Structural Evaluation of Mechanically Alloyed of W-50%atC Powders

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Abstract:
Tungsten carbide is potentially attractive for development of catalysts and widely used for fabrication of cutting tools due to its high hardness and wear resistance. In this work, the W and graphite granules were weighted close to the W-50at%C composition, and processed under argon atmosphere in a planetary P-5 ball mill using WC-Co balls (10 mm diameter) and vials (225 mL), rotary speed of 600 rpm, and a ball-to-powder weight ratio of 10:1. Samples were collected into the vial after different times (20, 60, 300 and 600 min) in order to evaluate the effect of milling time on the surface properties and phase transformation of W-50at%C powders. The as-milled W-50at%C powders were characterized by means of X-ray diffraction (XRD), BET analysis, He picnometry, and scanning electron microscopy (SEM) techniques. The particle sizes were promptly reduced during the initial milling times. Metastable structures were formed during milling whereas the surface area and porosity were increased for longer milling times.