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Phase transformation and shape memory effect of a Cu-Al-Ni-Mn-Nb high temperature shape memory alloy

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Abstract

The microstructure, phase transformation and shape memory effect of the high temperature shape memory alloy Cu-11.4Al-3.2Ni-3Mn-0.5Nb (wt%) were investigated for the first time. The shape recovery ratio can achieve 73% when submitted to 690 MPa and the compressive stress of fracture of the alloy is 1560 MPa.

Keywords: Copper alloys; shape memory alloys (SMA); phase transformation

Introduction

High temperature shape memory alloys (HTSMAs) have been attracting the attention of research groups due to their possible suitability for engineering applications in thermosensitive devices that operate above 100°C [1]. For this purpose, the phase transformation involving the shape memory effect must be above this temperature. The most widely used shape memory alloy (SMA) NiTi does not fit this requirement and can be only be used up to about 80°C [2]. Therefore, many attempts have been made on the Ni-Ti system to shift the martensitic transformation to higher temperatures by the addition of different elements thus obtaining the ternary system Ni-Ti-X (X=Zr, Pd, Hf) [3-9]. However, these alloys' drawback is their high production challenges such as high reactivity of the elements with oxygen and furthermore the high production costs associated. Hence, the

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