

Effect of Carbon Additions on FeCrNiMnTi High Entropy Alloy

Authors : C. D. Gomez-Esparza, Z. V. Hernandez-Castro, C. A. Rodriguez-Gonzalez, R. Martinez-Sanchez, A. Duarte-Moller

Abstract : Recently, the high entropy alloys (HEA) are the focus of attention in metallurgical and materials science due to their desirable and superior properties in comparison to conventional alloys. The HEA field has promoted the exploration of several compositions including the addition of non-metallic elements like carbon, which in traditional metallurgy is mainly used in the steel industry. The aim of this work was the synthesis of equiatomic FeCrNiMnTi high entropy alloys, with minor carbon content, by mechanical alloying and sintering. The effect of the addition of carbon nanotubes and graphite were evaluated by X-ray diffraction, scanning electron microscopy, and microhardness test. The structural and microstructural characteristics of the equiatomic alloys, as well as their hardness were compared with those of an austenitic AISI 321 stainless steel processed under the same conditions. The results showed that porosity in bulk samples decreases with carbon nanotubes addition, while the equiatomic composition favors the formation of titanium carbide and increased the AISI 321 hardness more than three times.

Keywords : carbon nanotubes, graphite, high entropy alloys, mechanical alloying

Conference Title : ICMEAT 2018 : International Conference on Materials Engineering for Advanced Technologies

Conference Location : Venice, Italy

Conference Dates : April 12-13, 2018