

Development and Characterization of Bio-Tribological, Nano- Multilayer Coatings for Medical Tools Application

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Abstract : Development of new generation bio- tribological, multilayer coatings, opens an avenue for fabrication of future high- tech functional surfaces. In the presented work, nano- composite, Cr/CrN+[Cr/ a-C:H implanted by metallic nanocrystals] multilayer coatings have been developed for surface protection of medical tools. Thin films were fabricated by a hybrid Pulsed Laser Deposition technique. Complex microstructure analysis of nano- multilayer coatings, subjected to mechanical and biological tests, were performed by means of transmission electron microscopy (TEM). Microstructure characterization revealed the layered arrangement of Cr₂₃C₆ nanoparticles in multilayer structure. Influence of deposition conditions on bio-tribological properties of the coatings were studied. The bio-tests were used as a screening tool for the analyzed nano-multilayer coatings before they could be deposited on medical tools. Bio- medical tests were done using fibroblasts. The mechanical properties of the coatings were investigated by means of a ball-on-disc mechanical test. The microhardness was done using Berkovich indenter. The scratch adhesion test was done using Rockwell indenter. From the bio- tribological point of view, the optimal properties had the C106_1 material.

Keywords : bio- tribological coatings, cell- material interaction, hybrid PLD, tribology

Conference Title : ICBBB 2015 : International Conference on Biotribology, Biomechanics and Bioengineering

Conference Location : San Francisco, USA

Conference Dates : June 07-08, 2015