PREPARATION AND CHARACTERIZATION OF NANO-SIZED HYDROXYAPATITE PARTICLES FOR USE IN BIOMEDICAL MATERIALS

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Abstract

Natural bone, an innate example of inorganic–organic biocomposites, consists of composition of approximately 70 wt% inorganic crystals (mainly hydroxyapatite with a chemical formula of Ca10(PO4)6(OH)2) and 30 wt% of organic matrix (mainly Type I collagen). Structurally, it is hierarchically organized from macro-, micro-, to nano-scale, where the basic building blocks are the plate-like hydroxyapatite (HAp) nanocrystals incorporated into collagen nanofibers [1.]. HAp is studied due to its biodegradable, bioactive, biocompatible and osteoconductive properties. HAp is widely used as bone substitution in bone tissue engineering and dental implant. However, the application of pure HAp is very limited due to its brittleness, that is why a lot of attention was paid to modifying HAp by polymers [2.-3.]. Needle-like and plate-like nanoparticles of hydroxyapatite were synthesized successfully by wet chemical precipitation and sol-gel precipitation technique. Various calcium and phosphorus precursors were used for preparing. The preparation was based on the following reaction equation with Ca/P molar ratio of 1.67, which was standard stoichiometry for pure HAp. Chemical structure was characterized by X-ray diffractometry, Fourier transform infrared spectroscopy, and thermogravimetric analysis. The particle size and morphology were studied using atomic force microscopy and dynamic light scattering method. The obtained material might be applied in biomedical applications.

LITERATURE


ACKNOWLEDGEMENTS: This work was supported by IGA University of Pardubice in terms of project SG FCT04.