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III/3

Nucleation of biomimetic hydroxyapatite

Božana Čolović, Vukoman Jokanović

Institute of Nuclear Sciences "Vinča", Laboratory for Radiation Chemistry and Physics, Belgrade, Serbia

Formation of biomimetic calcium hydroxyapatite on the surface of different substrates (various polymer thin films and silica thin films) was investigated in this study. Supersaturated SBF and SBF combined with EMEM or FCS were used as bioactive liquid environment. After aging in SBF for various periods of time, samples were investigated by FTIR-ATR and XRD to analyze obtained phases, while morphology of self assembled hydroxyapatite was investigated by SEM and AFM. Investigations of mass changes of the samples showed that the rate of CHA self nucleation depends on the type of substrate and medium as well as the ageing time.

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Structural characterization of synthetic and biological carbonated hydroxyapatite

Ljiljana Veselinović[1], Miodrag Lukić[1], Ljiljana Karanović[2], Nenad Ignjatović[1], Smilja Marković[1], Dragan Uskoković[1]

[1]*Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Belgrade, Serbia,*
[2]*Laboratory for Crystallography, Faculty of Mining and Geology , University of Belgrade, Belgrade, Serbia*

It is well known that inorganic part of bones and teeth are impure form of hydroxyapatite, (HAp) $Ca_{10}(PO_4)_6(OH)_2$. During the past few decades, great efforts have been invested to develop synthetic equivalent of natural apatite. The major difference of natural bioapatites from hydroxyapatites is in the presence of certain content of CO_3^{2-} ions in the structure. The presence of the CO_3^{2-} ions in the HAp structure influences the reactivity and stability. Therefore, the exact content of CO_3^{2-} ions as well as their arrangement in the structure is very important.

The aim of our work is comparative analysis of the biological carbonated hydroxyapatite extracted from human alveolar bone and synthesized carbonated hydroxyapatite (BCHAp). Structural and microstructural parameters were determined through Rietveld refinement of recorded XRPD data, and with transmission electron microscopy (TEM).

Microstructure analysis showed anisotropic X-ray line broadening due to the small crystallite size (about 10 nm) as well as anisotropic growth of crystallites. The Raman spectroscopy confirmed the apatite structure and crystallinity.