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„International Conference of Experimental and Numerical Investigations and New Technologies“

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Programme

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The Book of Abstracts

29 June – 02 July 2021

Zlatibor, Serbia

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PREPARATION AND CHARACTERIZATION OF ZrB_2-TiB_2 BASED COMPOSITES FOR HYPERSONIC SYSTEMS

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Abstract

ZrB_2 ceramics are considered potential materials for hypersonic systems in view of the melting point exceeding 3000 °C and excellent ablation resistance. Second phases, including SiC or CrB_2, further improve the oxidation behavior, whereas a lighter phase, like TiB_2 can decrease the overall weight. In this work, a powder mixture containing ZrB_2, TiB_2, CrB_2 and SiC was mechanically activated using high energy ball-milling. Sintering was performed by hot pressing following different thermal cycles, and subsequent annealing to remove oxide phases and reduce micro-cracking. The microstructure and hardness of the dense ceramics are compared in relationship to the thermal history. Fully dense ceramics were obtained with different oxide-phases amount depending on the sintering cycle and hardness approaching 24 GPa were achieved. Future works will explore the strength and oxidation resistance of this multi-phase system to check its suitability for hypersonic systems.

Keywords

mechanical activation, sintering, XRD, mechanical properties, ceramics.

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