C.1. DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Titanium and its alloys due to their properties are used in many industries. The problem with this type of alloys is their low abrasion resistance. Due to this property, the use of such alloys in friction-sensitive parts is limited and reduces the possibility of using these materials. Despite many examples of surface modification of titanium alloys described in the literature, such as physical and chemical methods, an alloy with appropriate abrasion resistance was still not obtained. However, due to their biological compatibility and a low elastic modulus comparable to human bone, these materials are suitable for biomedical applications.

The problem of low abrasion resistance is particularly noticeable in biomedical applications. One of the most commonly used titanium biomaterials is Ti6Al4V titanium alloy. Due to the low abrasion resistance of this alloy, in the tissue environment metallosis effect is observed, which adversely affect the human body. The literature describes many attempts to replace this type of alloy by others, but the alloy of other elements do not have properties so similar to human bones as the Ti6Al4V alloy. Vanadium is a toxic element that causes inflammation, allergic reactions and neurogenic disorders. It also exhibits a high tendency to corrosion. The product of biological corrosion is vanadium pentoxide - characterized by high solubility in the organism, which promotes the release of vanadium into the body fluids. Aluminum is also the element with adverse effects on the human body. This element affects the softening of the bones and damages the nerve cells, resulting diseases of brain and blood vessels.

Due to the presented problem, researchers are looking for the method of titanium alloy modification, which will increase its resistance to abrasion. Increased resistance to abrasion, will affect the extension of the time of exploitation of titanium alloys. This will improve the condition of patients using this type of alloy as well as allow for wider use of such alloys in materials susceptible to abrasion in the automotive and aerospace industries. Modification will positively affect both the economic and health aspects of people using these alloys. Coatings on the surface of the alloy should be a barrier that prevents the penetration of harmful elements into the body and should increase the material resistance to abrasive wear. This problem can be solved by modifying the surface of the Ti6Al4V alloy with the diazonium salt to obtain an organic layer and then attaching the polymer to the resulting layer. The purpose of the planned studies is to modify the surface of the titanium alloy (Ti6Al4V) using diazonium salts with hydroxyl groups and then attaching the polyurethane (to the resulting aryl layer), which is a biocompatible polymer. Polyurethane layers will be obtained from different types of monomers, which will affect on their properties. There will also be obtained layers with different thicknesses. The layers will be broadly characterized (physicochemical and mechanical), the stability of both the organic layer and the polymer layer on the alloy surface will be examined in the simulated body fluids.

It is planned to obtain polymeric layers on the surface of the alloy, which:

- will reduce of the amount of released harmful elements,
- will increase the resistance to abrasion,
- will increase of surface wettability,
- will increase the corrosion resistance,
- will increase the biocompatibility of the material.