

## ABSTRACT

The work contains: 92 p., 29 fig., 19 tabl., 74 refer.

Object of research is directionally crystallized alloys of systems based on high temperature ceramics, accordingly  $ZrB_2 - SiC$ .

The aim is to study the structure and properties of eutectic alloys based on refractory compounds by the crucibleless method of unsintered powder pressings.

Methods and apparatus: obtaining of directionally crystallized alloy of  $ZrB_2-SiC$  was carried out at the "Crystal - 206" installation. By using of complex of highly informative methods of material science (electronic microscopy X-ray diffraction and chemical analysis) investigated micro- and macrostructure, both phase and chemical composition of the obtained alloy  $ZrB_2 - SiC$ . Research hardness on the appliance PMT-3, X-ray recording was conducted by diffractometer Rigaku Ultima IV.

By crucibleless zone melting method directed crystallized alloys of  $ZrB_2 - SiC$  composite was obtained. The microstructure of the resulting composite is uniformly distributed and directed in the direction of growing the  $ZrB_2$  and  $SiC$  phases, and the eutectic regions are a matrix of dark silicon carbide with small inclusions of light color zirconium diboride.

Research of micromechanical properties showed that the obtained hardness of composite achieve 17.6 GPa along the direction of crystallization and 15.3 GPa perpendicular to the direction. During the hardness test, at a load of 100 N, it turned out that there are no cracks in the diagonals of the prints on the surfaces parallel to and perpendicular to the direction of crystallization.

Keywords: DIRECTIONALLY CRYSTALLIZED ALLOYS, ZIRCONIUM DIBORIDE, SILICON CARBIDE, MICROSTRUCTURE, MICROHARDNESS, FRACTURE TOUGHNESS.