Effects of hydrothermal processing conditions on cristallinity of apatite nanoparticles

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Hydroxyapatite (HAp) and other calcium phosphates which belong to apatite class have been one of the main issues that the large numbers of scientific studies were focused on for many years due to their biocompatibility and their bioactivity in human mineralized tissues [1]. The general formula of the apatite structure family can be described by $Me_{10}(AO_4)_6X_2$, where Me represents a relatively large metal cation in the +1 to +3 oxidation state; A is usually a nonmetal and X is an anion located inside hexagonal channels formed by face-sharing M_6 octahedra. Most commonly X is represented as OH^-, halide, CO_3^{2-} or O_2^{2-}.

Apatite characteristics such as crystallinity, particle size and composition etc. play important roles in controlling bioactivity and applicability of materials. For instance the presence of nanoparticles favours nucleation and growth of new bone limbs. Therefore investigation of effects of hydrothermal processing conditions on cristallinity of apatite nanoparticles was carried out. Strontium hydroxyapatite (SrHAp) powder was used as the host material and then the powder was modified by hydrothermal process in H_2O and H_2O_2 medium at temperature range from 150° until 90 °C for different processing time (1 to 6 hours). After longer hydrothermal processing time powder crystallization occurs at lower temperature.

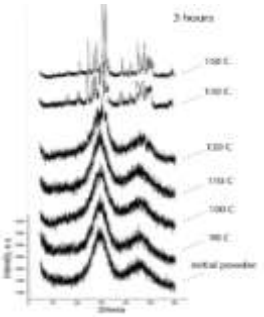

Fig.1 XRD patterns of hydrothermally treated SrHAp powders in H_2O medium

References

1. J. Kolmas, E. Groszyk and D. Kwiatkowska-Rozycka, BioMed Research International, article ID 178123, (2014)

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