PHOTOCURABLE MATERIALS FOR 3D PRINTING

3D printing method such as
  – 3D-inkjet printing
  – stereolithography
  – multiphoton polymerization

are high-capacity, modern generative methods being able to build up most complex 3D prototypes in all kind of areas. Even in medical application nowadays 3D printing 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.

Cured polymers are tunable concerning:
  – mechanical elasticity
  – tensile strength (1–1000 MPa)
  – swelling grade
  – surface functionality
  – tear resistance

We adapt the prepolymer materials to the needs of the chosen rapid prototyping process regarding:
  – viscosity
  – wavelength of light source
  – surface tension
  – curing speed

We offer you photocurable materials adapted to your printing machine. Materials are specified on nondegradable, biocompatible and medical characteristics.
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 (~ 100 MPa) to very elastic materials (≤ 1 MPa).

Elasticity of soft photopolymers for medical use.

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]

Surface functionality

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

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 prepolymer and polymers