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Bioresorbable carbonated hydroxyapatite $\text{Ca}_{10-x}\text{Na}_x(\text{PO}_4)_6-x(\text{CO}_3)_x(\text{OH})_2$ powders for bioactive materials preparation

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Abstract

The purpose of this work was to find and investigate a correlation between the carbonate ion content in crystalline lattice and defect structure, and solubility of the materials; finally, to prepare the materials under study for in vitro tests. Various techniques, such as XRD, FTIR, TEM, FESEM/EDX, TG/DTA, AES (ICP), wet chemical analysis, Ca-ionometry, microvolumetric analysis of evolved CO_2 , BET adsorption, were applied to determine the efficiency of carbonate substitution, and to quantify the elemental composition, as well as to characterize the structure of the carbonated hydroxyapatite and the site(s) of carbonate substitution,. It was shown that AB-type substitution prevails over other types with the carbonate content increase. According to in vitro tests, the bioactivity of the samples is correlated with the carbonate content in carbonate-doped hydroxyapatite due to accumulation of defects in carbonated hydroxyapatite nanocrystals. © Versita Warsaw and Springer-Verlag Berlin Heidelberg 2009.

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Keywords

Aliovalent doping, Carbonated hydroxyapatite, Microstructure, Resorption