

Experimental investigation of thermal expansion of molybdenum and vanadium carbides at high temperatures

Senchenko V N[@] and Melnikov S A

Joint Institute for High Temperatures of the Russian Academy of Sciences,
Izhorskaya 13 Bldg 2, Moscow 125412, Russia

[@] pyrolab@ihed.ras.ru

Currently, experimental studies are being carried out on the thermal expansion of refractory molybdenum and vanadium carbides, in particular, the influence of stoichiometry on the coefficient of thermal expansion during rapid electric heating from 10^7 to 10^8 K/s is of great interest. The novelty of the proposed approach is the use of precision technology of optical pyrometry, high-speed digital visualization of the thermal expansion of the materials under study, as well as the possibility of using various heating rates. The chosen approach allows us to investigate the thermal expansion coefficient of refractory carbides over a wide range of high temperatures for stoichiometries previously unstudied. Direct measurement of the sample temperature makes it possible to switch off the heating at a given temperature in real time (during the experiment). This allows us to investigate the change in the microstructure of the sample (after the experiment) after it reaches a predetermined temperature, which provides a study of the phase behavior of the sample upon heating and control of the change in its stoichiometry, which is especially important for refractory carbides. This work contains an experimental study of molybdenum and vanadium carbides thermal expansion at high temperatures up to the melting temperatures by microsecond electric heating method.