



Leibniz Institute of
Polymer Research
Dresden



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Annual Report 2025

Imprint

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April 9, 2026

Leibniz Institute of Polymer Research Dresden

Annual Report 2025

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Imprint

Modeling Biomolecular
Condensates in Cells



Adhesion Mechanisms of
Microplastics as a Basis for
Risk Assessment

Intelligent Polymer Materials for
Resolving Chronic Inflammation



Conductive Polymer Films for the
Battery Technology of the Future



Multimatrix Fiber Composites
for Patient-Friendly Medical
Technology

Preface



Dear readers,

In 2025, we successfully advanced the academic and organizational renewal of the IPF, achieving remarkable results. The newly established **Synergy Program** has proven highly effective in refining our profile and enhancing the coherence of our research. The program particularly fosters cross-divisional Emerging Topics that have been prioritized based on their relevance, level of innovation, and scientific excellence.

The effectiveness of this approach and the significance of the prioritized topics are reflected in the successful participation of IPF scientists in the core teams of **four Clusters of Excellence** approved in the past year. The clusters cover topics ranging from responsible electronics and sustainable construction to water-based material systems and the physics of life.

Other significant milestones of 2025 include the award of an **Alexander von Humboldt Professorship** in Organic Bioelectronics to Sahika Inal, the launch of a Saxon research network for bioelectronic materials and systems supported by the European Union's Structural Funds,

and the establishment of a new Research Training Group funded by the German Research Foundation, focusing on biomolecular condensates.

With the founding of **ResCure GmbH**, the tenth spin-off of the IPF has been established. The company develops inflammation-resolving medical devices that are currently undergoing clinical validation—another testament to the strong transferability of our fundamental research.

This report aims to provide an overview of the research activities and ongoing development of our institute in 2025. We extend our gratitude to our funding bodies and partners, as well as to our employees for their dedication and creative contributions.

We are confident that the momentum of our research can help ensure that our free, democratic society proves itself even in challenging times.

The IPF Board of Directors
Carsten Werner and Agnes Schausberger



Research Program

The interdisciplinary research at the IPF aims to advance fundamental knowledge of polymers and polymer-based materials, thereby enabling technological innovations in the fields of health, information, and sustainability.

Research Divisions

The IPF is organized into five Research Divisions, supported by central administrative and technical services.

The Division

Theory of Polymers

develops theoretical concepts and simulation methods to elucidate the fundamental mechanisms underlying structure formation and dynamics in living and engineered soft matter, in close integration with experiment.

The Division

Macromolecular Chemistry

develops synthesis methods and characterization techniques for (multi)functional polymers and nanocomposites tailored to specific applications.

The Division

Physical Chemistry and Physics of Polymers

focuses on the understanding, synthesis, and modification of colloids and interfaces, the rational design and assembly of particle-based nanostructured materials, and their integration into functional systems.

The Division

Polymer Materials Engineering

is dedicated to research topics along the development and processing chains of polymer materials, with special emphasis on multiphasic and hybrid materials.

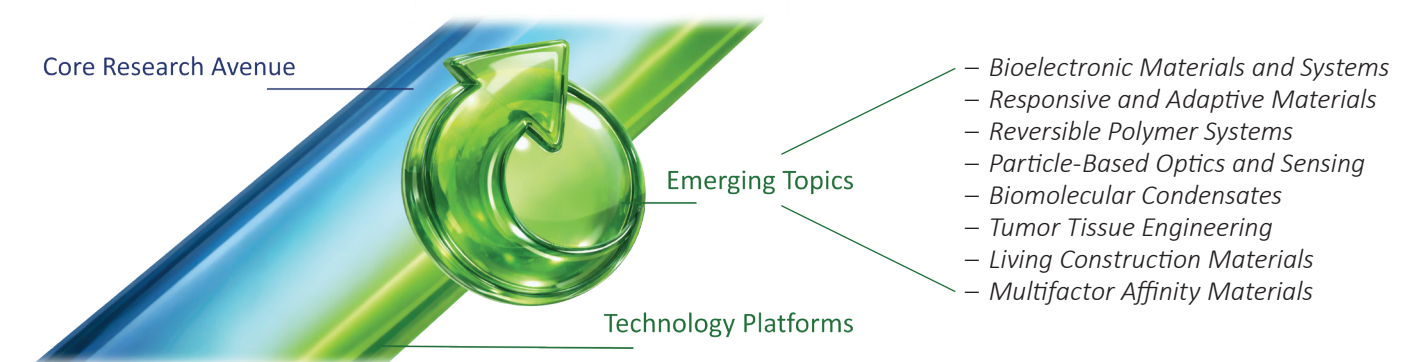
The Division

Polymer Biomaterials Science

investigates the structural basis of functional living matter from a materials science perspective, develops bio-inspired polymer materials, and translates them into biomedical technologies.

Synergy Program

To foster scientific excellence through collaboration across the divisions, the IPF continued the implementation of its Synergy Program, a key component of the institute's Research Plan 2025/2026.



Within the Synergy Program, the IPF's research profile is expanded and enhanced through the strategic prioritization of **Emerging Topics**, which are jointly pursued by the divisions.

Four **Technology Platforms** coordinate and advance expertise and infrastructure related to polymer and materials analytics, applied surface engineering, cross-scale processing technologies, and materials data science, respectively.

Modeling Biomolecular Condensates in Cells

Cells are highly structured yet extremely dynamic systems in which thousands of components interact precisely in space and time. Alongside classical, membrane-bound organelles, another form of cellular organization has come into focus in recent years: biomolecular condensates. These membrane-less, liquid-like compartments arise through phase separation—a physical process by which certain proteins and other biomolecules condense into dense droplets within the cell. The aim of Arash Nikoubashman and his team is to elucidate the formation, structure, and function of such condensates at the intersection of physics, biology, and computational modeling.



Many of the proteins involved in condensate formation possess properties reminiscent of synthetic polymers. Biomolecular condensates can therefore be described using concepts from polymer physics. “Yet every protein is unique,” explains Nikoubashman. “Even minor changes in the protein sequence can have significant functional consequences.” This gives rise to the central methodological challenge: how can general physical laws be formulated without losing sight of the vast molecular diversity of biological systems? “If you describe an elephant as a large gray sphere, the trunk disappears,” says Nikoubashman. “But if you go into the finest detail, you lose the overall picture. Our task is to find the appropriate level of abstraction.”

To achieve this goal, the research team employs particle-based computer simulations that represent a modeling level between high-resolution atomistic models and simplified field theories. This approach makes it possible to realistically capture key molecular interactions while also studying large systems over the timescales relevant to condensate formation. Once a steady state is reached, the resulting structures are analyzed, hypotheses are derived, and then tested in further simulations.

While many studies to date have been limited to condensates composed of only one or two protein species, Nikoubashman and his colleagues extend their models to systems with three interacting components. This seemingly small step enables the investigation of novel forms of organization within condensates. By systematically varying the concentrations and interactions of individual components, a wide variety of structural patterns previously observed experimentally have been identified and explained theoretically. In this way, the computational models provide fundamental insights into the physical principles of molecular self-organization.

»Our goal is to understand how large functional structures emerge from small molecular building blocks.«

In the future, the team aims to model even more realistic cellular environments. This will include the simulation of so-called “protocells,” which replicate selected properties of biological cells and allow for controlled analysis of complex interactions.

This research is also relevant for biomedicine: dysregulation of biomolecular condensates can contribute to the development of neurodegenerative diseases such as Alzheimer’s, Parkinson’s, and ALS—for example, when dynamic, liquid condensates transition into more solid, fibrous protein deposits (amyloid-like aggregates) as a result of genetic mutations or cellular stress. The developed simulation models help to better understand the molecular mechanisms underlying these transitions and to identify potential avenues for new diagnostic and therapeutic strategies.

Prof. Dr. Arash Nikoubashman (pictured on the left) studied physics in Düsseldorf and completed his doctorate in 2012 at the TU Wien. From 2012 to 2015, he conducted research as a postdoctoral fellow at Princeton University, USA. Within the framework of the Emmy Noether Programme of the German Research Foundation (DFG), he then established his own research group at the Johannes Gutenberg University Mainz. In 2023, he was appointed to a Heisenberg Professorship in Theory of Biologically Inspired Polymers, a joint professorship of the TU Dresden and the IPF. His interdisciplinary team in Dresden and Mainz investigates the physical principles by which cells self-organize their internal structure.



Original publication:
<https://pubs.acs.org/doi/full/10.1021/jacsau.5c00713>

Conductive Polymer Films for the Battery Technology of the Future

A reliable energy supply is the foundation of numerous emerging technologies—from electric mobility to stationary energy storage. However, key components of conventional batteries, particularly metallic current collector foils, are increasingly reaching their physical and chemical limits: they add significant weight, are prone to corrosion, and can reduce battery performance.

Beate Krause and her team have developed an alternative solution: an ultrathin, electrically conductive polymer film that is not only significantly lighter and more cost-effective, but also largely independent of the cell chemistry.



Metallic current collector foils possess high electrical conductivity but substantially contribute to the overall weight of battery cells due to their density. In addition, undesirable reactions with lithium or sulfur can occur, leading to efficiency losses and reduced service life. Polymers, by contrast, offer key advantages: they are corrosion-resistant, potentially easier to recycle, and enable significant weight reduction. The central challenge was to impart sufficiently high and long-term stable electrical conductivity—an essential prerequisite for making polymers technically competitive for use in batteries.

As part of the BMW-funded collaborative project BiPoLiS (Development of Lithium–Sulfur Bipolar Batteries), the research team developed a continuously manufactured, ultrathin, and highly conductive polymer film. Its high conductivity is achieved through the targeted combination of thermoplastic polymers with electrically conductive fillers such as carbon black particles and carbon nanotubes. A crucial factor is the formation of a stable, homogeneous filler network within the material: even very small agglomerates can impair the film manufacturing process.

A key advance was achieving three-dimensional electrical conductivity in the extruded film. While many conventional composite materials are conductive only along a preferred direction, the new film enables efficient electron transport in all spatial directions. At the same time, the team succeeded in reducing the film thickness to just 50 micrometers. This further reduces battery weight without compromising functionality.

»We can produce a continuously manufactured, electrically conductive polymer film with a thickness of only 50 micrometers—this is unique worldwide.«

The success of the project is based on the interdisciplinary expertise at the IPF in the fields of polymer processing, materials science, and battery technology. In addition, collaborations with external partners, particularly the Fraunhofer Institute for Material and Beam Technology IWS, played a key role in testing the developed materials under realistic conditions and further advancing them.

In the next phase of development, the team is focusing on optimizing the film's properties. For example, plasma functionalization of the surface can improve the adhesion of electrode materials. Furthermore, new collaborations with partners from industrial cell manufacturing aim to accelerate technology transfer. The goal is to quickly bring more powerful, lighter, and more sustainable battery systems into practical use.

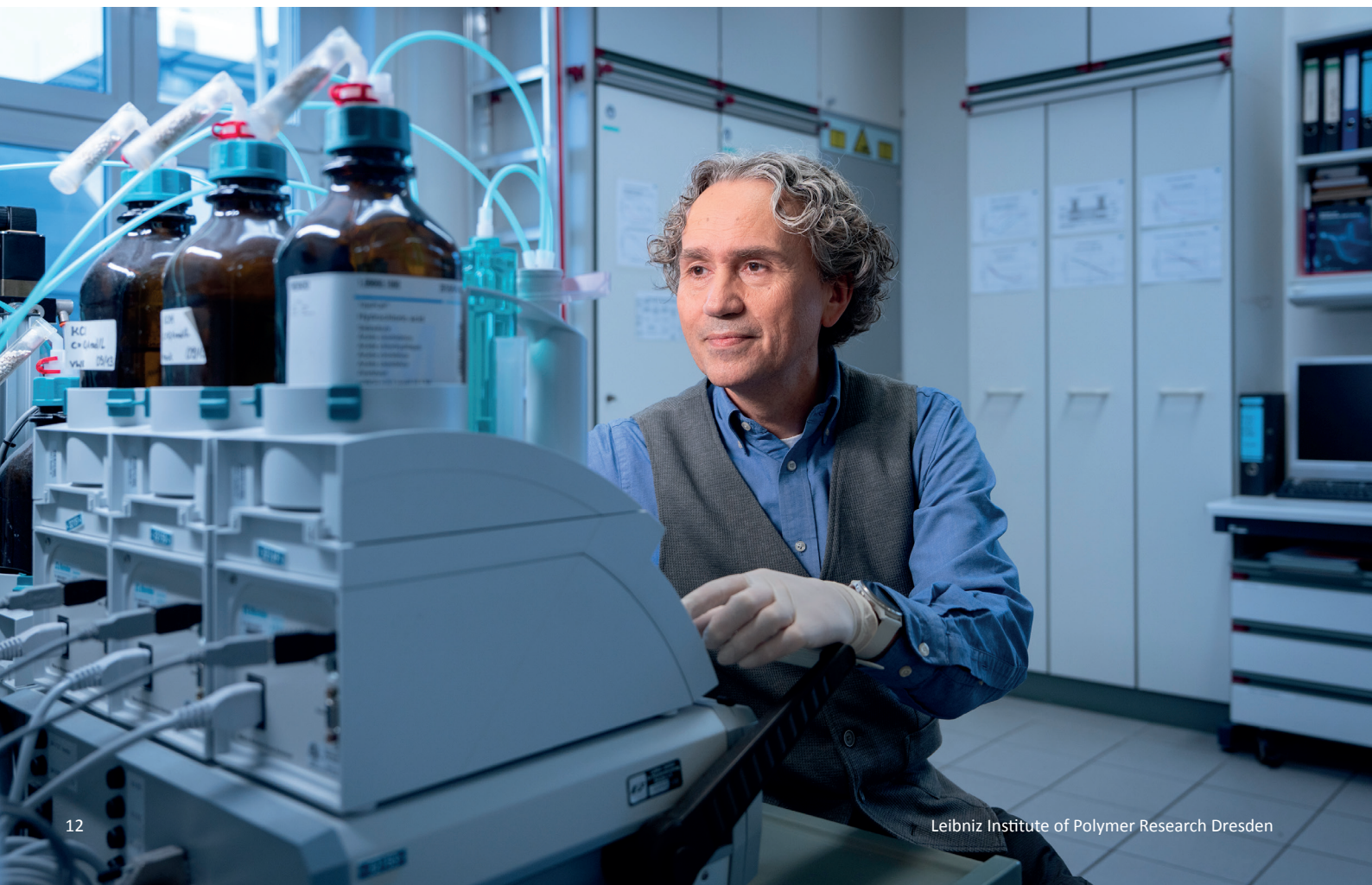
Dr. Beate Krause studied food chemistry at the TU Dresden and completed her diploma in 1999 and her First State Examination in Stuttgart in 2000. In 2005, she earned her doctorate at the TU Dresden with a dissertation on the modification of polymers by electron beam irradiation. Since 2001, she has been working at the IPF, where she specializes in the preparation of thermoplastic materials with nanostructured carbon fillers. Her research group “Functional Nanocomposites” includes several postdoctoral researchers and international early-career scientists working on electrically conductive polymer materials for applications in batteries, sensing, and thermoelectrics.



Original publication:
<https://link.springer.com/article/10.1007/s42114-026-01707-9>

Adhesion Mechanisms of Microplastics as a Basis for Risk Assessment

Plastics are used in numerous applications due to their versatile properties and are therefore ubiquitous in modern life. However, when they enter the environment in an uncontrolled manner, their persistence becomes a problem: instead of being fully degraded, they fragment into progressively smaller pieces—resulting in microplastic particles. Every year, millions of tons of plastic enter natural ecosystems. There, the particles are transported by currents, adhere to surfaces, and interact with mineral and biological structures. Whether they remain mobile or accumulate in sediments and aggregates depends largely on the interplay between physical adhesion and detachment forces. The research team led by Günter Auernhammer has identified a previously unknown mechanism, establishing a foundation for quantitatively describing and reliably predicting the mobility, aggregation, and spatial distribution of microplastics in natural systems.



A key factor is the balance between attachment and detachment: under what conditions do microplastic particles remain bound to surfaces, and when are they remobilized by hydrodynamic forces? A central influence is the so-called eco-corona: in natural waters, biomolecules adsorb onto the particle surface, forming a soft biopolymer coating. This layer alters the physical and chemical properties of the particles and thus their adhesion behavior and interactions with biological organisms.

The team's findings show that the eco-corona significantly enhances the adhesion forces between microplastic particles and the surfaces of living organisms. The adsorbed biomolecules act as polymer bridges: they increase the effective contact area and amplify weak physicochemical interactions into stronger overall adhesion. When these adhesion forces exceed the detachment forces generated by fluid flow, stable attachments and aggregates form.

To study these processes comprehensively, the team and its collaborators employ a multiscale approach: adhesion and detachment processes are studied from the nanoscale of individual particle contacts to the macroscale of sedimentation and aggregate formation. Experiments and simulations are systematically integrated to isolate individual influencing factors and quantitatively determine the forces involved. On this basis, aggregation and attachment processes can be described physically and incorporated into theoretical models.

»Our goal is to grasp the physical principles so thoroughly that we can observe, explain, and predict the behavior of microplastics.«

An ongoing challenge is the complexity of natural systems. Microplastics in the environment differ significantly from industrial reference materials: they age, oxidize, and continuously change their surface properties. At the same time, the widespread presence of plastic particles complicates the acquisition of uncontaminated reference samples. Analyzing real systems therefore requires a combination of methods from natural sciences, materials science, and geosciences. Accordingly, the research conducted by Auernhammer's team is highly interdisciplinary and firmly integrated into the Collaborative Research Centre "Microplastics" at the University of Bayreuth. In addition, the team collaborates with scientists at the University of Applied Sciences Dresden (HTWD), who contribute particular expertise in environmental analytics.

In the long term, the research results will help to better understand the environmental behavior of microplastics and, in the future, to more precisely assess under which conditions particles remain mobile, where they accumulate, and the extent to which they affect biological systems—an important prerequisite for robust environmental predictions and risk assessments.

Dr. Günter Auernhammer studied physics in Bayreuth and Paris. In 2004, he earned his doctorate at the University of Bayreuth with a dissertation on instabilities in layered liquids. He subsequently worked, among other places, at the Max Planck Institute for Polymer Research in Mainz and held postdoctoral positions abroad. He later led a research group in Mainz. Today, he heads the Department "Polymer Interfaces" at the IPF and leads a research group investigating the dynamic properties of surface-dominated systems. His scientific focus is on the dynamics of soft matter, particularly complex fluids and suspensions.



Original publication:
<https://arxiv.org/abs/2509.14371>

Multimatrix Fiber Composites for Patient-Friendly Medical Technology

Scoliosis is a lateral curvature of the spine that primarily occurs during childhood and adolescence. The established non-invasive therapy for scoliosis is wearing a brace. Conventional models are made of rigid plastic and must be worn for up to 23 hours a day over several years. The resulting restriction of movement is both physically and psychologically burdensome, making it particularly difficult for young patients to wear the orthosis consistently. An interdisciplinary team led by Axel Spickenheuer developed a novel scoliosis brace that combines functionality, comfort, and design quality. It is based on innovative material concepts with precisely adjustable mechanical properties, increasing everyday usability and thereby facilitating continuous wear—a key prerequisite for successful treatment.



At the core of the research are so-called multimatrix fiber composites, a new generation of thermoset composite materials offering greater design and functional flexibility. While conventional fiber composites contain only a single matrix material, multimatrix systems support the targeted combination of different matrix materials within a single component. This allows mechanical and functional properties to be precisely tailored locally: certain areas can be designed to be stiff and stable, while others remain flexible and mobile—without the need for additional mechanical joints. The integration of mineral reinforcement fibers reduces weight while simultaneously increasing structural stiffness and load-bearing capacity.

The newly developed scoliosis brace leverages the advantages of multimatrix fiber composites to improve mobility and user comfort. Different matrix materials are directly integrated into the fiber architecture, so that stiff zones perform spinal correction, while flexible areas facilitate putting on and taking off the brace and enhance freedom of movement in everyday life. In addition, the novel brace design allows, for the first time, an unobstructed view of the spine, enabling direct assessment of its curvature without relying on X-ray imaging. AI-assisted analysis of the collected data also supports individualized adjustments and more precise control of the treatment process. This creates the foundation for a personalized, data-driven therapy and represents a significant advancement over existing, static solutions.

»Through a high degree of functional adaptability, we can design fiber composites to better meet patient-specific requirements—with properties that previous materials could not provide.«

The brace was developed within the MBrace project, an international collaboration involving partners from academia, clinical practice, industry, and design in Germany (TU Dresden and University of Applied Sciences Dresden), Poland (Jan Kochanowski University of Kielce), and Belgium (Sirris and Isomatex SA). Design expertise was incorporated early on to address not only technical requirements but also aesthetic and ergonomic aspects, as well as the social acceptance of the orthosis. Medical partners provided data on fit, pressure distribution, and therapeutic effectiveness, which were directly integrated into product optimization. The result is a prototype at an intermediate technology readiness level, demonstrating the practical potential of the new material solutions for medical applications. In an individual case fitting, the improved wearing comfort compared to conventional brace designs has already been confirmed.

In the long term, the potential of multimatrix fiber composites extends far beyond individual products. In addition to medical technology, potential applications include aerospace, sports, and transportation. The team is currently working on scaling and transferring the technology to further areas of use.

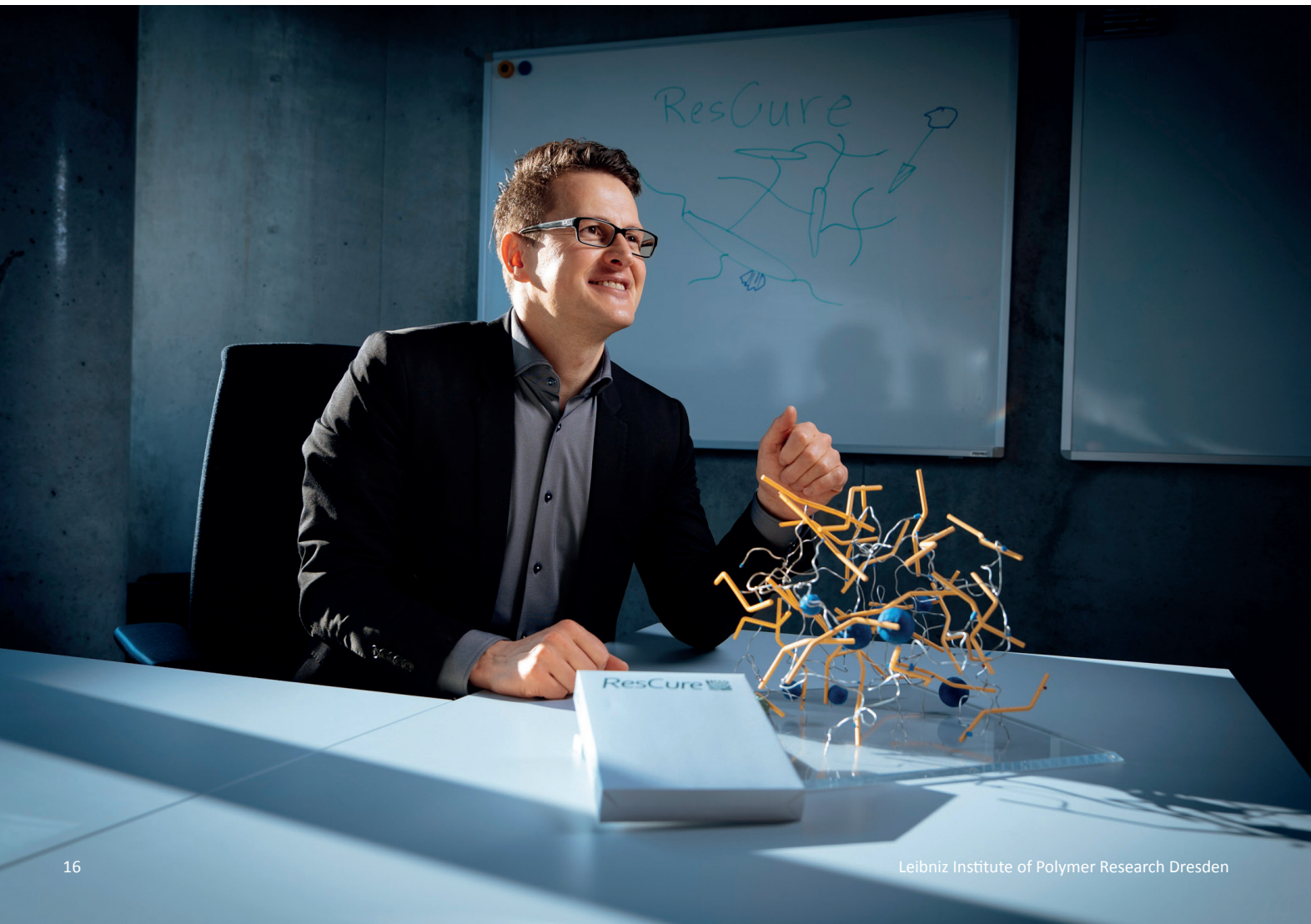
Prof. Dr.-Ing. Axel Spickenheuer studied aerospace engineering and gained international research experience, including in Japan and New Zealand. Since 2005, he has been working at the IPF, where he initially contributed to a national research project. By securing national and European project funding, he subsequently established his own research group. In 2014, he earned his doctorate in the field of fiber composite structures for ultra-lightweight applications. His research combines materials science, engineering, and product design to develop innovative, application-oriented solutions for lightweight construction.



Further information:
<https://composites-united.com/individuelle-koerper-stuetze/>

Intelligent Polymer Materials for Resolving Chronic Inflammation

Chronic wounds represent a significant burden both for affected individuals and for the healthcare system. In Germany, several million patients suffer from wounds that fail to heal over months or even years. Unlike acute injuries, the tissue remains trapped in a dysregulated inflammatory state. This creates a wound environment that impairs healing, characterized by elevated concentrations of tissue-degrading proteases and pro-inflammatory signaling molecules. To target this pathological environment, Uwe Freudenberg and his research team have developed fully synthetic polymer materials capable of binding pro-inflammatory signaling molecules through physical interactions. The aim is to resolve chronic inflammatory processes and to restore the conditions necessary for controlled tissue regeneration.



The underlying material concept is inspired by the natural extracellular matrix, which governs the distribution and activity of signaling proteins through electrostatic and hydrophobic interactions. This principle has been transferred to synthetic polymer networks. Their affinity for specific proteins can be precisely modulated by adjusting their charge properties. This results in a differentiated binding profile: regenerative factors are largely preserved, while pro-inflammatory molecules are reduced to a physiologically favorable level.

In contrast to conventional drug-based therapies, which typically target individual molecules, these synthetic polymer materials are capable of simultaneously binding a broad spectrum of signaling molecules. This enables complex inflammatory environments to be modulated in a multifactorial manner—exclusively through physical mechanisms and without the release of pharmacologically active substances.

»We develop tailor-made materials that regulate complex inflammatory processes purely through physical mechanisms—multifactorial, precise, and without the release of bioactive substances.«

The first application of this material concept is a novel wound dressing. The dressing acts exclusively within the local wound environment, is not absorbed by the body, and releases no bioactive substances. It therefore meets the regulatory requirements for approval as a medical device. The ResCure® dressing can be applied in the same way as a conventional wound contact layer and can thus be readily integrated into existing treatment concepts in modern wound care. Since June 2024, a multicenter clinical trial for the treatment of venous leg ulcers has been underway to evaluate the product's safety and efficacy; completion of the trial is anticipated for summer 2026.

To advance further development and clinical implementation, the ResCure GmbH was founded in 2025 as a spin-off of the IPF. The interdisciplinary team combines expertise in materials science, biology, pharmacy, biomedical engineering, and business administration. The close integration of fundamental research, materials development, regulatory expertise, and entrepreneurial competence enabled the successful transfer from the laboratory through patenting to clinical application. "Our ambition is not merely to publish," emphasizes Uwe Freudenberg, "but to deliver a solution all the way to the patient."

In the long term, the material concept has broader applicability. Through the targeted control of polymer–protein interactions, other tissue microenvironments characterized by chronic inflammation can also be modulated in a multifactorial manner. In the future, this approach could be applied, for example, to burn wounds, where excessive inflammatory responses may lead to systemic complications. Additional fields of application, such as inflammatory bowel diseases, are currently under investigation.

Dr.-Ing. Uwe Freudenberg studied chemical engineering at the University of Applied Sciences Dresden (HTWD) and earned his doctorate in materials science from the TU Dresden in 2007. He has been working at the IPF since 2003, where he established a research group focused on sugar-based hydrogel materials. Since 2010, he has headed the "Matrix and Tissue Engineering" department. His research focuses on the development of bioinspired polymer materials for regenerative medicine. With the founding of ResCure GmbH, he additionally assumed the role of its managing director.



Further information:
<https://rescure.de/>

IPF Fellows



Mahmoud Al-Hussein
University of Jordan,
Amman, Jordan
Nanostructured Organic Materials



Sandro C. Amico
Federal University of Rio Grande
do Sul, Porto Alegre, Brazil
*Polymer Composites and
Nanocomposites*



Christopher Barner-Kowollik
Queensland University of Technology,
Brisbane, Australia
*Photochemical Polymerization,
Polymer Networks*



Laura Bray
Queensland University of Technology,
Brisbane, Australia
3D Cancer In Vitro Models



Ayala Lampel
Tel Aviv University,
Tel Aviv, Israel
*Supramolecular Chemistry,
Peptide-Based Nanomaterials*



Jeetain Mittal
Texas A&M University,
College Station, USA
*Biomolecular Self-Assembly,
Protein Phase Separation,
Nanoparticle Superlattice Design*



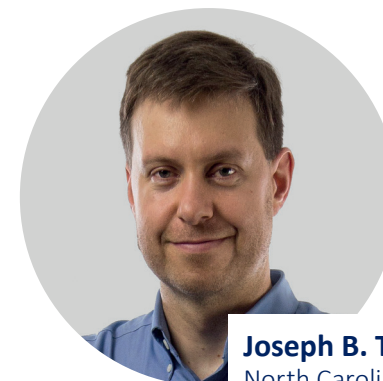
Kinsuk Naskar
Indian Institute of Technology Kharagpur,
Kharagpur, India
Rubber Blends and Nanocomposites



Benjamin Newland
Cardiff University,
Cardiff, UK
*Polymeric Biomaterials for Drug
Delivery and Neuroscience*



Maria da Conceição J. R. Paiva
University of Minho, Braga, Portugal
*Polymer Composites, Surface
Modification of Carbon Nanotubes
and Graphenes*



Joseph B. Tracy
North Carolina State University,
Raleigh, USA
Particle-Based Functional Materials



Kim Williams
Colorado School of Mines,
Golden, USA
Field-Flow Fractionation Techniques

Exemplary Publications

Impact of coiled-coil domains on the phase behavior of biomolecular condensates

Zhouyi He, Jens-Uwe Sommer, Tyler S. Harmon
ACS Macro Letters
 DOI: 10.1021/acsmacrolett.4c00821

Linking structure and topology in single-chain nanoparticles using simulations and scattering data

Marco Werner, Johanna Engelke, Ralf Schweins, Jens-Uwe Sommer, Alben Lederer
ACS Polymers Au
 DOI: 10.1021/acspolymersau.5c00075

Introduction of temperature-gradient elution in three-dimensional correlation thermal field-flow fractionation with quintuple detection for monitoring compositional dynamics of ultrahigh-molar-mass poly(styrene-*co*-maleic anhydride)

Upennyu Lucky Muza, Michael-Phillip Smith, Joshua T. Johani, Bert Klumperman, Alben Lederer
ACS Macro Letters
 DOI: 10.1021/acsmacrolett.5c00593

Highly efficient mechanochemical depolymerisation of bio-based polyethylene furanoate and polybutylene furanoate

Divya Jain, Florian Cramer, Pauline Shamraienko, Hans-Joachim Drexler, Brigitte Voit, Torsten Beweries
RSC Sustainability
 DOI: 10.1039/D5SU00428D

Mechanically interlocked monolayer and bilayer two-dimensional polymers with high elastic modulus

Ye Yang, André Knapp, David Bodesheim, Alexander Croy, Mike Hambsch, Ilka Hermes, Chandrasekhar Naisa, Darius Pohl, Bernd Rellinghaus, Changsheng Zhao, Stefan C. B. Mannsfeld, Gianaurelio Cuniberti, Zhiyong Wang, Renhao Dong, Andreas Fery, Xinliang Feng
Nature Synthesis
 DOI: 10.1038/s44160-025-00930-4

The rising danger of AI-generated images in nanomaterials science and what we can do about it

Nadiia Davydiuk, Elisha M. Krieg, Jens Gaitzsch, Patrick M. McCall, Günther K. Auernhammer, Mu Yang, Joseph B. Tracy, Sara Bals, Wolfgang J. Parak, Nicholas A. Kotov, Luis M. Liz-Marzán, Andreas Fery, Matthew Faria, Quinn A. Besford
Nature Nanotechnology
 DOI: 10.1038/s41565-025-02009-9

Finite element and machine learning-assisted analysis of fiber–matrix interphase in single-fiber pull-out tests

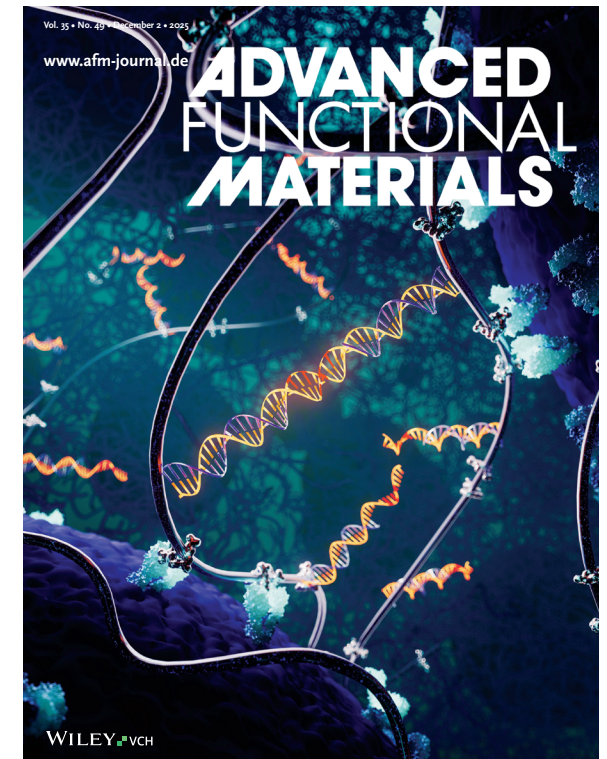
Karl Roetsch, Lars Bittrich, Andrea Bercini Martins, Christina Scheffler, Axel Spickenheuer, Markus Stommel
Composites Part B: Engineering
 DOI: 10.1016/j.compositesb.2025.112702

Ionic adaptive network: A sustainable route to replace synthetic rubbers with natural polymers for high-temperature applications

Subhradeep Mandal, Osvalds Verners, Eric Euchler, Arpita Kundu, Cordelia Zimmerer, Ricardo Bernhardt, Toshio Tada, Gert Heinrich, Sven Wießner, Amit Das
Sustainable Materials and Technologies
 DOI: 10.1016/j.susmat.2025.e01243

A label-free method for measuring the composition of multicomponent biomolecular condensates

Patrick M. McCall, Kyoohyun Kim, Anna Shevchenko, Martine Ruer-Gruß, Jan Peychl, Jochen Guck, Andrej Shevchenko, Anthony A. Hyman, Jan Brugués
Nature Chemistry
 DOI: 10.1038/s41557-025-01928-3



Reconfigurable microenvironments uncover mechano-sensing timescales and direct cell polarity

Syuan-Ku Hsiao, Markus Mukenhirn, Carsten Werner, Alf Honigsmann, Elisha M. Krieg
Advanced Functional Materials
 DOI: 10.1002/adfm.202513028

Events and Achievements



Selection of Sahika Inal for Alexander von Humboldt Professorship

Sahika Inal was selected for an Alexander von Humboldt Professorship, providing €5 million in funding over five years. Her professorship in Organic Bioelectronics will further strengthen the institute’s position in the field of bioelectronic materials and systems.



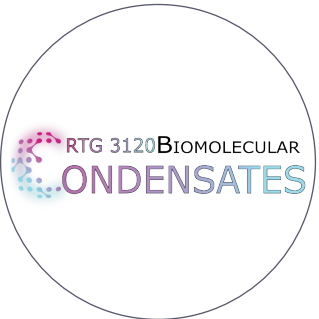
Participation in Core Teams of Four Clusters of Excellence

IPF researchers serve as Core Principal Investigators in four Clusters of Excellence: Responsible Electronics in the Climate Change Era (REC²), Climate-Neutral and Resource-Efficient Construction (CARE), Water-Driven Materials (BlueMat), and Physics of Life (PoL).



ERC Proof of Concept Grant for Ivan Minev

Ivan Minev was awarded an ERC Proof of Concept Grant. His research project *COATARRAY – Hydrogel Coatings for Improving the Efficiency of Implanted Electrode Arrays* aims to develop specific coatings that enhance the electrical and mechanical performance of bioelectronic implants.



New DFG Research Training Group

The German Research Foundation (DFG) awarded funding for the Research Training Group *Biomolecular Condensates: From Physics to Biological Functions* at the TU Dresden. Starting in 2026, it will receive approximately €7 million in funding over five years, with Jens-Uwe Sommer serving as spokesperson.



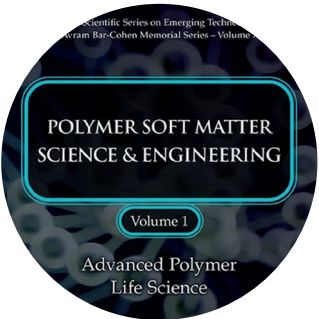
New Spin-Off: ResCure GmbH

A novel therapeutic approach based on an inflammation-resolving polymer platform is currently being validated in a multicenter clinical pilot study and has led to the establishment of the spin-off company ResCure GmbH (see *Intelligent Polymer Materials for Resolving Chronic Inflammation*, pp. 16–17).



Career Achievement Award for Carsten Werner

Carsten Werner received the Career Achievement Award of the Tissue Engineering and Regenerative Medicine International Society (TERMIS EU).



First Volume of IPF-Edited Book Series Published

The volume *Advanced Polymer Life Science*, edited by Jens Friedrichs, Uwe Freudenberg, and Carsten Werner, has been published. Written by leading experts, the book covers advances in the exploration of living matter, bioinspired polymer materials, and their applications in (bio)technologies.



Charles Goodyear Medal for Gert Heinrich

Gert Heinrich, former head of the IPF Institute of Polymer Materials, received the 2025 Charles Goodyear Medal from the Rubber Division of the American Chemical Society.

IPF MATERIALIZED!



19th Dresden Polymer Discussion

From May 25 to 28, the IPF and TU Dresden jointly hosted the 19th Dresden Polymer Discussion in Meissen, Germany. Under the theme *Biomolecular Condensates and Polymer Phase Transitions*, the conference brought together 95 globally leading scientists from materials science, theoretical physics, molecular biology, soft matter research, and related disciplines.



EFRE Funding for Two Joint Initiatives

The IPF and the Leibniz Institute for Solid State and Materials Research Dresden (IFW) secured EFRE funding for two joint initiatives: SMART, which establishes infrastructure for hybrid organic–inorganic materials, and AI4MAT, which creates a shared AI and machine-learning infrastructure for materials research.



Prof. Joehnk Trainee Sponsorship Prize

Former trainee Saya Helm received the Prof. Joehnk Trainee Sponsorship Prize 2025 from the *Stiftung Zukunft durch Bildung* after completing her training as a chemical laboratory assistant ahead of schedule with outstanding results and notable voluntary commitment.



Dresden Science Night

On June 20, the IPF welcomed around 800 visitors to the Dresden Science Night. Guests explored laboratories, experienced live scientific demonstrations, and participated in hands-on experiments across 17 stations.



Annual Reception “IPF MATERIALIZED!”

On April 3, the IPF hosted its Annual Reception at the Deutsches Hygiene-Museum Dresden, welcoming more than 240 guests. The event featured a keynote by Peter Fratzl, a lecture by Sahika Inal, and the presentation of awards by the IPF’s Association of Supporters.



Innovation Award for Elisha Krieg & Team

Elisha Krieg and his team were presented with the Innovation Award of the IPF’s Association of Supporters for leveraging synthetic DNA molecules to create soft hydrogel materials with precisely tunable and dynamic properties.



Doctoral Thesis Award for Patricia Flemming

Patricia Flemming was recognized with the Doctoral Thesis Award of the IPF’s Association of Supporters for her dissertation *Understanding and Tailoring Temperature-Induced Responsive Transitions in Polyelectrolyte Brushes on the Nanoscale*.

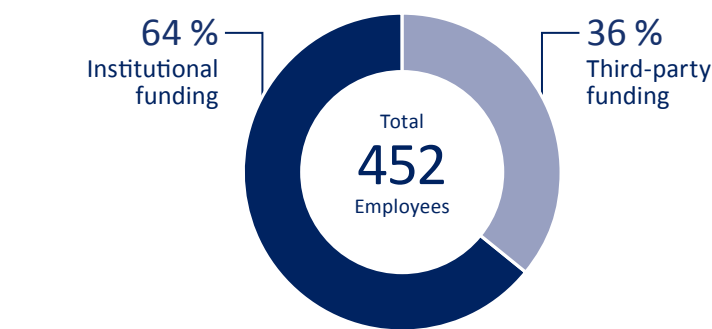


Professor Franz Brandstetter Prize for My Duyen Pham

My Duyen Pham was awarded the Professor Franz Brandstetter Prize of the IPF’s Association of Supporters for her master’s thesis *Cell-Instructive Anchor Polymers for the Culture of Induced Pluripotent Stem Cells*.

Figures

Employees



45 %

Female employees



31 %

International employees



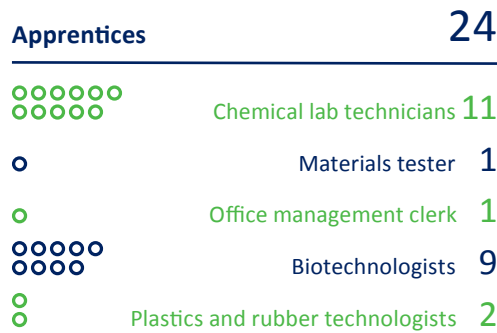
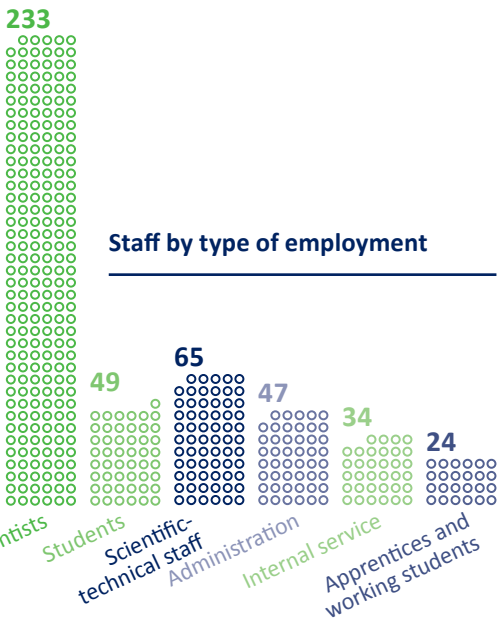
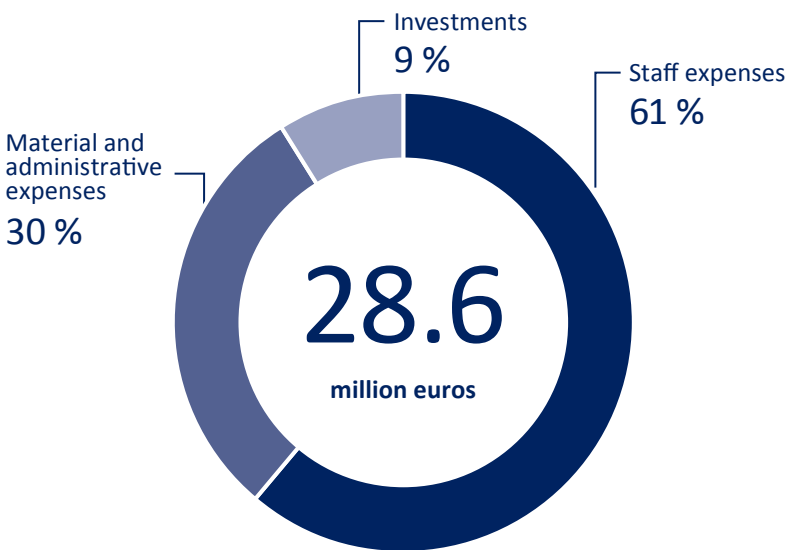
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Visiting scholars

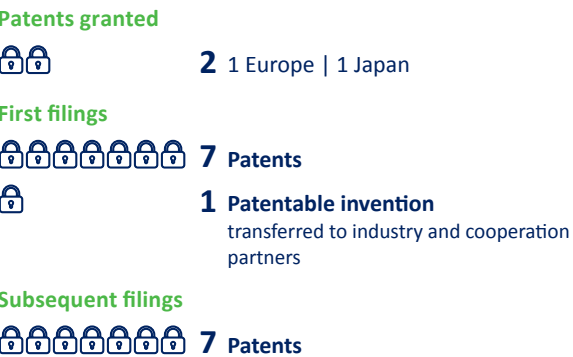


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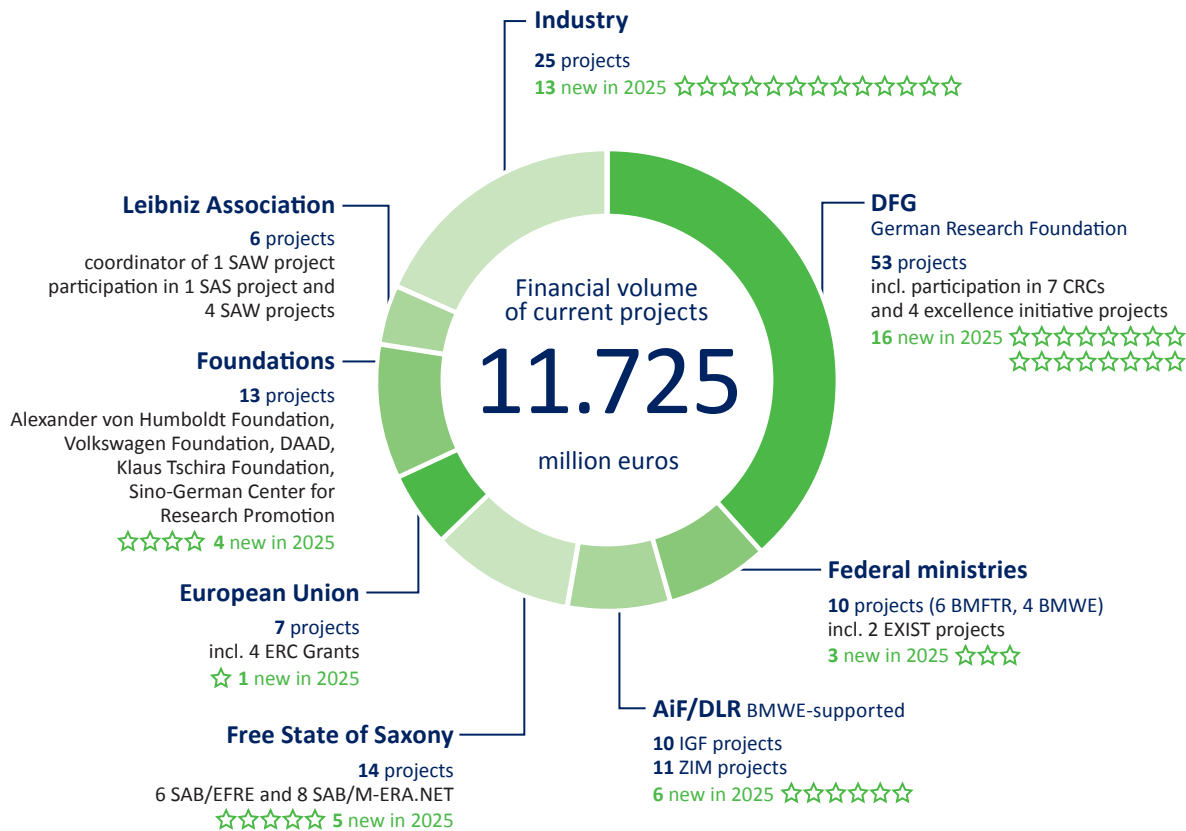
The IPF is jointly funded by the federal and state governments. The institute is co-financed by tax funds on the basis of the budget passed by the members of the Saxon State Parliament.



Patents



Third-party funding



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Publikationen Publications

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Absolventen Graduates

HABILITATIONEN
HABILITATIONS

Jens Gaitzsch
Functional polyesters from radical ring-opening polymerisation of cyclic ketene acetals
Technische Universität Dresden

PROMOTIONEN
DOCTORAL THESES

Atmika Bhardwaj
Crystallization in polymers: analyzed with molecular dynamics and machine learning models
Technische Universität Dresden

Rahma Boughanmi
Charakterisierung und Anwendung von nachhaltigen Biopolymeren in der Wasserbehandlung und der Klebstoffherstellung
Technische Universität Dresden

Carolyn Bunk
Covalently cross-linked amphiphilic PEG- and PCL-based star polymer co-networks using benzoxazinone chemistry
Technische Universität Dresden

Althea Carstens
Investigation of the molecular structure and self-assembly behaviour of bio-derivable polymers using advanced analytical techniques
Stellenbosch University, RSA

Yiyi Deng
Functional and degradable polyesters from radical ring-opening polymerization of cyclic ketene acetals and exploring their potential as nanocarriers
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Negin Farshchi
Material and mechanism for self-healing polyurethane powder coatings
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Syuan-Ku Hsiao
DNA-crosslinked hydrogels as programmable matrices for 3D cell culture
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Joshua Tinashe Johani
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Stellenbosch University, RSA

André Knapp
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Subhradeep Mandal
Reversible network formation in epoxidized natural rubber – a sustainable alternative to conventional sulfur vulcanization
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Chelsea Danielle Mondlane
Development of advanced analytical tools for chemical characterization of lignin raw materials
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Petronella Zabesuthu Ndlovu
Identifying structural defects in end-chain functionalised polyolefins and copolymers from chain walking polymerisation
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Jishnu Nirmala Suresh

Functional liquid isoprene rubber: from network formation to 3D printing for soft actuators
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Peyman Rostami

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Technische Universität Darmstadt

Lucas Schraa

Charakterisierung und Simulation infrarotgeschweißter kurzglasfaserverstärkter Thermoplaste
Technische Universität Dresden

DIPLOM- UND MASTERARBEITEN
DIPLOMA AND MASTER’S THESES

Sascha Bartosch

Investigation of weak binding of cationic ligands to a strong anionic polyelectrolyte studied by pulsed field gradient NMR
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Sven Beyer

Fabrication and characterization of organic electrochemical hydrogel transistors for *in vitro* applications – towards biomimetic sensors
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Léo Dagand

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Jannes Dressel

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Yang Zhou

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Fabian Frech

Charakterisierung und numerische Modellierung des feuchteabhängigen viskoelastischen Verhaltens von Polyamid 6
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Daniel Gscheidlen

Investigation of electrochemically driven reactions for the formation of hydrogels (electrogelation). Construction of a 3D printing setup to enable electrogelation of 2D and 3D structures
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Nuray Mammadzada

Macroscopic glycogen nanoparticle materials
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Regina Obochov

Optimization of conductive hydrogel coatings for enhanced neural electrode applications
Technische Universität Dresden

Johann Palm

Mikromechanische Analyse in Abhängigkeit prozessinduzierter morphologischer Eigenschaften
Brandenburgische Technische Universität Cottbus-Senftenberg

Tom Plettner

Verarbeitungs- und Ermüdungsverhalten von additiv gefertigten resorbierbaren Kompositbauteilen
Technische Universität Dresden

Alina Robert

Beyond uni-directional hierarchical wrinkle formation – experimental realization of different relaxation scenarios for complex load situations
Mahatma Gandhi University, IND

Paul Wedigo Scheer

Experimentelle Untersuchung von Multi-Matrix-Faser-Kunststoff-Verbunden (MM-FKV) bzgl. passiver Dämpfungseigenschaften dynamisch beanspruchter Strukturen
Technische Universität Dresden

Ayush Seal

Molecular dynamics simulations to investigate polymer film formation on hair surfaces
Technische Universität Dresden

BACHELORARBEITEN
BACHELOR’S THESES

Mara Franziska Abschke

Bedeutung von freigesetzten Histonen und Polyphosphat-Partikeln für Blut-Unverträglichkeits-Reaktionen
Duale Hochschule Sachsen, Riesa

Lingyi Cui

Untersuchung der Einflüsse auf die mechanischen Eigenschaften additiv gefertigter Bauteile
Technische Universität Dresden

Vivien Donath

Optimization of sulfated hydrogels for inhibiting the spread of Tau pathology
Technische Universität Dresden

Emma Große

Apolipoprotein-mediated nano-bio interactions
Duale Hochschule Sachsen, Riesa

Jannik Kindermann

Phase separating of cellular droplets with surfactant like polymers
Technische Universität Dresden

Patrick Lima da Silva

Effect of glass fiber diameter on the micro and macro mechanical properties of composites
Federal University of Rio Grande do Sul, BRA

Anton Seifert

Prozesseinflüsse im Mikrospritzgießverfahren auf die Prozess-Gefüge-Eigenschaftsbeziehungen von resorbierbaren Kompositen
Technische Universität Dresden

Naman Sharma

Crack tip behaviour study using digital image correlation and ABAQUS simulations
Indian Institute of Technology Kharagpur, IND

René Starke

Untersuchung eines Zwei-K-Spritzgießprozesses und dessen digitale Datenerfassung mit dem Ziel der Verbesserung der Prozessstabilität und Effizienz
Brandenburgische Technische Universität Cottbus-Senftenberg

Weronika Woronko

Messenger material nanoparticles for probing physical phenomena
Technische Universität Dresden

Julia Schmidt

Study of bacterial adhesion and movement on cholesterol coated surfaces
Technische Universität Dresden

Jonas Soucek

Differentiating topologies of single-chain nanoparticles using their formfactors and principle component analysis
Technische Universität Dresden

Vladislav Stavinskii

Enzymatic activity of myoglobin in polymersomes in various (simulated) environments
Technische Universität Dresden

Karina Zakirova

Converting 1D conjugated polymers into polymer double strands
Technische Universität Dresden

Auszeichnungen Awards

Prof. Dr. Gert Heinrich
Charles Goodyear Medal
für seine herausragenden Leistungen in der Kautschukforschung

Prof. Dr. Carsten Werner
Career Achievement Award der Tissue Engineering & Regenerative Medicine International Society (TERMIS EU)
für seine wegweisenden Beiträge zu Tissue Engineering und Regenerativer Medizin

Dr. Elisha Krieg & Team
Innovationspreis des IPF und des Fördervereins des IPF
für die Nutzung von DNA zur Herstellung programmierbarer weicher Materialien für biomedizinische Anwendungen

Dr. Patricia Flemming
Promotionspreis des IPF und des Fördervereins des IPF
für ihre Dissertation
„Understanding and tailoring temperature-induced responsive transitions in polyelectrolyte brushes on the nanoscale“

My Duyen Pham
Professor-Franz-Brandstetter-Preis des IPF und des Fördervereins des IPF
für ihre Masterarbeit
„Zellinstruktive Ankerpolymere für die Kultur von induziert pluripotenten Stammzellen“

Dr. Jens Gaitzsch
2024 Andrew Keller Award for Best European Paper
für seinen Artikel in *Polymer*
„Supercritical RROP: exploring the radical ring-opening polymerization of 2-Methylenemethylene-1,3,6-trioxane in supercritical CO₂ as a green solvent“
Autor:innen: J. Gaitzsch, B. Hopkins, S. M. Howdle, D. J. Keddie, F. Mehner, M. Reynolds-Green

Dr. Andrei Mitrofanov
Promotionspreis des Integrierten Graduiertenkollegs 2D Materials, Sonderforschungsbereich 1415
für seine Dissertation
„Low-dimensional lead halide perovskites with conjugated organic cations“

Dr.-Ing. Eric Euchler
ACEX Young Scientist Award
für seine herausragenden Leistungen in der Polymermechanik

Dr. Jens Gaitzsch
Wiley Top Viewed Article
für seinen Artikel in *Macromolecular Rapid Communications*
„Current standing on radical ring-opening polymerizations of cyclic ketene acetals as homopolymers and copolymers with one another“
Autor:innen: Y. Deng, J. Gaitzsch, F. Mehner

Leon Schild
Innovationspreis für Faserverbundkunststoffe der AVK
für die Entwicklung eines Verfahrens zur Auslegung und Fertigung einer räumlichen CFK-Tragwerksstruktur auf Basis ebener TFP-Preformen am Beispiel einer Querlenkerkonsole eines Formula Student Fahrzeugs

Dr. Krishna Gupta
Young Scientist Poster Award auf der NextGen Omics, Spatial & Data Conference
für das Poster
„LASSO: zero-background biomolecule isolation for versatile OMICS sample preparation and library construction“
Autor:innen: K. Gupta, E. Krieg, Y.-H. Peng, S. Speed

Dr. Beate Krause
Posterpreis auf der 10th NanoCarbon Annual Conference
für das Poster
„Hybrid-filled polypropylene as conducting film for battery application“
Autor:innen: A. Knapp, B. Krause, I. Kühnert

Dr. Patrick McCall
Best Poster Award auf der Konferenz „19th Dresden Polymer Discussion“
für das Poster
„A label-free method for measuring the composition of multi-component biomolecular condensates“
Autor:innen: J. Brugués, J. Guck, A. Hyman, K. Kim, P. M. McCall, J. Peychl, M. Ruer-Gruß, A. Shevchenko, A. Shevchenko

Dr. Patrick McCall
Best Poster Award auf der „GBM Compact: Focus on Condensate Biology“ Conference
für das Poster
„A label-free method for measuring the composition of multi-component biomolecular condensates“
Autor:innen: J. Brugués, J. Guck, A. Hyman, K. Kim, P. M. McCall, J. Peychl, M. Ruer-Gruß, A. Shevchenko, A. Shevchenko

Sven Schäfer
Best Poster Award beim Wissenschaftsforum „Evonik meets Science 2025“
für das Poster
„Turning bugs into features: degradable hydrogels from radical ring-opening polymerization (RROP)“
Autor:innen: C. Barner-Kowollik, J. Gaitzsch, T. Meißner, S. Schäfer, S. Seiffert

Dmitrii Sychev
Thieme Poster Prize auf der Materials for Sustainable Development Conference
für das Poster
„Visualization of the charge transfer and accumulation under illumination in different semiconducting materials“
Autor:innen: I. Hermes, A. Mitrofanov, F. Paulus, A. Senina, D. Sychev, B. Voit

Saya Inka Helm
Prof. Joehnk-Auszubildendenförderpreis 2025 der Stiftung „Zukunft durch Bildung“
für ihre exzellenten Leistungen als Chemielaborantin und ihr soziales Engagement

Leonie Ulrich
Preis für die besten Absolvent:innen der Fakultät Design an der HTW Dresden
für ihre sehr gute Studienleistung im Studiengang „Design: Products and Interactions – Master of Arts (M.A.)“

Stipendiaten Visiting Scholars

Humboldt-Forschungsstipendium der Alexander von Humboldt-Stiftung

Dr. Jyoti Yadav
Institute of Physical Chemistry, Polish Academy of Sciences, Warschau, Polen
Spatially resolving charge transport in solution with mechanofluorescent polymer brush surfaces
01.03.2023 – 01.03.2025

Dr. Fei Zhang
Institute of Flexible Electronics Technology, Tsinghua University, Zhejiang, China
Development of mixed ion-electron conductive composites for strain sensors
04.09.2024 – 03.09.2026

Dr. Yi Hou
Spontaneous single-step layer-by-layer electrostatic assembly of superstructures with strong and tunable plasmonic properties
01.04.2024 – 31.07.2025

Dr. Lauren Elaine Ball
Stellenbosch University, Südafrika
Optical detection of protein targets via controlled clustering of patchy gold nanoparticle aptasensors
01.12.2024 – 30.11.2026

Stipendium des Deutschen Akademischen Austauschdienstes (DAAD)

Ravichandir Shashank
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, Indien
Active molecules in inhomogeneous environments: emergence of chemotactic behaviour
01.11.2024 – 31.10.2025

Deepak Panwar
Indian Institute of Technology, Delhi, Indien
Enhanced photoluminescent properties of asymmetric gratings via template-assisted self-assembled quantum dots
01.10.2024 – 31.03.2025

Hadi Taghavian
Technical University of Liberec, Tschechien
Eco-friendly surface modification of submerged hollow fiber membrane for water treatment in bioreactors
01.08.2024 – 31.01.2025

Prof. Dr. Yub Narayan Thapa
Tribhuvan University, Kirtipur, Nepal
Mechanical and electrical properties of conjugated polymer-based composites for flexible electronics
14.11.2024 – 31.03.2026

Stipendium der Brasilianischen Bundesstiftung zur Förderung und Evaluation der Graduiertenausbildung (CAPES)

Andre Piva Romeu
Universidade Federal do Rio Grande do Sul, Porto Alegre, Brasilien
Analysis and numerical modelling of fiber-reinforced elastomers
07.11.2025 – 30.04.2026

Erasmus+

Zahn Stanvliet
Stellenbosch University, Südafrika
In-depth characterization of polymer-stabilized nanodisks
02.05.2025 – 30.09.2025

Dr. Rueben Pfukwa
Stellenbosch University, Südafrika
Design and synthesis of advanced functional polymer materials for biomedical applications
02.12.2025 – 22.12.2025

Miché Daniels
Stellenbosch University, Südafrika
Synthesis and characterization of MA-Copolymers with controlled archites using One-Pot reactions
03.10.2025 – 31.01.2026

Stipendium der São Paulo Research Foundation (FAPESP)

Isabela Luiza Rodrigues Cintra
Universidade Estadual Paulista, São Paulo, Brasilien
Development and characterization of PAN/Lkp membranes with graphene and graphene oxide for water decontamination
03.10.2025 – 30.09.2026

Stipendium des Programms „International Research Experiences for Students” (IRES)

Nicholas Finan
Duke University, Durham, USA
Developing messenger material nanoparticles for probing physical phenomena
22.05.2025 – 30.07.2025

Richard Sherburne Gilman
North Carolina State University, Raleigh, USA
Skin cleaning from hazardous substances
22.05.2025 – 30.07.2025

Merve Fedai
North Carolina State University, Raleigh, USA
Understanding the self-assembly of cellulose nanocrystals through coarse-grained simulations
23.05.2025 – 30.07.2025

Nikki Marie Hammond
North Carolina State University, Raleigh, USA
Developing parameters for modeling polymerization meditated condensation for DNA repair
23.05.2025 – 31.07.2025

Fontaine McFeathers
North Carolina State University, Raleigh, USA
Polymer-assisted bacteria killing
22.05.2025 – 30.07.2025

Claire Jing Jing Wang
North Carolina State University, Raleigh, USA
The fate of polymer-coated nanoparticles in biological media
23.05.2025 – 30.07.2025

Förderung des Programms „Horizon Europe: Marie Skłodowska-Curie Actions”

Maryam Mirahmadi
Istituto Italiano di Tecnologia, Genova, Italien
3D chiral structure-based nanobiosensor
06.06.2025 – 31.08.2025

Stipendium des Marie Skłodowska-Curie Doctoral Network

Alessandro Maria Ippoliti
Technische Universität Hamburg
Resorbable electrodes
01.10.2025 – 31.03.2026

Prime Minister's Research Fellowship (PMRF)

Saurabh Kumar Jha
Indian Institute of Technology Jammu, Indien
Polyurethane filled with carbon-based fillers for (thermo)electric application
21.05.2025 – 20.08.2025

Stipendium der Dresden International Graduate School for Interdisciplinary Life Sciences (DIGS-ILS)

Monica Louis
Illinois Institute of Technology, Chicago, USA
Stem cell and molecular biology and imaging
30.06.2025 – 26.09.2025

Stipendium des Programms „Graduate Study Abroad” des National Science and Technology Council

Min-Chun Tsai
National Tsing Hua University, Hsinchu, Taiwan
Design of novel hydrogel materials for bioelectronics
29.07.2024 – 31.07.2025

IPF-Stipendium

Maria Rosselló Gelabert
University of the Basque Country, Vitoria-Gasteiz, Spanien
Formulation and development of a muscoadhesive, biodegradable, injectable and thixotropic hydrogel to deliver and optimal lyosecretome formulation
16.09.2024 – 14.03.2025

Veranstaltungen Events

WISSENSCHAFTLICHE VERANSTALTUNGEN SCIENTIFIC MEETINGS

GUMFERENCE 2025: Advanced testing of soft polymers materials
06.02.2025, online

IPF DAY
05.03.2025, Dresden

The NanoCarbon Annual Conference 2025
18. – 19.03.2025, Würzburg

IPF MATERIALIZED! – Jahresempfang mit Preisverleihung
03.04.2025, Dresden

CU Innovation Day „Tailored Structures“
15.04.2025, Dresden

34. Seminar Kunststoffrecycling in Sachsen
13.05.2025, Dresden

Final Workshop of the M-ERA.NET project InsBIOration
20. – 21. 05.2025, Dresden

19th Dresden Polymer Discussion: Biomolecular Condensates and Polymer Phase Transitions
25. – 28.05.2025, Meissen

Mini-Symposium „Polymer Research Towards the Physics of Life“
03.06.2025, Dresden

14th International Symposium on Polyelectrolytes
13. – 18.07.2025, Campinas, Brasilien

Wrap-up Colloquium of IRES PhD students
25.07.2025, Dresden

Workshop „Life-Inspired Functional Assembly“
20. – 21.09.2025, Harbin, China

11th GACM Colloquium on Computational Mechanics for Young Scientists from Academia and Industry
21. – 24.09.2025, Braunschweig

1st International Symposium on Chemistry, Physics & Devices of Organic 2D Crystals
06. – 08.10.2025, Dresden

Autumn School on Chemistry, Physics & Devices of Organic 2D Crystals
09. – 10.10.2025, Dresden

Advanced Materials Safety Conference
04. – 06.11.2025, Dresden

29. Fachtagung über Verarbeitung und Anwendung von Polymeren TECHNOMER
06. – 07.11.2025, Dresden

Aachen-Dresden-Denkendorf International Textile Conference 2025
27. – 28.11.2025, Aachen

Dr. Aleeza Farrukh
Leibniz-Institut für Neue Materialien, Saarbrücken
Bioelectronic control over cell fate
25.02.2025

Prof. Dr. Oliver Thorn-Seshold
Technische Universität Dresden
From optical and electronic molecular switching to fluorescence stabilisation and near-infrared imaging: azobenzenes are so much more than just dyes!
06.03.2025

Dr. Volker Eberhardt
Fraunhofer-Institut für Angewandte Polymerforschung, Potsdam
openBIS – a full stack RDM-software
06.03.2025

Prof. Dr. Michael Grunze
Max-Planck-Institut für medizinische Forschung, Heidelberg
Micro-droplet arrays for drug discovery and antibiotic screening
21.03.2025

Dr. Julia Schumann
Humboldt-Universität zu Berlin
A customizable data management solution for materials research: An introduction to NOMAD
17.04.2025

Prof. Dr. Alexander Böker
Fraunhofer-Institut für Angewandte Polymerforschung, Potsdam
Regioselective and anisotropic multi-patching of small microparticles via a polymer brush-assisted microcontact printing (μCP)
29.04.2025

Dr. Olga Guselnikova
CEST Forschungszentrum für Korrosion und Oberflächentechnik, Wiener Neustadt, Österreich
Power of plasmonic materials for energy transfer to organic molecules towards sensing and catalysis
07.05.2025

Prof. Dr. Wolf Hiller
Technische Universität Dortmund
The determination of molar masses of polymers using diffusion ordered spectroscopy
08.05.2025

Jun.-Prof. Jannika Lauth
Eberhard Karls Universität Tübingen
A physicochemical approach to innovative photonics by probing (2D-) materials in the fast lane
03.06.2025

Prof. Dr. Seth M. Cohen
University of California San Diego, USA
MOF-polymer hybrids – at the interface of new materials
04.06.2025

Prof. Dr. Kinsuk Naskar
Rubber Technology Centre, Indian Institute of Technology Kharagpur, Indien
Vulcanization of synthetic rubber: some new thoughts
11.06.2025

Prof. Dr. Katharina Maniura
Empa Materials Science and Technology, St. Gallen, Schweiz
Steering events at the biointerface
18.06.2025

Prof. Dr. Alexander Revzin
Mayo Clinic, Rochester, USA
Microsystems for maintenance and analysis of cell and explant cultures
19.06.2025

Prof. Dr. Apratim Chatterji
Indian Institute of Science Education and Research, Pune, Indien
Entropy induced organization and dynamics of topologically modified ring-polymers
23.06.2025

Hao Wu, Ph.D.
Harvard Medical School, Biological Chemistry and Molecular Pharmacology, Boston, USA
Supramolecular structures that drive innate immunity in inflammation and cancer
26.06.2025

Prof. Dr. Gadi Rothenberg
University of Amsterdam, Niederlande
Supramolecular structures that drive innate immunity in inflammation and cancer
02.07.2025

Prof. Dr. Benjamin Dietzek-Ivanšić
Leibniz-Institut für Oberflächenmodifizierung, Leipzig
Light-driven molecular reactivity from solution to interfaces
02.07.2025

Prof. Dr. Karl Mandel
Friedrich-Alexander-Universität Erlangen-Nürnberg
Supraparticles obtained via forced-assembly of nano and molecular building blocks as information providers to turn matter perceptual and communicative
16.07.2025

Prof. Dr. Andreas Walther
Johannes Gutenberg-Universität Mainz
Hydrogels with a pinch of embodied intelligence
26.08.2025

Prof. Dr. Celine Calvino
Albert-Ludwigs-Universität Freiburg
From stimuli-responsive systems to sustainable polymer materials
04.09.2025

Prof. Dr. Sandro Amico
Federal University of Rio Grande do Sul, Porto Alegre, Brasilien
Overview of the Composites group at the Federal University of Rio Grande do Sul focusing on pressure vessels (materials, processing and software)
17.09.2025

Prof. Dr. Johannes Brendel
Universität Bayreuth
Static or dynamic? The impact of exchange dynamics in polymer self-assembly
25.09.2025

Prof. Dr. Johan Verbeek
University of Auckland, Neuseeland
Using atmospheric plasma treatment for polymer modification during extrusion
29.09.2025

Prof. Dr. Sissi de Beer
University of Twente, Enschede, Niederlande
Towards an electronic nose using polymer brushes
27.10.2025

Dr.-Ing. Karl Alexander Kalina
Technische Universität Dresden
Constitutive modeling with physics-augmented neural networks
28.10.2025

KOLLOQUIEN LECTURES

Dr. Kostas Daoulas
Max-Planck-Institut für Polymerforschung, Mainz
Describing dynamical helical polymers with minimal Ising-like models
08.01.2025

David Stein
Technische Universität Dresden
Correlation clustering of organoid images
31.01.2025

Dr. Suman Pokhrel
Universität Bremen
Metal sulfide nanoparticle synthesis in the flame
06.02.2025

Dr. Magdalena Mair
Universität Bayreuth
Data-driven methods to the environmental risk assessment of microplastic particles
29.10.2025

Dr. Martin Trulsson
Universität Lund, Schweden
Understanding how dense suspensions flow and when they do not
30.10.2025

Prof. Dr. Kathrin Harre
Hochschule für Technik und Wirtschaft Dresden
Sustainable polymer aplications against the global plastic crisis
30.10.2025

Prof. Dr. Tian Qiu
Deutsche Krebsforschungszentrum, Dresden
Micro-/nanorobots for minimally-invasive surgery
05.11.2025

Prof. Dr. Benjamin Schumann
Technische Universität Dresden
Chemical precision tools to dissect protein glycosylation
06.11.2025

MESSEAUFTTRITTE
TRADE FAIR PRESENTATIONS

INTEC, Leipzig
11. – 14.03.2025

VERANSTALTUNGEN FÜR DIE ALLGEMEINE ÖFFENTLICHKEIT
EVENTS FOR THE GENERAL PUBLIC

Lange Nacht der Wissenschaften
20.06.2025
Rahmenprogramm mit 19 Stationen, Ausbildungsinfostand
ca. 800 Teilnehmer

Gastmahl: Dresden is(s)t bunt
01.09.2025
Kulinarische Beiträge, wissenschaftliches Experiment und „Meet a Scientist“

ZWICK Roadshow
22.05.2025
Showtruck auf dem Institutsgelände, Fachkolloquien

Banu Iyisan, Ph.D.
Institute of Biomedical Engineering, Bogazici University, Istanbul, Türkei
Tailoring versatile nanocarriers as multimodal therapeutics and diagnostic platforms
07.11.2025

Prof. Dr. Alexander Govorov
Ohio University, Athens, USA
Short stories from the world of optical materials: Hot-electron generation in nanocrystals, chiral photochemistry and more
27.11.2025

Prof. Dr. Pol Besenius
Johannes Gutenberg-Universität Mainz
Supramolecular design of synthetic vaccines and injectable biomaterials
01.12.2025

Prof. Dr. Eric Fujiwara
Campinas State University, Brasilien
Optical fiber specklegram sensors
03.12.2025

Dr. Rueben Pfukwa
Stellenbosch University, Südafrika
Poly(N-vinylpyrrolidone) based polymers in advanced polymer materials
16.12.2025

COSMO Wissenschaftsforum
02.10.2025-27.02.2026
Ausstellung mit zwei Exponaten: Prototyp einer weichen, aber zugleich kraftvollen Roboterhand und organische Materialien für medizinische Neuroimplantate (in Kooperation mit dem Else Kröner Fresenius Zentrum für Digitale Gesundheit)

Lehrtätigkeit Teaching

PROFESSUREN
PROFESSORSHIPS

Technische Universität Dresden

Bereich Mathematik und Naturwissenschaften, Fakultät Chemie und Lebensmittelchemie

- **Prof. Dr. Brigitte Voit**
Professur für Organische Chemie der Polymere
- **Prof. Dr. Andreas Fery**
Professur für Physikalische Chemie Polymerer Materialien
- **Prof. Dr. Carsten Werner**
Professur für Biofunktionelle Polymermaterialien

Bereich Mathematik und Naturwissenschaften, Fakultät Physik

- **Prof. Dr. Jens-Uwe Sommer**
Professur für Theorie der Polymere
- **Prof. Dr. Arash Nikoubashman**
Professur für Theorie biologisch inspirierter Polymere

Bereich Ingenieurwissenschaften, Fakultät Maschinenwesen

- **Prof. Dr.-Ing. Markus Stommel**
Professur für Polymerwerkstoffe
- **Prof. Dr.-Ing. Sven Wießner**
Professur für Elastomere Werkstoffe

ANDERE EINRICHTUNGEN OTHER INSTITUTIONS

Hochschule für Technik und Wirtschaft Dresden

Fakultät Design

- **Prof. Dr.-Ing. Axel Spickenheuer**
Honorarprofessur für Werkstoffe und Simulationstechnik

Otto-von-Guericke-Universität Magdeburg

Fakultät für Verfahrens- und Systemtechnik

- **Prof. Dr. Julian Thiele**
Leiter des Lehrstuhls für Organische Chemie

Stellenbosch University, Südafrika

Department of Chemistry and Polymer Science

- **Prof. Dr. Albena Lederer**
SASOL Chair in Analytical Polymer Science

Bereich Bau und Umwelt, Fakultät Bauingenieurwesen

- **Prof. Dr.-Ing. Christina Scheffler**
Professur für Polymere im Bauwesen

Medizinische Fakultät Carl Gustav Carus
Zentrum für Regenerative Therapien Dresden

- **Prof. Dr. Carsten Werner**
Professur für Biofunktionelle Polymermaterialien

Medizinische Fakultät Carl Gustav Carus
Else Kröner Fresenius Zentrum für Digitale Gesundheit

- **Prof. Dr. Ivan R. Minev**
Professur für Electronic Tissue Technologies

Monash University, Melbourne, Australien

Faculty of Engineering

- **Prof. Dr. Daniela Lössner**
Professor of Chemical and Biological Engineering

Technische Universität Hamburg

Institut für Angewandte Polymerphysik

- **Prof. Dr. Franziska Lissel**
Professor of Applied Polymer Physics

WEITERE LEHRAUFTRÄGE
FURTHER TEACHING ASSIGNMENTS

Technische Universität Dresden

Bereich Mathematik und Naturwissenschaften

- **PD Dr. Tobias A. F. König**
TUD Young Investigator an der Fakultät Chemie und Lebensmittel-
chemie sowie Privatdozentur für Physikalische Chemie
- **Dr. Elisha M. Krieg**
TUD Young Investigator an der Fakultät Chemie und
Lebensmittelchemie
- **Dr. Christian Roßner**
TUD Young Investigator an der Fakultät Chemie und
Lebensmittelchemie
- **PD Dr. Martin Müller**
Privatdozentur für Makromolekulare Chemie
- **Dr. Quinn A. Besford**
TUD Young Investigator an der Fakultät Chemie und
Lebensmittelchemie

Bereich Ingenieurwissenschaften

- **PD Dr. Marina Grenzer**
Privatdozentur für Rheologie komplexer Fluide
- **Dr.-Ing. Ines Kühnert**
Lehrauftrag an der Fakultät Maschinenwesen
- **Dr.-Ing. Anna Sambale**
Lehrauftrag an der Fakultät Maschinenwesen
- **Dr. Amit Das**
Lehrauftrag an der Fakultät Maschinenwesen

Bereich Ingenieurwissenschaften (fakultätsübergreifend)
Graduiertenkolleg 2430 „Interaktive Faser-Elastomer-Verbunde“

- **PD Dr. Marina Grenzer**
- **Prof. Dr.-Ing. Sven Wießner**

Graduiertenkolleg 2767 „Supracolloidal Structures“

- **Prof. Dr. Andreas Fery**
- **Prof. Dr. Brigitte Voit**
- **Prof. Dr. Franziska Lissel**
- **Dr. Hendrik Schlicke**

Graduiertenkolleg 2250 „Impaktsicherheit von Baukonstruktionen
durch mineralisch gebundene Komposite“

- **Prof. Dr.-Ing. Christina Scheffler**

Ringvorlesung FLiK-Modul Bionik (bereichsübergreifend)

- **Prof. Dr.-Ing. Axel Spickenheuer**
Limits of Bio-Inspired Design

Brandenburgische Technische Universität
Cottbus-Senftenberg

Fakultät Maschinenbau, Elektro- und Energiesysteme

- **Dr.-Ing. Ines Kühnert**
Lehraufträge „Verarbeitungsbedingte Materialstrukturen“ und
„Aufbau und Materialverhalten der Kunststoffe“

Luleå University of Technology, Schweden

- **Prof. Dr.-Ing. Christina Scheffler**
Gastvorlesung zu Verstärkungsfasern und Faser-Matrix-Grenzschichten

University of Chemistry and Technology Prague,
Tschechien

- **Dr. Christian Roßner**
Assistant Professor of Macromolecular Chemistry

Hochschule für Technik, Wirtschaft und Kultur Leipzig

- **Prof. Dr.-Ing. Axel Spickenheuer**
Gastvorlesung zu Leichtbautechnologien: TFP / Preforming /
Anwendungen

Stellenbosch University, Südafrika

Department of Chemistry and Polymer Science

- **Dr.-Ing. Ines Kühnert**
Gastvorlesungen zu Special Topics in Polymer Science