EFFECTS OF HEAT TREATMENTS ON THE MICROSTRUCTURE AND MICROHARDNESS OF $Al_xCrFeNiMn$ ALLOYS

I. Voiculescu[1*], V. Geanta[1], M. Ionescu[2]

[1]Universitaty Politehnica of Bucharest (UPB), Bucharest, Romania
[2] SC IMA METAV, Bucharest, Romania
[*]Corresponding author's e-mail address: ioneliav@yahoo.co.uk

ABSTRACT

The new metallic materials called high entropy alloys, obtained by using at least five different chemical elements introduced in quasi-equiatomic percent, have outstanding features of hardness and toughness, being an interesting alternative for use as hardfacing by welding on components subjected to severe stress and abrasive wear. The paper shows the effect of heat treatments applied to high entropy alloys from the AlxCrFeNiMn family, by studying the changes of microstructure and micro-hardness. Four different types of alloys have been analyzed, with different content of aluminum, for which two series of aging were applied: the first one at a temperature of 700oC for 4 hours followed by cooling in air and the second one to 700oC for 4 hours combined with maintenance at 1100 °C for 2 hours and cooling in air. Microstructural aspects have revealed the tendency of precipitation and spheroidizing of intermetallic compounds in the matrix and some grain refining processes. It was found that, for certain alloys (HT3), heat treatments resulted in the doubling of hardness, while for others (HT6, HT8 and HT12) the hardness had only an insignificant modification compared to the as-cast state.

KEYWORDS: High entropy alloys; Heat treatments; Microhardness.

ACKNOWLEDGEMENTS

The research work was financially supported by the Romanian National Program for Research in the framework of the Project **PN-II-IN-DPST-2012-1-0066 -** Component for excavator reinforced with high entropy alloys - HEATETH**.**

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