

Accepted Manuscript

Short communication

3D freeform printing of silk fibroin

Maria J. Rodriguez, Thomas A. Dixon, Eliad Cohen, Wenwen Huang, Fiorenzo G. Omenetto, David L. Kaplan

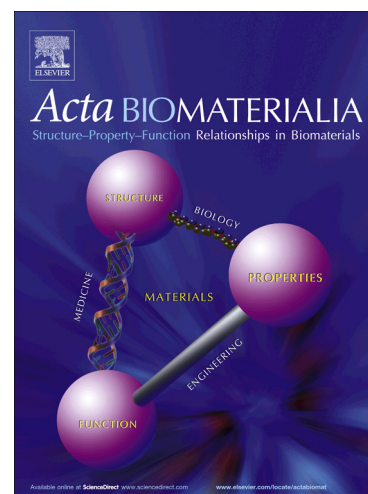
PII: S1742-7061(18)30118-1
DOI: <https://doi.org/10.1016/j.actbio.2018.02.035>
Reference: ACTBIO 5340

To appear in: *Acta Biomaterialia*

Received Date: 23 November 2017
Revised Date: 13 February 2018
Accepted Date: 28 February 2018

Please cite this article as: Rodriguez, M.J., Dixon, T.A., Cohen, E., Huang, W., Omenetto, F.G., Kaplan, D.L., 3D freeform printing of silk fibroin, *Acta Biomaterialia* (2018), doi: <https://doi.org/10.1016/j.actbio.2018.02.035>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Article type: Brief Communication**3D Freeform Printing of Silk Fibroin**

*Maria J. Rodriguez, Thomas A. Dixon, Eliad Cohen, Wenwen Huang, Fiorenzo G. Omenetto, David L. Kaplan**

M. R., Dr. T. A. D., Dr. W.H., Prof. F.O., Prof. D. K.

Department of Biomedical Engineering, Tufts University, Medford, MA, USA

E-mail: david.kaplan@tufts.edu

Dr. E.C.

Biomedical Engineering Program, University of Massachusetts, Lowell.

Lowell, MA, USA

Keywords: silk, printing, freeform, biomaterials, laponite

Abstract

Freeform fabrication has emerged as a key direction in printing biologically-relevant materials and structures. With this emerging technology, complex structures with microscale resolution can be created in arbitrary geometries and without the limitations found in traditional bottom-up or top-down additive manufacturing methods. Recent advances in freeform printing have used the physical properties of microparticle-based granular gels as a medium for the submerged extrusion of bioinks. However, most of these techniques require post-processing or crosslinking for the removal of the printed structures. [1,2] In this communication, we introduce a novel method for the one-step gelation of silk fibroin within a suspension of synthetic nanoclay (Laponite) and polyethylene glycol (PEG). Silk fibroin has been used as a biopolymer for bioprinting in several contexts, but chemical or enzymatic additives or bulking agents are needed to stabilize 3D structures. Our method requires no post-processing of printed structures and allows for *in situ* physical crosslinking of pure aqueous silk fibroin into arbitrary geometries produced through freeform 3D printing.

1. Introduction

Silk fibroin is an attractive biopolymer for diverse applications due to its all-aqueous and

Download English Version:

<https://daneshyari.com/en/article/6482971>

Download Persian Version:

<https://daneshyari.com/article/6482971>

[Daneshyari.com](https://daneshyari.com)