EFFECT OF ANNEALING TEMPERATURE ON THE MICROSTRUCTURE AND MECHANICAL PROPERTIES OF AG-DLC COATINGS

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DLC coatings present excellent mechanical, tribological and biological properties, which make them a suitable option for biomedical applications. Presently, these coatings can be found in different medical devices, since they improve the wear and corrosion resistance, reduce the friction coefficient and present a lower microbial colonization when compared with metallic or polymeric devices. Recently, several studies were focused on the addition of different metals to-DLC coatings, which are claimed to enhance their adhesive and cohesive strengths due to the reduction in the internal stress state. Ag is pointed as an effective antibacterial agent against a wide range of bacteria, which allows improving the biomaterials lifetime. In this sense, Ag-DLC coatings represent a promising choice for medical device applications. The aim of this work is the production and microstructural and mechanical characterization of Ag-DLC coatings. The Ag-DLC coatings were deposited by unbalanced magnetron sputtering using a carbon target with different number of silver pellets, in order to achieve different contents of Ag. After deposition samples were annealed with the aim of varying the Ag particle size and distribution in the DLC matrix. In order to evaluate the variations in the crystalline structure and the Ag particle size / distribution, the as deposited and annealed samples were analyzed by X-ray diffraction and scanning electron microscopy, respectively. The effect of silver content on the mechanical behavior of the coatings, hardness, adhesion / cohesion and residual stress, was determined by nanoindentation, scratch testing and deflection testing, respectively.

Keywords
Ag-DLC
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Residual Stress
Hardness