

PROPERTIES OF CARBIDES IN SOLID AND LIQUID CONDITION (2000 TO 6000 K)

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The purpose of this work is to experimentally study the properties of refractory carbides in the melting range and liquid phase. First of all, this refers to the electrical resistivity, as well as to the thermal properties (enthalpy, heat capacity, introduced energy). The most refractory materials needed for aviation and space technology are carbon compounds with metals. However, graphite melts only at pressures above 120 atmospheres [1], and it does not have high impact strength, like refractory metals.

The results of the study of the properties of refractory carbides over the widest temperature range are also important for nuclear power engineering, since nuclear fuel in the form of spherical micro-fuel elements is covered with protective layers of carbides and graphite.

By the method of pulsed current heating (3-5 us), samples of zirconium carbide (with a high content of carbon) were investigated [2]. The temperature was measured on samples in the form of a wedge-shaped model of a black body. The heat capacity, electrical resistivity (referred to the original dimensions) and Joule heating energy were obtained depending on the measured temperature. The onset of the phase transition (solidus) for $ZrC + C$ was fixed at 3150 K, the termination of the phase transition (liquidus) at 3640 K. The properties obtained supplement the picture of the behavior of the substances shown in the phase diagrams.

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 2. A.Kondratyev, S.Muboyajan, S.Onufriev, A.Savvatimskiy, Journal of Alloys and Compounds 631, 2015, 52-59