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MORPHOLOGY OF CORUNDUM MICROSPHERES PRODUCED BY THE PLASMA METHOD*

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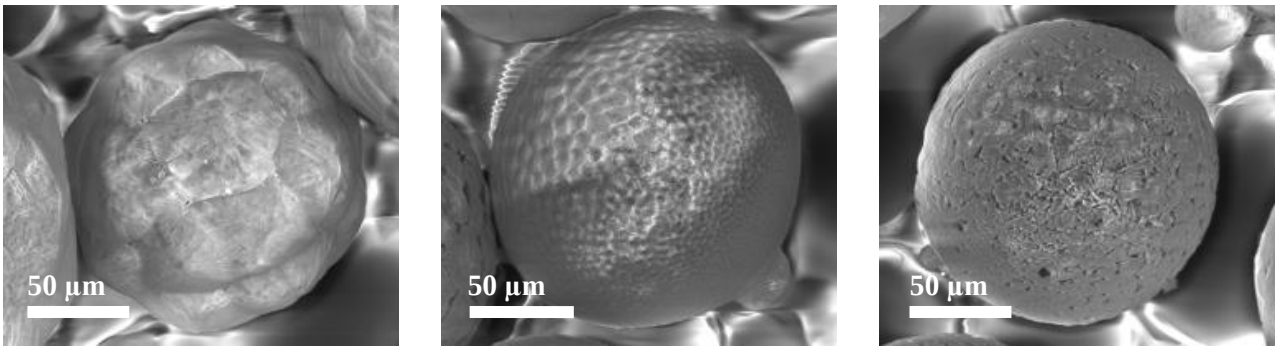
Today, the relevance of corundum microspheres is due to their high-performance characteristics (high strength, melting point, wear resistance, etc.). The combination of these characteristics increases the demand in the industrial market. Thus, the search for new technological solutions for the efficient production of corundum microspheres from natural materials is topical. The high melting point of corundum (2345 K) imposes a number of restrictions on the use of classical heating sources. The most efficient and structurally simple are direct current electric arc plasmatron, which make it possible to realize a plasma flow with an average mass temperature of ≥ 5000 K [1–4].

This paper presents the results of experimental studies of obtaining corundum microspheres based on boehmite γ–AlO(OH) in a thermal plasma medium. It is expedient to evaluate the effectiveness of plasma exposure by the spheroidization of particles and the formation of a non-porous shell [5]. On Fig. 1 shows electronic images of three types of formed shells of corundum microspheres during plasma treatment.



a *b* *c*

Fig.1. Surface morphology of microspheres based on boehmite.

The first type (Fig. 1, *a*) of the particle surface structure is characterized by the presence of acute-angled craters. Some craters are interconnected, the size of the craters is in the range of 2÷5 µm. The second type (Fig. 1, *b*) of the surface structure includes prismatic particles fused together with rounded corners 5–10 µm in size. The third view (Fig. 1, *c*) of the particle surface is presented as separate hilly layers. The different type of surface structure of particles obtained in a plasma flow is associated with the peculiarities of the preparation of agglomerated powders based on boehmite and is difficult to control during thermal treatment. According to the results of EDX spectrometry, no change in the elemental composition depending on the morphology of the obtained microspheres was found. The obtained energy spectra indicate that the composition contains a high content of aluminum (Al) – 67.42 wt. %. The content of oxygen (O) is fixed at around 29.66 wt. %. There are traces of silicon (Si) with a concentration of 2.92 wt. %.

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