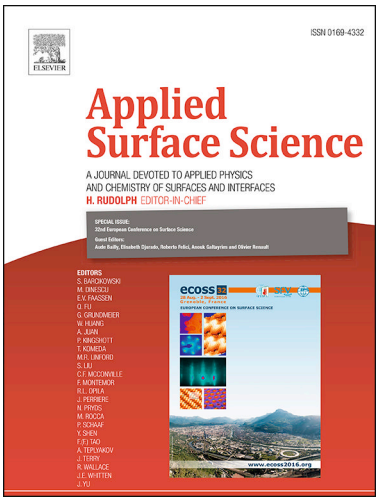

Full Length Article

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PII: S0169-4332(18)30012-6
DOI: https://doi.org/10.1016/j.apsusc.2018.01.008
Reference: APSUSC 38147

To appear in: *Applied Surface Science*

Received Date: 16 October 2017
Revised Date: 22 December 2017
Accepted Date: 2 January 2018

Please cite this article as: A.C. Popescu, P.E. Florian, G.E. Stan, G. Popescu-Pelin, I. Zgura, M. Enculescu, F.N. Oktar, R. Trusca, L.E. Sima, A. Roseanu, L. Duta, Physical-chemical characterization and biological assessment of simple and lithium-doped biological-derived hydroxyapatite thin films for a new generation of metallic implants, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.01.008

Physical-chemical characterization and biological assessment of simple and lithium-doped biological-derived hydroxyapatite thin films for a new generation of metallic implants

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Abstract

We report on the synthesis by PLD of simple and lithium-doped biological-origin hydroxyapatite films. The role of doping reagents (Li_2CO_3, Li_3PO_4) on the morphology, structure, chemical composition, bonding strength and cytocompatibility of the films was investigated.

SEM investigations of the films evidenced a surface morphology consisting of particles with mean diameters of (5–7) μm. XRD analyses demonstrated that the synthesized structures consisted of HA phase only, with different degrees of crystallinity, mainly influenced by the doping reagent type. After only three days of immersion in simulated body fluid, FTIR spectra showed a remarkable growth of a biomimetic HA film, indicative of a high biomineralization capacity of the coatings. EDS analyses revealed a quasi-stoichiometric target-to-substrate transfer, the values inferred for the Ca/P ratio corresponding to a biological apatite. All synthesized structures displayed a hydrophilic behavior, suitable for attachment of osteoblast cells. *In vitro* cell viability tests showed that the presence of Li_2CO_3 and Li_3PO_4 as doping reagents promoted the hMSC growth on film surfaces.

Taking into consideration these enhanced characteristics, corroborated with a low fabrication cost generated by sustainable resources, one should consider the lithium-doped