

**RESENT ADVANCES IN INVESTIGATION OF
THERMOPHYSICAL PROPERTIES OF ULTRA HIGH
TEMPERATURE CERAMICS (UHTCS) WITH THE AID OF
LASER HEATING**

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The presentation is a review of novel original methods of high-temperature materials properties measurements developed recently at High Temperature Institute of RAS (Moscow, Russia). The scope of the developments and investigations is related to the extension of the temperature/pressure range of the co-called conventional thermophysics towards vicinity of the melting points of the most refractory substances such as graphite, carbides, diborides and some high-temperature oxides. Various methods of laser heating experiments are performed covering pressure range from vacuum up to high static pressures of a few kilobars. It is shown that different properties of UHTCs as well as graphite materials can be measured with a precision comparable with that of conventional methods. Laser heating methods are applied for measurements of different properties of both non-metal and metal-like substances in the condensed state and for vaporisation studies at temperatures up to ca. 4500 K. One must acknowledge high importance of modern methods of high-speed optical diagnostics and especially polychromatic optical pyrometry. This important issue is discussed in detail with a presentation of a range of high-speed pyrometers. Some experimental results on solidus and liquidus lines in the Zr-C, Zr-U-C, Ta-C and Hf-C systems are presented along with the data on spectral emissivity of liquid and solid phases in the vicinity of the melting points. Modern methods of the thermal conductivity and the thermal expansion measurements up to extremely high temperatures and some measurement results up to 3500 K are presented. Some data on behaviour of a few very high-melted oxides in the domain of their melting points are presented as well.