

Nanocomposites and nanomaterials

Obtaining a homogeneous nanosize film with using an erosive plasma source

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One of the most widespread methods of film deposition is a plasma spraying method with using erosion sources. The feature of this method is a presence of macro- and micro-inclusions in the resulting coatings, which does not allow to obtain homogeneous nanosize films for using them in nanotechnology. Nowadays, there are methods for filtering microparticles which have some disadvantages such as incomplete removing microparticles or high loss of cathode material during the deposition.

A new method for the deposition of nanoscale homogeneous surfaces has been proposed [1]. This approach consists of destruction microparticles without removing them from the stream. It is based on the use of cylindrical configuration of electrostatic plasma lens for an introduction fast electrons into the volume of dense plasma flow. The fast electrons are generated by the secondary electron emission from the electrodes of plasma lens. Focusing of the plasma flow causes an increase in the density of the plasma flow and speed spraying at any electrode potential. An increase in the pressure of working gas and value of the electrode potential lead to raise in the area of film deposition and its homogeneity. Investigations of sprayed surfaces have been showed the existence of the effect of microparticles destruction with an applied magnetic field in the filter or without it.

Thus, the use of a filter with erosive plasma source allows to obtain nanoscale films of high purity and homogeneity with quite high load factor of material.

1. *Goncharov A. A. Recent development of plasma optical systems (invited) // Rev. Sci. Instrum.-2016.-87.-P. 1-5.*