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PII: S0263-4368(17)30515-2
DOI: doi:10.1016/j.ijrmhm.2017.09.014
Reference: RMHM 4523

To appear in: *International Journal of Refractory Metals and Hard Materials*

Received date: 3 August 2017
Revised date: 16 September 2017
Accepted date: 21 September 2017

Please cite this article as: S. Lemboub, S. Boudebane, F.J. Gotor, S. Haouli, S. Mezrag, S. Bouhedja, G. Hesser, H. Chadli, T. Chouchane , Core-rim structure formation in TiC-Ni based cermets fabricated by a combined thermal explosion/hot-pressing process. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Rmhm(2017), doi:10.1016/j.ijrmhm.2017.09.014

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Abstract

TiC-Ni-based cermets were obtained by thermal explosion from different elemental mixtures (Ti, C, Ni and X, where X = Cr, Mo or W) and subsequently densified by hot-pressing under a cyclic load. The whole process was performed in a single stage in the same experimental device according to the following thermal and pressure procedure: a heating rate ramp up to 1573 K without applying any load followed by an isothermal dwelling under a compressive cyclic load of 32 MPa. The thermal explosion synthesis occurred during the heating ramp at a temperature close to 1273 K that was practically independent of the starting nominal composition. The influence of different refractory elements on the chemical composition and microstructure of cermets was studied. SEM characterization showed that only with Mo and W, the cermets developed the characteristic core-rim structure. A high densification was achieved, but decreased when the refractory elements were added. Nevertheless, in these cases higher hardness values were obtained.

Keywords: Cermets, Thermal explosion, Core-rim microstructure, Solid-solution carbides