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ELECTRON-BEAM DEPOSITION OF COMPOSITE COATINGS BASED ON METAL AND CERAMICS*

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Composite coatings consisting of two or more components combined to form a layered or mixed structure are an established feature for enhancing the parameters and characteristics of materials [1]. To date, one of the most promising composites for obtaining wear-resistant and corrosion-resistant plasma coatings that increase the durability and reliability of starting materials, are composites that consist of a metal-ceramic matrix [2]. Such coatings can be obtained by various mechanical, chemical, and modern high-performance beam-plasma methods [3]. Among all beam-plasma deposition methods, electron-beam evaporation and vapor deposition of the evaporated material on products has the highest deposition rates that ensure the formation of a coating with desired characteristics [4]. At the same time, the evaporation of dielectric materials including ceramics, by an electron beam is very difficult and inefficient; this problem is successfully solved with the use of fore-vacuum plasma electron sources [5].

The paper presents the results of experimental studies of the processes of obtaining plasma with ceramic and metal particles and coatings deposited from such plasma on metal substrates.

Evaporated ceramic-metal targets were fabricated from nanopowder of alumina ceramics sintered in the process of electron-beam exposure with different proportions of metal. The mass-to-charge composition of a multicomponent plasma formed during the evaporation of sintered targets has been studied, metal-ceramic coatings have been obtained, and their characteristics have been studied.

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