Experimental investigation of thermophysical properties of ceramics from equimolar mixture of carbides by microsecond resistive heating method

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The use of microsecond pulsed resistive heating allows one to determine the thermophysical properties of electrically conductive materials at high temperatures, in the premelting region and in the liquid phase. Recently, carbides and carbide ceramics of refractory metals have become increasingly popular, making it important to study their thermophysical properties. These refractory materials are relevant for use in technology and industry, in the construction of nuclear submarines and reactors, in aircraft manufacturing and rocket engineering. Of particular interest is the study of the thermal expansion of these materials at high temperatures and pressures, as experimental data in these areas is insufficient. Our experimental setup implements a microsecond pulsed resistive heating method based on the Joule heating process, which allows us to obtain experimental data above the melting point at a pressure of about 500 bar, in a duration of about 100 μs. This paper presents the obtained experimental data on the thermal expansion of ceramics from an equimolar mixture of TiC, TaC and NbC carbides at high temperatures. Comparison with literature data in the solid phase showed that the obtained and processed experimental data are reliable.
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