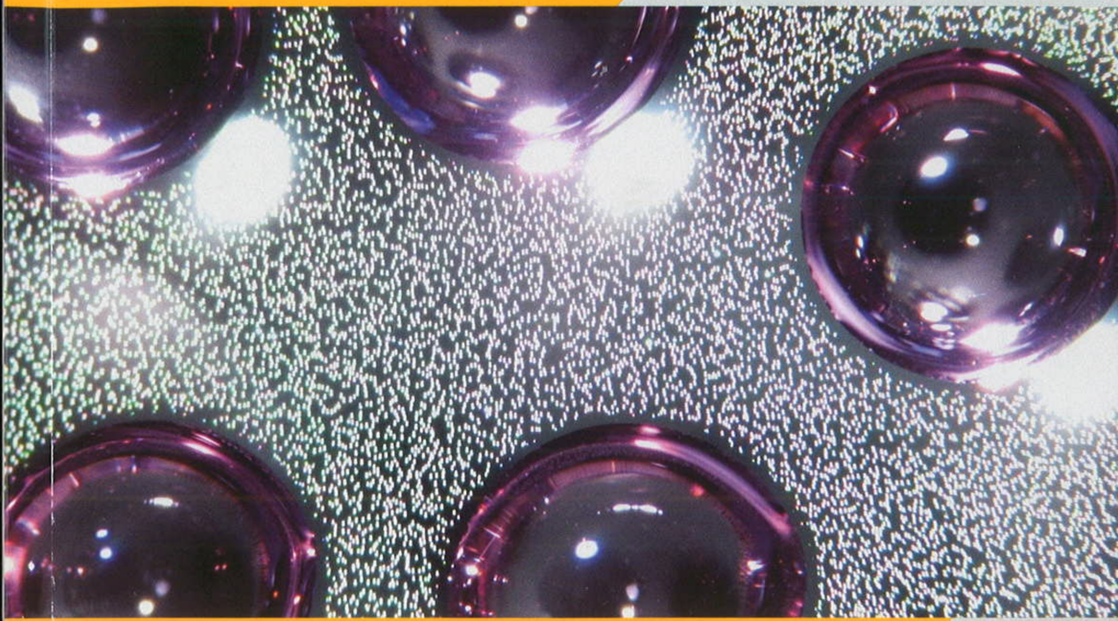
Tapping the Potential of Stem Cells



world conference on **regenerative medicine**

[Germany | Leipzig 2009]

October 29-31, 2009 | www.wcrm-leipzig.com

Program

Rapid Prototyping and Scaffolds
New Techniques for Tissue Engineering

sium

4TH FRAUNHOFER LIFE SCIENCE SYMPOSIUM "RAPID PROTOTYPING AND SCAFFOLDS – NEW TECHNIQUES FOR TISSUE ENGINEERING"

Partners

Rapid Prototyping Network ENFICOS
(funded by FMET)
www.rp-netzwerk.de

enficos

Fraunhofer Additive Manufacturing Alliance
www.generativ.fraunhofer.de

Fraunhofer GENERATIV

Program Overview

	Room 10
09:00 - 10:30 am	Techniques in Rapid Prototyping *Keynote: L. Moroni*
10:30 - 11:00 am	Coffee Break & Poster Session
11:00 - 12:30 pm	Biocompatible Materials and Medical Application *Keynotes: J. V. Seppälä, J. Stampfl*
12:30 - 02:00 pm	Lunch Break
02:00 - 03:30 pm	Materials and Techniques in Rapid Prototyping
03:30 - 04:00 pm	Coffee Break & Poster Session
04:00 - 05:30 pm	Biological Responses and Clinical Applications of Rapid Prototyping *Keynote: M. Kellomäki*
05:45 - 07:00 pm	Opening Ceremony WRM (in Hall 2)
07:00 pm	Get-together in the Exhibition Area

Room 10

09:00 - 10:30 am Techniques in Rapid Prototyping
Chairs: F. Rustichelli, D. Glatz

Design of Rapid Prototyped Smart Scaffolds in Regenerative Medicine
L. Moroni Keynote

Rapid Prototyping Technologies for Regenerative Medicine (An Introduction and Overview About Methods, Possibilities and Advantages)
A. Hähndel

Innovative Custom-made Development and Production of Textile Scaffolds for Tissue Engineering
A. Arshi

Fabrication of 3D Scaffolds by Two-photon Polymerization of Acrylated Polyethylene Glycols
A. Ovsianikov

10:30 - 11:00 am Coffee Break

11:00 am - 12:30 pm Biocompatible Materials and Medical Application
Chairs: A. Grzesiak, J. Kuhbier

Novel Resorbable Polymers for Tissue Engineering and Controlled Release
J. V. Seppälä Keynote

Biophotopolymers for Stereolithography and Two-photon Lithography
J. Stampfl Keynote

Spider Silk as a Scaffold for Cell Seeding Using Miniature Weaving Frames
J, Kuhbier

12:30 - 02:00 pm Lunch Break

02:00 - 3:30 pm Materials and Techniques in Rapid Prototyping
Chairs: A. Grzesiak, V. Popov

Advanced Production Concepts for Metallic Medical Implants
F. Petzoldt

Rapid Prototypi
H.-J. Richter
New Methods i
Melting
W. Meiners
Internal Stresses
R. Jäger

03:30 - 04:00 pm

04:00 - 05:30 pm

Rapid Prototypin
M. Kellomäki Keyn
Production of In
A Quality Contro
D. Schulze
The Biological Re
Nanoparticles
C. Greulich
Innovative, Tailor
Dispense-plotting
U. Deisinger
Gallium Releasing
A. R. Boccaccini

05:45 - 07:00 pm

07:00 pm

Chain linking reactions have lead to poly(ester-urethanes), poly(ester-amides), poly(ester-anhydrides) and poly(phospho-esters). Poly(ester-amides) based on chain-extended ε-caprolactone oligomers have shown enzymatic surface erodability, and they are regarded as potential materials for targeted delivery. Rapidly degrading poly(ester-anhydrides) have exhibited hydrolysis-based surface erosion characteristics, enabling zero-order active agent release. These polymers with highly promising degradation behavior are tested for the release of macromolecular active agents, which do not dissolute by diffusion-based mechanisms. The synthesized polymers have also been used in bioactive composite materials, in which bioactive glass granules or fibers are used as the bioactive component. These materials are bioactive in a simulated body fluid environment and *in vivo*, and they appear to have excellent osteoconductive properties.

Furthermore, crosslinked polymers have been obtained. Some of these crosslinkable prepolymers are photocurable at room temperature, which enables the use of new methods to prepare 3D scaffold constructs for tissue engineering applications. Well-organized architecture and multiscale interconnected porosity has been obtained (e.g., by using micromolding in capillaries or stereolithography).

KL038 Regulatory affairs & policy in regenerative medicine

B Siegel[1]
[1]Genetics Policy Institute, Wellington, FL, USA

The political climate for regenerative medicine has changed for the better. In the area of funding for basic research in embryonic stem cells, a new administration in Washington promises new funding opportunities. A broad consumer movement propels the field forward.

There exists a new ReGEN industry concentrating on cell therapies. How will companies untangle the IP thicket? Who will train the clinicians to perform cell therapies? Who will devise the strategies for reimbursements? Will the global regulatory authorities create a system to move cell therapies forward, sooner rather than later?

For societies to realize the full promise of regenerative medicine, it is imperative to create a foundation of sensible public policy. The ramifications for the future of medicine are immense.

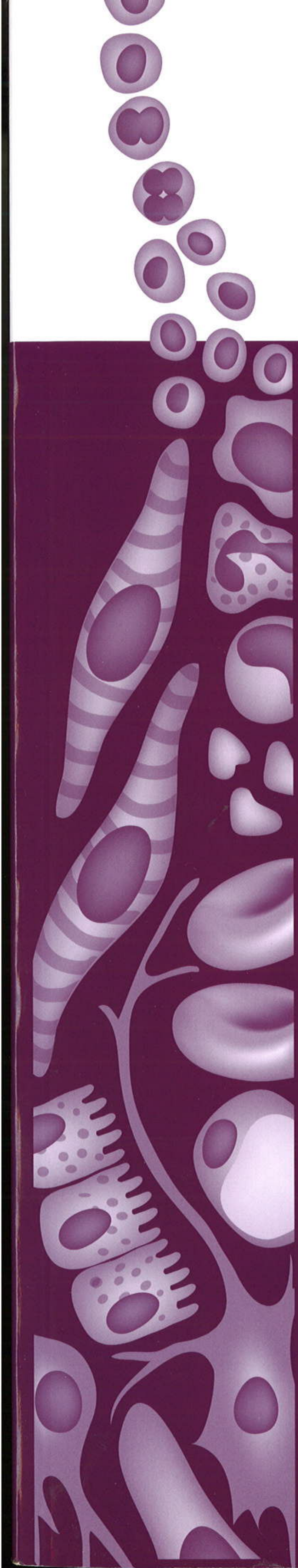
KL039 Biophotopolymers for stereolithography & two-photon lithography

J Stampfl[1], C Heller[1], M Schwentenwein[2], F Varga[3], G Russmüller[4] and R Liska[2]
[1]TU Wien, Institute of Materials Science and Technology, Vienna, Austria
[2]TU Wien, Institute of Applied Synthetic Chemistry, Vienna, Austria
[3]Ludwig Boltzmann Institute of Osteology, Vienna, Austria
[4]Medizinische Universität Wien, Department of Cranio-, Maxillofacial and Oral Surgery, Vienna, Austria

The fabrication of geometrically well-defined 3D scaffolds offering good biofunctional (biocompatibility, degradability and cell adhesion) properties is still a largely unsolved issue in regenerative medicine. One approach to manufacture such 3D scaffolds is based on additive manufacturing technologies (AMT). For this work, lithographic AMT were evaluated regarding their suitability for fabricating cellular scaffolds. The focus of the investigations lies on dynamic-mask processes, laser micro-stereolithography and two-photon lithography. These methods allow the fabrication of parts with minimum feature resolutions down to 200 nm and minimum wall thicknesses down to 1 µm. AMT is therefore suitable for the fabrication of cellular structures in a number of applications in biomedical engineering.

In order to find suitable materials the biocompatibility, determined by cell adhesion and cell proliferation of osteoblast-like cells, the photo reactivity, mechanical properties and cytotoxicity of several commercially available acrylate-based monomers and polymers have been tested. Despite the high rate of polymerization and the easy accessibility of a large number of monomers, the main drawback of these acrylate-containing resins is the high cytotoxicity of residual unreacted acrylate groups. Therefore, a completely new class of photoreactive monomers based on vinyl ester, vinyl carbonates and vinyl carbamates were synthesized. These materials turned out to show lower cytotoxicity by a factor of 100 compared with similar acrylates.

The biocompatibility and mechanical properties of the vinyl ester polymers were evaluated, indicating the suitability of this new class of biophotopolymers for a number of applications in tissue engineering. Further tests regarding biodegradeability of these polymers were performed, indicating the suitability of this new class of materials for the fabrication of 3D scaffolds.



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