

THE INFLUENCE OF ALUMINUM IN HIGH ENTROPY ALLOY FeNiCrCuAl

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Abstract: High entropy alloys are alloys who contain of 5 to 11 metal elements in their chemical composition. The term high entropy alloys at first used in 1995 by the chinese researcher Yeh . This research has greatly contributed to the formation, development and research high entropy alloys. In this paper we describe the influence of aluminum in high entropy alloy FeNiCrCuAl.

Keywords: aluminum, high entropy alloys, SEM, hardness.

1. Introduction:

High entropy alloys are alloys of the group consisting of 5 to 11 metal elements in their chemical composition. The term high entropy alloys at first used in 1995 by the chinese researcher Yeh.[1,2] This research has greatly contributed to the formation , development and research high entropy alloys . High entropy alloys consist of metallic elements divided into principals elements and secondary elements.[2] The principals elements are called because their molar fraction greater than 3.5 percent. Like principals elements we can use the chromium (Cr), manganese (Mn), iron (Fe) , cobalt (Co), nickel (Ni), copper (Cu) aluminum (Al), titanium (Ti), cobalt (Co) vanadium (V), magnesium (Mg), zinc (Zn) and so on.

To be considered high entropy alloys these alloys must meet several conditions:

1. Must have at least 5 items to be able to get a high entropy alloy;
2. The maximum difference in atomic radius is not less than 12%;
3. The enthalpy of mixing in the alloy is in the range of (-40) ~ (10) KJ / mol.[3]

Some researchers have found that a basic criterion for obtaining a high entropy alloy are the two main parameters Ω and δ training phase, where Ω is the quotient between the product enthalpy of mixing and melting temperature, and δ is the average change of the radius atomic elements. X. Yang believes that Ω and $\Omega \geq \delta$ can have values 1.1, $\delta \leq 6.6\%$ when forming a stable solid solution.[4]

To investigate the influence of aluminum in alloys with high entropy of the type FeNiCrCuAl second molding were carried out where the aluminum content was different.

- For the first high entropy alloy obtained we used an amount of 5% aluminum.
- For the second high entropy alloy obtained we used an amount of 10% aluminum.

2. Experimental details:

2.1. Tests Material

Quantities used for the attainment of this alloy are: for the first high entropy alloy we used: Fe 20%, Ni 20%, Cr 35%, Cu 20% Al 5% and for second high entropy alloy we used: Fe 20%, Ni 20%, Cr 30%, Cu 20%, Al