2D and 3D reinforcement structures, simulation-assisted preforming/component production processes, and the recycling of fiber-reinforced plastic composites will be the subject of the two-day "Composites" section.

As during every return of the conference to Dresden, the second day of the event will be dedicated to current product developments for personal and technical safety applications, e.g. newly designed lightweight textile chains for industrial uses, intelligent protective garments for firefighters, the processing of metal yarn for cut protection applications, and partial particle finishings for improved protection of barrier fabrics.

In the special sessions "Textile Construction with Membranes and Textile Concrete", examples for textile construction by means of concrete reinforcements and membranes will be introduced. An individual talk will present the TUD-initiated large-scale research project "Carbon Concrete Composite - C3", which aims to permanently establish textile concrete and textile architecture across all industries. Other talks will show applications for textile-based, resource-efficient construction, developments of self-supporting textile structures for architectural applications as well as semi-permeable textile membranes for wind protection. These practice-oriented presentations are supplemented by the modeling and simulation of textile membranes for architectural applications. The talks will give impressive insights into the possibilities of innovating architectural application by means of textile-based constructions.

For the third time, the first day of the event will also involve the third parallel section: the IGF-ZIM transfer event "From Idea to Practice" organized by the Forschungskuratorium Textil e.V. Attendants will be introduced to selected successful products and methods developed in co-operation between researchers and industry representatives, and effectively realized by the industry. The research projects are both supported financially by the AiF and by the Federal Ministry for Economic Affairs and Energy. For the first time, this transfer session will include a successful project from our partner country South Korea.

This year, the conference is topped off with the "Saxomax - Textile Innovations" section, which will present a new generation of multiaxial non-crimp fabrics for fiber-reinforced composites, and explain the transfer of expertise with industry and European co-operation partners. Within the context of "SAXOMAX" at the Institute for Textile Machinery and High Performance Material Technology of the TU Dresden, a junior research group is tasked with the development of an innovative, simulation-based technology for the production of a stitch-free, multiaxial non-crimp fabric with adjustable draping properties for composite applications. The aim is to replace the stitch formation process with a local, application-adapted point fixing by means of matrix-adapted binding agents. This innovative technology is based on works concerned with the characterization of technologies, binding agents, and materials as well as model development.

The 8th Aachen Dresden International Textile Conference will be accompanied by an extensive presentation of posters. More than 100 scientists and corporate representatives from Germany and abroad will be presenting their new research results. Selected posters will also be presented in short talks by the conference attendees. Three outstanding poster presentations will be awarded the Poster Award 2014.

In addition to these, the advancement awards of the Circle of the Friends and Supporters of the ITM at TU Dresden e.V. will be awarded to two excellent graduation papers by alumni of the Institute for Textile Machinery and High Performance Material Technology at TU Dresden.

New non-halogen flame retardants for textile finishing

Deutsches Textilforschungszentrum Nord-West gGmbH, Duisburg/Krefeld

Despite their excellent flame retardant properties, polyphosphazenes are currently not used as flame retardant agents for textile finishing, because a permanent fixation on the substrate surface could not be accomplished yet. At the DTNW, we succeeded in the synthesis and characterization of non-combustible and foam-forming polyphosphazene derivatives (Figure 1). We could immobilize them permanently on cotton fabrics and cotton/polyester blends via a photo-induced grafting reaction. The modified textiles show improved flame retardant properties, higher levels of limiting oxygen index, reduced mass loss in thermogravimetric analysis and pass several standardized flammability tests (Figure 2). Furthermore, the permanence of the finishing was confirmed by conducting washing and abrasion tests. In addition, the DTNW research activities in the field of textile flame retardancy include halogen-free sol-gel-based systems and various polycarboxylic acids.

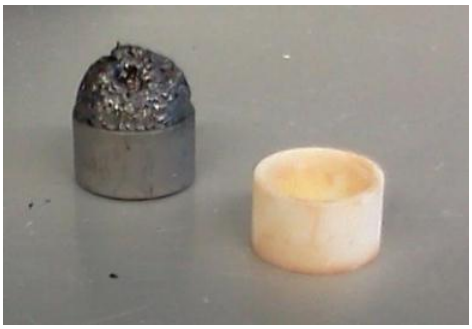


Fig. 1: Foam-forming properties of polyphosphazenes

Fig. 2: Flammability test on cotton fabric (left: blank, right: polyphosphazene-modified)

Contact Polyphosphazenes:
Dr. Klaus Opwis, opwis@dtnw.de, phone: +49-203-379-8219

Contact N-P-Silanes:
Dr. Torsten Textor, textor@dtnw.de, phone: phone:+49-203-379-8221

Contact Polycarboxylic Acids:
Dr. Markus Oberthür, oberthuer@dtnw.de, phone: phone:+49-203-379-8233

Further information:

Lecture: Klaus Opwis et al.: **Permanent flame retardant finishing of textiles by the photochemical immobilization of polyphosphazenes**
Friday, 28.11.2014, Hall 1 „Chemistry“, 11:40 am

Poster P74: Ralf S. Kappes et al.: **Nitrogen- and phosphor modified compounds for sol-gel-based flame retardants**

IGF projects 16780 N (Permanente Flammschutzausrüstung textiler Flächen mit Polyphosphazenen), 18213 N (Wasserlösliche Polyphosphazene), 17459 N (Sol-Gel-basierte Flammschutzausrüstungen), 17082 N (Polycarbonsäuren)

Innovative textiles for the recovery of noble metals

Deutsches Textilforschungszentrum Nord-West gGmbH, Duisburg/Krefeld

Natural and synthetic polyelectrolytes are able to bind various metal ions reversibly. The DTNW has successfully exploited this capacity and developed a process to bind high amounts of such polyelectrolytes durably on textile materials. Such textiles are able to adsorb various noble metals, e.g., platinum, gold, silver and palladium, from low-concentrated process waters generated by the metalworking industry. The inexpensive textile can be produced on an industrial scale by using typical machinery from textile finishing processes. Furthermore, we could successfully demonstrate the feasibility of polyelectrolyte-functionalized textiles on an industrial level for the continuous filtration of palladium-containing process waters from a producer of semiconductors. In addition, our adsorber textile is useful for the recovery of strategic elements or environmental protection, e.g., for the decontamination of chromate-polluted ground waters and soils.

The outstanding project results were honored by the UMSICHT Award 2014 and a nomination for the der Otto-von-Guericke Award 2014 (AiF Project of the Year). Moreover, the project is nominated for the Deutschen Rohstoffeffizienz-Preis (decision December, 04, 2014).

Contact:
Dr. Klaus Opwis, opwis@dtnw.de, phone:+49-203-379-8219

Further information:

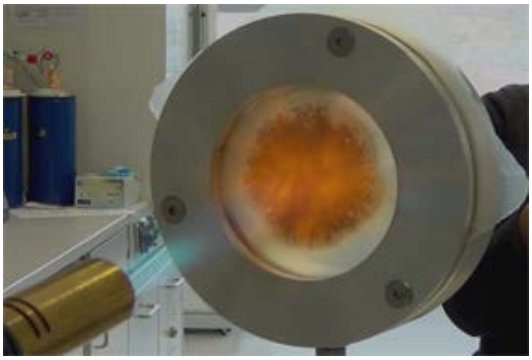
IGF project 17247 N „Rückgewinnung von Wertmetallen aus wässrigen Reststoffströmen durch polyelektrolyt-funktionalisierte Textilien“, partner: Institut für Energie- und Umwelttechnik e.V. (IUTA), Duisburg

Nacre-mimetic fire-barrier coatings

DWI – Leibniz Institute for Interactive Materials

One important aim of today's materials research is to develop new materials that can compete with the quality of natural materials. "Nature produces complex materials by elaborate combinations of molecular building blocks. That way, materials evolve that are light, but still extremely durable," says Dr. Andreas Walther, research group leader at DWI – Leibniz Institute for Interactive Materials in Aachen/Germany. "Bone, spider silk and nacre are just three out of numerous examples." In particular, Andreas Walther and his team were inspired by nacre. They synthesized a nacre-mimetic fire-retardant composite, which has superior mechanical properties (high modulus of 45 GPa, high strength of 350 MPa), but also has a low density and is transparent.

"Seashells are able to grow nacre in a lengthy process, which takes several months to years. For our nacre-mimetic material we had to find a faster, more efficient way," he explains. Nacre has a brick-and-mortar structure. Solid inorganic platelets ("bricks") are surrounded by a soft, energy-dissipating polymer layer ("mortar"), which significantly contributes to the excellent properties of the material. Andreas Walther and his team were able to mimic this structure. They initially covered filmy calcium carbonate platelets with a polymer layer and then assembled these building blocks into alternating hard and soft layers. The resulting material shows low gas permeability and outstanding fire-retardancy. It can be used for large-scale fire-barrier materials as well as for fire-barrier coatings on textiles.



Fire-retardant foil mimicking the structure of nacre

Contact:
Dr. Janine Hillmer, hillmer@dwi.rwth-aachen.de, phone: +49 (0)241 80 23336

Further Information:

Lecture: Andreas Walther et al.: **Water-borne self-assembled nacre-mimetic nanocomposites with superior mechanical and functional properties**
Friday, 28.11.2014, Hall 1 „Chemistry", 11:15 am

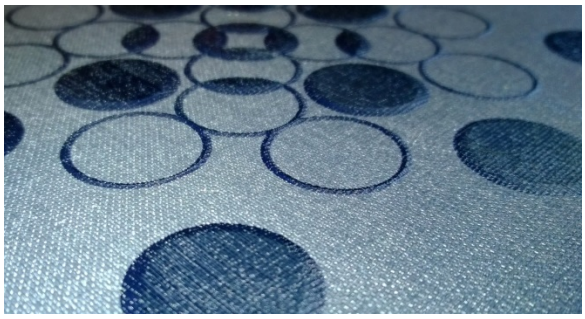
Poster P70: Paramita Das et al.:**Water-borne self-assembled nacre-mimetic nanocomposites with superior mechanical and functional properties**

Application potentials of digital textile printing using hot-melt inks

Research Institute for Textile and Clothing (FTB), Hochschule Niederrhein – University of Applied Sciences, Mönchengladbach

A new solid ink technology provides an eco-friendly opportunity for digital textile printing, which is already successfully used in printing CAD and GIS drawings on paper. In this technology hot-melt inks are used in the shape of solid balls (TonerPearls™) which are melted in the print head and applied onto the substrate by means of piezo technology. On the substrate the small ink dots solidify immediately so the product is ready for use directly after the printing process. Subsequent treatment like drying or fixation is no longer necessary. Unlike conventional textile inks, the same solid ink can be used to print on a wide range of different textiles with excellent contour sharpness.

In the German-Dutch INTERREG IV A project "SITex-Print – Solid Inks for Textile Printing" this waterless and environment-friendly printing technology is transferred to textile applications in color and functional printing. Different approaches are presented to enhance fastness results of the printed samples with a minimal requirement of textile pre- and after-treatments. First focus of hot-melt ink printing applications is soft signage and interior decoration for printing textile displays, banners, flags or wallpapers. Furthermore, the usability for 3D and resist printing is presented.



Cyan, magenta, yellow and black TonerPearls™ (left), 3D structured hot-melt print on PES fabric (right)

Contact:
Dr. Michael Korger, michael.korger@hs-niederrhein.de, phone: +49 (0)2161 186-6099

Further information:

Poster P81: Michael Korger et al.: **Application potentials of digital textile printing using hot-melt inks**

The project "Technologie-Kompetenz-Verbund Funktionale Oberflächen (TKV FO)" enclosing "SITex-Print" is supported by the European Regional Development Fund (EFRE) of the European Union, the Ministerium für Wirtschaft, Energie, Industrie, Mittelstand und Handwerk (MWEIMH) of Nordrhein-Westfalen, the Ministerie van Economische Zaken (EZ), the province Limburg, the province Noord-Brabant, the province Gelderland, the province Drenthe and the province Overijssel within the framework of the INTERREG IV A programme Deutschland-Nederland.

Stab resistant knitted clothing

Research Institute for Textile and Clothing,
Niederrhein University of Ap-plied Sciences

Stab and cut resistant textiles are mostly produced from aramide or ultra-high molecular weight polyethylene (UHMW-PE). These materials have stab resistant properties combined with a lower weight compared to chain mails.
In a recent ZIM project, knitted structures with stab resistant properties have been developed for a safety jacket, combining cut resistant yarns with a loop form, similar to chain mail. Compared to woven fabrics or nonwovens, knitted fabrics offer an enhanced drapability, which makes them better suited for being used in a jacket with high wearing comfort.
In the Niederrhein University of Applied Sciences, fabrics have been knitted by using different structures, yarns, and yarn combinations. They have been finished with diverse methods (coating, laminating, felting …) and evaluated in order to optimize the combinations of yarn, structure, and finishing with respect to their stab resistance properties.
The project partner Bache Innovative has developed several models of knitted safety jackets, starting from a light summer jacket with lower protective properties to models for people with particularly high risk potential, offering an increased stab resistance.
The results of stab resistance tests of different combinations of yarn, structure, and finishing as well as the different jacket models are presented.

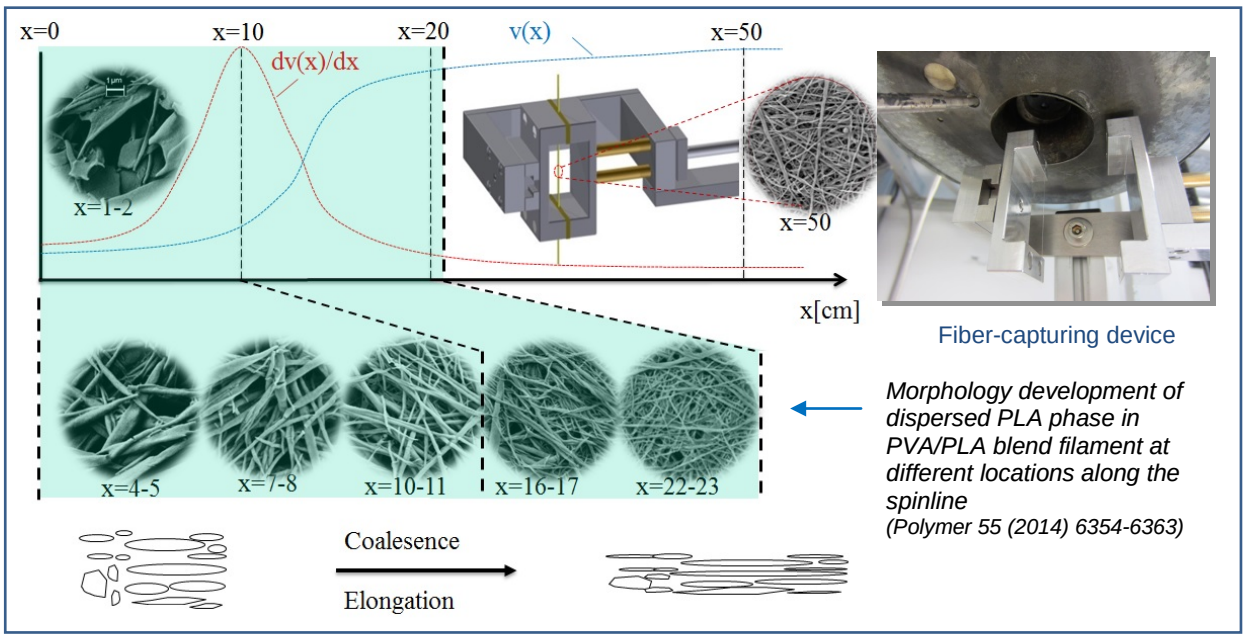
Contact:
M. O. Weber, marc.weber@hsnr.de, phone: +49 2161 186 6033

Further information:

Lecture: Marcus O. Weber, Thorsten Bache et al.: **Stab resistant knitted clothing**
Thursday, 27.11.2014; Hall 3 „IGF-ZIM-Transfer“, 06:00 pm

funded by Bundesministerium für Wirtschaft und Technologie due to a decision of the Deutscher Bundestag, under grants KF 2233806

The investigations provide valuable insight into the mechanism of micro-/nanofibril formation of thermoplastic polymer blends in the melt spinning process. Using a special self-constructed fiber-capturing device, pieces of thermoplastic polymer blend filaments at different locations along the spinline were collected. This fiber-capturing device allows closer off-line studies of the morphology of dispersed poly (lactic acid) (PLA)-, and polypropylene (PP) phases from two different blend systems: poly (lactic acid) /poly (vinyl alcohol) (PVA), and PP/PVA blends, respectively. It was observed that, during melt spinning, the originally rod-like structures of the dispersed PLA-, PP phase in a binary blend with PVA matrix were stretched and coalesced to form continuous long thin *nanofibrils* in the fiber formation zone due to the presence of an elongational flow. The velocity and tensile stress fields of the flow are mainly responsible for stretching and coalescence of the dispersed PLA-/PP phase into these nanofibrils within the polymer blend.



Fiber-capturing device

Morphology development of dispersed PLA phase in PVA/PLA blend filament at different locations along the spinline
(Polymer 55 (2014) 6354-6363)

Contact:

Nguyen Hoai An Tran, tran@ipfdd.de; Harald Brünig, bruenig@ipfdd.de
phone: +49 (0)351 4658 301

Further information:

Poster P77: Nguyen Hoai An Tran et al.: **Monitoring morphological changes of polymer blends along the spinnline using fiber-capturing device**

Synthesis and characterization of polymer functionalized magnetic nanoparticles for sensing application

Leibniz-Institut für Polymerforschung Dresden e.V.

Institute of Textile Machinery and
High Performance Material Technology (ITM),
TU Dresden

Magnetizable nanoparticles based on magnetite were generated as part of the subproject A2 of the cluster of excellence ECEMP. These particles were further functionalized with polymeric shells by a “grafting from” approach. Due to the comprehensive investigation of the synthesis and polymerization conditions core-shell nanoparticles with superparamagnetic properties could be synthesized and functional epoxy groups were bonded to their surface. These nanoparticles were then attached to high-strength polyethylene textiles to create magnetizable, textile sensor structures. With such sensors, embedded into fiber-reinforced composites (FRP), manufacturing, aging and damaging can be detected and monitored destruction free and locally resolved. This will help to design and utilizes FRP components more efficient.

Ultra-high molecular weight (UHMW) PE woven with stitched magnetic sensor yarn (left); woven with magnetite nanoparticles and dried particles (right)

Contact:
Mimi Hetti, hetti@ipfdd.de, phone: +49 (0)351 4658 552
Doris Pospiech, pospiech@ipfdd.de, phone +49 (0)351 4658 497
Matthias Bartusch, matthias.bartusch1@tu-dresden.de, phone: +49 (0)351 463 32626

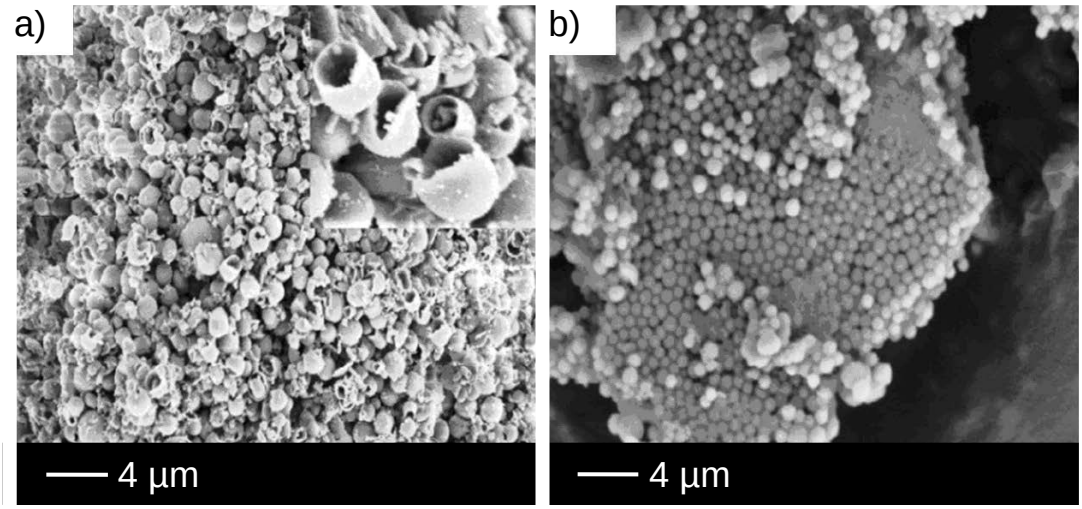
Further information:

Poster P79: Mimi Hetti et al.: **Synthesis and characterization of polymer functionalized magnetic nanoparticles for sensing application**

New silica-based nanoparticles to modify fabric surfaces versatility

Leibniz-Institut für Polymerforschung Dresden e.V.

The goal of producing high added value textiles has attracted extensive research interest, motivated by the demand of fabrics that offer additional functionality to the user above conventional textiles. Toward this goal, we have prepared colored silica-based nanoparticles, which can be used as potential colorants and functional finishing agents. In this study, we prepared brilliant yellow-doped silica nanoparticles. Brilliant yellow-doped silica nanoparticles were synthesized by using a water-in-oil micro-emulsion technique. Poly(diallyldimethylammonium chloride) was used as bridge to link negatively charged brilliant yellow dye and negatively charged silica matrix. Finally, the produced colored silica-based nanoparticles were integrated into fabric surfaces by pigment printing. PET fabrics printed with brilliant yellow-doped silica particles display sensitivity to pH in the range from 3 to 10. This work offers numerous opportunities to achieve simultaneous coloration and functional finishing of textile materials in one process.



SEM images of (a) brilliant yellow dye-doped silica particles without using poly(diallyldimethylammonium chloride), and (b) brilliant yellow dye-doped silica particles after modification of brilliant yellow with 0.5 wt.% poly(diallyldimethylammonium chloride)

Contact:
Dr. Tarek Salem, dr.tarek74@googlemail.com; Dr. Frank Simon, simon@ipfdd.de
phone: +49 (0)351 4658 488

Further information:

Poster P78: Tarek Salem et all.: **New silica-based nanoparticles to modify fabric surfaces versatility**

Funded by Cultural Affairs and Mission sector – Ministry of Higher Education (Egypt) and German Academic Exchange Service (DAAD)

Automotive Interior Center (AIC)

Institut für Textiltechnik of RWTH Aachen University

The feeling of comfort for passengers in cars basically depends on the acoustics and air conditioning inside the vehicle. The feeling, occurring inside an automobile, is strongly influenced by the materials and structures of seating, headlining and side covering. Primarily, composite structures consisting of spacer and knitted fabrics, nonwovens, webbings or foams are used for these components. Amongst others, spacer fabrics are already used as an alternative to foams for upholstering of seats and/or other interior textiles. The characteristics of the individual components can already be determined by standardized test methods. However, currently the possibility to develop new integrated textiles and textile composites for vehicle interiors is missing for automotive manufacturers and suppliers.
Under the Ziel2.NRW project "development and test center for innovative textiles of automotive interiors: Interior Automotive Center (AIC)" a center of excellence of companies and research institutes for automobile interiors is established at Aachen.
One of the main targets of the AIC project is the development and subsequent use of a test bench that allows the systematic determination of the influence of textile interior components according to the acoustic and thermal comfort feeling of passengers. A fundamental part of the Automotive Interior Center (AIC) is to build short and cost-optimized production chains for selected textile components in automotive interiors such as headliner, textile undercarriages, door lining or seats.
Therefore new materials, conceptions, developments and manufacturing methods are used. Likewise, component test benches for flash tests of acoustic, thermal and textile characteristics are constructed by different experts.
A second part of the center is a test bench, with which relevant characteristics of the interior textiles are analyzed experimentally in terms of acoustic and thermal comfort feeling of the vehicle passengers. For that purpose at the Institute of Textile Technology, existing textile production chains are completed with the help of laboratory scales for the production of prototypes and extended for textile components in the interior. Furthermore, new component test benches are constructed for the targeted and systematic interpretation of textiles with which a test of thermal, acoustic and textile properties is possible. These flash tests do allow early valuation of the characteristics of the generated materials and accelerate the entire development process. Accompanying to the flash test methods and to support the development of textiles, the interior textiles are modeled in computer simulations.

Contact:
Dr.-Ing. Volker Niebel, volker.niebel@ita.rwth-aachen.de, phone: +49 (0)241 80 – 23420

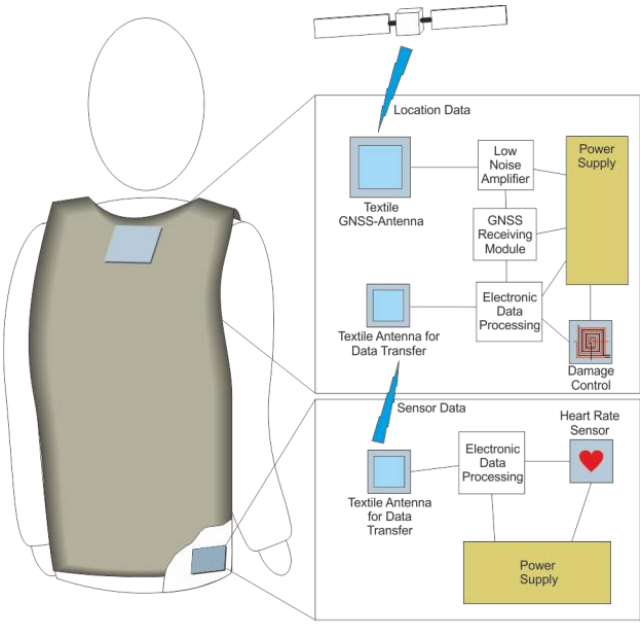
Further information:

The "Automotive Interior Center - AIC" project is fundet by the Ministry of Innovation, Science and Research of the State North Rhine-Westphalia, the European Union and the NRW.Bank under the Ziel 2 program. Furthermore the following project partner are participating: The Institute of Automotive Engineering of RWTH Aachen, Textiles & Flooring Institute at RWTH Aachen, t + h Ingema Ingenieurgesellschaft mbH and Johnson Controls Inc.. We are thankful for their cooperation in this project.

SmartPro - Smart Protective Clothing for Law Enforcement Personnel

Institut fuer Textiltechnik of RWTH Aachen University

Nowadays, protective clothing for law enforcement personnel is mostly heavy, bulky and rigid. Therefore it limits the wearer's mobility and agility. The main goal of the European research project SmartPro is the development of lightweight and flexible protective clothing for security personnel with integrated smart functionalities.
These smart functionalities include physiological monitoring by measurement of the heart rate and a sensor to detect damages to the protective clothing. Thereby threats to the law enforcement personnel can be detected and localised. Textile antennas using Global Navigation Satellite System (GNSS) allow for geolocalisation and fast rescue of law enforcement personnel. Textile antennas will also be included into the body armour for the transfer of detected data to a coordination centre.
The research within SmartPro project will result in solutions for lightweight, flexible and smart protective clothing for law enforcement personnel.



Overview of the smart systems for protective clothing

Contact:
Melanie Hoerr, Melanie.hoerr@ita.rwth-aachen.de, phone: +49 (0)241 80 234 50

Further information:

Poster P99: Melanie Hoerr et al.: **SmartPro - Smart protective clothing for law enforcement personnel**

The research leading to these results has received funding from European Community's Seventh Framework Programme (FP7) under Grant Agreement N° 607295.

Biomimetic multifunctional textile reinforcements for large scale production of composite structures

Institute of Textile Machinery and High Performance Material Technology (ITM), TU Dresden

Constantly increasing prices for raw materials and energy, as well as current discourse on the reduction of CO_2 - emissions, place an emphasis on the utilities of lightweight construction. In this case Fibre Reinforced Polymers (FRP) provides extensive opportunities. References for effective load-bearing structures can be found abundant in Nature like knot-holes in trees or wings of a dragon-fly. Development of biomimetic technologies is already showing an increasing trend. The potential for biomimetic design for light-weight constructions has already been identified and various biomimetic composite-based structures have demonstrated that this principle can be efficiently used in new innovative structural systems through tailoring material properties in a certain direction.
Current research activities in the highly productive field of multiaxial warp knitting has opened up possibilities of producing biomimetic textile reinforced structures through local yarn path manipulation. This so-called warp yarn path manipulation technology allows the possibility to create reinforcement structures in accordance to the flow of forces and to integrate in-line textile-based sensor systems for efficient structural health monitoring.
Thin thermoplastic Tapes based on these biomimetic textile reinforced structures can be further processed by established large-scale production methods like tape laying, winding and using a thermal press. The functional principles of these non-crimp fabrics are due to Glass Fibre - Polypropylene (GF - PP) hybrid yarns, which consist of the reinforcement fibres and matrix material and thus ensure the favourable process parameters for the consolidation. The use of basic technologies, such as the warp knitting technology in textile processing and pressing, tape laying, winding by the FRP manufacturing allow a resource- and cost-effective small and large scale processing of biomimetic multifunctional non-crimp fabrics.

Multiaxial warp knitting machine with warp yarn manipulation module for the production of biomimetic multifunctional textile reinforcements
Source: TU Chemnitz/MERGE, Photo: Hendrik Schmidt

Contact:
Dipl.-Ing. Tristan Ruder, Tristan.Ruder@tu-dresden.de, Phone: +49 (0)351 463-42245

Further information:

Lecture: Tristan Ruder et al.: **Biomimetic multifunctional textile reinforcements for large scale production of composite structures**
Thursday, 27.11.2014, Hall 2, „Composites“, 04:20 pm

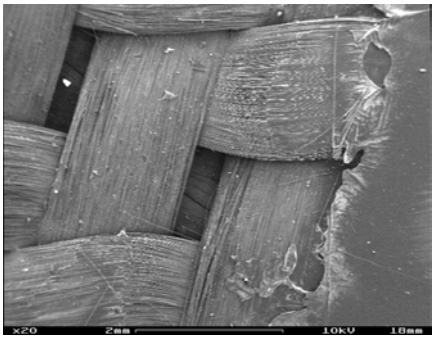
Poster P102: Eric Häntzsche et al.: **Textile-integrated carbon filament yarn sensors for structural health monitoring of membranes and composites**

This work was performed within the Federal Cluster of Excellence EXC 1075 “MERGE Technologies for Multifunctional Lightweight Structures” and supported by the German Research Foundation (DFG). Financial support is gratefully acknowledged.

Procedure for local repair of fiber plastic composites and spinning of yarns from recycled carbon fibers

Institute of Textile Machinery and High Performance Material Technology (ITM), TU Dresden

The growing demand for fiber reinforced composites in different fields of industrial as well as common life applications goes a long with an increasing need for specific repair concepts. At the ITM, the main object of current research and development is the regain of defined composite properties dealing with physical-chemical repairing approaches. Especially, the intention is the complete local removal of the matrix in a selected damaged area. The pure carbon fiber fabric is exposed, without affecting the existent textile reinforcing structure in its stability. Subsequently, the bearing capacity is restored by a required force flowed layer reconstruction of carbon reinforcement composites. The composite structure is maintained in its original mechanical and dimensional properties. Accompanied by a DFG fundamental research project, patented procedures, namely the careful removal of matrices by different techniques, are in the focus of current investigation.



SEM of CFRP after chemical treatment

ITM Lab card roller

So far, carbon fiber (CF) accumulated from production waste or pyrolyzed CFRP (carbon fiber reinforced plastic) components are processed into non-woven or in injection molding components. Utilizing the excellent mechanical, textile-physical and chemical properties of the CF, a DFG-project handling fundamental investigations about spinning of CF waste with defined yarn count and mixing ratios is initiated and carried out at ITM. The objective is the development of yarn structures having comparable performance in CFRP parts near to CF virgin filaments (up to 80% strength) and can thus also be used in load-bearing components. The entire sequence of fiber formation has been considered for the examined process. The initial investigation is characterized by a suitable, required non-woven material production.

Contact:
Dipl.-Chem. Kristin Küchler, kristin.kuechler@tu-dresden.de, phone: +49 (0)351-20250175
Dipl.-Ing. Martin Hengstermann, martin.hengstermann@tu-dresden.de, phone:+49 (0)351-20250173

Further information:

Lecture: Kristin Küchler et al.: **Development of a local, chemical-physical repair procedure for fiber-plastic com-posites**
Friday, 28.11.2014, Hall 2, „Composites“, 03:00 pm

Poster P113: Martin Hengstermann et al.: **Development of carded webs made from recycled carbon fibers for subsequent spinning for a usage in structural CFRC parts**

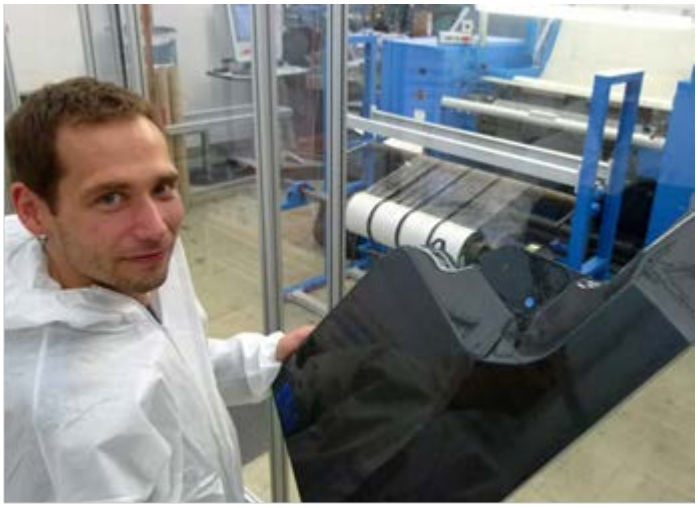
We would like to thank the DFG (Deutsche Forschungsgemeinschaft) for the financial support of the research DFG HU 2107/4-1, DFG CH 174/36-1 and DFG CH 174/34-1.

Fibre based nonwovens in light weight construction – a transferable concept for the recycling of carbon waste material

Sächsisches Textilforschungsinstitut e.V. (STFI), Chemnitz

SÄCHSISCHES TEXTIL FORSCHUNGS INSTITUT e.V.

Carbon fibre waste is a comparatively young and undeveloped kind of waste which will extensively grow over the next decades. In the future the application of CFRP structures will increase in the construction of vehicles, in particular in the section of e-mobility, based on the extreme lightweight construction potential in comparison to traditionally used materials like steel and aluminium.
With the application of CFRP in different industrial branches the amount of the attacking fibre material waste will strongly increase in future as well. This fibre waste occurs on one hand as cutting scrap in the production process as well as on the other hand from recycled composite parts after pyrolysis or solvolysis (e.g. end-of-life-waste).
Therefore, it is a necessity to bring these energy-intensely produced carbon fibres back to the cycle of material use.
The presentation explains the nonwoven production on the base of carbon fibre waste as possibility for the realisation of textile fabrics which allow the use of relatively long fibres. Furthermore, the available machinery at the STFI premises is explained as well as the technical and technological challenge of carbon fibre pro-cessing.



Contact:
Marcel Hofmann, marcel.hofmann@stfi.de, phone: +49 (0)371 5274 205

Further information:

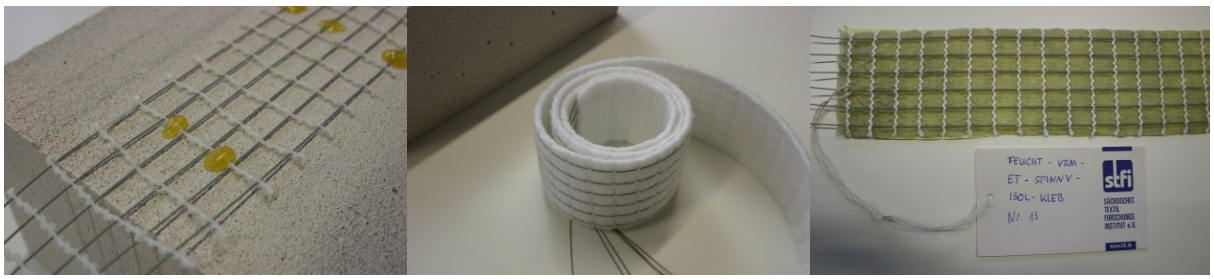
Lecture: Marcel Hofmann et al.: **Fiber based nonwovens in light weight construction – a transferable concept for the recycling of carbon waste material**
Friday, 28.11.2014, Hall 2, „Composites“, 03:25 pm

Technical textiles for monitoring applications in construction

Sächsisches Textilforschungsinstitut e.V. (STFI), Chemnitz

To guaranty the functionality, reliability and safety of buildings and their quality assessment of maintenance the monitoring of moisture and deflection is required.
With focus on building safety STFI developed together with partners of research and industry new textile composites with sensing functions. In the presentation the steps of developing such textiles, the results and experiences in application fields will be presented.

- Textiles for monitoring of deflection on load-bearing structures
- Textiles for monitoring of moisture in concrete and timber constructions



Examples of ribbon-like sensor Textiles

Contact:
Elke Thiele, elke.thiele@stfi.de, phone: +49 (03)71/ 5274-243

Further information:

Lecture: Maria-Barbara Schaller, Elke Thiele et al.: **Technical textiles for monitoring applications in construction**
Thursday, 27.11.2014; Hall 3 „IGF-ZIM-Transfer“, 05:35 pm

AiF 17110 BR/1

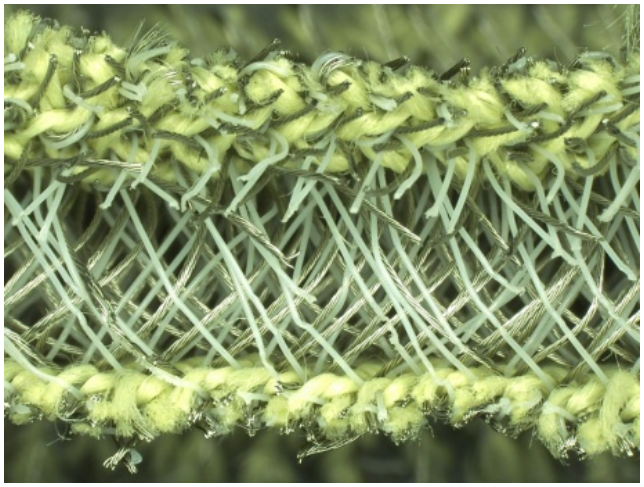
3D spacer fabrics based on metallic threads – the lightweight, flexible kind of cut protection

Textile Research Institute Thuringia-Vogtland, Greiz

Das Institut für Spezialtextilien
und flexible Materialien

The demand for protective clothing is rising due to changes in the world of work. It has to safeguard against complex sources of danger and at the same time to fulfill the demands for comfort and clothing physiology. For these reason solutions for partial constructions, which provide besides the cut protection also a cushioning effect (impact protection) and with it excellent clothing physiological properties, have been developed.
These qualities can be achieved by the application of new threads in 3D spacer fabrics, while the usually necessary multiple textiles layers in the cut protective clothing are reduced to few layers.

Extensive investigations concerning the thread running (deflection and friction behaviour) as well as to the mesh formation process and the caused dynamic yarn tension are necessary at this point. The new cut and impact protection warp knitting is a feature of low weight per unit area, high flexibility and excellent clothing physiological comfort.



Cross section of the 3D-cut protection fabric

Contact:
Monika Weiser, m.weiser@titv-greiz.de, phone: +49 (0)3661 611 403

Further information:

Lecture: Monika Weiser et al.: **3D-Gewirke mit Metallgarn – die leichte, flexible Art des Schnittschutzes**
Thursday, 27.11.2014, Hall 3, „Protective Textiles“, 09:50 am

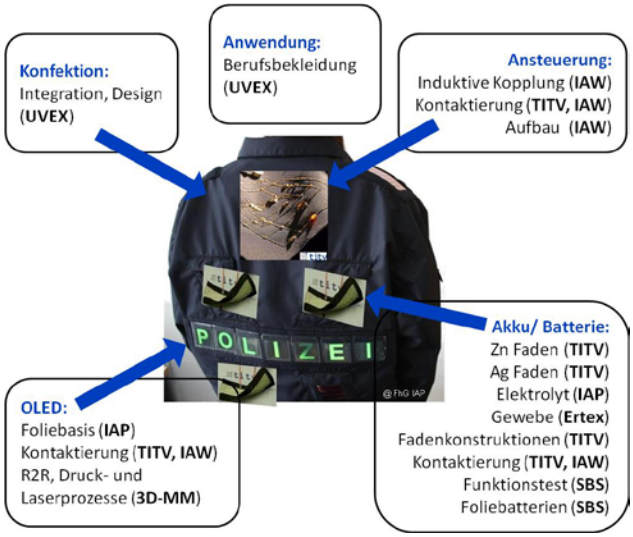
Einsatz von Metallgarnen in 3D-Gewirken für Anwendungen im Bereich der Schutztextilien“ IGF - AiF 17424 BR2

TexBatt – The textile based autarkic battery for textile integrated electronic systems

Textile Research Institute Thuringia-Vogtland, Greiz

Das Institut für Spezialtextilien
und flexible Materialien

Safety-related luminescent textiles come into focus of development from strength to strength. The energy supply of textile integrated electronic systems is a challenge, too, because mobility, wear comfort, and stability have to be ensured. A textile based, flexible battery, which is rechargeable by inductive coupling, is developed in the joint project TexBatt for the power supply of OLED/LED displays in clothing.
The partners of this challenging project are companies as well as two research institutes with profound knowledge in textile technology, processing OLEDs and batteries and their integration in textiles. Single components were developed. Now they will be combined in laboratory scale. After further optimization, demonstrators using the example of safety textiles and of the integration of inducting coupling for recharging of the textile battery will be produced together.



Contact:
Dr. Yvonne Zimmermann, y.zimmermann@titv-greiz.de, phone: +49 (0)3661/611 310

Further information:

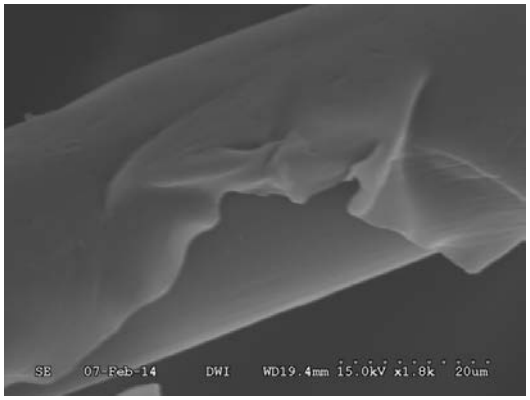
Poster P61: Yvonne Zimmermann et al.: **TexBatt – the textile based autarkic battery for textile integrated electronic systems**

BMBF 16SV6092, TexBatt

Super-stable foam formulations for the minimal application in the field of finishing and cleaning using biological stabilizers, based on the example of textile floor coverings and upholstery fabrics

TFI - Institut für Bodensysteme an der RWTH Aachen e.V.
DWI-Leibniz-Institut für Interaktive Materialien, Aachen

In the project textile floor coverings and upholstery were finished with hydrophobins to implement a consistent and sustainable soil repellency. The modified surface and soiling characteristics were tested and analyzed. The colorimetric assessment of finished goods show generally better results regarding the soiling behavior. Furthermore the surfaces were analyzed with measurement techniques like x-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM) and contact angle measurements. The finished goods with hydrophobins were also tested on safety related characteristics. Investigations in lab-scale and industrial scale showed better cleaning properties in comparison with commercial available detergents.



Contact:
Dr. Robert Kaufmann (DWI), kaufmann@dwi.rwth-aachen.de, Tel.: +49 (0)241/8023324
Sophia Gelderblom (TFI), s.gelderblom@tfi-online.de, Tel.: +49 (0)241/9679134

Further information:

Poster P64: Robert Kaufmann et al.: **Application of hydrophobins in cleaning of carpets and upholstery**

funding by the AiF within the framework of the industrial collective research programme (IGF)

Announcement and Call for Papers – "Aachen-Dresden" 2015

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Deadline Call for Papers: January 31, 2015

Contact for 2015: Dr. Janine Hillmer, DWI – Leibniz Institute for Interactive Materials
aditc2015@dwi.rwth-aachen.de, Tel.: +49 (0)241 80-233-36

Further Information: www.aachen-dresden-itc.de

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and

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- TITV, Textilforschungsinstitut Thüringen-Vogtland e.V., Greiz

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