

Experimental study of thermal expansion of the liquid phase of vanadium at high temperatures

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Microsecond electric pulse heating is a popular method for studying the physical properties of refractory metals at high temperatures and in the liquid phase. Meanwhile, thermophysical properties, such as the thermal expansion coefficients and the density of refractory metals in the melting region and in high temperature region up to 3–7 kK, are still insufficiently studied, in particular vanadium and hafnium are still insufficiently investigated at this temperature region. In the present work, the results of studies of these materials are discussed.

This work contains an experimental study of vanadium and hafnium thermal expansion at high temperatures up to 3–3.5 kK and in the melting region by the method of pulse electrical heating. This fast heating drives the sample from room temperature up into the liquid phase in time less of 40–100 μ s. Using the experimental approach, an experimental investigation of the thermal expansion coefficient, electrical resistivity at melting region of vanadium and hafnium has been carried out. The obtained temperature dependences of the thermophysical properties for the metals are of interest, in particular, for constructing wide-range equations of state, as well as for use in new high-temperature technology.