N1-P-052501

THIN NITROGEN-CONTAINING TITANIUM COATINGS FORMATION ON THE PLLA SCAFFOLDS SURFACE BY REACTIVE MAGNETRON SPUTTERING IN N_2 + Xe MIXTURES*

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For the bioresorbable scaffolds manufacture polymer of poly-L lactic acid (PLLA) [1] are widely used, which are currently one of the most promising biodegradable materials [2]. However, their use for tissue engineering applications is limited by high surface hydrophobicity, which prevents cell adhesion and proliferation. One of the most promising modifying method of PLLA scaffolds surface and give them a high free energy of the surface is to apply thin nitrogen-containing titanium coatings (TiN_xO_y) via PVD methods [3].

The reactive magnetron sputtering is the most universal method for TiN_xO_y coating depositions, since in wide range allows you to vary the composition of the operating gas, the target material, power on the power supply and other parameters. It is known that the working gas has a strong effect on the coefficient and sputtering rate, the ionization cross section, gas ionization energy and Penning effect [4]. Therefore, the use of jet and inert gases, as well as their mixtures, was the usual phenomenon for the formation of various TiN_xO_y coatings. On the other hand, the method of reactive magnetron sputtering allows you to process complex structures, such as polymer bioresorbisable PLLA scaffolds, as well as affect the sputtering rate and the chemical composition of the formed coatings

In this paper, the results of PLLA scaffolds surface modification the by the method of reactive magnetron sputtering of the titanium target in the presence of a mixture of reactive nitrogen (N2) gas with a working xenon (Xe) gas are presented. As a result of such a process of modification on the surface of the PLLA of scaffolds, a thin nitrogen-containing titanium coating, represented by oxide and titanium oxynitrides of various stoichiometry, is formed. The modification process does not significantly affect the morphology of PLLA scaffold, and an increase in the wettability of the surface is observed.

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* This study was funded by the Russian Foundation for Basic Research (RFBR) according to the research project № 20-32-90133. This research was supported by the TPU development program - Priority 2030 (Project No. Priority-2030-NIP/IZ-011-0000-2022).