

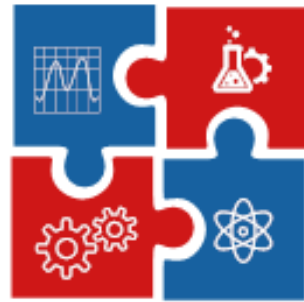
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Programme and The Book of Abstracts

04 – 07 July 2023

Zlatibor, Serbia

**„International Conference of Experimental and Numerical
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ELEVATED TEMPERATURE THERMAL PROPERTIES OF ZrB₂ WITH TUNGSTEN ADDITIONS

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Abstract

The thermal properties of zirconium diboride (ZrB₂) ceramics with tungsten additions of up to 5 wt% were characterized up to 2000°C. Densification was promoted by the addition of 0.5 wt% carbon. ZrB₂ ceramics were prepared from commercially available powder by hot pressing. The crystalline phases present were determined by x-ray diffraction. The microstructure and density change as a result of the addition of tungsten, but this does not affect much the thermal behavior of ZrB₂ at room and elevated temperatures. Thermal diffusivity at 200°C decreased from 0.158 cm²/s for nominally pure ZrB₂ to 0.149 cm²/s for ZrB₂ with 5 wt% Tungsten carbide (WC). The thermal diffusivity decreased with increasing temperature, reaching a value of 0.145 cm²/s at 2000°C for ZrB₂ with 5 wt% Tungsten carbide (WC). Heat capacity, unlike thermal diffusivity, did not change during thermal cycling. Thermal conductivity, which was calculated from thermal diffusivity, heat capacity, and density, was as high as 77.9 W/(m·K) at 2000°C for ZrB₂ with 5 wt% Tungsten carbide (WC). Any level of Tungsten carbide (WC) contamination reduces thermal conductivity. Properties, including hardness, oxygen content, elastic modulus, strength were measured and will be discussed.

Keywords: Tungsten carbide; Zirconium diboride; Hot pressing, Thermal properties; Microstructure.

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