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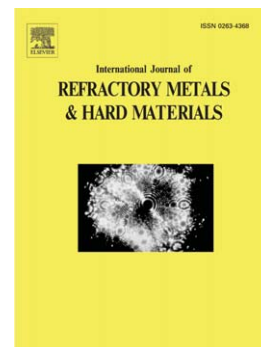
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The influence of sintering time on the microstructural properties of chromium-rhenium matrix composites

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ABSTRACT

This paper comprises the results of studies of the changes in the structure of Cr-Re-Al₂O₃ metal matrix depending on heat treatment time in sintering temperature. The density of material with the following composition: 95%(75%Cr-25%Al₂O₃)+5%Re was increased using the technique of sintering under pressure (30MPa) at the temperature of 1450°C. As a result, materials characterized by a high relative density (<97% of theoretical density) were obtained. Next, they were subjected to structural tests including scanning and transmission electron microscopy as well as X-ray diffraction. Changes in the phase composition, grains size and parameters of crystallographic structure depending on heat treatment time were analysed. It was found that during sintering rhenium is dissolved in the chromium matrix and Cr-Re solid solution is formed. When sintering time is extended to 120 min, the matrix of the composite becomes completely homogenous, which results in an increased strength of the composite.

Keywords: Metal matrix composites; Rhenium; Hot pressing; Microstructure analysis; XRD

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