RESEARCH HIGHLIGHTS

DEUTSCHE INSTITUTE FÜR TEXTIL- UND FASERFORSCHUNG DENKENDORF

DITF REPORT

May 2025 – No. 1

Bioeconomy Innovation Award

DITF and TECNARO receive award for innovative textile coating

As part of the eighth Bioeconomy Day at the Haus der Wirtschaft in Stuttgart, Peter Hauk MdL, Minister for Agriculture, Food and Consumer Protection Baden-Württemberg, presented five companies with the Baden-Württemberg Bioeconomy Innovation Award for their pioneering solutions. The DITF, together with TECNARO GmbH, received the prize of 10,000 euros each for their research work "Textile coating made of lignin for sustainable geotextiles".

The project, which was carried out at the DITF by Cigdem Kaya and PD Dr. Thomas Stegmaier, is, like the other award-winning projects, a special success story that shows how bioeconomy can work in practice. At the same time, it is an example of successful cooperation between business and science as the key to success, said Hauk.

DITF scientist Cigdem Kaya accepted the award on behalf of all those involved at the DITF and at TECNARO and presented the development to the numerous guests at the event.

The award winners from TECNARO and the DITF: Dr. Georgios Mourgas, Cigdem Kaya, Jürgen Pfitzer, PD Dr. Thomas Stegmaier, Dr. Michael Schweizer

Synthetic textiles are used in civil engineering, which could be replaced by environmentally friendly, biodegradable natural fibers. However, some of these natural fibers decompose too quickly.

In the award-winning project, Cigdem Kaya and Thomas Stegmaier, together with TECNARO GmbH, have therefore developed an environmentally friendly, bio-based protective coating made from lignin that significantly extends the life of natural fibers. A practical aspect of this is that lignin is produced in large quantities as a waste product during paper production. However, further research is needed to establish the existing waste material as a new recyclable material in industrial manufacturing processes in the textile industry. The award provides additional motivation for this.

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DITF: Success with "Praxissprints"

The DITF were extremely successful in the current "Praxissprints" funding call by the Baden-Württemberg Ministry of Economic Affairs with a total of seven projects and an associated funding volume of around one million euros. The "Praxissprints" program is part of InvestBW, the central innovation funding program of the Ministry of Economic Affairs, and aims to support the transfer process of research results into practice through to the market launch of products and processes.

The call for funding met with a great response from all eligible applicants from science and industry. A total of 567 project applications with a total funding volume of more than 150 million euros were submitted. 78 of these projects were selected and will receive funding from the state budget amounting 18.72 million euros. Further information on the DITF projects can be found on page 3.

On the death of Professor Dr. Dr. h.c. Franz Effenberger

Obituary of the former Head of the Institute for Textile Chemistry and Man-Made Fibers at the DITF

Professor Effenberger was a brilliant chemist, researcher and university lecturer. A bridge builder between science and industry. With his passing, the DITF have lost an important companion. In November last year, Professor Effenberger was a guest of honor at the Aachen-Dresden-Denkendorf International Textile Conference organized by the DITF. On December 11, 2024, the former Head of the Institute of Textile Chemistry and Man-Made Fibers at the DITF passed away. Professor Effenberger was 94 years old.

Professor Dr. Dr. h.c. Franz Effenberger, Director of the Institute for Textile Chemistry and Chemical Fibers (ITCF) at the DITF 2003–2009

Franz Effenberger studied textile engineering in Krefeld, then chemistry at the Technical University of Stuttgart, received his doctorate in 1958 under Hellmut Bredereck at the Technical University of Stuttgart with the topic "Investigations on condensed heterocyclic ring systems" and habilitated in organic chemistry in 1964. After a one-year research stay at the University of Michigan in the USA in 1965 and years as a Winnacker Fellow, he was appointed Professor of Organic Chemistry at Stuttgart University of Applied Sciences and Director of the Institute of Organic Chemistry at the University of Stuttgart in 1971. He held both positions with great passion and success until 2002.

At the University of Stuttgart, where he was Vice-Rector (1980–1986) and Rector (1986–1990), Franz Effenberger was involved in the reform of the chemistry degree course and was committed to establishing the bioprocess engineering specialization. He was also active abroad: he taught as a visiting professor at Cornell University in Ithaca/USA in 1977 and at the Ecole Supérieure de Physique et Chimie in Paris in 1989.

His most important areas of work included the chemistry of aromatics, heterocycles and amino acids, the chemical foundations of molecular electronics, applications of enzymes in synthesis and the development of ultra-thin organic layers. Franz Effenberger has presented around 350 publications and 55 patents in collaboration with renowned companies – impressive proof of his scientific achievements and his professional life's work, which was entirely dedicated to research. In 2023, he published his autobiography "From Aromatics and Heterocycles to Bio- and Nanotechnology" in the series "Life's Work in Chemistry". In 2003, Franz Effenberger took over the management of the Institute for Textile Chemistry and Chemical Fibers (ITCF) at the DITF for six years after having been member of the DITF Board of Trustees until 2003. With tireless commitment, outstanding expertise and an open ear for his employees, colleagues and the needs of the industry, Professor Effenberger succeeded in further expanding the outstanding national and international reputation of the ITCF Denkendorf. As a scientist with strategic skill and a flair for the right topics, he initiated numerous forward-looking research projects, promoted cooperation with industry in a targeted manner and thus set the course for a successful future for research in Denkendorf. Together with the SGL Group, Franz Effenberger initiated the development of carbon fiber technology at the ITCF and thus set a milestone on the way to independent European carbon fiber production technology, the mastery of which is of decisive importance for Germany as a high-tech location.

Franz Effenberger has received many awards. For his scientific work and his overall oeuvre, which was characterized by discoveries
and new findings, he was awarded the Humboldt Research Award and the Federal Cross of Merit 1st Class, among others. His achievements have also been recognized many times abroad. Keiō University awarded him with the Japan Society for the Promotion of Science Fellowship Award, the University of Strasbourg honored him with the Louis Pasteur Medal, and in France he was made a Knight of the Legion of Honor (1997). The Universidade Federal de Santa Maria (Brazil) awarded Franz Effenberger an honorary doctorate.

The DITF owe Professor Effenberger a great deal and will always honor his memory.

DITF success in the "Praxissprints" funding call

Approval of seven transfer-oriented project applications

At the beginning of December 2024, the Baden-Württemberg Ministry of Economic Affairs published the "Praxissprints" call for funding, targeting companies, business-related research institutions of the Baden-Württemberg Innovation Alliance, the Fraunhofer Gesellschaft and the German Aerospace Center (DLR) as well as universities and colleges in the state. The call, which has a funding volume of 18.72 million euros, addresses projects that prepare the results of basic research and laboratory developments in such a way that they can lead to joint research projects with industry, industrial contracts or the acquisition of property rights in a next step. The aim is to accelerate innovation processes and support the acquisition of cooperation partners for the practical implementation of innovations and the protection of intellectual property (IP) of the research institutions.

The scientists at the DITF submitted numerous transfer-oriented project applications from all subject areas along the textile value chain and were rewarded for their commitment with a total of seven approvals. All projects have now been launched and have a processing time of eight months. This means that proverbial "sprints" are required. The following overview shows the topics of the projects.

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DITF practice sprints

> EFVKS - Continuous fiber-reinforced plastic screw
> SteamBlend - resource-efficient processing of blended textiles using steam explosion
> LactiSlip – Controlled release of lactide from panty liners for a healthy vaginal environment
> ProtectLig – Development of lignin-containing dispersions for textile coatings as a protective layer against degradation by microorganisms and UV light
> PiezoPLA – Development of piezoelectric PLA fibers in melt spinning
> PEFFR – Bio-based, flame-retardant poly(ethylene furanoate) copolymers for textile fibers
> MetAkusTex – Acoustic textiles: Theoretical and metrological method development

On the way to substituting virgin fiber CFRP

Tapes made from recycled carbon fibers for lightweight construction

Carbon fiber reinforced plastics (CFRP) are in high demand in lightweight construction applications such as the automotive industry due to their high strength, rigidity and low weight. However, as their use increases, so do the quantities of carbon fiber waste, which has so far mostly been incinerated or landfilled, although recycling processes such as pyrolysis and solvolysis do exist. However, the quality of these recycled fibers is limited as they are shorter and lose their orientation, which makes them difficult to use in high-performance structures.

Researchers at the DITF have developed an innovative solution to this problem: Highly oriented tapes made from recycled carbon fibers (rCF) that can be used in structural applications such as automotive parts. The yarns are opened, mixed with thermoplastic polyamide 6 fibers, oriented and processed into endless tapes. Special processing methods are used to restore the fiber orientation, which significantly improves the mechanical properties.

This technology was successfully applied in the "Infinity" research project. The rCF tapes developed achieved 88 % of the tensile strength and tensile modulus of new fibers. In addition, a life cycle analysis showed that the use of recycled fibers can reduce greenhouse gas emissions by up to 66 %. These innovations therefore make an important contribution to a sustainable circular economy in the CFRP sector and enable a genuine substitution of virgin fibers, which significantly improves both environmental protection and resource conservation.

Developed "Infinity" rCF tape variant with trimmed tape edges

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Elastic inks for textile-integrated electronics

Resistant print coatings for reliable conductivity

Electrically conductive prints on textiles are the basis for functional textiles with electronic functions in the sports, fashion and automotive industries. Conductive inks and binders must be well matched in order to ensure permanent conductivity even under mechanical influences.

Sofar, wrapped yarns and tension-relieved conductive yarns have been widely used as conductive components in textiles. They ensure a reliable flow of current even in textiles that are subject to heavy wear. Their production is complex and only suitable for the mass market to a limited extent. Printing conductive structures on textile surfaces using screen printing or chromojet technology, a digital spray printing technique, is much more cost-effective.

However, there are some challenges in the production of printed conductive textiles. One of the biggest difficulties is ensuring the conductivity of the printed materials while the flexibility and softness of the textile. In addition, the durability of the prints can deteriorate, especially with frequent washing or mechanical stress.

Electrically conductive printing paste (left), dried, conductive, elastic layer on textile (right)

To overcome these challenges, the DITF are working on new ink and paste formulations based on conductive particles and elastic binders. The hysteresis properties of new ink formulations are of central importance here. Hysteresis refers to the ability of a material to retain its properties under repeated stretching or loading. A well-adjusted hysteresis supports the conductivity of printed structures even under permanent mechanical stress. Appropriate materials can adapt to the movements of the textile without impairing the conductive properties.

The aim of the DITF research team is to expand the knowledge of the interactions between conductive particles and binders, between additives and textile auxiliaries to such an extent that highly conductive inks and pastes can be produced in a targeted manner. This makes it possible to produce resistant print coatings for different textile substrates and for different applications that enable reliable conductivity. Under these conditions, the costs for the mass production of textile electronics can be reduced.

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JEC Composites Innovation Award 2025

Development of house walls made of carbon fiber stone awarded

At this year's JEC Composites Innovation Awards ceremony, the award in the "Construction & Civil Engineering" category went to the "DACCUSS" project, the DITF led as coordinator. The company TechnoCarbon Technologies GbR, the inventor of Carbon Fiber Stone (CFS), received the JEC Award together with its development partners. The award is for the development of house walls made of Carbon Fiber Stone (CFS), a CO_2-negative composite material.

Every year, the JEC presents the award to innovative and creative projects that demonstrate the great potential of composite materials. With the help of a development team of twelve companies and research institutions, TechnoCarbon was able to successfully enter its innovative DACCUSS building element for house walls made of carbon fiber stone in the competition.

Carbon Fiber Stone is a building material made of natural stone and bio-based carbon fibers. It serves as an environmentally friendly replacement for CO_2-intensive concrete. While conventional concrete walls release large amounts of CO_2 during production, the DACCUSS building element binds 59 kg of CO_2 per square meter and therefore has a negative CO_2 balance. In addition, the elements weigh only a third of equivalent reinforced concrete house walls.

Each DACCUSS building element consists of several high-strength natural stone slabs made from magmatic rock. Inside the construction are bio-based carbon fibers developed at the DITF. They form the stiffening element that enables the high strength of the construction elements and in turn contribute to the negative CO_2 balance. The layer between the natural stone slabs is filled with carbon-negative biochar granulate, which responsible for insulating the building element. The mineral sawdust from cutting the stone slabs can be used as a soil conditioner and serves as a binder for free CO_2 from the atmosphere.

Awarded (from left): Kolja Kuse (TechnoCarbon), Dr. Erik Frank (DITF), Britta Easchl (e5)

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Fluorescence microscopy of spinning preparations

New LED fluorescence technology for the development of ceramic fibers

Spinning preparations are mixtures of various chemical components that are applied to the surface of fibers. Specific characteristics of fibers or yarns can be influenced in this way. It is common, for example, to the fibers a high slip resistance or antistatic properties. Spinning preparations reduce fiber damage in the further processing procedure and enable high production speeds.

Spinning preparation also plays an important role in the development of ceramic fibers at the DITF. Here, the green fibers, i. e. the still unfired precursor fibers, are treated with a preparation in order to keep the mechanical stresses during further processing to a minimum. This is because ceramic-forming green fibers do not yet exhibit high mechanical stability. Their processing is therefore challenging and requires coordinated process control. For the quality of the subsequent process steps, it is important to apply the spinning preparation evenly, but checking this application is difficult: the translucent preparation on the equally light-colored fibers is barely visible under the light microscope. And the thin films on the fibers are also difficult or impossible to image under an electron microscope.

Carl Zeiss Colibri fluorescence device on Axioscope 5 reflected light microscope

This is where fluorescence microscopy can help: it is based on the fact that certain molecules (fluorophores) irradiated light of a certain wavelength at a different (longer) wavelength. Using suitable filter combinations, it is possible to filter out only this emitted light. The bright excitation light is excluded from the imaging. The fact that fluorescence microscopy is performed against a dark background means that even low concentrations of fluorophores can clearly imaged.

The spinning preparations used in ceramic fiber production do not fluoresce by themselves. A suitable dye (fluorochrome) must be added to them. Very low concentrations are sufficient here, but the fluorochrome must be distributed homogeneously in the spinning preparation. The dye must therefore meet special requirements.

For decades, the very bright light used for fluorescence excitation in fluorescence microscopes generally came from mercury vapor lamps. These emit light across the entire visible spectrum, right into the UV range. Suitable filter combinations can be used to filter out the necessary range for the required excitation and emission from this broad spectrum.

Recently, this solution has been replaced by modern LED technology. The DITF have also retrofitted an LED fluorescence device (Colibri) manufactured by Carl Zeiss. The advantages are immense: exactly the right wavelength for excitation of the fluorescent dye can be selected from the outset. In addition, the brightness of the excitation can be regulated. It is even possible to mix different color channels and thus enable optimal imaging of the sample. For, pure UV excitation can be mixed with light from the visible range.

For example the green fibers, the Carl Zeiss Colibri device on a new Axioscope 5 reflected light microscope has proven to be ideal. Under UV excitation, the distribution of the spinning preparation over the entire green fiber bundle can be easily visualized. This allowed any inhomogeneities to be made visible and the preparation distribution to be optimized.

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Brochure Trend Radar Circular Economy

Orientation in the extensive field of circular economy

Simone Drygant and Dr. rer. pol. Marcus Winkler from the Center of Management Research at the DITF have written the brochure "Trend Radar Circular Economy" for the SME Digital Center Smart Cycles. The publication offers small and medium-sized companies orientation in the extensive field of the circular economy by presenting the various approaches and terms relating to the topic and discussing their special features. The sub-areas of recommerce, R-strategies, zero waste, collaborative circular economy, life cycle assessment and cradle to cradle are examined in more detail.

The brochure also looks at important related regulations at European and national level and takes a closer look at the Circular Economy Action Plan (CEAP) and the National Circular Economy Strategy in Germany.

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ADD International Textile Conference 2024

High-tech textiles provide impetus for the circular economy and recycling

On November 21 and 22, the DITF hosted the Aachen-Dresden-Denkendorf International Textile Conference in Stuttgart. 450 participants from 25 countries and five continents took the opportunity to attend one of Europe's most important specialist conferences.

"Here in Stuttgart, the ADD ITC can feel 'completely at home'. Baden-Württemberg was and is a textile state, our companies in the textile and clothing industry are building on their past successes and at the same time are well equipped for the future thanks to their innovative spirit. Textile materials and processes are formative for our business location. Functional textiles and textiles based on high-performance fibers as well as those based on renewable raw materials offer further potential that is far from being exhausted".

Professor Dr. Michael R. Buchmeiser (Chairman of the DITF) during his opening speech

Dr. Patrick Rapp, State Secretary in the Baden-Württemberg Ministry of Economic Affairs, Labour and Tourism, opened the ADD ITC with this positive assessment in his welcoming address and sparked interest for the following contributions at the two-day conference. With 78 presentations in plenary sessions and three parallel sessions, the DITF, together with the DWI – Leibniz Institute for Interactive Materials, Aachen, and the ITM Institute for Textile Machinery and High-Performance Materials Technology at TU Dresden, offered an extremely wide-ranging, highly topical program. Experts from industry and research reported on research results and marketable textile innovations in the fields of high-performance fibers, bio-based fibers, fiber composites, medical textiles, functionalization and textile machine construction.

Host and organizers of the AAD ITC at the Liederhalle Congress Center in Stuttgart

Focus on sustainability

The central theme was the challenge posed by the circular economy and recycling. Sustainability means developing and producing high-tech textiles with innovative functions without negative effects on the environment and society – and at the same time profitably. This requires not only suitable technologies, but also the right choice of materials and the correct handling of substances and material flows. The presentations covered everything from the relevant UN and EU directives to their concrete implementation in companies.

Transfer session

Under the motto "From the idea to practice", the Forschungskuratorium Textil e. V. presented successful cooperation projects from the IGF-ZIM program in a separate transfer session, in which representatives from science and industry jointly developed and successfully implemented products and processes.

Speakers from this year's partner countries Belgium, the Netherlands and Luxembourg gave a comprehensive insight into the textile industry and research in the three countries with presentations and discussions.

The conference program was complemented by exhibition stands from 24 companies and research institutions as well as a poster exhibition with over 100 scientific posters. Three of the poster presentations were honored with the Best Poster Award of the Aachen-Dresden-Denkendorf International Textile Conference 2024.

The conference is organized annually alternately by the institutes ITM Dresden, DWI Aachen and DITF Denkendorf. In 2025, the ADD ITC will take place on November 27 and 28. Then the DWI - Leibniz Institute for Interactive Materials e.V. invites you to Aachen.

Participants in the poster exhibition

Functionalization Forum

At the end of January, the DITF, together with AFBW and the Hohenstein Group, hosted the annual Functionalization Forum, which covers all aspects of the functionalization and finishing of textiles. This includes innovative materials and technologies in the production of functional fibers, finished fabrics and technical systems. This year's presentations focused on the topics of material and energy efficiency, biomaterials, recycling, reparability and end-of-life and presented current research results and trend analyses, as well as new areas of application and marketing aspects.

Smart Textiles User Forum

Intelligent textiles for construction, architecture and mobility

When textiles are equipped with electronic components, conductive yarns and textile sensors, the application possibilities are almost unlimited. These high-tech textiles are a global growth market. At the Haus der Wirtschaft in Stuttgart, manufacturers, users and researchers presented amazing examples of applications in construction, architecture and mobility.

The user forum started with a look behind the construction fence of the Stuttgart 21 railroad project

In keeping with the themes of the event, participants were able to a look behind the construction fence of the Stuttgart 21 rail project on the first day. After the tour, DITF Executive Board member Professor Dr. Götz T. Gresser drew parallels with the market for smart textiles. Just like the completion of the underground station, the market potential for smart textiles is developing more slowly than predicted. An important reason for this is that there is still a lot to be regulated. Standardization was therefore a key topic in the presentations on the second day of the event. Kristina Müller from the German Institute for Standardization explained that consistent compliance with standards could reduce the cost of errors in construction, for example, from the current estimated eleven percent to five percent per year. Jan Beringer from the Hohenstein Group used the example of actively illuminated high-visibility clothing to show the hurdles that need to be overcome on the way to standardization.

In addition to high-visibility equipment, workwear offers many opportunities for smart functions. Despite all safety precautions, accidents at work cannot always be avoided, explained Silke Rehm from Adresys. Smart clothing can then automatically make an emergency call and trigger an emergency shutdown of the machine.

There are suitable testing devices for monitoring and quality assurance of materials and textile surfaces. Stefan Fliescher from Textechno presented a device that has so far only been used at the DITF.

The second block of presentations focused on mobility: examples included textile ideas for flight cabins of the future from Diehl Aviation, precise and therefore energy-saving heating systems for vehicles from Köstler and contactless sensor technology from Rotec, which detects when fiber ropes need to be replaced. Erhardt flexible, customized bodies for commercial vehicles. They are particularly suitable for logistics in city centers and are equipped with textile sensor technology, for example for measuring temperature or determining the optimum load.

In the construction and architecture application area, solutions for climate change are in demand. TEC KNIT develops smart shading systems made from shape memory polymer fibers that close or depending on the temperature. Optigrün relies on smart rainwater management for greening buildings. Textile sensor technology ensures that the water is optimally distributed over the surface – Michael Schneider from the Smart Textiles Hub showed how intelligent knitted fabrics installed on flat roofs react to moisture and temperature by contracting or expanding accordingly.

"It is not known in many industries where textiles can offer new ways and solutions. And even less is known that these textiles are also smart," emphasized Professor Götz T. Gresser in his closing remarks.

The event was accompanied by an exhibition with numerous smart products that invited visitors to try them out. The annual user forum is organized by the DITF, TITV Greiz and FKT. The next SMART TEXTILES user forum will take place on March 4 and 5, 2026 in Zeulenroda.

Prof. Dr. Götz T. Gresser, DITF Board Member, welcoming the user forum

DITF Innovation Day

With a wide range of topics, this year's Innovation Day once again attracted numerous interested parties from science and industry to Denkendorf and provided an insight into current research work.

Twelve scientists presented their research findings and projects, which address issues along the entire textile value chain and provide answers with smart, sustainable solutions. During the subsequent tour of the DITF pilot plants, the participants experienced the theory in practice and had the opportunity to talk directly to the researchers.

Prof. Dr. Götz T. Gresser, Chairman of the DITF and Dr. Simon Küppers, Technology and Innovation Manager of the Saurer Group, at the handover of the SAURER air-jet spinning machine

Donation from the Saurer Group

SAURER.

The Saurer Group, global market and innovation leader for spinning technology, has made a generous donation to complete the machine equipment at the Spinning Technology Center Denkendorf. At the beginning of April 2025, Dr. Simon Küppers, Technology and Innovation Manager of the Saurer Group, handed over a fully automated Autoairo air-jet spinning machine with 6 spinning units. Thanks to its compact size, the spinning machine can be used very flexibly. Designed and adapted to research activities, the machine perfectly complements the DITF spinning technology and enables the processing of many new topics and projects on air-jet spinning technology. The DITF would like to say a big thank you!

FTTM: Promoting young talent

FTTM DENKENDORF

As one of the leading European research institutions in the field of textile technology, the DITF have a special responsibility to promote young scientists. Training and further education are among the fundamental tasks of the DITF. In addition to teaching, the DITF, together with well-known German companies from the textile and clothing industry as well as the textile machinery industry, support the training of young engineers and research in the field of textile technology and textile machinery engineering through the FTTM association. The annual general meeting of the FTTM took place in Denkendorf on April 10. The first item on the agenda was the promotion of young talent. As in other sectors, there is a lack of qualified personnel and interested young people in the textile industry and textile machine construction.

BioFibreLoop – Stay tuned

biofibreloop

The BioFibreLoop research project launched in summer 2024 and coordinated by the DITF, which to develop recyclable outdoor and workwear made from renewable bio-based materials, is pace. The first textiles are ready, and a lignin-based coating is on its way. All processes are aimed at a circular economy with comprehensive recycling and virtually waste-free functionalization based on nature's example. The project is funded as part of the EU's Horizon Europe research and innovation program and involves 13 partners from nine countries. A newsletter has recently been published to provide insights into the project. So stay up to date. Register under 'Communication Material' at biofibreloop.eu.

Fairs & Events

May 13 – 15	ESMA Academy – Digital Printing on Textiles, Denkendorf – DITF-Workshop
May 24	Day of Science, University of Stuttgart – DITF booth
May 27 – 31	8th International Conference on Industrial and Hazardous Waste Management, Crete, Greece – DITF presentation
June 05	SME Innovation Day of the BMWK, Berlin – Exhibition DITF Demonstrators
August 31 until September 04	XIXth Conference of the European Ceramic Society (ECerS), Dresden – Lecture DITF
September 10 – 12	DORNBIRN GFC 2025, Dornbirn, Austria – DITF presentations and stand
November 05 – 06	38. Hofer Vliesstofftage, Hof – DITF stand and lectures
November 17 – 20	Medica/Compamed, Düsseldorf – DITF and ITVP at the bw-i joint stand
November 26 – 28	ADD International Textile Conference 2025, Aachen

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