

The influence of multilayer metal-carbon coatings composition with different arrangement of functional layers on their surface morphology

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Recently, metal-containing diamond-like coatings deposited by various methods have become widespread in materials science. But the practical application of such coatings in pure form is limited by the peculiarities of their structure. There are various ways to control their structure and one of which is the inclusion of metal and nitride layers into such coatings [1].

The purpose of this work was to determine the influence of the composition of multilayer coatings (Ti-(Ti+DLC); Ti-(Ti+DLC)-DLC; Ti-(Ti+N+DLC)-DLC; Ti-(Ti+N+DLC); TiN-(Ti+DLC)) on the surface morphology. The investigations were carried out with an atomic force microscope (AFM) Dimension FastScan (Bruker, USA). The carbon component of the coating was deposited using a pulsed cathode-arc method with the following parameters: pulse repetition frequency of 15 Hz, discharge voltage of 350 V. Doping with nitrogen was due to sputtering at the nitrogen partial pressure in the chamber of 5×10^{-2} Pa. The metal component was formed using a DC arc discharge at the arc current of 70 A. VT-100 titanium alloy as a cathode was used. The thickness of the layered coating depended on its architecture and was in the range from 300 to 500 nm.

Surface morphology, roughness, distribution of coarse grains in the coating and the structure of the carbon matrix largely depend on the sequence (architecture) and the type of layers deposited.

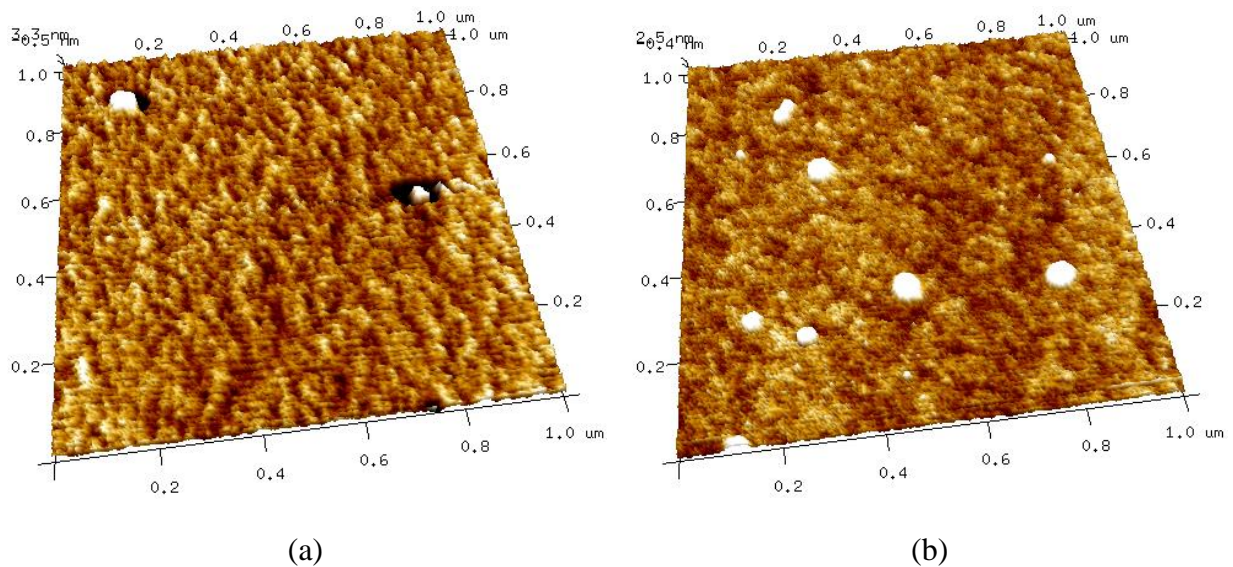


Figure 1. Three-dimensional images, scanned area $1 \times 1 \mu\text{m}^2$:
(a) Ti-(Ti+DLC)-DLC; (b) Ti-(Ti+N+DLC)-DLC.

This research was supported by the grants of Belarussian Republican Foundation for Fundamental Research BRFFR № T17KIG-009.

1. H.A. Castillo, *Applied Surface Science* **257**, 2665 (2011).