

## Accepted Manuscript

Amino acid-grafted and N-acylated chitosan thiomers:  
Construction of 3D bio-scaffolds for potential cartilage repair  
applications

Fernanda G.L. Medeiros Borsagli, Isadora C. Carvalho, Herman  
S. Mansur



PII: S0141-8130(17)34265-4  
DOI: doi:[10.1016/j.ijbiomac.2018.03.133](https://doi.org/10.1016/j.ijbiomac.2018.03.133)  
Reference: BIOMAC 9355

To appear in:

Received date: 31 October 2017  
Revised date: 8 February 2018  
Accepted date: 21 March 2018

Please cite this article as: Fernanda G.L. Medeiros Borsagli, Isadora C. Carvalho, Herman S. Mansur , Amino acid-grafted and N-acylated chitosan thiomers: Construction of 3D bio-scaffolds for potential cartilage repair applications. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Biomac(2017), doi:[10.1016/j.ijbiomac.2018.03.133](https://doi.org/10.1016/j.ijbiomac.2018.03.133)

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.

# Amino Acid-grafted and *N*-acylated Chitosan Thiomers: Construction of 3D Bio-Scaffolds for Potential Cartilage Repair Applications

Fernanda G. L. Medeiros Borsagli<sup>1a</sup>, Isadora C. Carvalho<sup>1b</sup>, Herman S. Mansur<sup>1\*</sup>

<sup>1</sup>*Center of Nanoscience, Nanotechnology and Innovation - CeNano<sup>2</sup>I, Department of Metallurgical and Materials Engineering, Federal University of Minas Gerais/UFGM, Brazil.*

<sup>a</sup>medeirosfernanda80@gmail.com; <sup>b</sup>isadora.cota@gmail.com; \*hmansur@demet.ufmg.br

## Abstract

In this work novel three-dimensional (3D) scaffolds were developed with chitosan thiomers derivatives for potential soft tissue repair applications. Amino acid-grafted chitosan (cysteine, CHICys) and *N*-acylated chitosan (11-mercaptoundecanoic acid, CHIMerc) derivatives were synthesized by covalent coupling reaction and hydrogel scaffolds were produced by freeze-drying process. They were comprehensively characterized by swelling and degradation behaviors, NMR, FTIR and Raman spectroscopy, SEM and X-ray microcomputed tomography. The results demonstrated the synthesis of chitosan thiomers with distinct degree of thiol substitution (CHICys=5 % and CHIMerc=26 %), producing highly porous scaffolds (porosity > 80 %) with hierarchical interconnected 3D pore structures. Additionally, their physicochemical properties and architectural features were significantly tuned by the thiol-modifier, evidenced by the swelling degrees ranging from approximately 2300% (CHICys) to 1800 % (CHIMerc) and chemical stability against degradation. Moreover, they exhibited cytocompatibility based on *in vitro* bioassays, which hold promise as suitable platform in soft tissue engineering applications.

**Keywords:** Chitosan; Thiolated chitosan; Thiomers; 3D Scaffold; Cytocompatibility; Soft tissue biomaterial.

---

\* **Corresponding author: Prof. H Mansur.** Department of Metallurgical and Materials Engineering, Federal University of Minas Gerais, Av. Antônio Carlos, 6627– Escola de Engenharia, Bloco 2 – Sala 2233, 31.270-901, Belo Horizonte/MG, Brazil, Phone/FAX: +55 31 34091843; email: hmansur@demet.ufmg.br

Download English Version:

<https://daneshyari.com/en/article/8327237>

Download Persian Version:

<https://daneshyari.com/article/8327237>

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