CONCLUSIONS

By the crucibleless method of unsintered powder pressings, a directed crystalline alloy ZrB_2-20 vol% SiC was obtained.

The microstructure of the resulting composite is uniformly distributed and directed in the direction of growing the ZrB_2 and SiC phases. Among the crucible light beads of zirconium diboride with a mean transverse dimension of 54.2 microns and a length of 194.5 microns, a fine eutectic microstructure of the ZrB_2-SiC system is well observed. Eutectic regions are a matrix of dark silicon carbide with small inclusions of light color zirconium diboride.

Phase analysis of the sample by X-ray diffraction has confirmed a significant level of texturing. It has also been found that only zirconium diboride and cubic beta silicon carbide (β-SiC) are included in the composite.

It was proved that the average Vickers hardness of the resulting composite is 17.6 GPa along the crystallization direction and 15.3 GPa in the perpendicular direction, which is due to the anisotropy of the atomic-crystalline structure of the GSD of the zirconium diboride lattice.

It was found that during indentation at a load of 100 N on surfaces parallel and perpendicular to the direction of crystallization, there are no cracks in the diagonals of prints, which is not typical for single-phase materials. This behavior can probably be explained by the features of the stress-strain state in the direction of the crystallized ZrB_2-20 vol% SiC alloy.

It was shown that after oxidation during 1 hour at 1600 ° C, a crystallized ZrB_2-SiC alloy is directed to a surface of an oxidized layer with a thickness of less than 10 μm. This behavior can be explained by the peculiarities of the structure and the minimum number of defects in the obtained material.