Nanocomposites and nanomaterials
Nanocomposite apatite-biopolymer materials

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Current treatments require from biomaterials rapid dissolution in the body and implant replacement by new bone tissue. Pure hydroxyapatite (HA, $Ca_{10}(PO_4)_6(OH)_2$) is bioresistive material, so now many studies aim at exploring other, more resorbable calcium phosphate materials in the form of composites.

Composite apatite-biopolymer materials compared to simple calcium phosphates(hydroxyapatite, tricalcium phosphate, octacalcium phosphate, calcium-deficient hydroxyapatite, tetra tricalcium phosphate) are similar to human bone tissue and their nanoparticles induce biological reactions that occur at bone remodeling by increasing of HA surface area [1,2].

In this study, a method of simultaneous formation of alginate polymer matrix and synthesis of HA was used to produce a nanostructured composite with different ratios of organic and inorganic components. The proposed natural polymer sodium alginate is the most perspective because it has a high biocompatibility and degradation ability.

The structure and morphology of the synthesized nanocomposites gained by XRD, FTIR and TEM analyzes were characterized. The research showed that increase polymer proportion in the composite reduces the size of synthesized HA crystallites and crystallinity of composite material. It leads to the formation of HA nanoparticles in the polymer matrix composition. FTIR investigations showed an intermolecular interaction between HA and SA.

Therefore, the formation of nanosized hydroxyapatite particles in the polymer matrix approaches the obtained material to the biogenic bone tissue and can provide its more effective implantation.

1. *L.F. Sukhodub1, G.O. Yanovska, L.B. Sukhodub, V.M. Kuznetsov, O.S. Stanislavov* Nanocomposite apatite-biopolymer materials and coatings for biomedical applications// J.Nano-Electr.Physics.-2014.-**6,** N 1.-P. 1-16.

2. *Yang D, Jin Y, Ma G, Chen X, Lu F, Nie J.* Fabrication and characterization of chitosan/PVA with hydroxyapatitebiocomposite nanoscaffolds// J Appl Polym Sci.-2008.-**110**, N 6.-P. 3328-3335.