Effect of WB Addition on Mechanically Alloyed and Ni activated Sintered W Matrix Composites

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The aim of the present study is to investigate the effect of WB addition on the microstructural and physical properties of the mechanically alloyed (MA'd) and sintered W-1 wt.% Ni composites. W–1 wt.% Ni-x wt.% WB (x=0.5, 1, 2, 4) matrix composites were fabricated via mechanical alloying and activated sintering method. Milling was carried out in a SpexTM Mixer/Mill. MA'd powders were compacted in a hydraulic press and the pellets were sintered at 1400 °C for 1 h under Ar / H2 gas flowing conditions. Particle size distributions of the MA'd powders were carried out using laser particle size analyzer (PSA). Microstructural and phase characterizations of the MA'd powders and sintered samples were carried out using XRD, SEM/EDS and EPMA. TOPAS™ software was used to estimate the crystallite sizes and lattice deformations of the powders. Densities of the composites were measured by the Archimedes density method. Furthermore, Vickers microhardness and wear resistance measurements of the sintered samples were also conducted. Relative density values varied between 91.5 % and 97.9 % for the sintered samples containing various proportion of WB particles. Vickers microhardness values increases with increasing WB addition.

Key words: tungsten matrix composites, mechanical alloying, activated sintering, tungsten boride, X-ray diffraction, scanning electron microscopy