

Effects of Thermal Treatment on Phase Transformation Temperature and Microstructures of Cu-Al-Ni Shape Memory Alloys

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Abstract

This study presents the effects of various heat treatments and quenching media on Cu-Al-Ni shape memory alloys. Transformation temperatures, entropy and enthalpy changes were investigated by means of differential scanning calorimeter measurements. It was found that the transformation temperatures very much dependent on the cooling rate, and the highest values for the transformation temperatures were obtained through the use of a solution of water and 10% NaOH as a quenching medium. The structure-properties of Cu-Al-Ni SMA have shown significant variations with different types of quenching media. The martensite phase transformation behavior was characterized by X-ray diffraction, optical microscopy, atomic force microscopy and field emission electron microscopy. The variations of hardness measurement for these alloys were determined using Vicker's hardness.

Keywords: Cu-Al-Ni; Transformation temperature; Shape memory alloys; Quenching media; Thermal treatment.