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Fabrication of W-Cu composites by hot-shock consolidation QIANG ZHOU, PENGWAN CHEN, XIANG GAO, HAO YIN — In this work a novel approach for producing tungsten-copper composites has been investigated. This approach combines high temperature preheating technique and underwater shock consolidation. By combining these two processes W-Cu composites with various mass ratios were produced. The powders were first blended by mechanically alloying by a planetary ball mill. Prior to application of shock wave, the elemental powders were preheated to different temperatures between 400 and 900° by heat released from a self-propagating high-temperature synthesis reaction. A water column was used to prolong the duration of shock pulse, uniformize the distribution of shock pressure and reduce the peak of shock pressure, which are of benefit to reduce the cracks in sample induced by shock wave. The pressure history of the powder during the shock process was experimentally measured by Manganin gauges and simulated by using LS-DYNA. The powders were compacted to near theoretical densities. The consolidated specimens were then characterized by SEM analysis, X-ray diffraction, strength and micro-hardness testing. The heat diffusivity and thermo-shock resistance of the consolidated W-Cu composites were also tested and compared with similar compositions manufactured by conventional methods.

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