

Universally processable materials for Rapid Prototyping

Flexible polymers as
vein materials

Functional Surface
properties

Biocompatible
and celladhesive

1 *Stereolithography processed blood vein from new photopolymeric materials. Inner diameter <2 mm.*

2 *Epithelial cells growth on new polymeric materials.*

PHOTOCURABLE MATERIALS FOR RAPID PROTOTYPING

Rapid Prototyping (RP) method such as

- 3D-Inkjet Printing
- Stereolithography
- Multiphoton Polymerisation

are high-capacity, modern generativemethods being able to build up most complex 3D prototypes in all kind of areas. Even in medical application nowadays RP gets more and more important to personalize the medical implants to the individual needs of the patients. New materials for rapid prototyping processes are needed that fulfil the variety of requirements on the processing side on the one hand and the multifold demands on a medical implant device as well.

We offer you photocurable materials adapted to your RP device. Materials are specified on nondegradable, biocompatible and medical characteristics.

We adapt the prepolymer materials to the needs of the chosen rapid prototyping process regarding:

- viscosity
- wavelength of light source
- surface tension
- curing speed
- scaling up

Cured polymers are tunable concerning:

- Mechanical Elasticity
- Tensile Strength (1–1000 MPa)
- Swelling grade
- Surface Functionality

Fraunhofer Institute for Applied Polymer Research IAP

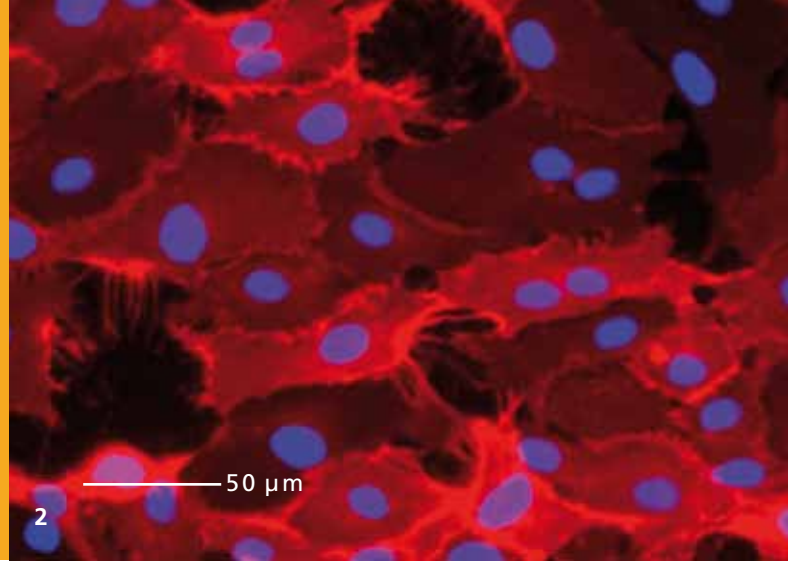
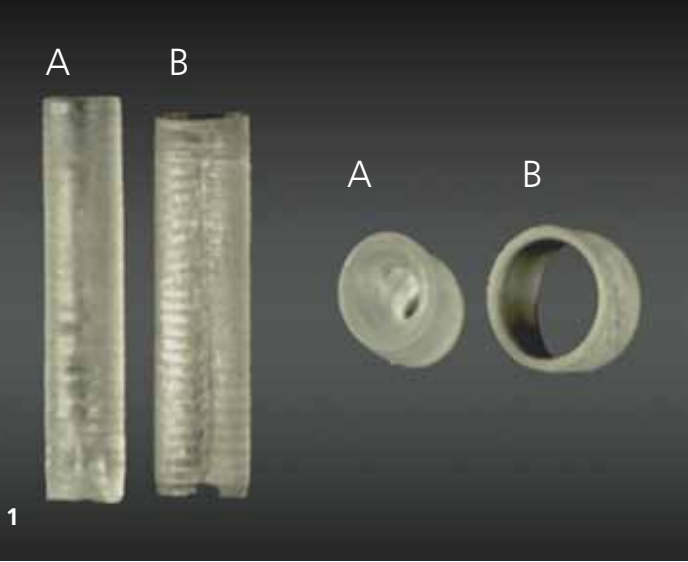
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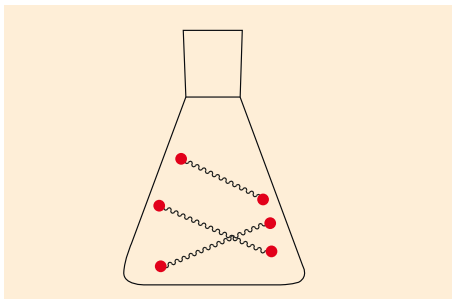
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Adapted Prepolymer Synthesis

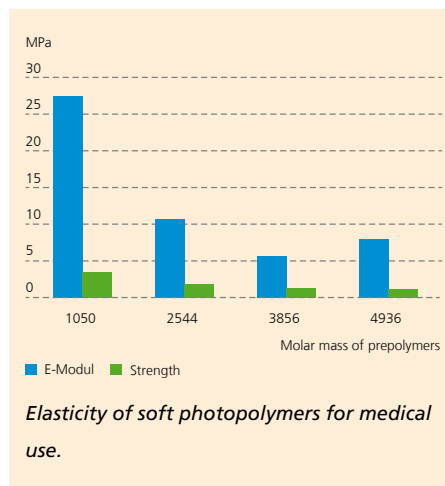
Linear Macromolecules or Oligomers are functionalized in an one step synthesis procedure with photoreactive endgroups. The spacer molecule is chosen of the wanted abilities of the cured polymers attributes as:

- Elasticity
- Elongation Strength
- Wettability
- Surface attributes



Polymer Attributes

The dependency of the molar mass of the deployed prepolymer and the resulting photo-cured polymers E-module enables to tune polymers from elastic (~30MPa) to very elastic materials (~5MPa).



Structuring with SL

Smallest structuring via stereolithography (SL) or multiphoton polymerisation (MPP) allows 3D Prototype processing with complex structures down to mm and μm dimension. [2]

Biocompatibility

Postcured materials are biocompatible and even cell adherent to endothelia cells. [4]

Services

- Synthesis of photoactive resins
- Synthesis and selection of photoinitiators
- Formulation of printable inks
- process-related adjustment of the photoactive materials
- Chemical and physical analysis of prepolymers and polymers

Surface functionality

The polymers surface may be functionalized with chemical groups such as -OH, -CO₂H, NH₂ etc. to adapt the surface with tunable wetting abilities, contact angles or to enable post curing coating possible (e.g. with biomolecules).