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Effects of sintering temperature on dihedral angle of NiTiCu SMA fabricated using spark plasma sintering

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Abstract

Applications of shape memory alloys can be designated based on the transformation temperatures which could be dominated by the chemical composition of nickel, processing temperature and secondary phase precipitates. The existence of secondary phase precipitates can be mainly affected by the grain surface and boundary energy which could be calculated by the dihedral angle. In this work, nickel-titanium-copper shape memory alloy has been fabricated using spark plasma sintering technique at various temperatures such as 700 °C, 800 °C and 900 °C. The influence of sintering temperature has been investigated on the occurrence of dihedral angle. Grain boundary and surface energy have been suppressed while energy of triple junctions has been improved with the sintering temperature. The reason behind this was observed by the enhancement of fraction of triple junctions with dihedral angle. Results suggest that the dihedral angle can be improved with the sintering temperature which led to enhance the density of the NiTiCu SMA.

Keywords:

Spark plasma sintering, NiTiCu, Shape memory alloy, Dihedral angle

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