



Effect of Heat Treatment on Some Thermodynamics Analysis, Crystal and Microstructures of Cu-Al-X (X: Nb, Hf) Shape Memory Alloy

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NEW VERSION OF ABSTRACT

Heat treatment is an important technique that can improve the properties of shape memory alloys. In this study the effect of heat treatment at three different temperatures (973 K, 1073 K and 1173 K) on some thermodynamics parameters, crystal structure, and microstructure of Cu₈₆Al₁₂Nb₂ and Cu₈₆Al₁₂Hf₂ (mass %) Shape Memory Alloy has been investigated. After heat treatment, the change in the thermal properties of the samples was determined using Differential Scanning calorimetry (DSC). The effect of heat treatment on the crystal and microstructure of the alloy samples were determined at room temperature using X-ray diffraction (XRD), Scanning Electron microscopy (SEM) device. The DSC result showed that in both samples the temperature hysteresis was decreased after heat treatment. Also grain size was decreased by increasing the treatment temperature in both samples. And finally, optical images represented that Hafnium (Hf) is more dissolved in the alloy compared to Niobium (Nb).

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OLD VERSION OF ABSTRACT

In recent years, nuclear power plants have been built worldwide. This amount large of power is better than other energy sources for the environment, it does not have a greenhouse gas. A pressurized water reactor (PWR) is a type of light water reactor to generate electricity and it needed enriched Uranium and large cost. The purpose of this work was to investigate three different types of steel for PWR reactor vessels such as SA30400, SA302B and SA355B-1 steel. The result shows that SA355B-1 performs better than the other. On the other hand, phonons, ionization and collision events show very little damage to all materials.