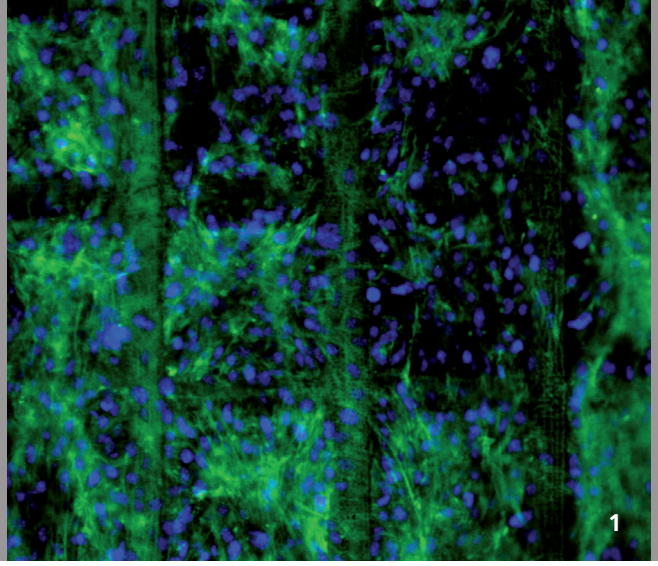

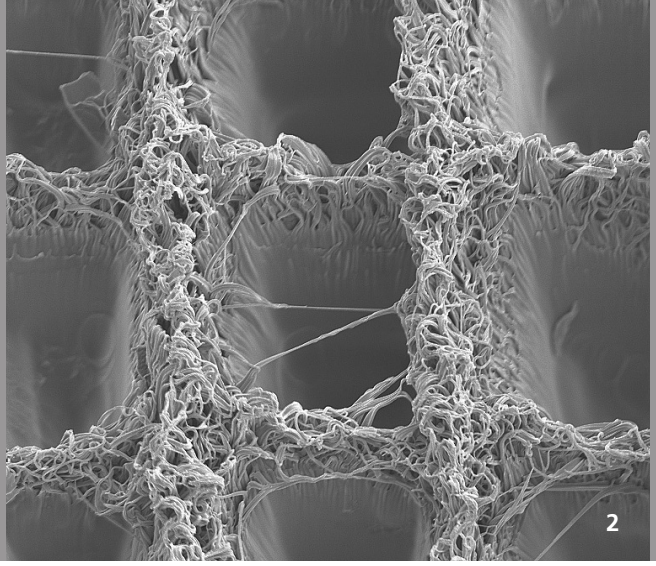



# BIOCOMPATIBLE PHOTORESIN FOR STEREOLITHOGRAPHY

## Task

Tissue engineering is a field of science that, by combining cell biology, generative process technologies and chemical material development, can replace or repair biological tissue. One approach tissue engineering takes is the additive manufacturing of scaffolds, which are seeded and cultivated with the body's own cells. Through the use of mechanical and biological stimuli, artificial tissue-like structures can be produced. The challenge is to create skeletal structures that meet the specific requirements in terms of mechanical stability, elasticity and biocompatibility. At the same time 3D freeform shapes have to be produced, tailored to the patient with resolutions in the range of ~ 10 µm.

## Method

By using local photochemical polymerization, Fraunhofer ILT has built 3D polymer components layer by layer. The monomers here are linked together via thiol-ene click chemistry, whereby the use of potentially cytotoxic factors, e.g. photo-initiators and absorbers, can be minimized. Elastic 3D polymer components, which swell upon contact with water, can thus be manufactured by means of lithography-based 3D printing processes, such as digital light processing (DLP) or stereo-lithography (SLA).

*1 Light microscopic fluorescence image of a cell-populated scaffold (green: cytoskeleton, blue: cell nucleus).*

*2 SEM image of a biocompatible scaffold.*

## Result

Fraunhofer ILT has developed a photoresin for the additive manufacturing of biocompatible and elastic polymer 3D free-form shapes. Thanks to proliferation and cytotoxicity assays, the biocompatibility of the polymers has been demonstrated, and after coating with poly-L-lysine, cell adhesion of fibro-blasts was shown at the surface.

## Applications

The new material can be used primarily in the production of scaffolds for implants and cell assays. In addition, the material and technical investigations form the basis for a new class of stereolithographically processable materials for technical applications.

The project was financed by the Exploratory Research Space of the RWTH Aachen University and the Hans Hermann Voss Foundation.

## Contacts

M.Sc. Andreas Hoffmann
Telephone +49 241 8906-447
andreas.hoffmann@ilt.fraunhofer.de

Dipl.-Chem. Holger Leonards
Telephone +49 241 8906-601
holger.leonards@ilt.fraunhofer.de



Fraunhofer Institute for Laser Technology ILT, www.ilt.fraunhofer.de
DQS certified by DIN EN ISO 9001, Reg.-No.: DE-69572-01