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Bio-functional composite coating of calcium apatite and ZnO on a printed porous orthopedic implant(Conference Paper)

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Краткое описание

To date, a large number of different alloys based on CoCr, Ti, stainless steel, etc. are used in medicine. However, metal implants are bioinert, despite the development of biodegradable magnesium-based alloys. In addition, because of their mechanical properties, only few numbers of alloys have come close to mechanical properties of the cortical part of human bone. These superelastic alloys are usually based on the Ti-Nb-Ta, Ti-Nb-Ta-Zr systems which have a high cost. It is advisable to apply bioactive coatings that would have the best resemblance to human bone in terms of chemical composition, physical properties and biological parameters. In this paper, the physical and chemical properties of hydroxyapatite (HAP) coatings with the addition of ZnO, obtained by electrochemical deposition in an aqueous solution on a printed porous sample of 316L steel, were studied. The HAP study was carried out by the methods of analysis as: scanning electron microscopy with the energy dispersive microanalysis system, transmission electron microscopy with EDAX analysis system. The laser melting of powdered 316L steel was carried out using the Mlab cusing R machine. The SLM process parameters were: laser power 90 W, a frequency 50 kHz, a scanning speed 500 mm/s, a spot size 100 μm , the oxygen content was less than 0.1 %. A new type of materials for use in medicine was obtained and investigated. The ratio of Ca/P of the obtained coating corresponds to generally the accepted parameters. The structure of HA is characterized by a high degree of crystallinity. © 2018 TANGER Ltd., Ostrava.