

IMPROVEMENT OF TRIBOLOGICAL AND BIOLOGICAL PROPERTIES OF TITANIUM ALLOY HIP REPLACEMENT IMPLANTS COVERED BY DIAMOND COATINGS

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This research is focused on improving tribological and biological properties of hip replacement implants using CVD diamond coatings. Various types (micro-, ultrananocrystalline and multilayer) of well-adherent diamond coatings of different thicknesses were deposited on titanium alloy implants to protect them from mechanical wear and to increase their biocompatibility. Comparative measurements of different diamond layers wear resistance were investigated using tribometer testing. The diffusion of doping elements (Al and Ni) from titanium alloy through different types of diamond coatings was studied using atomic-absorbing spectrometry. Bacterial growth on different diamond layers was investigated using incubation of bacteria stamp and confocal microscopy. Research results showed that using of diamond coatings on hip replacement implants highly increases their wear resistance, hilling ability and biocompatibility. Such research not have been carried out in Russia before. Development of diamond coatings on titanium implants allows applying such coatings everywhere in biomedicine implantation.