



**DEVELOPMENT OF SUSTAINABLE INTERRELATIONS BETWEEN EDUCATION, RESEARCH AND INNOVATION AT WBC UNIVERSITIES IN NANOTECHNOLOGIES AND ADVANCED MATERIALS WHERE INNOVATION MEANS BUSINESS**



Introducing:

**INNOVENT e. V.**

Pruessingstrasse 27B  
D-07745 Jena  
Germany

Dr. Matthias Schnabelrauch  
Dr. Ralf Wyrwa  
Dr. Torsten Walter



**Kick-off meeting**

Barcelona, 3-5 March 2014

## INNOVENT e. V.

- Private, non-profit research association founded 1994 in Jena
- Main areas of research
  - ✘ Surface Engineering
  - ✘ Magnetic and Optical Materials and Systems
  - ✘ Biomaterials
- About 160 employees (5 research departments)



- JENA – a rapidly growing high-tech region in the eastern part of Germany with 104,500 residents (25,000 students)
- 450 years old Friedrich-Schiller University and Ernst-Abbe University of applied sciences
- 2 Industry-oriented and 9 academic research institutes
- High-tech location with tradition, home of companies like ZEISS, and SCHOTT Jenaer Glas

08/04/2014

# MAIN ACTIVITIES OF THE RESEARCH DEPARTMENTS



## Surface engineering

*Heads of department: Dr. Bernd Grünler, Dr. Arnd Schimanski*

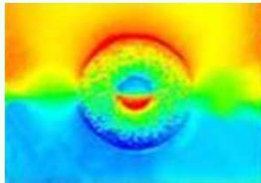
Flame coating – Plasma technologies - Elektrochemical processing - PVD – Parylene coating – Surface characterization and analytics – Mechanical construction – Prototype construction



## Primer & Chemical Surface treatment

*Head of department : Dr. Jörg Leuthäuser*

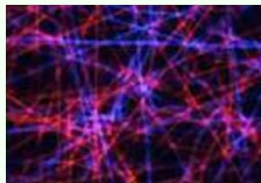
Adhesion promoter/Primer – Functional surfaces – Hybrid injection moulding – Joining technologies: Bonding, Painting, Casting – Electro/gas phase silicatization – Composite materials - Corrosion/Durability - Cleaning/activation



## Magnetic & Optical systems

*Head of department : Prof. Dr. Peter Görnert*

Magnetism – optics – crystal growth – simulation – magnetic nanoparticles – composites – single crystals – epitaxial films – magnetic measurement techniques – magneto-optical sensors– optical measurement methods – simulation software



## Biomaterials

*Head of department : Dr. Matthias Schnabelrauch*

Organic and polymer synthesis - resorbable polymers and composites - polylactides - glycosaminoglycans - polysaccharides - bone substitutes - magnetic nanoparticles – Drug delivery systems - bioactive coatings - electrospinning - biological testing



## Analytics & Material testing

*Head of department : Dr. Katrin Pawlik*

Polymers - Plastics - Oligomers - Additive Substances - Adhesives - Coatings - Paints - Bulk Analysis - Surface Analysis - Separation Technologies - Process Monitoring - Failure Analysis

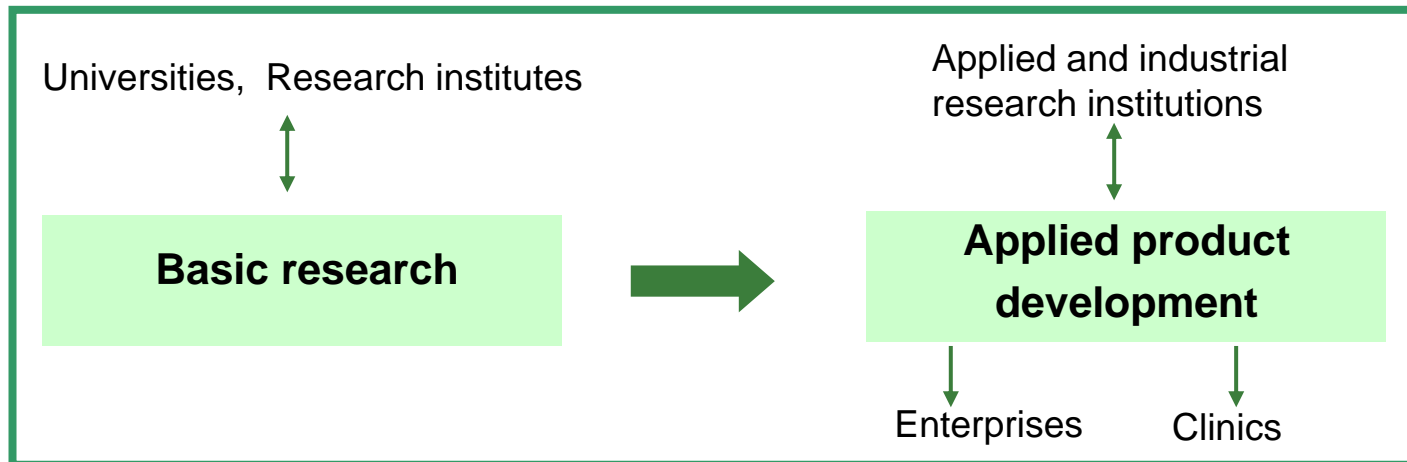
## BIOMATERIALS DEPARTMENT

Head: Dr. Matthias Schnabelrauch

### R & D – Main activities

- Design of tailor-made biodegradable polymer and composite materials for biomedical and pharmaceutical applications
- Adjustment and optimization of interface properties of biomaterials by controlled surface engineering
- Testing of material and application properties of biomaterials incl. *in vitro* testing

### Research and Collaboration





## BIOMATERIALS DEPARTMENT

### Competences / Equipment

- Monomer/polymer synthesis, polymer modifications, surface functionalization
- Polymer analytics (HPLC/GPC, FT-IR, UV-VIS, NMR)
- Material characterization (surface analytics, thermal/mechanical testing, drug release)
- Polymer processing (extrusion, electrospinning)
- Surface coating (spincoating, ultrasonic nebulization, LB-technique)
- Biological testing (cytotoxicity, cell adhesion and proliferation assays, microscopy (LSM), protein and DNA/RNA analytics (RT-PCR), biodegradation, determination of antimicrobial activity)

### Personnel

- Interdisciplinary research team
- Currently 18 scientists (chemists, biochemists, biologists, engineers), 8 technicians
- BS / MS students



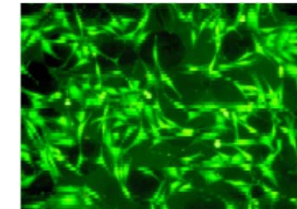
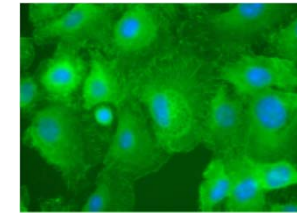
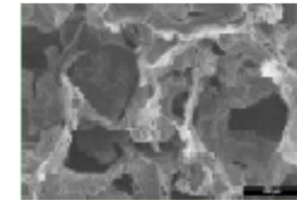
# BIOMATERIALS – CURRENT FOCUS OF WORK

## Resorbable Materials

- Synthesis of tailor-made synthetic biodegradable polymers (polyesters, polyurethanes and their copolyesters) and organic/inorganic hybrid materials
- In situ hardening materials for generation of hydrogels, adhesives, bone substitutes, and generative technologies incl. 3D-printing and stereolithographic processes
- Glycosaminoglycan chemistry (functionalization, bioconjugation, hydrogel and coating fabrication)

## Functional and drug releasing Coatings and fiber meshes

- Drug-releasing coatings (antibiotics, anti-inflammatory drugs, osteogenic agents, growth factors) for implants, prosthesis and other medical devices
- Coatings for the stimulation of cellular functions (cell adhesion, proliferation)
- Micro and nano-structured fiber meshes produced by electrospinning and investigation of their use as scaffolds and drug carriers in biomedicine



## ROLE IN THE PROJECT

- Availability of long-term experiences in biomaterial and medical device research from basic studies up to clinical device approval
- Offering contacts to EU and German networks for biomaterial and nanotechnology research and development as well as knowledge transfer networks
- Identifications of specific research and development needs of European and German medtech companies
- Preparation of course materials and manuals related to novel technologies in biomaterial science (Biomaterials in clinical practice, Biomedical application of additive manufacturing, etc.)
- Offering training (lectures) on specific topics of biomaterial science
- Pursuing opportunities for the consortium to apply for future scientific projects on promising topics of biomaterial and medical device research (upcoming EU calls)
- WP 7 leader (quality control)
- Open for collaborations and new suggestions.