CHARACTERISTICS OF NANOSTRUCTURED FE50CR35NI15 ALLOY POWDERS PRODUCED BY MECHANICAL ALLOYING

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Abstract

Studied nanostructure, ternary Iron-Chromium-Nickel alloy, produced from pure elemental powders by high-energy ball milling. The nanostructured alloys obtained are characterized by several techniques, such as X-ray diffraction (XRD), which allowed the optimization of nickel in chromium dissolution time in Iron. The peaks of a solids solutions seem of face centered cubic (FCC) structure Fe3Ni2 and BCC structure FeCr for a speed of 200 and 250 rpm respectively the exploitation of the XRD patterns recorded the crystallites size of the order about 83 nm for 48 hours milling time for Fe3Ni2 phase and about 14 nm for 48 hours milling time for FeCr phase. The scanning electron microscopes (SEM), EDX analysis have confirmed the refining of grinded particles in function of milling time and the homogenization of our powders in different parts components. The mixture of Iron, Chromium and nickel particle formed begins to decrease in volume; moreover the milling times increases and the refinement of particles continuous. A layering structure constituting of alternating layers of Fe, Cr and Ni is observed, this typical structure of materials, prepared by mechanical alloying formed by ductile and hard elements. The measurement of Differential Calorimeter Scanning (DSC) has confirmed the formation of our alloys.

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