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ABSTRACT

FABRICATION OF COMPLEX SCAFFOLDS AND TISSUE ENGINEERING CONSTRUCTS BY 3D PLOTTING

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Many rapid prototyping technologies, originally developed for mechanical engineering, have been adapted to scaffold fabrication and manufacturing of tissue engineering constructs. The method of 3D plotting– layer by layer deposition of pasty biomaterials to create 3D objects of pre-defined inner and outer morphology – offers a variety of options for creating complex structures, composed of more than one (bio)material. Due to the mild manufacturing conditions also delicate components like biopolymers, growth factors and even live cells can be included in the 3D plotting process. In addition, this technique easily can be performed under sterile conditions because the necessary instrumentation is small compared to e.g. 3D powder printers or machines for selective laser sintering. This paper gives an overview of some recent developments in the field of 3D plotting, especially concerning manufacturing of calcium phosphate cement (CPC) scaffolds under mild conditions, combination of CPC and biopolymers within one object and direct plotting of blood capillary-like hollow strands. Finally, also the inclusion of living cells in the 3D plotting process will be discussed.

Brief CV

Michael Gelinsky, born 1967 in Tübingen* (Germany) studied Chemistry at the University of Freiburg in Germany and did his PhD there on a topic of bioinorganic chemistry with Heinrich Vahrenkamp.

In 1999 he moved to Dresden University of Technology and started to work on biomaterials at the Institute of Materials Science. In 2002 he became head of the research group "Tissue Engineering and Biomineralisation" at the newly founded Max Bergmann Center of Biomaterials.

2010 he was appointed full professor by the Medical Faculty of Dresden University and heads the Centre for Translational Bone, Joint and Soft Tissue Research, a central research unit of Faculty and University Hospital.

The work of Michael Gelinsky is focused on biomaterials design for hard and soft tissues, tissue engineering, translational musculoskeletal medicine and bone biomineralisation. He is a founder member the Center for Regenerative Therapies Dresden (CRTD) which is part of the German National Initiative of Excellence.

He is actively cooperating with researchers in Europe as well as Australia, Canada, China, India, Japan, Korea and Thailand – and acts as PI of several coordinated national and international projects.

* If the "ü" in "Tübingen" is not available please use "ue" instead