Coaxial 3D printing of actuating electroactive scaffolds for muscle regeneration

Initiative: Integration molekularer Komponenten in funktionale makroskopische Systeme (beendet, nur noch Fortsetzungsanträge)

Bewilligung: 25.06.2017

Laufzeit: 3 Jahre

Projekt-Website: http://www.fmz.uni-wuerzburg.de/fmz/

Electroactive polymers have been investigated as stimuli-responsive materials for many years but their functional application has fallen short of expectations. The project aims at a new approach combining synthesis of conductive polymers, state of the art materials science and advanced 3D printing to utilize nanoscale effects in microscale processing, that can be electrically simulated to actuate on the macroscale. Using the newly developed 3D printing technique of melt electrospinning writing, coaxial (core-shell) fibres that comprise of a stimuli responsive shell surrounding a conductive polymer core will be prepared. Flow induced crystallization - already observed with melt electrospinning writing - aligns nanoscopic structures so that they can macroscopically electromodulate. These 3D-printed biomedical materials will be coated with a biocompatible hydrogel to integrate within living tissue/cells. The outcome of a successful project is a strong foundation for manufacturing new electroactive polymers that can then be tailored for use in many different life science applications.

Projektbeteiligte

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Open Access-Publikationen

The Next Frontier in Melt Electrospinning: Taming the Jet
Designing outside the box: Unlocking the geometric freedom of melt electrowriting using microscale layer shifting.
Accurate prediction of melt electrowritten laydown patterns from simple geometrical considerations.
Polymers for melt electrowriting