

Degradable Polyurethanes

Transfer Offer

The synthesis of biocompatible and biodegradable polyurethanes (PU) and polyureas is one of the main research areas of the Biomaterials department. Polyurethanes are characterized by a broad spectrum of properties, ranging from thermoplastic elastomers and porous foams to rigid polymer networks. Copolymerization allows the adaption of the properties of the polymers to the specific material requirements.

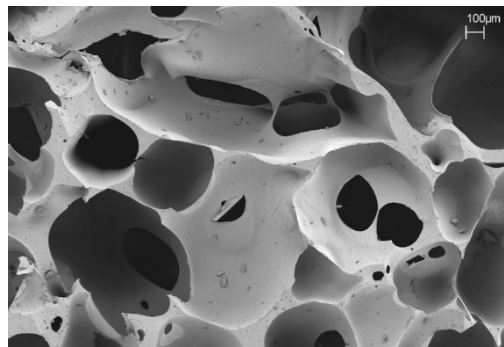
Technology

The following activities are current focus at INNOVENT:

- Production of porous polyurethane scaffolds (BMW project in progress)
- Development of extrudable polyurethanes (in the low temperature range $< 120\text{ }^{\circ}\text{C}$)
- Forming by injection molding (tension and bending rods, platelets)
- Electrospinning of polyurethane microfiber nonwovens up to 400 cm^2 in size
- Addition of active and bioactive substances, dyes or nanoparticles
- Addition of fillers (e.g. calcium phosphates, calcium carbonates)
- Adjusting of degradation times for different applications



Resorbable PU foam



SEM image of a PU foam



PU test rods

Advantages and Application Possibilities

- Excellent cytocompatibility
- Low thrombogenicity
- Adjustable elasticity and biodegradation, adaptable to specific applications
- Optimal tissue integration, complete resorption without toxic degradation products (results of *in vivo* studies available)
- **Medical Applications:** Use as cardiovascular implants (stents, occluders, heart valves), as osteosynthesis materials, for augmentation in dentistry and spinal surgery or as soft tissue replacement (e.g. hernia occlusion)

State of Development/Equipment and Property Rights

At INNOVENT a mini-extruder and a corresponding injection molding machine (Haake) are available.

Property rights for special applications in life science and medicine are possible.

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