



МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ
КАФЕДРА ІНОЗЕМНИХ МОВ
ЛІНГВІСТИЧНИЙ НАВЧАЛЬНО-МЕТОДИЧНИЙ ЦЕНТР

МАТЕРІАЛИ

**XIV ВСЕУКРАЇНСЬКОЇ
НАУКОВО-ПРАКТИЧНОЇ КОНФЕРЕНЦІЇ
СТУДЕНТІВ, АСПІРАНТІВ ТА ВИКЛАДАЧІВ
ЛІНГВІСТИЧНОГО НАВЧАЛЬНО-МЕТОДИЧНОГО ЦЕНТРУ
КАФЕДРИ ІНОЗЕМНИХ МОВ**

«TO MAKE THE WORLD SMARTER AND SAFER»

26 березня 2020 року



Сумський державний університет
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**Суми
2020**

APATITE-BIOPOLYMER MATERIALS AND COATINGS FOR BIOMEDICINE

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The use of materials with osteointegrating and bactericidal properties is an important dental strategy.

For this purpose, methods for the manufacture of composite material in the form of a film based on hydroxyapatite and natural polymer (alginate) with the addition of inorganic ions and the subsequent saturation of drugs and active substances were developed and investigated.

The main theoretical prerequisite for the use of dental implants is the fact of tissue integration with the incorporation of biologically inert materials into the jawbone. Dental implants are inserted into the bone instead of the lost tooth and remain for the next 3-4 months or six months. This time is required to heal the implant with bone.

Osteointegration is a biological phenomenon that means implantation of the implant with a living bone. At this stage again the bone tissue germinates into the surface of the implant, a good bonding between the implant and the bone is obtained.

Currently, the main materials used for the manufacture of implants are industrial grade titanium, titanium-aluminum alloy.

It has been proven that the only material that has demonstrated biocompatibility during long-term studies and grows with bone is the Ti-6Al-4V alloy.

Advantages of this or that implant systems are a constant topic of discussion, however, there is a tendency for more widespread use of osteointegrated implants with previous “engraftment” without loading of the intraosseous part of the implant, which usually has a porous surface.

The purpose is to develop the latest biopolymer-apatite materials for dentistry.

To achieve the goal, the following tasks are set:

- studying of the influence of physical parameters of natural polymers on the patterns of synthesis of composite materials based on hydroxyapatite with specified structural characteristics;

- obtaining bioactive materials based on natural polymers and hydroxyapatite for dentistry;

- studying of morphology, structure and properties of bioactive materials for dentistry.

To study the morphology of coatings, their phase and elemental composition, raster electron microscopy, X-ray spectral and X-ray structural analysis were used.

In carrying out the set tasks within the project modern instrumental methods and methods of research of the received materials were applied.

The results of the study of the structure, phase composition, morphology of the surface of the coating based on hydroxyapatite, which is applied to the implant surface by the method of thermal deposition.

The advantages of such coatings:

- rapid osteointegration with a high bone-implant clutch, especially in conditions of low bone density.

Disadvantages:

- the risk of loss of coverage due to resorption, especially during large augmentation, immediate implantation, use of platelet-rich plasma (PRP) in peri-implantitis conditions.

The obtained coatings are of interest for use in clinical practice as biocoating on titanium implants, which are currently undergoing clinical trials.

So, the use of materials with osteointegrating and bactericidal properties is an important dental strategy. This project proposes technological approaches for the synthesis of nanostructured materials in the form of synthetic CDGA films for their further use in dentistry.