

방전플라즈마소결법에 의해 제조된 벌크 비정질 복합재의 특성

Consolidation of bulk metallic glass composites by spark plasma sintering and their properties

한국생산기술연구원 이진규*, 김택수, 신승용, 김휘준, 배정찬

Bulk metallic glass (BMG) composites have attracted during recent years much attention as a way to further improve mechanical or functional properties compared to monolithic BMGs. BMG composites reinforced by particles, fibers, or in-situ formed ductile phase precipitates have been found to exhibit improved mechanical properties of the BMGs. It was found that the metallic glass matrix composite exhibit enhanced plasticity, not generally observed in monolithic BMGs. In the present study, we report the consolidation of the BMG composites with dual amorphous phases. To produce the BMG composites, Cu- and Zr-based amorphous powders were mixed in a Turbula blender and mechanically alloyed by ball milling, and then consolidated in their supercooled liquid region using a spark plasma sintering method. The microstructure and mechanical properties of BMG composite has been studied. Structural characterization was performed by X-ray diffractometry (XRD), optical microscopy (OM) and scanning electron microscopy (SEM). Thermal properties of the samples were studied by differential scanning calorimetry (DSC). Mechanical properties of samples were measured at room temperature under compressive mode.

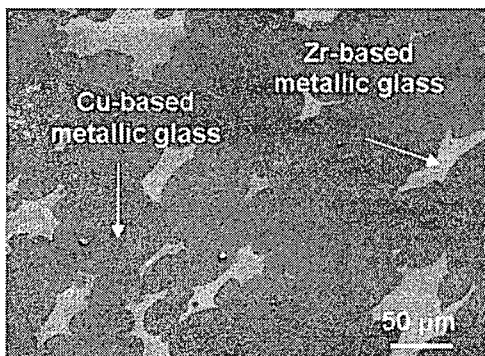


Fig. 1. SEM micrograph of the Cu-based BMG composite containing 10 vol% Zr-based metallic glass phase.

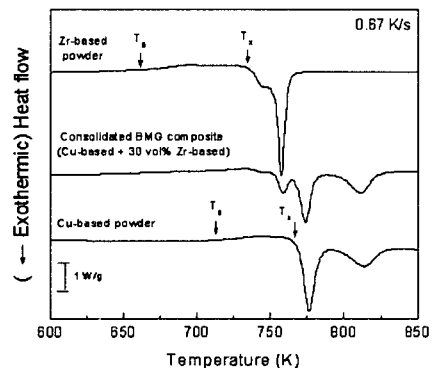


Fig. 2. DSC traces of the two kinds of metallic glass powders and the consolidated BMG composite