

**Study on the Sintering Behavior of Mechanically Alloyed
75W-25Cu Powder Using a Dilatometry Technique**

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ABSTRACT

Solid and liquid sintering behaviors of mechanically alloyed 75W-25Cu powders have been studied by using a dilatometry technique. The sintering was performed under hydrogen atmosphere of 1 atm with a heating rate of 3 °C/min. The mechanically alloyed 75W-25Cu powders were prepared by high energy ball milling process under argon atmosphere of 1 atm with alloying times of 0 to 400 h. To compare with the sintering behaviors of mechanically alloyed powders, pure Cu and W powders were also sintered under the above conditions. As the mechanical alloying time increased from 0 to 400 h, the shrinkage behavior of the alloyed powders was enhanced during the sintering, and the starting temperature of liquid sintering decreased from 1083 to 1068 °C. The saturation temperature, above which the shrinkage was completed, of liquid phase sintering decreased from 1248 to 1148 °C with increasing mechanical alloying time from 200 to 400 h. The residual stress of the mechanically alloyed powder was measured by X-ray diffractometer. The microstructure of sintered specimen was observed by optical and scanning electron microscope. From these results, variations of solid and liquid sintering behaviors with mechanical alloying time were discussed in terms of the amount of residual stress and the distribution of W and Cu powders in the mechanically alloyed powder.