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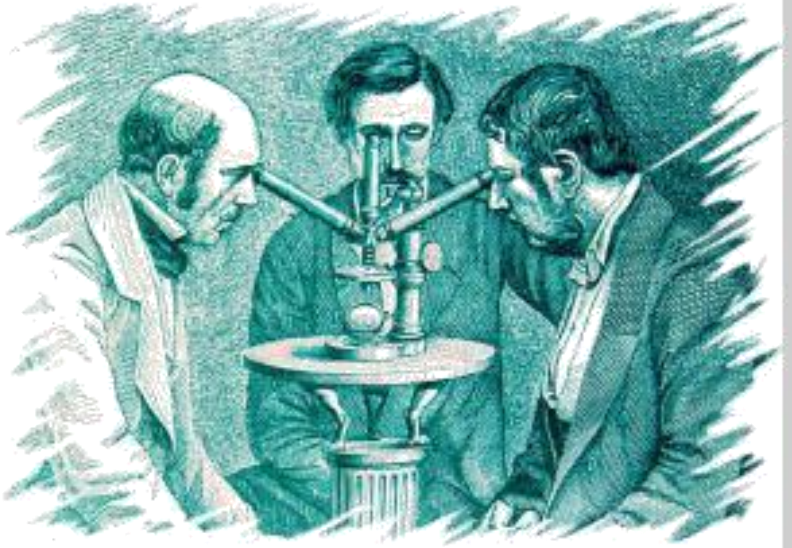

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CONTROLLABLE SYNTHESIS OF TRICALCIUM PHOSPHATE (TCP) POLYMORPHS BY WET PRECIPITATION: EFFECT OF WASHING PROCEDURE

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Calcium hydroxyapatite (HA), α-TCP and β-TCP are alloplastic bone substitutes that belong to the class of calcium phosphate ceramics (CPCs). Being injectable, bioactive and biocompatible, CPCs are promising for bone tissue engineering applications and are used as scaffolds and carriers to deliver stem cells, drugs and growth factors [1, 2]. α- and β-TCP have same chemical composition, but due to different structure, density and solubility, more soluble polymorph α-TCP is used as powder component of various bone cements while β-TCP - as biodegradable bioceramics [3]. It is well known that changing synthesis conditions could lead to final product with aspired structure, morphology or physiochemical properties [4]. The aim of this study was to report on the effect of washing procedure of the as-prepared calcium phosphate precipitates on the synthesis of TCP polymorphs.

α- and β-TCP were synthesized by wet precipitation method using $Ca(NO_3)\cdot 4H_2O$, and $(NH_4)_2HPO_4$ as starting materials. Calcium to phosphorous molar ratio was kept 1.5. As- prepared precipitates were filtered, washed with distilled water and different volume of specific solution: distilled water, ethanol, isopropanol, acetone and acetonitrile. Washed materials were dried in oven overnight and annealed in the furnace in air.

The crystallinity, crystal structure and structural changes were evaluated by X-ray diffraction (XRD), Fourier-transform infrared (FTIR) and Raman spectroscopy. Thermal behavior of the dried precipitates was investigated by thermogravimetric analysis (TGA). Scanning electron microscopy (SEM) was used for the characterization of morphological features of the synthesized products.

α- and β-TCP polymorphs were prepared by wet precipitation procedure at nearly identical thermal conditions. It was shown that the nature and amount of washing agent determines structure and morphology of the as-precipitated species and formation of TCP polymorphs after the thermal treatment.

References

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