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Synthesis of bio-compatible coatings stimulated by electron-beam plasma TATIANA VASILIEVA, SERGEY LYSENKO, Moscow Institute of Physics and Technology, VADIM KUKAREKO, Institute of Physics and Technology NAS Belarus — The synthesis of oxides at the inner surface of the titanium tube was studied experimentally. The plasma was generated injecting the electron beam along the tube filled with O₂. The sample temperature in the act of the treatment and the oxide layer thickness were controlled by varying the beam current, the oxygen pressure, and the treatment duration. The Auger spectrometry and X-ray structural phase analysis showed TiO₂ in the rutile form to predominate in the coatings chemical composition. The atomic force microscopy showed that the oxidation didn't change the tube wall structure. The optimal micro-relief of the surface can be formed preliminarily by means of conventional techniques and the plasmachemical treatment is able to additionally improve the surface bio-compatibility. The computer simulation of plasma-surface interaction was carried out to predict the plasma composition, to find the spatial distribution of the sample temperature, and to calculate the flows of the chemically active plasma particles bombarding the tube wall. The flows of atomic and singlet oxygen were found to be the most intensive and, therefore, these particles are responsible for the formation of the biocompatible TiO₂-coatings.

Tatiana Vasilieva
Moscow Institute of Physics and Technology

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