CONCLUSION

1. It is found that during the hot pressing process, an interaction occurs in the ZrB_2–15%$MoSi_2$ system with the formation of molybdenum borides MoB and solid solutions of $(Zr,Mo)B_2$. However, in the ZrB_2–15%SiC system interaction is not revealed.

2. Addition of chromium diboride to ZrB_2–15%$MoSi_2$ and ZrB_2–15 %SiC composites in an amount of 5% intensifies the process of densification of the material, almost to a non-porous state, by changing the structural and phase composition. The formation of MoB, Cr_3B_4 borides and solid solutions based on zirconium borides is observed.

3. The increase of mechanical properties (strength with three-point bending, fracture toughness) is consistent with an increase of grain-boundary strength, which may be due to the formation of solid solutions based on zirconium borides. The obtained values of the increased bending strength were 490 MPa in ZrB_2–15%$MoSi_2$–5%CrB_2 and 650 MPa in ZrB_2–15 %SiC–5%CrB_2.

4. It is shown that the resistance to oxidation increases by 1,85 times at temperatures of 1300–1400 ^oC and decreases by about 15% at 1500 ^oC, which is associated with an increase in the values of diffuse constants in the layers of the material, especially in the case of ZrB_2–15 %SiC–5%CrB_2. However, the formation of a new phase ($ZrSiO_4$) during the oxidation process can increase the high-temperature stability of ceramics based on zirconium diboride by reducing the chemical and diffusion activity of the material. It is also worth noting that zircon ($ZrSiO_4$) has a lower diffusion coefficient of oxygen than ZrO_2.

5. It is determined that the beginning of the process of oxidation of ZrB_2 to ZrO_2 and B_2O_3 takes place at temperatures of ~750 ^oC. Above 1100 ^oC – the formation of SiO_2 occurs through the reaction of silicon-containing elements ($MoSi_2$

та SiC) with oxygen. Thus, a stable borosilicate glass is formed, which counteracts the aggressive media.

6. X-ray diffraction analysis of oxidized ceramics showed that the final product is monoclinic ZrO_2 and amorphous phases based on SiO_2. It was determined that the alloying of the glass phase with the "heavy" elements Cr, Mo, Zr reduces the distance in the first coordination sphere, compared with the amorphous glass ZrB_2–15%SiC, which is probably due to the difference in atomic radii of the elements (Cr – 130 pm, Mo – 139 pm). Moreover, ceramics of composition ZrB_2–15%$MoSi_2$ has a definite phase $ZrSiO_4$, which protects it from oxidation at temperatures up to 1650 ^oC.

7. Simulation of the oxidation process confirms the adequacy of the given model and explains the behavior of the material during oxidation. Thus, increase of the diffusion and chemical constants indicates an increase in the resistance to oxidation of ceramics based on ZrB_2.