Living Foams - a route towards artificial tissue

Initiative: "Leben?" - Ein neuer Blick der Naturwissenschaften auf die grundlegenden Prinzipien des Lebens

(beendet)

Bewilligung: 01.12.2016

Laufzeit: 5 Jahre

The main objective of this proposal is to realize a bottom-up strategy for tailored artificial tissue - a living foam - using multifunctional minimal cell compartments (MCCs) based on giant liposomes or polymersomes as fundamental building blocks. The living foam is characterized by dedicated molecular contacts between the compartments serving as cell-cell contact mimics comprising artificial gap junctions and artificial adherens junctions. The junctions permit to generate an interconnected communication network of MCCs that relay chemical and mechanical signals. Eventually, this design scheme will allow us to form actively driven foams in 3-D that resemble tissues in various ways. The foam will also allow replacing a fraction of living cells in native tissue to form hybrid structures either to substitute or to supply new properties paving the way towards a revolution in tissue engineering in the context of wound healing, contractile tissue, skin ageing and relaying signals for unperturbed bone development.

Projektbeteiligte

Prof. Dr. Andreas Janshoff
Universität Göttingen
Fakultät für Chemie
Institut für Physikalische Chemie
Biophysikalische Chemie
Göttingen

Prof. Dr. Joachim Spatz
Max-Planck-Institut für medizinische Forschung
Dept. of Biointerphase Science & Technology
Heidelberg

Dr. Marco Tarantola
Max-Planck-Institut für Dynamik und Selbstorganisation
LFPB/Biophysics Group
Göttingen
Prof. Dr. Claudia Steinem  
Universität Göttingen  
Faculty of Chemistry  
Institute of Organic and Biomolecular Chemistry  
Göttingen

Prof. Dr. Eberhard Bodenschatz  
Max-Planck-Institut für Dynamik und Selbstorganisation  
Abteilung Hydrodynamik, Strukturbildung und Biokomplexität  
Göttingen

Open Access-Publikationen

Prestress and Area Compressibility of Actin Cortex