INVESTIGATION OF SIC CERAMICS, MODIFIED BY INTENSE ELECTRON BEAM

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SiC ceramics is widely used in a different brunches of industry [*Gnesin G.G. Silicon carbide materials, Metallurgiya, Moscow, 1977, Luchinin V., Tairov Ju. // Nanoindustrija. – 2010. – Vyp. 1. – S. 36–39*]. SiC has the property to crystallize in different modifications (polytypes) [*Andrievskij R.A.// Uspehi himii. – 2009. – № 78 (9). – S. 889-900*].

The work purpose is studying of structural-phase transformations in the surface layer of SiC ceramics, subjected to intense electron beam with parameters: 15 keV, 10, 15, 20 J/cm^2, 200 μs, 3 pulses; gas pressure (argon) in the chamber was10^{-2} Pa.

SiC powder (average particle size of 0.9 microns) with the addition of 1 wt.% of SiC nanopowder was used for producing ceramics.

Samples of ceramics consolidated by the SPS method at following modes: temperature 2100 °C, pre-pressing 70 MPa, duration 10 min. Microstructure and phase transformations, physical-mechanical properties versus conditions of electron beam irradiation were carried out at the TPU Nano-Centre.

The nanostructuring of the surface layer (crystallite sizes from10 to30 nm) was revealed after irradiation by the electron beam with the energy density 15 J/cm^2. It was shown that irradiation of SiC ceramics is accompanied with appropriate changes of the surface layer polytypy composition in comparison with the initial one. Decreasing of the β-SiC (6H) polytype content was about two times at beam energy density 10 J/cm^2, but increasing of such content was about two times at the beam energy density 20 J/cm^2. The reasons of such behavior are discussed.

Thus, irradiation of SiC ceramics by the intensive electron beam allows to vary the polytypy composition of surface in wide range; it leads to change of mechanical properties.

Keywords: *SiC, ceramic, electron, beam, SPS.*