Resources, cooperation, networks

Methods and state-of-the-art equipment available in the fields of:

- Polymer synthesis
- Materials and surface modification
- Analytics
- Different types of microscopy
- Surface and nanostructure characterization
- Thermoplastics and elastomer processing
- Manufacturing and characterization of fibre reinforced composites
- Materials testing
- Modelling/simulation
- Bioengineering and characterization of bio-interface phenomena

Cooperation with industry
is possible in many different ways according to the specific needs of the respective enterprise. For example we offer cooperation within joint projects including public funding as well as contract research or licensing.

Students
may work at the institute within their PhD, diploma, master, or bachelor studies in the fields of chemistry, physics, and material science. In addition, they may participate in research projects as student researchers or trainees. The theses work is usually performed in close cooperation with the Technische Universität Dresden and the supervisor is one of the five professors jointly appointed at the university in chemistry, physics, or engineering.

Powerful networks
on regional, national, European or international scale are one of the fundamentals of the institute's successful work. The IPF is an active member of the local research network DRESDEN concept.

Funding and staff
Regular budget financed by federal and state governments
Staff: 457 (12/2015), including 230 scientists

Organizational structure of the Leibniz-Institut für Polymerforschung Dresden e. V.

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- Dept. Analytics

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- Group Matrix Engineering

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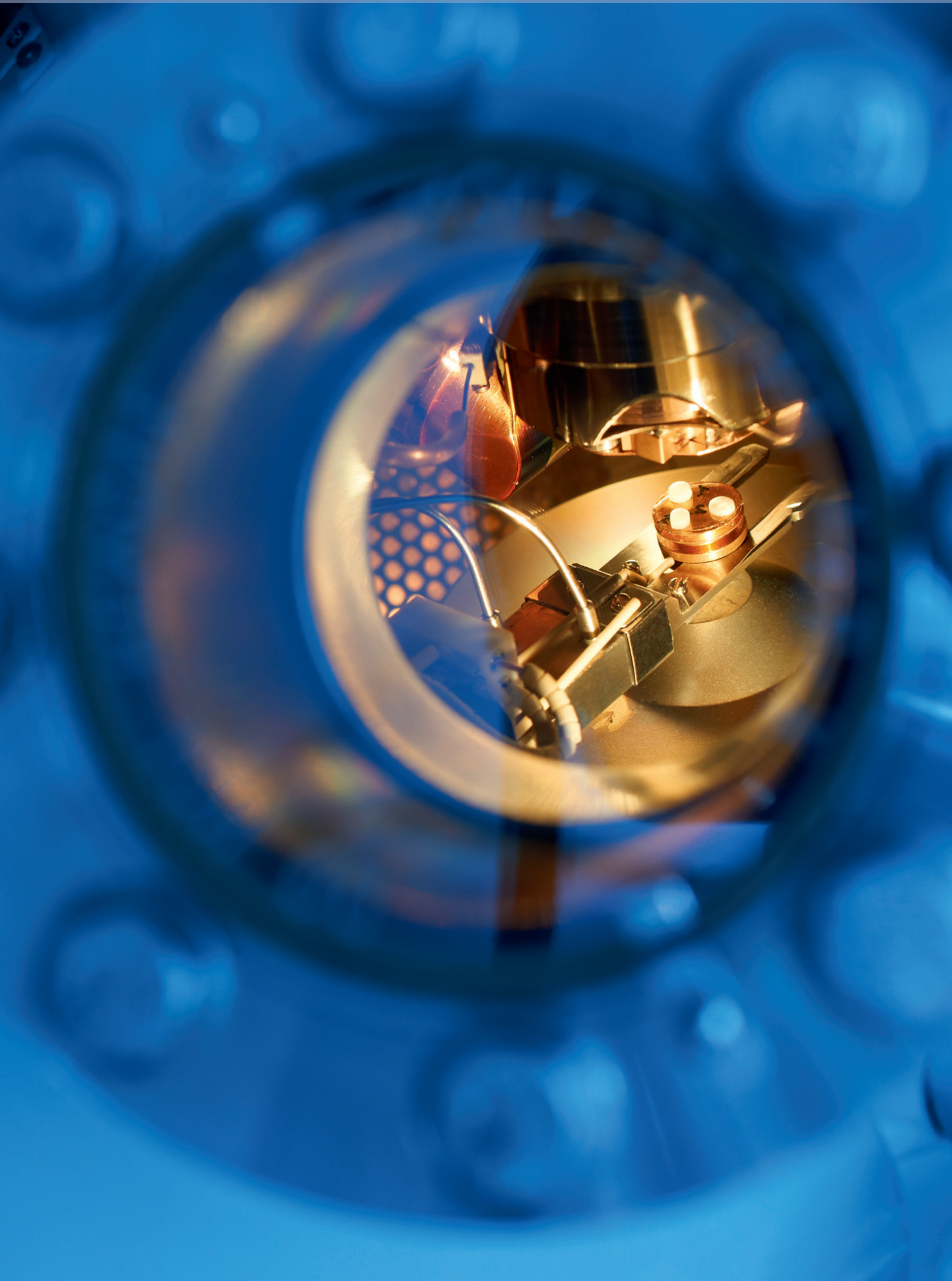
Leibniz-Institut für Polymerforschung Dresden e.V.

Polymer Research

Fascination. Innovation.



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Updated:
March 2016

Member of the Leibniz Association

POLYMER RESEARCH
Fascination. Innovation.

The Leibniz Institute of Polymer Research Dresden (IPF) is one of the largest polymer research institutions in Germany. As an institute of the Leibniz Association, the IPF is committed to carrying out application-oriented fundamental research and receives its basic funding in equal parts from the federal and state governments.

The approach is holistic, covering synthesis and modification of polymer materials, their characterization and theoretical investigation, up to processing and testing. A special feature of the institute's activities is the close cooperation of scientists and engineers, and a broad range of modern instrumentation and methods are available including pilot plants allowing material and technology development under industry-relevant conditions. The research focus is on materials problems and needs which can be approached by control of interface-determined properties as well as interactions at interfaces and surfaces.

A deep understanding of techniques and processes as well as of underlying physical aspects shall provide the basis to develop long-term concepts for technological implementation and applications of new polymeric materials.

The institute's profile is determined by four strategic topics that are addressed in close collaboration of all departments of the institute.

Functional nanostructured interfaces and polymer systems

Biology-inspired interface and material design

Polymer networks: Structure, theory, and application

Process-controlled structure formation in polymer materials

Functional nanostructured interfaces and polymer systems

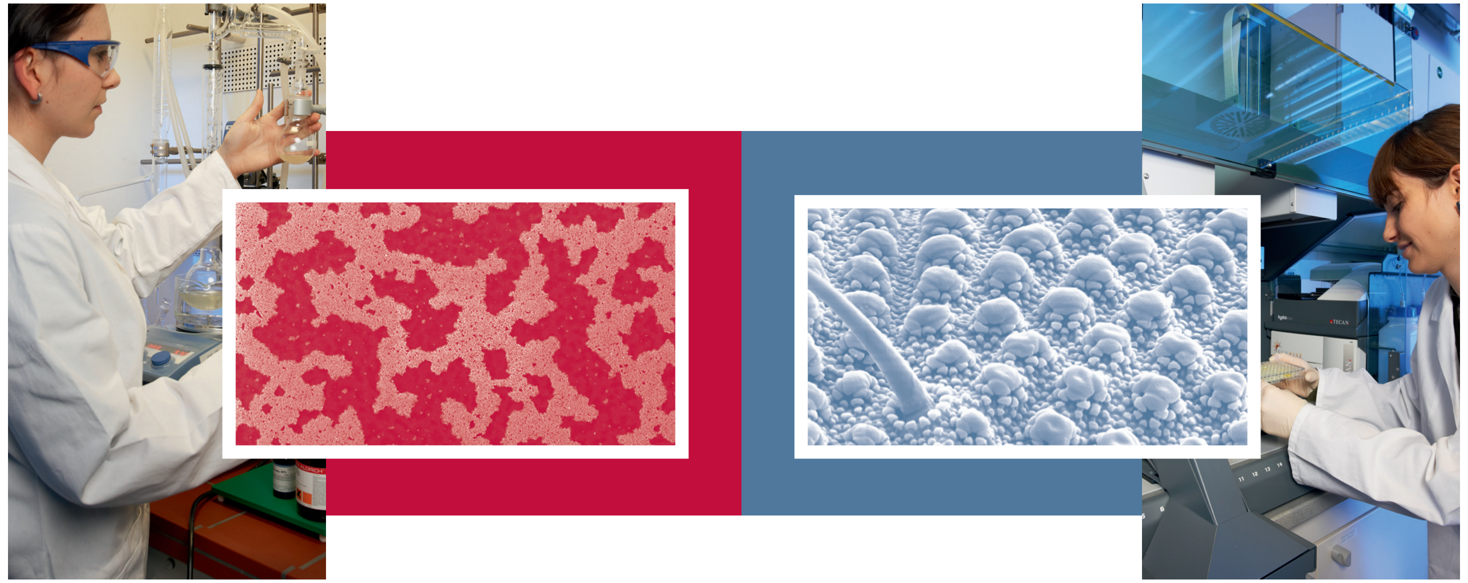
Materials with novel, well defined properties and adjusted functionalities are developed for highly integrated novel technologies in communication, transportation, medicine, microelectronics, microsystem engineering, power generation as well as storage and efficient use of energy. The materials innovations rely on design of architectures, functionalities, self-assembly, and nanostructuring of polymers by novel synthetic strategies as well as on control of physical interactions and interfacial properties. To enable the use of single macromolecules for nanoscale functional elements also techniques of manipulation, positioning, and integration of those nanoelements are developed. The required chemical and structural nanoscale analysis is performed by state-of-the-art characterization techniques.

The optimization of materials is based on an improved understanding of correlations between molecular structure, nanomorphology, interface functionality, and the macroscopic materials and end-user properties.

Biology-inspired interface and material design

The rapidly expanding knowledge in molecular life science is combined with the institute's competence in the fields of theory, synthesis, physical chemistry, interface design, and processing of polymers. Biology-inspired functional materials are developed that recapitulate and modulate features of living matter – such as recognition, responsiveness, self-healing capacity – in synthetic and biohybrid polymer materials.

These novel materials are applied in medicine and regenerative therapies as well as in non-medical technologies such as sensorics, surface technology, and environmental engineering.



Polymer networks: Structure, theory, and application

Crosslinked polymer systems are gaining increasing importance as functional materials, e. g. as smart materials for actuators, sensors, and microfluidics / microsystem technology, or as gels in biomedical applications. They are also indispensable as elastomer construction materials in energy-efficient light-weight construction and mobility technologies. To provide the basis for developping novel functional and construction materials from crosslinked polymers, research on polymer networks at the IPF is focussed on elaboration, experimental testing, and characterization of theoretical and analytical models that help to overcome deficits in understanding of correlations between molecular and supramolecular structure, topology, and properties in crosslinked polymer systems, in particular those formed in confined geometries (e. g. polymer films) or in self-assembled multicomponent polymer systems.

Process-controlled structure formation in polymer materials

A complex approach integrating aspects of materials science, natural sciences and process technology – from the molecule to the material in a complex component – serves to develop novel functional and multicomponent polymer materials for light-weight construction, mobility and energy technology, and environmental engineering. Often, structure formation processes during processing of polymer materials are utilized to optimize and tailor materials properties, which allows innovations easy to transfer into industrial practice. The approach is applied to reactive injection moulding of thermoplastics, reactive mixing of elastomers, electron-induced modification during processing, chemically initiated dispersion strategies for polymer nanocomposites, and structure formation, stabilization, and localization of nanofillers in multiphase polymer blends and polymer composites.

The activities include the characterization of structure and morphology, development of novel technologies in process engineering, novel materials concepts, and adapted physical models.