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Investigation of the process of current flow through a composite based on Al_2O_3–ZrO_2 during electron beam processing in an medium vacuum

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The results of an experimental study of the flow of current through an Al_2O_3–ZrO_2 composite with a variable composition of components from 0 to 100 wt. are presented. % in the process of electron beam exposure. The electron beam was formed by a pre-vacuum plasma electron source based on a glow discharge with a hollow cathode. It is shown that when the surface of the composite is heated above 1000 ^oC, the magnitude of the current flowing through it increases noticeably, reaching a value of 1.7 mA. The magnitude of the flowing current is determined by the surface temperature, the electrophysical properties of ceramic materials and the ratio of the fractions of each component. With an increase in the content of Al_2O_3 in the composite, the magnitude of the flowing current decreases markedly. According to the temperature dependence of the flowing current, the activation energy of the conductivity of Al_2O_3 and ZrO_2, as well as their mixtures, is determined.

Keywords: electron beam, electron beam sintering, Al_2O_3–ZrO_2 composite, conduction activation energy, medium vacuum.

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