

Method of designing individual medical devices and its laser processing to impart antibacterial properties

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Nowadays, titanium and its alloys with a laser-modified surface are finding more and more applications in various fields. One of the most popular is medicine, especially in the functionalization of the surface of medical devices. Our research is aimed at imparting antibacterial properties to the surface of titanium and its alloys due to the formation of oxide films. In our previous studies, we have demonstrated the presence of bactericidal properties in laser-induced oxide coatings by photoactivation with uv radiation. In this study, we consider the technology of applying such coatings on surfaces of complex three-dimensional shapes, such as individual titanium membranes. In addition, the paper considers the process of automating the design of individual membranes after undergoing computed tomography using artificial intelligence and the subsequent process of their processing using laser radiation. The reported study was financially supported by the Ministry of Science and Higher Education of the Russian Federation research agreement No. 075-11-2021-045 of 24.06.2021, project title “Development of high-tech production of equipment and technologies for laser functionalization of medical devices” (within the framework of decree of the Government of the Russian Federation No. 218 of 09/04/2010).