

XRD analysis and microstructure of milled and sintered V, W, C, and Co powders

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Abstract

In the current study, results of the milled and sintered V, W, C, Co powders are presented. Analytical techniques such as SEM equipped with EDS and XRD were used to study microstructure and phase evolution, respectively. In addition to B1 (VW)C solid solution, a rhombohedral V_2O_3 and new τ -type ($Cr_{23}C_6$) carbide were formed after sintering. The possible formation mechanisms behind detected phases are discussed. It is evident that complete MA process depends strongly on the starting compositions of pure elements, their lattice coherency according to Hume-Rothery rules on crystal structure and atomic size, and enough milling time that provides adequate kinetics.

Keywords

- X-ray analysis;
- (V,W)C;
- $Co_{15}W_8C_6$;
- Sintering