conferenceseries.com

J Biotechnol Biomater 2018, Volume 8
DOI: 10.4172/2155-952X-C1-089

3rd Annual Conference and Expo on

BIOMATERIALS

March 05-06, 2018 | Berlin, Germany

Laser printing of biomaterials and living cells

Boris Chichkov[1, 2]
[1]Leibniz University Hannover, Germany
[2]Laser Zetrum Hannover e.V., Germany

In this lecture, we discuss laser based techniques applied for precise generation of 3D scaffolds for tissue engineering and for printing biological cells into 3D patterns. For the scaffold generation, two-photon polymerization (2PP) technique is applied, which allows writing CAD structures directly into the volume of photosensitive polymer solutions. Scaffolds from different biomaterials like organic-inorganic Sol-Gel-Composites (e.g., zirconium-hybrids), biodegradable polymers (e.g., polylactic acid (PLA), polycaprolactone (PCL), polyethylene glycol (PEG)), and hydrogels (e.g., gelatin, hyaluronic acid, chitosan, alginate, gellan gum) or hydrogel blends, have been generated with this technique. For arranging cells in 3D patterns, laser-assisted bioprinting (LAB) based on the laser-induced forward transfer process is used. Different cell types, including primary cells, stem cells, and iPS cells embedded in hydrogels as extra-cellular matrix, have been printed. Both 2PP and LAB techniques are capable of advancing 3D cell culture towards CAD defined and precisely arranged 3D cell models and organ-on-chip systems. Printed tissue, for example skin, can be used for analyzing the effect of agents like pharmaceuticals or cosmetics *ex vivo* and by applying human primary cells it might be applied instead of animal tests.

b.chichkov@lzh.de