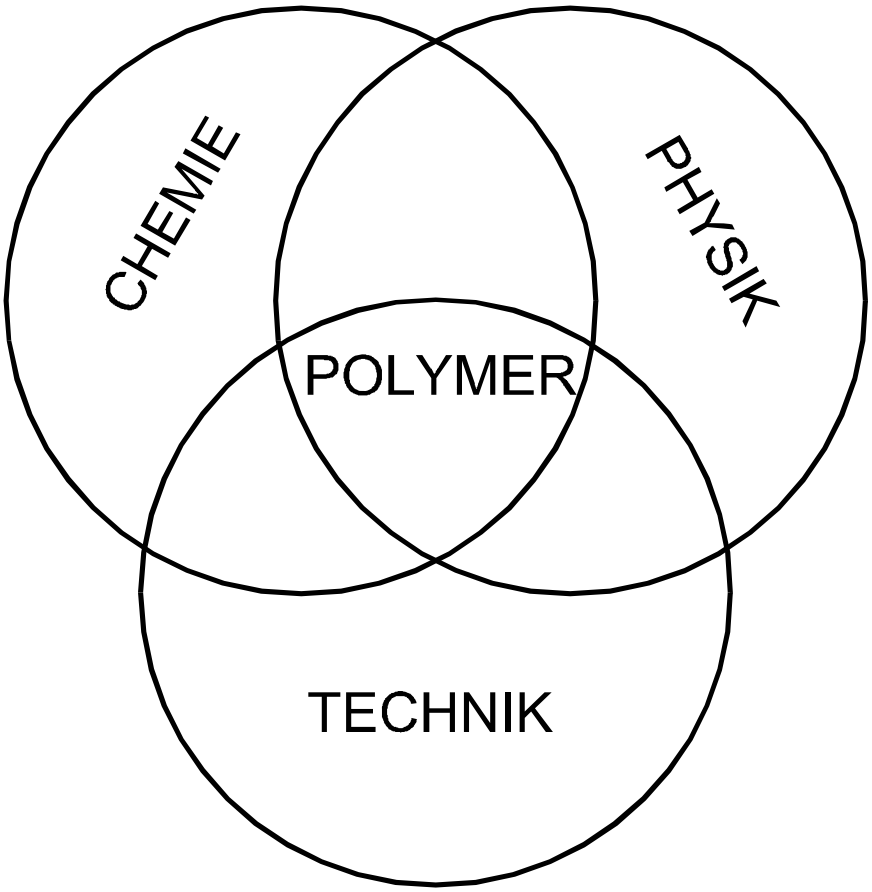
Berlin-Brandenburgischer Verband
für Polymerforschung e.V.



Annual Report

Bericht über die wissenschaftlichen Aktivitäten

2003

Content

Preface

The 17th Annual Report of the BVP comes in unchanged design, with the essential parts being in English. This shall facilitate its use by our foreign partners, as a source of information about the polymer research scenery in Berlin and its neighbourhood. In order to avoid confusion, the names of the participating institutions will be cited in their german version only.

This report can also be found at the home page of the BVP (see next page).

The principal purpose of the report is to reveal the scientific activities of the members and their graduate and undergraduate students. This is done, as every year, in a rather straigtforward and simple manner.

In August 22, 2003, the BVP mourned the decease of its corresponding member Prof. H. Klare.
The former regular member U. Scherf, who has moved to the university of Wuppertal, has agrred to become a corresponding member of BVP.

We hope this report may find your interest. It may also stimulate the desire to cooperate with the members.

M. Hennecke, BAM

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http://pmm08.physik.hu-berlin.de/bvp/bvphome.htm

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Research Interests of the Regular Members of BVP

Prof. Dr. Markus Antonietti

Max-Planck-Institut für Kolloid- und Grenzflächenforschung

The scientific work covers different aspects within the area of the synthesis, structure and characterisation of colloids and polymers. A rough division in four topics can be made:

Polyelectrolytes
Investigations of model systems: Static and dynamic light scattering, rheology; PE mixtures; alternative PE-architectures; Polyelectrolyte-surfactant complexes

Heterophase polymerization
Micro-, mini-, and (macro) emulsion polymerization, inverse precipitation polymerizations; complex surface functionalization of latexes; hierarchical structures from latexes, polymer dispersions as drug carriers and diagnostics

Amphiphilic polymers
surface stabilization, micellation, stabilization of metal and semiconductor colloids, new synthetic toutes amphiphilic block copolymers, doulbe hydrophilic blocks and crystallization control

Colloidal superstructures
Aggregation of different colloid types, structure analysis of colloidal superstructures by means of light scattering, X-ray diffraction and electron microscopy, hierarchical materials.

Prof. Dr.-Ing. Wolfgang Arlt

Technische Universität Berlin, Institut für Verfahrenstechnik
Thermodynamik und Thermische Verfahrenstechnik

Research Topics (with Dr. Ing. Irina Smirnova)

Separation of macromolecules from solutions
Dissolved macromolecules can be separated as liquids or solids by the change of temperature or pressure or by the addition of a third component. Depending on the conditions, the morphology of the crystal and/or the molar mass distribution can be influenced. An advantageous third component is a compressed gas, because it can be separated from the solution by a simple change of pressure. Processes based on this concept are studied experimentally and theoretically.

Production and use of silica aerogels
Silica aerogels are inorganic polymers whose structure is a three-dimensional network of silica and oxygen atoms. They have a lot of pores being filled with air. Their density is only a few times higher than that of air. Aerogels have remarkable properties like the insulation of sound or heat. We investigated the rapid production of silica aerogels and the use as a carrier for pharmaceuticals and fragrances. The research is supported by the German National Science Foundation (DFG).

As a carrier for pharmaceuticals, aerogels allow for fastest release even compared with nano-crystalline material. The network is immediately destroyed when contacting hydrophilic aerogels to liquids. So the aerogels are loaded by the aid of supercritical gases.

Removal of high volatile organic compounds (VOC) from polymer latices
An important topic in the production of latices is the removal of VOC's, e.g. of monomers or solvents. In a European research project we investigated the thermodynamic principles for a removal of VOC's from latices from emulsion polymerization. We investigated the distribution coefficient of several compounds between the polymer and the aqueous phase. A modified thermodynamic model was able to represent the data.

Modeling of polymer systems
One of the tasks of thermodynamics is e.g. the modeling of the mutual solubility of compounds by an equation of state. While many models are available for mixtures of compounds with a low molecular mass, models for macromolecules are rare. We developed in-house the so-called PC-SAFT equation of state which takes into account the chain structure of macromolecules. This model is able to describe the thermodynamical properties of low and high molecular mass systems. We applied this model to data of polymers and gases. Future investigations relate to the extension of the model to ionic macromolecules.

Separation scheme for mixed polymers

The Packaging Ordinance is the legal basis for the work of the private company DSD (Duales System Deutschland) in the field of collecting mixed used polymers and their reuse. Mixed polymers are of no commercial value. The research concentrated on packing material what mainly consists of poly-olefins.
We found a separation scheme to separate high density poly-ethylene (HDPE), low density poly-ethylene (LDPE) and poly-propylene (PP) on the basis of thermodynamics of polymers. The purities of the products are sufficient for the direct reuse. The scheme was patented and piloted in the 1000 kg scale.

Application of dendrimers and hyperbranched polymers in chemical engineering

Structured polymers can be tailor-made by chemists. Dendrimers are very expensive because of their costly production. An alternative are hyperbranched polymers (hyPol) being available at prices around 10-15 €/kg. We found, that certain hyperbranched polymers break the aceotrope of aqueous systems like ethanol-water or tetrahydrofuran-water. Because of their very very low fugacity, hyPol do not spoil the top product of distillation columns.

Further research is dedicated to use hyPol as carriers for pharmaceuticals.

Prof. Dr. Ludwig Brehmer

Universität Potsdam, Institut für Physik
Condensed Matter Physics

The main topic of our research is the **"Solid State Physics of Functional Nano-Structured Organic Layers, Interfaces and supramolecular structures"** with the main parts:

- Molecular structuralised and functionalised supramolecular architectures
- Design and molecular modelling of supramolecular structures and materials
- Fabrication and characterisation of ultra thin layers on molecular level
- Construction, processes and interaction of supramolecular structures
- Electrical properties: charge transport, dc and ac measurements, dipole relaxations (impedance spectroscopy)
- Optical and NLO properties: UV-Vis and IR spectroscopy, ellipsometry, optical constants, SHG
- Separation processes (membranes)
- Theory of charge transport in disordered structures
- Application of specific interactions for microsensorics (pyroelectricity, resistive humidity measurements, optical detection of metal ions)
- Nano-optics
- Nano-particle at organic surface
- Nano-photo.science
- Molecular electronics (molecular switches, rectifier, interfaces)

Equipment for research and development:

- Fabrication of ordered film architectures:
  - Organic molecular beam deposition system (OMBD): with LEED, RHEED, MS, Auger spectroscopy-UHV-STM
  - Langmuir-Blodgett laboratory (clean room): BAM, Kelvin technique, alternating LB-technology
  - spin-coated device with Kern 1 and Kern 2 cleaning system and hot plate, self-assembling method
  - molecular modelling
  - film dipping system
- Structure characterization of ordered films:
  - X-ray diffractometry, UV-VIS and IR spectroscopy, microscopy (polarization, fluorescence), ellipsometry
  - interface rheology, ADSA technique

- Preparation of substrates and metalization:
  - evaporation and sputter devices, bonding machine, scribing machine, electron beam exposure

- Nano-lab (IGL Nano-optics):
  - AFM-atomic force microscope TMX2000 (Topometrix)
  - AFM/STM-atomic force microscope AUTOPROBE CP (Park Scientific)
  - AFM/STM-atomic force microscope UNIVERSAL (Park Scientific)
  - conducting-probe atomic force microscope CSM
  - SNOM: scanning nearfield optical Microscopy and AFM
  - SNEM: Scanning Nearfield Ellipsometrie Microscopy

- Electrical properties:
  - ac, dc, TSC, TSDC, pyroelectrical measuring station, impedance spectroscopy, CVC, Kelvin technique)

- Optical properties:
  - ellipsometry, grid coupler (wave guiding), plasmon microscopy, electroluminescence, NLO-ps stations, m-line station, thermoluminescence

- Thermal analysis:
  - Differential Scanning Calorimeter (DSC)
  - Thermal Gravimetrie Analyser (TGA)

- Utilization of large systems (DESY II, HASYLAB)
  - NEXAFS, synchrotron radiation, UPS

- Sensor laboratory:
  - gas mixing technique
  - humidity chamber

Selected main research topics

- Nano-photo science: optically induced switching processes (NLO, cascading)
- OLED: polarization, nanostructuring
- OFET: Organic Field Effect Transistors
- electro-optical effects
- charge transport in unordered systems (MC simulation, stochastic transport)
- membranes: modular ultrathin separation phases
- microsensorics (humidity, IR)
- molecular electronics (switching, interface)
- NLO-effects and waveguiding

Dr. Ulrich Buller

Fraunhofer-Institut für Angewandte Polymerforschung

The research and development of the Fraunhofer-Institute for Applied Polymer Research is divided into five research divisions:

Research division 1 »Natural polymers«
(see research areas Dr. Hans-Peter Fink)

Research division 2 »Functional Polymer Systems«
(Dr. Ulrich Buller)

The research division »Functional Polymer Systems« works in the following fields:

Physically active polymers
The department deals with the preparation, characterization and application of functional polymer systems. We improve sensor and transducer properties in new polymer electrets to detect pressure distribution, vibrations and radiation. New dye doped polymer systems can be used as spectral converters, in laser technology, as fluorescence sensors and as light – activated biocidal coatings.

Organic light-emitting diodes and displays, organic field effect transistors
The development of low-content displays with polymer materials is carried out in this group. The group offers a complete range of research and development services from synthesis of new polymer materials to the construction of prototype devices combining a state-of-the-art equipment and a comprehensive know-how. This is a strategy to identify ways from the research to an industrial application. An additional field is the construction of organic field effect transistors with new materials for a polymer electronic.

Modification and Characterization of Surfaces
The group „Surfaces“ modifies chemical and physical properties of polymer surfaces, prepares thin organic functional layers and analyzes the surfaces and thin layers. Various plasma processes and VUV photochemical processes as well as gas phase and liquid phase reactions of the surfaces are used for surface modification on equipment ranging from the laboratory scale up to the pilot scale.

Anisotropic Optical Materials
Research topic of the group is the development of new anisotropic self-organizing materials with complex optical functions. The research covers the synthesis and investigation of various thermotropic calamitic and discotic liquid crystals and lyotropic mesogens. Main applications are anisotropic light modulating optical components for display and information technology.

Photochemistry in Polymers
The basic and applied research in photochemistry and optics is aimed to contribute to the development of optical technologies based on polymers. The research is focused on the development of photosensitive materials, their photochemical processing and the creation of optical elements. Topics are photochemistry in polymers and supramolecular assemblies, especially photochemistry and spectroscopy with polarized light, and holography.

The research on molecular photoreactions, light-induced orientation and diffusion processes in polymers create a reliable basis for the photochemical manipulation of polymers, polymer surfaces and supramolecular systems. Different effects starting from molecular ordering to microstructuring volume films and surfaces of polymer film were realized by means of photochemistry and holography. The developed technologies based on the studied materials and processes have applications in optical data storage, photoalignment of liquid crystals, fabrication of anisotropic films of functional materials, the creation of various optical elements, such as polarizer, retarder, filter, diffuser, diffraction grating, or photonic crystals.

Chromogenic polymers
The department chromogenic polymers develops novel polymeric systems whose optical properties are controllable by external stimuli like temperature, electric field, pressure and light. Hereby, transparency and/or color of foils, plastics, gels and liquid crystalls can be adjusted according to the requirements of specific applications

Research division 3 “Synthesis and Polymer Technology”
(see research areas Dr. Gerald Rafler)

Research division 4 “Water-born Polymer Systems”
(see research areas Dr. Werner Jaeger, Professor André Laschewsky)

Research Division 5 „Pilot-Plant Center for Polymer Synthesis and Polymer Processing in Schkopau “
(responsible Dr. Mathias Hahn)

Prof. Dr. Gerhard H. Findenegg

Technische Universität Berlin, Institut für Chemie
Physical Chemistry of Colloids and Interfaces

We are studying the structure, dynamics and selected properties of *complex liquids* (aqueous and nonaqueous systems of amphiphilic block copolymers, surfactants and polyelectrolytes) in bulk, in thin films, and at interfaces. We are also interested in the role of surfactants and block copolymers as structure-directing agents to produce mesoscopically ordered inorganic-organic composites, and in the structure and phase behavior of pure substances and mixtures in nanopores.

Surfactant and polymer systems

- The structure and dynamics of micellar aggregates of block copolymers and surfactants in solution, and of lyotropic phases of these amphiphiles, is studied by scattering techniques (SLS, DLS, SAXS, SANS, and NSE spectroscopy). The results are correlated with the macroscopic properties of these systems (with T. Hellweg).
- Adsorption layers and surface aggregates of amphiphilic molecules adsorbed from aqueous solutions at the free surface and at solid/liquid interfaces are investigated by X-ray and neutron reflectometry (XR and NR), and grazing-incidence small-angle scattering (GISANS). The interface of water against hydrophobic polymer surfaces and the formation of nanobubbles at such interfaces is studied by NR, GISANS and atomic force microscopy (AFM) (with R. Steitz).
- The structure of polyelectrolyte multilayers and the effect of polyelectrolytes on thin soap films is studied by a combination of different techniques (R. v.Klitzing).

Confinement effects in nanopores

Mesoporous silica materials with hexagonally ordered arrays of cylindrical pores of uniform size (MCM-41 and SBA-15) are synthesized by sol-gel processes, using surfactants and block copolymers as templates, and the pore walls can be chemically functionalized. These materials are used to study confinement effects on the phase behavior and the mesoscopic structure of pure substances and binary mixtures:

- Freezing and melting of water and organic substances (DSC); pore condensation of vapors (gravimetric and volumetric adsorption studies in a wide temperature and pressure range).
- Adsorption and surface aggregation of surfactants (adsorption calorimetry).
- Microphase separation of liquid mixtures in porous solids (SANS, NSE).

Further information: http://www.tu-berlin.de/~insi/ag_findenegg/

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Dr. habil. Hans-Peter Fink

Fraunhofer-Institut für Angewandte Polymerforschung
Natural Polymer Division

The research work of the division is centred on cellulose and starch as the most abundant natural polymers. Investigations are performed in a wide range covering the extraction of the raw materials, characterization and modifications, the industrial conversion, as well as the development of new processing routes and products. R&D projects are dealing with environmentally friendly routes for man-made cellulosic fibres and films, specialty chemicals based on cellulose and starch, the development of cellulose fibre reinforced composites, as well as non-food starch products. As a highlight-example, based on the lyocell-technology, a pollution free processing route for cellulose blown films similar to polyolefin films has been developed recently. Applied research is complemented by basic investigations with regard to the structure formation of bacterial cellulose, the regioselective derivatization of polysaccharides, and the structure of these biopolymers in solution, among others. These investigations as well as solid state structure and property relationships are helpful in finding out capabilities and limitations of the natural polymers.

There are several laboratories and large scale equipments for chemical modifications, a wet spinning laboratory for viscose and cellulose carbamate, a mini pilot plant for the processing of cellulose according to the lyocell technology, extruders, an accredited materials testing lab, several analytical methods including rheology and thermoanalysis, as well as comprehensive methods for solid state characterization (electron microscopy, X-ray scattering, NMR- spectroscopy, among others).

The range of current R&D work with regard to cellulose only may be demonstrated by the following projects:

- new cellulose derivatives
- microcarriers
- hemicelluloses
- bacterial cellulose
- natural fibre reinforced materials
- new commodity materials
- food casing processing routes
- cellulose carbamate fibre technology
- structure-property relationships of fibres, films, and composites

More detailed information regarding the Natural Polymer Division are available at the home page

http://www.iap.fraunhofer.de

Prof. Dr. habil. Jörg Florian Friedrich

Bundesanstalt für Materialforschung und -prüfung
Division VI.3: Analysis and Structure of Polymers

The following topics are investigated in a great number of internally and externally funded projects:

Certification and validation of polymers

- Emission of low-molecular weight substances from plastics and migration of additives in polymers (TOC, Headspace-GC, GC-MS, HPLC-MS, MS^n, Ion-trap MS, SPME technique etc.)
- Certification and testing of plastics in contact to foods and drinking water as well as investigations of damages in polymers and composites
- Aging / photodegradation of HALS stabilized polymers; migration of HALS

Macromolecular analysis; reference materials

- Characterization of polymers, especially evaluation and certification of polymer standards by application and development of reference methods (viscometry, osmometry, light scattering, SEC, high-temperature SEC, HPLC, SFC, IR- and UV-MALDI-TOF MS, Asymmetric and Thermal Field Flow Fractionation, NMR, FTIR)
- Chromatographic and spectroscopic characterization of copolymers (liquid adsorption chromatography under critical conditions-LACCC, 2D-HPLC)

Polymer surfaces; plasma technique, adhesion

- Analysis of polymer surfaces and thin polymer films (XPS, SFM/SPM, SEIRA, IRRAS, ATR, DRIFT, FTIR microscopy); orientation of macromolecules at surfaces (NEXAFS, GIR); preparation of monomolecular model films (Langmuir-Blodgett and Self-Assembling techniques)
- Functionalization of polymer surfaces by plasma treatment; deposition of thin homo and copolymer layers bearing functional groups of different type and density; syntheses and grafting at polymer surfaces; hydrophobic-hydrophilic 2D structures; wrapping of nanoparticles with functional groups and thin polymer layers
- Diagnostics of plasmas by self-excited electron resonance plasma spectroscopy in polymer-depositing plasmas; optical emission spectroscopy; probe and ion MS; hyphenating of plasma treatment and XPS surface analysis
- Characterization of interfaces; interfacial reactions in polymer composites; nanocomposites and metal-doped polymer layers; adhesion phenomena

Characterization of polymer solids

- Preparation of carbon nanotubes, nanofibres and carbon nitride powders using plasma and CVD methods; hydrogen storage capability of nanofibres/nanotubes; electrically conducting composites
- Characterization of polymer solids and thin polymer films by dielectric relaxation spectroscopy and dynamic mechanical analysis
- Molecular modeling of polymer structures (LC; copolymers; interface/interphase in blends)
- Permeation of polymers; modeling of permeation; formation of barrier layers (fluorination and oxyfluorination by gas-phase or plasmachemical treatments)

Prof. Dr. Reimund Gerhard-Multhaupt

Universität Potsdam, Institut für Physik
Chair of Applied Condensed-Matter Physics

Main research area:

Quasi-permanent charge storage and dipole orientation in homogeneous and heterogeneous polymer electrets mainly for transducer applications:

- Preparation of uniform, voided, or oriented films of highly insulating polar or non-polar polymers by means of spin coating, solution casting, hot pressing, high-temperature stretching, sandwich fusing, etc. plus vacuum deposition of metal electrodes if required
- Global or patterned electric charging or poling of dielectric polymer films by means of biased electrodes, corona or plasma discharges, electron beams, etc. at various temperatures
- Thermal (pyroelectrical) and acoustical (piezoelectrical) probing of electric field, charge or polarisation profiles in the thickness direction of thin electret films, surface-potential and pyroelectrical probing in the film plane
- Dielectric spectroscopy over large temperature and frequency ranges including piezoelectric resonance measurements as well as thermally stimulated or isothermal discharge or depolarisation experiments
- Investigation of dipole orientation, ferroelectricity (switching, hysteresis, etc.), quasi-static and dynamic pyroelectricity, direct and inverse piezoelectricity in polymer-electret films
- Investigation of charge storage and transport and their molecular mechanisms in dielectric polymers, in particular at high electric fields, by means of electrical and optical methods
- Demonstration and assessment of applications-relevant electro-mechanical, mechano-electrical, and thermo-electrical transducer properties of novel or modified polymer electrets

Other research topics:

Nonlinear optical properties of electrically poled polymers including electro-optical effects and optical second-harmonic generation

Viscoelastic spatial light modulators without or with reflective metal electrodes for applications in optical information processing and light-valve projection of high-resolution images

Physics of musical instruments, in particular materials- and geometry-related vibration behaviour of historic and modern organ pipes

Homepage: http://canopus.physik.uni-potsdam.de/

Prof. Dr. Andreas Hampe

Bundesanstalt für Materialforschung und –prüfung
Department VI “Function of Polymers”

Field of research: Mechanical properties of composite materials

The department consists of the divisions

VI.1 "Durability of Polymeric Materials"
VI.2 "Mechanics of Polymers and Composites"
VI.3 "Analysis and Structure of Polymers"

The divisions VI.1 and VI.3 are headed by Prof. W. Mielke and Prof. J. Friedrich, both also members of the BVP. The research activities of these divisions are described on their pages of this booklet.

In the division VI.2, which is headed by Dr. Ch. Marotzke, the mechanical properties of Polymers and composite materials are investigated with a special focus on the micro mechanics. The aim of the research is a better understanding of the behaviour of composite materials under mechanical loads and the identification of the dominating failure mechanism. For the detection of micro damages sound emission measurements and measurements of inner surfaces using a X-ray refraction technique are performed.

Further details on the projects and the research equipment can be found in the internet:

http://www.bam.de

Prof. Dr. Manfred Hennecke

Bundesanstalt für Materialforschung und -prüfung (BAM)
President of BAM

In the Federal Institute for Materials Research and Testing (guideline: safety and reliability in chemical and materials technologies), projects in polymer science are mainly carried out in the department VI “Function of Polymers” (see reports of A. Hampe, W. Mielke, and J. Friedrich).

In special areas, applied research and testing in polymer science and technology is done by other departments of BAM, e.g.: polymers in the building trade (M. Maultsch, BAM VII.0), microbiological degradation of polymers (M. Pantke, BAM IV.1), analysis of polymer surfaces (W. Unger, BAM VIII.23), non-destructive testing of polymers and compound materials (M. Hentschel, BAM VIII.32), use of polymers for the packaging of dangerous goods (BAM III.1, III.2), polymers in the technology of landfills (W. Müller, BAM IV.3), polymer optical fibres (W. Daum, BAM S.1).

For further information please visit the Web site of BAM:

http://www.bam.de

In cooperation with the department “Function of Polymers” of BAM, M. Hennecke is personally engaged in the development and application of luminescence technics for the characterisation of polymers, e.g.with respect to molecular orientation, photo-oxidation, degradation and crosslinking.

Prof. Dr. Siegfried Hess

Technische Universität Berlin
Theoretical Physics

This group, which is part of the Institute of Theoretical Physics at the TUB, treats problems in statistical physics in order to explain physical phenomena of the various kind. The work focuses on the calculation of equilibrium and nonequilibrium properties of liquid and solid materials. Simple and complex substances are considered, such as liquid crystals, colloidal solutions, dilute polymer solutions and polymer melts. Apart from conventional approaches of theoretical physics also numerical methods, such as molecular dynamics (MD), nonequilibrium molecular dynamics (NEMD), smooth particle dynamics Monte Carlo computer simulation are employed. The goal is to determine macroscopic properties based on microscopic models.

The theoretical investigations on polymeric materials in the dilute, molten and glassy states are centered around the analysis of the interrelation between rheological properties on the one hand, and structural and conformational changes of macromolecules on the other hand. The simulations also provide data which can be directly compared with experimental input obtained from flow birefringence, light and neutron scattering measurements.

Website for further information:

http://wwwitp.physik.tu-berlin.de/hess/

Prof. Dr. Georg Hinrichsen
(currently on special leave of absence)

Technische Universität Berlin
Fachgebiet Polymerphysik

The research activities of the Fachgebiet Polymerphysik are concerned with the description and characterization of polymeric materials using various physical methods of investigation. Main object is the understanding of the interrelations between macroscopic (physical and technical) properties and the morphological (microscopic and sub-microscopic) structure of these materials.

The research projects can be summarized in the four complexes of themes:

Oriented semi-crystalline Polymers (Dr. H. Springer)

Observation of structure and orientation distribution of uniaxially or biaxially stretched polyamide, polyethylene terephthalate and LLD-polyethylene films by WAXS, SAXS, light scattering, DSC; thermal-mechanical analysis, IR-spectroscopy, polarized fluorescence spectroscopy, dielectric relaxation spectroscopy and optical birefringence.

Fibre-reinforced polymeric composites

Production and characterization of fibre-reinforced polymers with unique properties: Carbon fibre/carbon composites; aramid fibre/polyamide composites; natural fibre reinforced polymers; biocomposites.

Development of production technologies of fibre reinforced composites: Aqueous dispersion impregnation process; dry powder impregnation process.

Polymeric nanofilms

Design of a laboratory equipment and process for the continuous production of polymeric nanofilms with 20-100 nm thickness. Characterization of the produced films and check on their applicability in membrane and sensor technology.

High-temperature superconducting films (Dr. I. von Lampe)

Production and characterization of HTSC films and coatings using polymer metal precursors (polymethylmethacrylate, polyacrylic acid, novolac).

Internet information

http://tu-berlin.de/fb6/polymerphysik

Dr. habil. Werner Jaeger

Fraunhofer-Institut für Angewandte Polymerforschung Golm
Forschungsbereich „Wasserbasierende Polymersysteme“
Department “Water Born Polymers”

Synthesis and characterization as well as selected application of completely or in part water soluble polyelectrolytes, hydrophilic gels and polymer colloids.

Water Soluble Polymers

- Synthesis: block, graft, comblike and alternating copolymers variing electro-chemical and molecular parameters; polymeric surfactants; reversible and irre-versible gels.

- New technologies for the preparation of water soluble polymers: dispersion polymerization in aqueous systems, graft copolymerization in inverse emulsion, controlled radical polymerization.

- Selected application: processing aid for seperation processes.

Polymer Colloids

- Synthesis: emulsion and dispersion polymerization in aqueous and inverse systems

- Products: Tailor-made dispersions concerning particle size and particle size distribution, particle morphology, functionality and reactivity

- Characterization: Size and density of particles, particle electrophoresis, charge titration rheology of concentrated dispersions.

Prof. Dr. J. Koetz

Universität Potsdam, Institut für Chemie
Colloid Chemistry

Synthesis and characterization of well-defined polyelectrolytes
Different types of polyelectrolytes were synthesized and characterized by means of dynamic and static light scattering as well as different potentiometric titration techniques.

Interactions between colloidal particles and polyelectrolytes
The adsorption of polyelectrolytes on the surface of colloidal particles (kaolin, barium sulfate, sludge) is investigated by using different methods of charge determination (electrophoretic light scattering, streaming potential, acoustophoresis). The mechanism of the interaction and multiple reloading of colloidal particles in presence of polyelectrolytes are discussed.

Polyelectrolyte complex formation
The complex formation behavior of oppositely charged polyelectrolytes is investigated at different polymer concentrations. In diluted systems the research is focused on the complex formation mechanism by using static and dynamic light scattering techniques. The cooperative nature of complex formation in mixed polyelectrolyte-surfactant systems has been investigated by using a potentiometric technique based on a surfactant selective electrode. Concentrated polyanion-polycation systems are characterized by means of polarising microscopy, DSC-measurements, and wide angle X-ray scattering. In addition, protein-polysaccharide complexes are characterized by electron microscopy.

Mesoscopic organized colloidal systems
The structure formation in liquid crystalline lamellar systems, consisting of water/long chain alcohol/surfactant, is investigated in absence and presence of polyelectrolytes. Phenomena of self-organization in amphiphilic mesophases are used to modify the bilayer structures by incorporation of polyelectrolytes. SANS measurements show a temperature induced transition from a compact to a more swollen liquid crystalline phase in such polymer-modified systems.

To what extent polymers favour or restrain the formation of microemulsions is revealed by the phase diagrams in multi-component systems. The influence of polymers on the phase behavior is studied by means of electric conductivity, rheology, NMR relaxation and self-diffusion experiments, polarising microscopy, micro-DSC, and electron microscopy. The incorporation of polyelectrolytes can induce the extension of the isotropic liquid crystalline phase as well as transitions to lamellar liquid crystalline phases. Such polyelectrolyte-modified microemulsions can be used as template phases for a controlled nanoparticle formation.

Prof. Dr. Gerhard Koßmehl
(retired)

The scientific projects at Freie Universität Berlin are mostly finished. Results not yet published are under work and will be completed for publication.

Aim of research have been and are:

new synthetic routes to macromolecular organic materials in order to create new or modified polymers , that are characterized in relation to their chemical structures and tested for interesting properties in science and technique.

Topics of research:

- Electrical conductive materials
- Liquid crystalline polymers
- Hydrogels and other polymers for application in ophthalmic medicine
- Modification of polymer surfaces
- Reactive polymers - Reactions on and with polymers
- Sensors on the basis of enzyme electrodes
- Polymers in agriculture.

Within the scope of WiTeBü Berlin are offered chemical and technical chemical consultations and examinations as well as popular-scientific presentations (lectures, seminars and arrangements) for the information of non chemists in general chemical problems in everyday life. Topics are: fundamental biochemistry, organic and macromolecular chemistry, material sciences and environmental problems.

Prof. Dr. André Laschewsky

Fraunhofer-Institut fürAngewandte Polymerforschung und
Universität Potsdam, Institut für Chemie
Chair for Applied Polymer Chemistry

The research interests focus on the design, the synthesis and the characterization of novel functional monomers and polymers. Particular attention is paid to polymers in aqueous media, the self-organization of polymers therein and at interfaces, and the functionalization of the assemblies formed. The understanding of the correlation between molecular architecture, supramolecular structure and macroscopic properties of polymers is aimed at.

Recent activities comprise:

New monomers which are suited for polymerization reactions in aqueous media

New polymerization reactions that are suited for aqueous media

New methods of "controlled free radical polymerization"

Amphiphilic monomers and polymers:
polymeric monolayers and multilayers, polymeric lyotropic liquid crystals, micellar polymers, polymeric surfactants, polymeric model membranes)

Novel emulsifiers for emulsion polymerization

Hydrogels

Polymer surfaces

(Ultra)Thin polymer coatings

Ion containing polymers
(polyelectrolytes, polyelectrolyte complexes, polyzwitterions, ionomers, blends of polymers and inorganic compounds (hybrid materials))

Stimuli-responsive polymers

Polymers for non-linear optics

Prof. Dr.-Ing. Werner Mielke

Federal Institute for Materials Research and Testing
Division VI.1 “Durability of Polymeric Materials”

The division is part of the department VI “Performance of Polymeric Materials”
Its tasks are

- Investigation of the resistance of engineering and functional polymers to chemical, thermal and photochemical attack
- Development of methods for the acceleration of ageing tests and of methods for the early detection of ageing phenomena in polymers
- Development of reference methods, establishment of rules and specifications for ageing tests
- Investigation of damages caused by deterioration of engineering plastics by ageing
- Development, production and certification of elastomeric reference materials

Current projects

- Resistance of geo-polymers against hydrolytic and oxidative attack
- Chemical resistance of polymers used as packaging materials for the transport of dangerous goods
- Thermal analysis of polymers
- Combustion behaviour of polymers
- Thermoluminescence of polymers
- Photochemical ageing of polymeric materials
- Cure-monitoring of thermosets and rubber
- Synthesis and modification of nano particles by CCVD-Process and plasma chemical synthesis

Further projects and a summary of methods and technical equipment can be found at

http://www.bam.de/english/expertise/areas_of_expertise/department_6/division_61/division_61.htm

Further activities:

Secretary of the German Society of Rheology (“Deutsche Rheologische Gesellschaft (DRG) e. V.”)

http://www.drg.bam.de

Prof. Dr. Helmuth Möhwald

Max-Planck-Institut für Kolloid- und Grenzflächenforschung
Department of Interfaces

The work of the Möhwald group with polymeric systems has concentrated on polyelectrolytes at interfaces and in ultrathin films. The following research highlights have been achieved:

- Stiff polyelectrolytes adsorb at ionic and zwitterionic amphiphilic monolayers at the air/water interface and there form ordered nematic arrays. The distance between the polymer strands may be varied by compression of the surfactant layer.

- Dyes like pyrene may be incorporated into monolayers in sufficient concentration to enable electron transfer. The latter occurs over chromophore distances as high as 3 nm and may be enhanced by constructing films with polarity gradients.

- Hollow polyelectrolyte capsules present microcavities with semipermeable walls to perform chemical and biochemical reactions. Permeation may be controlled by chemical composition, pH, ionic strength and light. Thus chemical and physical processes may be studied like enzymatic and other catalystic synthesis, mineralization and filling.

- The mechanical properties of hollow capsules may be varied in a broad range and quantified by force spectroscopy with single capsules.

- Composites of polyelectrolytes and polyoxometallates are suited to build up structured films. They exhibit electrochromic properties, that can be used in devices because of their high stability.

Prof. Dr. Dieter Neher

Universität Potsdam, Institut für Physik
Physik Weicher Materie

Research Subjects

Electroluminescence Devices
Light-emitting diodes with linearly-polarized emission, polyfluorene-based LEDs, electrophosphorescence

Electrooptical Devices based on Aligned Polymer Layers
polarization-sensitive photodiodes, alignment of polymer liquid-crystals by ultrathin photoaddressable polymers.

Polymer composite devices
polymer based solar cells, polymer blend emission layers, polymer nanoparticles.

Photorefractive Polymers
Photoconductivity and charge carrier generation in organic photorefractive composites, modeling of response time, determination of trap densities.

Electromechanics
Measurement of the mechanical properties of ultrathin layers as a function of temperature and frequency, photoinduced softening, grafted polymer layers, ferroelectric polymers.

Fluorescence- and Ramanspectroscopy
Orientation of liquid-crystals, polarized emission spectroscopy, determination of order parameters

Prof. Dr. Dieter Paul
(retired June 1st, 2002)

GKSS-Forschungszentrum Geesthacht GmbH
Institut für Chemie Geesthacht/Teltow

The Institute of Chemistry of GKSS is unique in its interdisciplinary research and development activities in membrane and separation technology within the program of the Hermann von Helmholtz Assocciation of German research centres. Competent staff and suitable and advanced equipment are important pre-conditions for the development of new solutions for separation problems in process-, environmental-, bio- and medical technology.

The institute`s section in Teltow performed mainly fundamental research for flat and hollow membranes starting from a molecular modelling of structure-property relation and new procedures for the synthesis of special polymers accentuating the application in life sciences, and elaboration of suitable analytic techniques and procedures in collaboration with the Geesthacht section, whereas this section is focused more on manufacturing of membranes, development of membrane modules and reactors, process development and operation of pilot plants.

The use of membranes in process technology is concentrated on the subject areas:

- membrane reactors
- membrane for fuel cells
- water processing
- hybrid processes
- natural gas conditioning
- process and flue gas treatment.

Membrane relevant subjects in bio- and medical technology are:

- biohybrid systems with organ supporting functionality
- bioprocess technology.

In future , the institute`s activities will be centered on regenerative medicine (development of biohybrid organs, apheresis, and tissue engineering) and functional material systems (stimuli-sensitive polymer systems, nano-composites, membranes).

National collaborations, e. g. with the universities of Berlin and Potsdam, Institutes of the Max-Planck-Society and the Fraunhofer-Society, and the industry and international cooperation as well as GKSS internal support were major factors for the success of research projects carried out by the Institute of Chemistry in its two locations in Geesthacht and Teltow.

Prof. em. Dr. habil. Dr. h. c. Burkart Philipp
(retired)

Main topic was the history of the Teltow-Seehof area of polymer and colloid research in connection with the 10th anniversary of the new institutes founded in 1992. Besides this, advisory activities to scientists and institutions in chemistry, physics and technology of cellulose are to be mentioned.

Prof. Dr. Jürgen P. Rabe

Humboldt-Universität zu Berlin
Institut für Physik

Research Topics:

- Structure and dynamics of molecular nanostructures
- Correlation with electronic, optical, mechanical and (bio-)chemical properties from molecular to macroscopic length and time scales
- Fabrication of nanostructures from synthetic and biological macromolecules employing interfacial forces and selforganization
- Molecular dynamics simulations
- Development of methods for interfacial optics and scanning probe microscopies including STM, SFM and SNOM
- Basic research for a molecular information technology

R&D-Equipment:

- UHV and HV-deposition of metals and molecular materials
- Plasmareactors
- Physical-chemical preparation and characterisation of thin organic films (spin-coating, self-assembly, Langmuir-Blodgett-technique)
- Confocal optical microscopy
- Imaging ellipsometry & Brewster-Angle Microscopy
- Tunneling-Microscopy & -Spectroscopy (STM/STS) at solid-liquid/gas-interfaces
- Dynamic Force-Microscopy (SFM) at solid-liquid/gas-interfaces
- Optical Nearfield-Microscopy (SNOM)
- Workstations for Molecular Dynamics-Simulations

Information in WWW:

http://www.polymerphysics.de

Prof. Dr. K.-H. Reichert

Technische Universität Berlin
Institut für Chemie

Research Topics:

- Gas phase polymerization of propylene with heterogeneous catalysts.
  Video microscopic studies of single catalyst particle growth during polymerization reaction and morphological studies of polymer particles.

- Gas phase and slurry polymerization of propylene in controlled mini reactor.
  Studies of polymerization kinetics and polymer properties. Modelling and process design.

- Polyester synthesis. Development of methods for fast screening of catalysis in small scale.

R & D – Equipment (own development):

- Mini reactor for video microscopic studies of catalyst particle growth and polymer morphology during polymerization reaction.

- Micro balance reactor for kinetic studies of gas phase polymerization and mono-
  mer
- absorption of polymers.

- Controlled mini reactor for gas phase and slurry polymerization for on line kinetic studies of catalytic olefin polymerization at industrial conditions.

Prof. Dr. A. D. Schlüter

Freie Universität Berlin
Fachgebiet Organische Chemie, Polymersynthese

Our research is in the area of synthetic organic chemistry and is mainly directed towards the synthesis of structurally novel types of mono- and polydisperse macromolecules. Special monomers are designed and synthesized as well as new polymerization procedures are developed to achieve this goal. A wide range of chemistry including main group and transition-metal organics plays a role here. For the new polymerization strategies and procedures it is of utmost importance that they meet the basic criteria for a good polymer synthesis like efficiency and controlled reaction courses. Above all, access to oligomers is necessary, because they are immeasurably valuable as models for structure assignments, and for extrapolating the properties of the respective polymers.

Chemical modification of polymers is also an important aspect in our group, whereby the central question is to which extent a certain modification can be achieved. The group strongly cooperates with physical chemists, physicists, pharmaceutical chemists, spectroscopists, and theoreticians of various nations and institutions in order to determine the properties of the new macromolecules prepared.

Some of the projects being worked on are aimed towards certain structural types which promise to have interesting properties based on materials science or general physical knowledge. This project area reflects the interdisciplinary nature of polymer research, since the selection of target structures requires the interaction of physicists, materials scientists, and chemists. Concrete projects currently being worked on are as follows:

- Polyarylenes (Suzuki polycondensation)
- Dendritic structures with cylindrical shape (dendronized polymers, nanorods, nanoobjects)
- Repetitive syntheses
- Dendrimers with quantifiable polarity gradients and for cancer research
- Buckyboards and buckybelts (double-stranded, cyclic aromatics)
- Shape-persistent macrocycles
- Two-dimensional networks

Prof. Dr. Reinhard Schomäcker

Technische Unviersität Berlin
Fachgebiet Technische Chemie

Reaction Kinetics in Multiphase Systems
Determination of micro and macro kinetic parameters and development of models for desciption of reactions in micellar solutions, emulsions and microemulsions. For kinetic investigations conventional and relaxation methods are used.

Homogeneous Catalysis in Microemulsions
Reactions of hydrophobic reactants with hydrophilic catalysts like enzymes or metal complexes are carried out with high rates by means of microemulsions. By means of these reaction media the advantages of homogenous and heterogeneous catalyses can be combined.

Reaction Engineering for Production of Nanoparticles in Microemulsions
The development of procedures for sythesis of nanoparticles in microemulions requires the detailed understanding of this complex process of particle formation in a micro-heterogeneous media. The mechanism was found to be very similar to that of emulsion polymerization.

Development of Reactive Membranes based on Polymer-Metal-Compound Systems
This research is a cooperation of the working groups Reichert and Schomäcker and is a project within Sfb 448 “Mesoscopic structured compound systems”.

Molecular Imprinting
Imprinting of suitable template molecules in polymer networks enables the production of artificial enzymes and antibodies which are remarkably more durable than their natural analogues. Especially, catalytically active, molecularly imprinted synthetic materials are produced in different configurations, such as ground particles or membranes, and they are examined according to the aspects of reaction engineering. Moreover, imprinted polymers can also be used as stationary phases in chromatogaphy.

Priv.-Doz. Dr. Andreas Schönhals

Bundesanstalt für Materialforschung und –prüfung (BAM)
Fachgruppe VI.3: Analyse und Struktur von Polymeren

The main research field is the investigation of molecular dynamics and the structure of complex polymeric systems. Experimental main methodologies are relaxation methods like broadband dielectric spectroscopy. The main point is the evaluation of molecular mechanisms and its theoretical undersratnding. Moreover new measuring techniques and evaluation strategies are under consideration.

Actual topics
Molecular dynamics of low molecular weight glass forming systems and polymers in confining geometries like nanoporous glasses, zeolithes and on surfaces.

Correlation of molecular dynamic, photochemical and photochemical induced processes in photochromic polymers

Structure and molecular dynamic of liquid crystalline polymers
Sorption and permeation of gases trough complex polymeric systems.
Molecular dynamic simulation of selected polymeric structures and comparison with experimental data.

Priv.-Doz. Dr. rer. nat. habil. Burkhard Schulz

University of Potsdam
Interdisciplinary Research Centre Thin Organic and Biochemical Films

Objects of Research

Polymer Synthesis

- Synthesis of heat resistant polymers and preparation of fibres, membranes and ultra thin films
- Synthesis of high performance polymers for applications in nanotechnology, microsystem technology, and microsensorics
- Development of new synthetic routes for 1,3,4-oxadiazoles
- Polymerisation and chemical modification of side chain polymers as photo-active materials for data storage or for microsensors
- Preparation and processing of electrically conducting polymers

Preparation and investigation of supramolecular and nanosized structures

- Preparation and characterisation of highly ordered layers based on substituted aromatic oxadiazoles and polyoxadiazoles by vacuum deposition methods, Langmuir-Blodgett technology and self assembling techniques
- Investigation of the structural, spectroscopic and optical behaviour of organic materials under ultrahigh pressure
- Preparation of oxadiazole crystals and characterisation of their nonlinear properties
- Synthesis and characterisation of liquid-crystalline oxadiazoles

In co-operation with the Institute of Thin Film Technology and Microsensorics Teltow (http://www.idm-teltow.de)

- Synthesis of new polymers as sensitive materials or as resists for e-beam- and deep UV- lithography
- GPC and HPLC
- Polymer surface characterisation by AFM, ATR-IR-spectroscopy and contact angle measurements

Prof. Dr. J. Springer
(retired since April 1st, 2000)

The research concerns with interdependencies of the chemical structure and the physical resp. physico-chemical properties of polymers. The synthesis of monomers and polymers is directed to the production of model substances resp. polymers with a defined structure as possible.

The topics within this research are:

Synthesis, analytic and properties of functional polymers:

Photoactive, redoxactive and liquid crystalline side group homo- and copolymers. Highly branched biocompatible carriers for x-ray contrast agents.*)

Rheo-optical properties of polymer solutions:

Light scattering of dilute solutions in shear flow (investigation of the shear-induced orientation and deformation of macromolecules) *)

Gas permeability of polymers:

Solubility of gases and their diffusion in polymers.*)

Interfacial properties of composite materials:

Fiber/polymer interfaces. Surface modifications. Adhesion. Wetting phenomena. Characterization of surfaces by electrokinetic measurements. Influence of surrounding gases on the interfacial tension of polymer liquid crystalls.

*) The experimental investigations within these research fields are finished.

For further informations please visit the web site at:

http://www.tu-berlin.de/~itc/springer

Prof. Dr.-Ing. Manfred. H. Wagner
Emeritus: Prof. Dr. Helmut Käufer

Technische Universität Berlin
Polymer Engineering and Physics Group

Polymer Engineering and Physics together with the Groups of Glass, Ceramic, and Metallic Materials Science and Engineering, form the Institute of Materials Science and Technology of TU Berlin. The Institute is part of Faculty III Process Sciences. The Polymer Engineering and Physics Group offers students of “Material Science” the subject “Organic Materials” to specialise in, and students of other engineering fields (mechanical engineering, process engineering, biomedical engineering, civil engineering, business administration and engineering, architecture) compulsory and optional courses with a focus on polymer engineering and physics.
The Polymer Engineering part of the group with its polymer processing laboratory is located in the building WF at Fasanenstrasse 90. The Polymer Physics part of the group together with the groups of glass and ceramic materials are situated at Englische Strasse 20. On an overall lab and office space of about 2400 m^2, the Polymer Engineering and Physics Group is well endowed with all important machinery and equipment for polymer processing (extrusion, film blowing, injection moulding, hot pressing and forming etc.) and polymer testing (mechanical, rheological, thermal, electrical, morphological). Main research fields are:
Rheology of polymer melts and solutions, development of rheological constitutive equations, analysis and optimisation of polymer engineering processes
Innovative applications of polymer engineering techniques in biomedical engineering, e.g. polymer stents with shape memory effect, development of polymer products for biomedical engineering (lenses, surgical suture, dental implants, catheter, polymer stents and polymeric coating of stents)
Development of polymer-metal precursors for high temperature super conductive films
CAD based engineering of all kind of plastic parts
Development of a mini-injection moulding machine and mini-test bars for evaluation of mechanical properties of polymer materials on the basis of 3 to 5 g of material.
Recycling of plastic waste from PVC, PE, PP, PA, PC, electronic boards from epoxy resin, etc. Recycling of polymer composites from packing residues by dissolution; reprocessing of polymer and solvent
Analysis of structure and morphology of polymers (density, dielectric and mechanical measurements, wide and small angle x-ray measurements, DSC)
Analysis of mechanisms of deformation and relaxation of polymers and polymer composites
Mechanical and optical spectroscopy of polymeric materials
Thermal analysis of thermoplastics and their composites
Fibre-reinforced high-performance composites from glass, aramid and carbon fibre with thermoplastic matrices
Mechanical and optical spectroscopy of polymeric materials

http://www.tu-berlin.de/fb6/polymer
http://www.tu-berlin.de/fb6/polymerphysik

Nachruf auf Prof. Dr. Dr.h.c. Hermann Klare

Am 22. August 2003 verstarb in Dresden Professor Dr. phil. Hermann Klare im 95. Lebensjahr, der im vergangenen Jahrhundert über mehrere Jahrzehnte das Gesicht der deutschen Chemiefaserindustrie und Chemiefaserforschung maßgebend mit geprägt hat. Lebenslauf und Lebenswerk des Verstorbenen wurden anlässlich seines 90. Geburtstages im Jahresbericht 1999 unseres Verbandes gewürdigt.

Geboren am 12. Mai 1909 in Hameln, trat er nach dem Studium der Chemie in Kiel und einer Promotion bei Nobelpreisträger Otto Diels in die chemische Industrie ein, um sich so der Gleichschaltung der Universitäten durch den NS-Staat zu entziehen. Zunächst auf dem Viskosegebiet im Werk Wolfen und dann als engster Mitarbeiter von Paul Schlack bei der Entwicklung der Perlon-Faser in Berlin-Lichtenberg war er an der Nahtstelle zwischen Forschung und Betrieb sehr erfolgreich und leitete dann 1942-1945 Aufbau und Anfahrbetrieb der ersten deutschen Perlonfabrik in Landsberg/Warthe. Nach Rückkehr aus der Sowjetunion von einer Verpflichtung im Polyamidseidenwerk Klin übernahm er zunächst die Leitung der Perlonfabrik und später des Gesamtbetriebes im Chemiefaserwerk Schwarza.

1953 wurde Hermann Klare als stellvertretender Direktor an das Institut für Faserstoffforschung Teltow-Seehof der Deutschen Akademie der Wissenschaften zu Berlin berufen, das er von 1961 bis 1968 als Direktor leitete, zugleich in Verbindung mit einer Professur für Chemie und Technologie der Chemiefasern an der TH Leuna-Merseburg. Internationale Beachtung fanden seine 1954 erschienene und in mehrere Sprachen übersetzte Monographie „Technologie und Chemie der synthetischen Fasern aus Polyamiden“ und seine bahnbrechenden Erkenntnisse zum Mechanismus der Fadenbildung im Viskoseprozess, die er gemeinsam mit einer Gruppe von Mitarbeiterinnen und Mitarbeitern gewann. Als Präsident der Akademie der Wissenschaften der DDR trug er in den 70-er Jahren wesentlich zum Ansehen der Chemie, besonders auch der Polymer- und Faserstoffchemie, in der Öffentlichkeit bei. In seinem 8. Lebensjahrzehnt verfasste er eine Geschichte der Chemiefaserforschung, die auch heute noch eine Fundgrube für interessante Zusammenhänge und fachliche Details ist.

Hermann Klare verstand es, Durchsetzungsvermögen mit menschlichem Verständnis, Sparsamkeit und Konsequenz mit Großzügigkeit zu verbinden und damit nachfolgenden Generationen ein Beispiel zu geben. Sein trockener Humor diente gleichermaßen der Belebung festlicher Anlässe und der Entspannung kritischer Situationen. Die Mitglieder unseres Verbandes werden sein Andenken in Ehren halten.

B. Philipp

Gerhard-Kanig-Vorlesung

Frau Eleonore Kanig, Ludwigshafen a. Rh., hat im Berichtsjahr unserem Verband eine großzügige Spende zukommen lassen, mit der das Andenken an ihren Mann, Professor Dr. rer. nat. Gerhard Kanig (1917 – 2002), der viele Jahre in der BASF AG tätig gewesen ist und unserem Verband als korrespondierendes Mitglied angehört hat, wachgehalten werden soll. Die Mitglieder des Berlin-Brandenburgischen Verbandes für Polymerforschung e.V. (BVP) danken Frau Kanig herzlich für diese Zuwendung.

Auf einstimmigen Beschluss der Mitgliederversammlung hat der BVP eine „Gerhard-Kanig-Vorlesung“ eingerichtet, mit der herausragende in- oder ausländische Polymerwissenschaftler oder Polymerwissenschaftlerinnen ausgezeichnet werden sollen. Die Einladung zu dieser Vorlesung wird in der Regel zu der wissenschaftlichen Konferenz „Polydays“ ausgesprochen, die alle zwei Jahre veranstaltetet wird. Die Auszeichnung ist mit der Verleihung einer Urkunde und der Zuwendung eines Geldbetrags verbunden.

J. Springer

Guest Lectures (Berliner Polymeren-Colloquium)

2003-02-12 **Prof. Dr. H.J. Butt**, (Max Planck Institut für Polymerforschung Mainz)
Rasterkraftmikroskopie: Eine Methode, Oberflächenkräfte zu untersuchen
BAM, Berlin

2003-09-30 **Dr. Jonathan W. Martin** (National Institute of Standardas and Technology (NIST) Gaithersburg, Maryland, USA
Application of the Reciprocity Law in Accelerating Photodegradation of Polymeric Materials
BAM, Berlin

2003-10-07 **Prof. Petro Smertenko** (Institute ofSemiconductors Physics, Kiew)
Application of differential approach for analysis of characteristic functions and Part two of differential approach for analysis of characteristic functions
Universität Potsdam

2003-12-09 **Dr. Konstantin Grytsenko** (Institute of Semiconductors Physics, Kiew)
Gas phase deposition of polymers
Universität Potsdam

Conferences and workshops

Training course: "Thin organic Films"

Date:	31. March 2003 - 04. April 2003
Place:	University of Potsdam
Organizer:	Condensed Matter Physics, Institute of Physik (L. Brehmer, J. Reiche) Interdisciplinary Research Centre *„Thin Organic and Biochemical Films"* (B. Schulz)
-	in Cooperation with GKSS Teltow-Seehof, Max-Planck-Institute "Colloid- and interface research" and Fraunhofer-Institute "Applied Polymer Research" in Golm
Participants:	21 students/Ph.D. students
Topics:	One week training course for students and PhD-students in the field of fundamentals of the preparation and characterisation of thin film layers supramolecular architectures and Nanosciences.

INTAS-Meeting

Date:	01.-03. May 2003
Place:	University of Potsdam
Organizer:	Institute of Physics, Condensed Matter Physics (L. Brehmer)
Participants:	17 scientists
Topics:	Reactions of metal atoms, nanoclusters and complexes in matrices

National meeting of the German Society of Rheology (DRG) and the Rheology-Group in the VDI Society for Chemical and Process Engineering "Rheologentagung 2003"

Date:	05.-06. May 2003
Place:	Berlin
Organizer:	Deutsche Rheologische Gesellschaft (DRG) e.V. (W. Mielke, M.H. Wagner, H.M. Laun)
Participants:	90

6. PhD - WORKSHOP "Nanotechnology for Biosensors and Biochips"

Date:	16.-18. June 2003
Place:	University of Potsdam
Organizer:	Condensed Matter Physics, Institute of Physics (L. Brehmer, J. Reiche) Interdisciplinary Research Centre *„Thin Organic and Biochemical Films"* (B. Schulz)
Participants:	27 students
Topics:	Biosensors, Biochiptechnologies, Nanostructures, Nanoparticle, Nanoelectronic

New Products for New Markets - New materials and their application in information technology and sensors

Date:	18. June 2003
Place:	Potsdam
Organizter:	B. Schulz; Interdisciplinary Research Centre Thin Organic and Biochemical Films and Centre for Innovative Materials
Participants:	50 Participants from academic and industrial institutions

Annual European Rheology Conference (AERC) 2003

Date:	11.-13. September 2003
Place:	Guimaraes, Portugal
Organizer:	European Society of Rheology (J.M. Maia, J.A. Covas, M.H. Wagner et al.)
Participants:	260

Dechema-Course „Polymerization Technology“

Date	Sept. 2003
Place	University of Hamburg
Organizer	K.H. Reichert et al.

AFM-USER-Meeting

Date:	07.-08. October 2003
Place:	University of Potsdam
Organizer:	Fa. VEECO
and	Institute of Physics, Condensed Matter Physics (L. Brehmer)
Participants:	87 scientists
Topics:	AFM-Microscopy, Nanotechnology

Scientific Activities of the Regular Members

Publications

Some members of the BVP (being head of institutes or departments) are responsible for a large number of independently working scientists. Only those papers are cited here to which they have individually contributed.

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R. Zorn, A. Schönhals, L. Hartmann, F. Kremer, B. Frick, D. Richter
Dynamics of confined glass-forming systems observed by inelastic/quasielastic neutron scattering
3rd Eur. Conf. on Neutron Scattering, Montpellier, France, 03.-06. Sept. 2003

Master Thesis / Diplomarbeiten

Mohammed **Abboud** (M.H. Wagner)
Video Microscopy for Fast Screening of Heterogeneous Polymerization Catalysts
Technische Universität Berlin

Fikri **Alemdaroglu** (A.D. Schlüter)
Synthesis of a High Molecular Weight Amphiphilic Poly(para-phenylene) for Studying its Nanoscale Assemblies
Freie Universität Berlin (2003)

Hakki Hakan **Atasoy** (A.D. Schlüter)
Application of Isocyanate Chemistry to the Periphery of Dendronized Polymethacrylates via the Attach-to Route
Freie Universität Berlin (2003)

Bernhard **Bandow** (S. Hess)
Modellierung dynamischer Vorgänge in Systemen unter eingeschränkter Geometrie
Technische Universität Berlin

Isabelle **Bjesse** (W. Arlt)
Aspen-Plus feasibility study of the THF-water separation using hyperbranched polymers as extraction solvents
Technische Universität Berlin

Yves **Bodenthin** (H. Möhwald)
Struktur dünner Filme aus metallo-supramolekularen Modulen
Universität Potsdam

John **Caldwell** (M.H. Wagner)
Mechanical properties of thermoplastic materials and the effect of processing parameters
Technische Universität Berlin

D. **Franke** (M. Antonietti)
Towards insulated molecular wires: Polymerization of surface active monomers onto 1-D and 2-D supramolecular supports
Freie Universität Berlin und MPI KG

Ülker **Gültekin** (M.H. Wagner)
Biaxiales Recken von Thermoplastischen Folien
Technische Universität Berlin

Rabie al-**Hellany** (A. Dieter Schlüter)
Synthesis of Pyrene-tagged Dendronized Polymers
Freie Universität Berlin (2003)

Henrik V. **Henke** (R. Schomäcker)
Messung von Adsorptionsisothermen am molekular geprägten Polymeren
Technische Universität Berlin

Stefanie **Herzog** (W. Arlt)
Anwendung der PC-SAFT-Zustandsgleichung auf die Berechnung der Phasengleichgewichten zur Modifikation der Silicia-Aerogel-Herstellung
Application of the PC-SAFT equation of state on phase equilibria important for the production of silica aerogels
Technische Universität Berlin

Nedal **Idies** (M.H. Wagner)
Weiterentwicklung und Inbetriebnahme eines Prüfstandes zur Simulation des Verschleißes im Hüftgelenk
Technische Universität Berlin

Susanne **Jähnert** (R. Schomäcker)
Charakterisierung von immobilisiertem Curcubituril
Technische Universität Berlin

Asimina-Kleio **Kavarnou** (W. Arlt)
Phase Behaviour and Applications of Dendritic Polymers in the Field of Chemical Engineering
Technische Universität Berlin

Alexander **Kremmer** (R. Gerhard-Multhaupt)
Präparation und elektrische Charakterisierung von ferroelektrischen Polyamid 11-Filmen
Universität Potsdam

Sven **Lehmann** (R. Schomäcker)
Recycling von Polyvinylchlorid (PVC): Status Quo und Perspektiven
Technische Universität Berlin

Jozo **Mamic** (W. Arlt)
Experimentelle Untersuchung zur Verwendung von Silica Aerogelen als Trägermaterial für pharmazeutische Wirkstoffe Experimental investigation for the use of silica aerogels als a carrier for pharmaceuticals
Technische Universität Berlin

Solene **Megard** (M.H. Wagner)
Micro Indentation Experiments on PMMA/Aluminium and PMMA/Konstantan Alloy Interfaces
Technische Universität Berlin

Daraie Fard **Nemat** (M.H. Wagner)
Versuche zum Kompaktieren von Granulaten, Pulvern und Fasern aus Thermoplasten als Grundlage für den Bau einer Kompaktiereinrichtung
Technische Universität Berlin

Lina **Nüsgen** (R. Schomäcker)
Empirische Modellierung des Polymerisationsverhältnisses von Reaktivharzen
Technische Universität Berlin

Steffi **Reichelt** (J. Koetz)
Nanopartikelbildung in Phosphatodylcholin(PC)-modifizierten Mikroemulsionen
Universität Potsdam

Jörn **Rolker** (W. Arlt)
Prozesssimulation von Sonderverfahren zur Trennung azeotroper Gemische mittels hyperverzweigter Polymere und Modellierung ausgewählter VLE dendritischer Polymerlösungen durch UNIFAC-FV
Simulation of special processes for the separation of azeotropic mixtures with the aid of hyperbranched and dendritic polymers using the UNIFAC-FV method
Technische Universität Berlin

Mirko **Saric** (J. Koetz)
Nanopartikelbildung in lipidhaltigen Mikroemulsionen
Universität Potsdam

Andrea **Schmidt** (R. Schomäcker)
Untersuchungen zur Selektivität von partiellen Hydrierungen im Membranreaktor
Technische Universität Berlin

Katja **Skrabania** (A. Laschewsky)
Synthese von Poly(2-Methyl-2-oxazolin)en mit funktionellen Endgruppen
Universität Potsdam

Dayal **Smita** (Prof. Schomäcker/Dr. Ramanan)
Investigation of Transesterification Reaction in Liquid/Liquid Two Phase System
Technische Universität Berlin

Sebastian **Stolz** (W. Arlt)
Measurement and Correlation of High-Pressure Phase Equilibria in the System Polymer-Solvent-Supercritical Gas
Technische Universität Berlin

Iris **Waidelich** (R. Schomäcker)
Einsatz von Membranen zur Emuslionsspaltung: Machbarkeitsstudie, Marktuntersuchung und Positionierungsstrategie
Technische Universität Berlin

Michael **Vogel** (A.D. Schlüter)
Synthesis of Terpyridines
Freie Universität Berlin (2003)

Arsim **Zhubi** (M.H. Wagner)
Entwicklung einer Hautdurchführung zur Erzeugung einer extrakorporalen kreisförmigen Infektionsschutzmanschette für Peritonaldialyse-Katheter
Technische Universität Berlin

Dissertationen

Inna **Bechthold** (G. Rafler, M.H. Wagner)
Technisch relevante Aspekte der Ringöffnungspolymerisation von L,L-Dilactid
Technische Universität Berlin

Andreas S. **Bormann** (I. Müller, M.H. Wagner)
Lineare Stabilitätsanalyse kompressibler Fluide
Technische Universität Berlin

Tevfic **Cibik** (G. Hinrichsen, H.-P. Fink)
Untersuchungen am System NMMO-H_2O-Cellulose
Technische Universität Berlin und Fraunhofer IAP, Potsdam

Ning **Hao** (A. Schönhals)
Molecular Mobility and Gas Transport of Polycarbonate-based Nanocomposites
Technische Universität Berlin und BAM

Kirsten **Jansen** (M. Hennecke)
Säureeinfluss auf die photochemische Alterung UV-stabilisierter Polyethylenfolien
Freie Universität Berlin und BAM

Ingo **John** (M.H. Wagner, J. Scholz)
Beurteilung von vernetztem UHMWPE hinsichtlich seiner Eignung als Implantatwerkstoff für Hüftgelenkschalen
Technische Universität Berlin

Christoph **Kozlowski** (J. Springer, W. Jaeger)
Synthese und Charakterisierung von neuartigen Blockcopolymeren auf Basis von Poly(alkylenoxiden)
Technische Universität Berlin und FhG-IAP Golm

Theodora **Krasia** (M. Antonietti)
Synthese und kolloidale Eigenschaften neuartiger Blockcopolymere mit ß-Dicarbonyl-Einheiten
Universität Potsdam und MPI KG

Fabian **Kutzner** (A.D. Schlüter)
Synthese und Charakterisierung von Monomeren und deren Suzuki-Polykondensation zu amphiphilen, wasserlöslichen Poly(para-phenylen)en
Freie Universität Berlin (2003)

Christian **Liebner** (R. Schomäcker)
Einführung der Polythermen Temperatur Rampen
Methode für die Ermittlung kinetischer Daten
Technische Universität Berlin

Angelika **Menner** (J. Springer)
Synthese und Charakterisierung elektrochromer Homo- und Copolymethacrylate
Technische Universität Berlin

Rivelino **Montenegro** (M. Antonietti)
Crystallization, Biomimetics and Semiconducting Polymers in Confined Systems
Universität Potsdam und MPI KG

Herry **Purnama** (R. Schomäcker)
Catalytic Study of Copper based Catalysts for Steam Reforming of Methanol
Technische Universität Berlin

Rainer **Rihm** (G. Hinrichsen, H.-P. Fink)
Röntgen-Strukturuntersuchungen an Celluloseregeneratfasern
Technische Universität Berlin und Fraunhofer IAP, Potsdam

Marc **Schneider** (H. Möhwald)
Untersuchung von Wechselwirkungskräften und dem Adsorptionsverhalten von Polyelektrolytmolekülen auf Nanometer-Skala
Universität Potsdam und MPI KG

Bernd **Schwarz** (H. Möhwald)
NMR Spektroskopie an Polyelektrolyt Mono- und Multischicht-Systemen
Universität Potsdam und MPI KG

Thomas **Steffl** (H. Münstedt, M.H. Wagner)
Rheological and film blowing properties of various low density polyethylenes and their blends
Friedrich-Alexander Universität Erlangen-Nürnberg

Arne **Thomas** (M. Antonietti)
Poröse Silikate durch Nanocasting: Von chiralen Templaten zu neuer Chemie in Poren"
Universität Potsdam und MPI KG

Michael **Töpper** (G. Hinrichsen, H. Reichl)
Entwicklung einer auf Photo-BCB basierenden Technologie für das Waverlevel Packaging
Technische Universität Berlin

Nora **Weitbrecht** (R. Schomäcker)
Reaktionstechnik von homogen katalysierten Hydrierungsreaktionen in wässrig-mizellarer Lösung
Technische Universität Berlin

Christoph **Wieland** (A. Laschewsky)
Synthesis and Characterization of Cationic Polyelectrolytes as Standard Materials for Aqueous Gel Permeation Chromatography
Universität Potsdam

Patents

J. Koetz, J. Bahnemann, S. Kosmella, M. Peter
Polymer-modifizierte Nanopartikel
PA: 102 61 806.2, Anmeldetag: 19.12.2002
PCT-Anmeldetag: 18.12.2003

L. Brehmer
International patent: Procedure for optical of mass transport
2003

Awards

P. Ilg
Rheologie Preis 2003 der Deutschen Rheologischen Gesellschaft

L. Brehmer, P. Karageorgiev, St. Katholy, H. Orendi, D. Stabenow, B. Stiller
Technologie-Transfer-Preises des Landes Brandenburg 2003 Team: Nano-Optik des Lehrstuhls Physik kondensierter Materie and OPTREL GbR Kleinmachnow (2. Preis)

A professorship at the university of Erlangen has been offered to **Wolfgang Arlt,** member of BVP.

A professorship at the ETH Zürich, Switzerland, has been offered to **Arnulf-Dieter Schlüter**, member of BVP.

Lehrveranstaltungen

Some lectures were held as part of the Master of Science in Polymer Science curriculum of the FU Berlin, HU Berlin, TU Berlin, and U Potsdam. They are indicated by MSPS

Technische Universität Berlin

Sommersemester 2003

Phase Equilibrium Thermodynamics (Fluid phase equilibria) Characterization of Multicomponent Systems (Polymers, Petroleum)	Arlt Smirnova
Phase Diagrams in Multicomponent Systems Thermodynamic Models (gE models, Equations of State, Perturbation theory)	Arlt Smirnova
Phase Equilibrium Calculations in Multicomponent Systems (Liquid-Liquid, Vapour (Gas)-Liquid, Flash Calculation) Continuous Thermodynamics	Arlt Smirnova
Polymerization Technology MSPS 2 V, 1 SE	Reichert
Polymerization Technology MSPS 1 Na	Reichert
Rheologie der Polymerschmelzen I 2 V, 2 PR	Wagner
Kunststoffverarbeitung II 2 V, 4 PR	Wagner Rautenberg
Konstruieren mit Kunststoffen II 2 V, 2 UE	Wagner Wache
Kunststoffe im Bauwesen 2 V, 2 PR	Rautenberg
Rechnergestützte Entwicklung und Konstruktion von Kunststoffprodukten II 2 V, 2 UE	Bolst/John
Kunststoffrecycling 2 V	Wagner Tartakowska
Polymerphysik II 2 V, 2 PR	H. Springer
Physikalische Eigenschaften der Kunststoffe 2 V, 1,5 UE + PR	H. Springer Wagner
Röntgenweitwinkelstreuung an Polymeren 2 V	H. Springer
Kunststoffprüfung 2 V	Mielke Hentschel
Statische und dynamische Simulationstechniken in der Polymerphysik 2 V	Hofmann

Polymerwissenschaftliches Seminar 2 SE	Wagner Rautenberg Springer
Messtechnische Übungen 2 PR	Wagner Rautenberg
Polymer Testing 2 V	Mielke Hentschel
Kolloquium des SfB 448 "Mesoskopisch strukturierte Verbundsysteme" 3 SE	Hess

Wintersemester 2003 / 2004

Herstellung, Verarbeitung und Anwendung der Kunststoffe 2 V ,1 UE + PR	Wagner H. Springer
Rheologie der Polymerschmelzen II 2 V, 2 UE	Wagner
Kunststoffverarbeitung I 2 V, 4 PR	Wagner Rautenberg
Rechnergestützte Entwicklung und Konstruktion von Kunststoffprodukten I 2 V, 2 UE	Bolst/ John
Konstruieren mit Kunststoffen I 2 V, 2 UE	Simonsohn Wache
Thermische Untersuchungen an Polymeren 2 V	H. Springer
Polymerphysik I 2 V, 4 PR	H. Springer
Röntgenkleinwinkelstreuung an Polymeren 2 V	H. Springer
Mechanische Grundlagen und Technologie der polymeren Verbundwerkstoffe 2 V, 2 PR	Marotzke Rautenberg
Polymerphysik III 2 V	Hofmann
Rastersondenmikroskopie an Polymeren 2 V	Munz
Polymerwissenschaftliches Seminar 2 SE	Wagner Rautenberg H. Springer
Messtechnische Übungen 2 PR	Wagner Rautenberg
Herstellung, Verarbeitung und Anwendung der Kunststoffe 2 V, 1 UE + PR	Wagner H. Springer
Rheologie der Polymerschmelzen II 2 V, 2 UE	Wagner
Kunststoffverarbeitung I 2 V, 4 PR	Wagner Rautenberg
Rechnergestützte Entwicklung und Konstruktion von	Bolst

Kunststoffprodukten I 2 V, 2 UE	John
Konstruieren mit Kunststoffen I 2 V, 2 UE	Simonsohn Wache
Kolloquium des SfB 448 "Mesoskopisch strukturierte Verbundsysteme" 3 SE	Hess

Freie Universität Berlin

Sommersemester 2003

Introduction to Macromolecular Chemistry MSPS 2 V	Schlüter
Basic Polymer Synthesis MSPS 3 V	Schlüter
Physikalische Chemie der Polymeren II 1 V	Hennecke

Wintersemester 2003/2004

Short course in physical chemistry of polymers MSPS 1 V	Hennecke
Physikalische Chemie der Polymeren I 1 V	Hennecke

Universität Potsdam

Sommersemester 2003

Kolloidchemie II 2 V	Koetz
Kolloidchemie II 1 SE	Kosmella
Polymerchemie I 2 V	Laschewsky
Strukturbildung in kolloidalen Systemen 2 V	Koetz Antonietti
Physikalische Chemie der Grenzflächen 2 V	Koetz Brezesinski
Spezialpraktikum PR (4 Wochen)	Koetz Kosmella
Technische Chemie II 1 V	Laschewsky
Biopolymers 2 V	Peter
Colloidal Phenomena 2 V	Koetz Antonietti
Selected Aspects of Polymer Synthesis 2 S	Laschewsky Strehmel
Biopolymer and Colloidal Laboratory 4 P	Kosmella Tiersch
Polymerchemie I 2 V	Antonietti
Strukturbildung in kolloidalen Systemen 2 V	Kötz Antonietti
Colloidal Phenomena 2 V	Kötz Antonietti
Biophysics of Membranes and Cells 2 V	Möhwald Sukhorukov
Moderne Methoden der Charakterisierung von Grenzflächen und Kolloiden 2 S	Möhwald Schönhoff Motschmann
Technische Chemie II 1 V	Laschewsky
Polymerchemie I 2 V	Laschewsky
Modern Methods of Polymer Synthesis 2 V	Laschewsky Strehmel
Polymers as high-tech materials 2 V	Schulz
Optical Spectroscopy and Photonics II 2 V	Neher
Organic Semiconductors 2 V	Neher

Physical and Engineering Properties of Polymers MSPS 4 V, 2 S, 1 UE	Gerhard-Multhaupt Neher
Electrical and Optical Properties Laboratory MSPS 4 P	Gerhard-Multhaupt Neher
Festkörperphysik II 2 S, 1 UE	Gerhard-Multhaupt
Polymers as high-tech materials 2 V	Schulz
Herstellung und Charakterisierung organischer Nanostrukturen 2 V	Brehmer
Oberseminar: Nanophysik - Organische Grenzflächen und dünne Schichten 2 SE	Brehmer
Doktorandenseminar: Nanophysics of organic materials 2 SE	Brehmer

Wintersemester 2003/2004

Kolloidchemie I 2 V	Koetz
Kolloidchemie I 1 SE	Kosmella
Polymerchemie II 2 V	Antonietti
Modern aspects of Colloid Science 2 V	Koetz Antonietti
Spezielle Aspekte der Polymersynthese 2 V	Laschewsky Strehmel Antonietti
Technische Chemie I und II 2 V	Laschewsky
Praktikum zur Kolloidchemie I und II 4 P	Koetz Kosmella Tiersch
Spezialpraktikum PR (4 Wochen)	Koetz Kosmella Laschewsky
Moderne Aspekte der Kolloidforschung 2 V	Kötz Antonietti
Supramolecular Chemistry (IMPRS) 2 V	Antonietti
Physikalische Chemie III 2 V 2 UE	Möhwald Kurth Schönhoff
Physikalische Chemie zweidimensionaler Systeme 2 V	Möhwald

Moderne Methoden der Charakterisierung von Grenzflächen und Kolloiden 2 S	Möhwald Schönhoff Motschmann
Spezielle Aspekte der Polymersynthese 2 V	Laschewsky Strehmel Antonietti
Technische Chemie 2 V	Laschewsky
Functionalized organic layers and interfaces 2 V	Schulz
Experimental Physics I for Chemists and Biochemists 2 V	Neher
Material Science III 2 V	Neher
Organic Field-Effect Transistors (lab course) 1 P	Neher Zen
Soft-Matter Physics 2 V	Gerhard-Multhaupt
Materialwissenschaften I 2 V	Mellinger Gerhard-Multhaupt
Functionalized organic layers and interfaces 2 V	Schulz
Course of lectures Nano-Sciences for PhD-students in Biology, Chemistry and Physics 2 V	Schulz Brehmer
Projektlabor: „Dünne organische Schichten“ 1 V+SE	Reiche Brehmer Regenstein
Nichtlineare optische Eigenschaften organischer Materialien II 2 V	Schrader Brehmer
Oberseminar: Oberflächen und Grenzflächen 2 SE	Brehmer

Humboldt-Universität zu Berlin

Sommersemester 2003

Kolloquium zur Makromolekül- und Vielteilchen-physik 2 SE	Rabe Röder Sokolov Schimansky-Geyer

Wintersemester 2003/2004

Physik von Makromolekülen 2 V, 2 UE	Rabe
Polymer Characterization MSPS 4 V 2 SE 8 P	Rabe Kirstein Rabe Kirstein Severin Koch Barner Ecker Jäckel Zhuang, Rabe
Introduction to Polymer Physics MSPS 4 V, 2 SE	Sokolov Kirstein
Struktur der Materie (a): Atom- und Molekülphysik 4 V, 2 SE	Rabe
Kolloquium zur Makromolekül- und Vielteilchenphysik 2 SE	Rabe Röder Sokolov Schimansky-Geyer