

Nanocomposites and nanomaterials

The study of physicochemical properties of the Ti-6Al-4V alloy

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Nanomaterials are widely used in many areas of life. Due to its small dimensions are characterized by unique properties. They are used, among others, to improve the properties of conventional materials such as for example alloy Ti-6Al-4V [1]. This alloy is mainly used in medicine applications. It is made of, among others, hip or knee replacement or bone's screws [2]. Despite the very good alloy properties are produced on it the organized layers of organic compounds. These layers significantly improve its properties such as biocompatibility, bio functionality, wear resistance.

In this study, the thin layers of carboxylic acids, alkylphosphonic acids and silane compounds on the surface of the titanium alloy were produced. The layers were obtained as a result of the modification of the liquid and gas phases. In order to obtain mentioned above organic layers, the following compounds were used: gas-modified FDTS, PFMS, liquid modification – PFDA and PFDPA. Then the characteristics of the SAMs layers, on the surface of the titanium alloy, was carried out. It consisted of measuring the contact of value of the angle and the surface free energy and friction test using a micro scale by the use of microtribometer T-23.

The surface topography unmodified Ti-6Al-4V alloy and after modification of liquid and gas phases, as a result of which the thin layers of carboxylic acids, alkyl phosphonic and silane compounds were examined by IR, XPS and Atomic Force Microscopy (AFM).

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