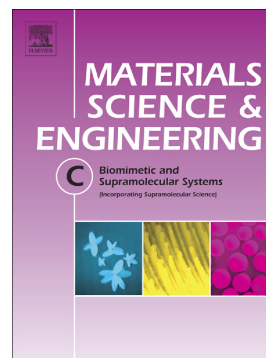


Accepted Manuscript

3D porous collagen/functionalized multiwalled carbon nanotube/chitosan/hydroxyapatite composite scaffolds for bone tissue engineering

S. Türk, I. Altınsoy, G. Çelebi Efe, M. Ipek, M. Özacar, C. Bindal



PII: S0928-4931(18)30004-3
DOI: doi:[10.1016/j.msec.2018.07.020](https://doi.org/10.1016/j.msec.2018.07.020)
Reference: MSC 8732
To appear in: *Materials Science & Engineering C*
Received date: 2 January 2018
Revised date: 25 May 2018
Accepted date: 8 July 2018

Please cite this article as: S. Türk, I. Altınsoy, G. Çelebi Efe, M. Ipek, M. Özacar, C. Bindal , 3D porous collagen/functionalized multiwalled carbon nanotube/chitosan/hydroxyapatite composite scaffolds for bone tissue engineering. Msc (2018), doi:[10.1016/j.msec.2018.07.020](https://doi.org/10.1016/j.msec.2018.07.020)

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.

3D porous collagen/functionalized multiwalled carbon nanotube/chitosan/hydroxyapatite composite scaffolds for bone tissue engineering

S. Türk^a, I. Altınsoy^b, G. Çelebi Efe^{a,b}, M. Ipek^b, M. Özacar^{a,c}, C. Bindal^{a,b,*}

^a*Sakarya University, Biomedical, Magnetic and Semi Conductive Materials Research Center (BIMAS-RC), Esentepe Campus, 54187 Sakarya, Turkey*

^b*Sakarya University, Faculty of Engineering, Department of Metallurgy and Materials Engineering, Esentepe Campus, 54187 Sakarya, Turkey*

^c*Sakarya University, Science & Arts Faculty, Department of Chemistry, Sakarya 54187, Turkey.*

Abstract

In this study, we describe new collagen / functionalized multiwalled carbon nanotube / chitosan / hydroxyapatite (Col/f-MWCNT/CS/HA) composite scaffolds which were fabricated by freezing (-40°C at 0.9°C/min) and lyophilization (48 h, 0°C and 200 mtorr). The compressive stresses (from 523 to 1112 kPa), swelling (from 513.9±27 to 481.05±25 %), porosity (from 98±0.15 to 95.7±0.1 %), contact angle (from 87.8 to 76.7°) properties examined before and after biomineralization for comparison 3D porous Col, CS, Col/f-MWCNT and Col/f-MWCNT/CS scaffolds. Biomineralization was performed by biomimetic method in concentrated SBF (10xSBF, at 37°C and 6.5pH). XRD, SEM, EDS, FTIR, TGA, Optical microscopy and BET results showed that compared to Col, CS and Col/f-MWCNT scaffolds, Col/f-MWCNT/CS scaffolds had higher in vitro bioactivity, large surface area (11.746 m²/g) and a good pore volume (0.026 cc/g), interconnected porous microstructure (with 20-350 µm pore size) and incorporates the advantageous properties of both Col, f-MWCNT, CS and HA. Finally, the methyl thiazolyl tetrazolium (MTT) assay was performed to evaluate scaffolds cytotoxicity which showed that Col/f-MWCNT/CS scaffolds have the best biocompatibility.

Keywords: Scaffold; Hydroxyapatite; Biomimetic method; Bone tissue engineering

* Corresponding author.

E-mail addresses: bindal@sakarya.edu.tr Tel: +90 264 295 5759 Fax: +90 264 295 56 01

Download English Version:

<https://daneshyari.com/en/article/7866098>

Download Persian Version:

<https://daneshyari.com/article/7866098>

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