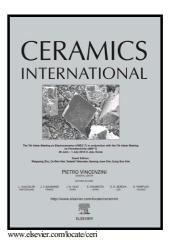
Author's Accepted Manuscript

Biomimetic chitosan-hydroxyapatite hybrid biocoatings for enamel remineralization

Agripina Zaharia, Viorica Muşat, Elena Maria Anghel, Irina Atkinson, Oana-Cătălina Mocioiu, Mariana Buşilă, Viorica Ghisman Pleşcan



 PII:
 S0272-8842(17)31186-0

 DOI:
 http://dx.doi.org/10.1016/j.ceramint.2017.05.346

 Reference:
 CERI15506

To appear in: Ceramics International

Received date: 4 April 2017 Revised date: 14 May 2017 Accepted date: 29 May 2017

Cite this article as: Agripina Zaharia, Viorica Muşat, Elena Maria Anghel, Irina Atkinson, Oana-Cătălina Mocioiu, Mariana Buşilă and Viorica Ghisman Pleşcan Biomimetic chitosan-hydroxyapatite hybrid biocoatings for ename r e m i n e r a l i z a t i o n , *Ceramics Internationa* http://dx.doi.org/10.1016/j.ceramint.2017.05.346

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable 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

ACCEPTED MANUSCRIPT

Biomimetic chitosan-hydroxyapatite hybrid biocoatings for enamel remineralization

Agripina Zaharia¹, Viorica Muşat^{2*}, Elena Maria Anghel³, Irina Atkinson³, Oana-Cătălina Mocioiu³, Mariana Buşilă², Viorica Ghisman Pleșcan²

¹Faculty of Dentistry, Ovidius University of Constanta, 124 Mamaia Blvd., 8700 Constanta, Romania

²Centre of Nanostructures and Functional Materials-CNMF, Department of Materials Science and Engineering, "Dunărea de Jos" University of Galati, 111 Domnească, 800201 Galați, Romania,

³Institute of Physical Chemistry "Ilie Murgulescu" of Romanian Academy, Spl. Independentei 2020, 060021 Bucharest, Romania

*Corresponding author. viorica.musat@ugal.ro

Abstract

Development of biomimetic ceramic-based materials is currently a challenge in dental tissue engineering. Synthetic hybrid chitosan (CS)-hydroxyapatite (HAP) layers are regarded as candidates for teeth remineralization, protection against further demineralization ensuring also antibacterial activity. Thus, the aim of this work was to obtain new biomimetic CS-HAP layers for restoration of damaged mature enamels and to pursue morphological, compositional, structural and hardness modifications of the grown layers by immersion for 4, 7 and 10 days into artificial saliva (AS) under CS-Emdogain (EMD) hydrogel action. SEM-EDX, HRTEM-SAED, FTIR and micro-Raman findings indicated formation of carbonate-substituted HAP, B-type, with c-axis orientation in the newly formed CS-HAP coatings. Prolonged immersion span of 10 days caused increasing CS content in the superficial grown layer while carbonate content diminished. Optimum Ca/P ratio (1.85 at. %) and hardness of 2.48 GPa were recorded for seven days growth using CS-EMD hydrogel. Subtle changes in HAP lattice parameters were recorded for 10-day grown layer while c-axis orientation of HAP crystals at mesoscale was preserved. Mechanism of CS interaction during in situ biomimetic synthesis and self-assembly of HAP crystals under CS-EMD hydrogel presence is also discussed.

Graphical Abstract

Download English Version:

https://daneshyari.com/en/article/5438098

Download Persian Version:

https://daneshyari.com/article/5438098

Daneshyari.com