

Synthesis and Structural properties of intermetallic NiAl (Fe) mechanically alloyed

N. Ammouchi¹, M. Gherib², A. Otmani¹, A. Djekour², A. Guittoum³

⁽¹⁾*Laboratoire de Recherche sur la Physico-chimie des Surfaces et Interfaces, Université de Skikda, B.P.26 Skikda (Algérie), e-mail : badines2002@yahoo.fr.*

⁽²⁾*Laboratoire de Magnétisme et Spectroscopie des Solide, Université de Annaba B.P.12 Annaba (Algérie)*

⁽³⁾*Centre de recherche nucléaire d'Alger, 2 Bd Frantz Fanon, BP 399, Alger (Algérie).*

Abstract:

Mechanical alloying is a non-equilibrium process for materials synthesis. It has been used to obtain nanocrystalline intermetallic AlNi(Fe) alloy. Al, Ni and Fe elemental powders have been ball milled in a planetary mill (Pulverisette 7, Fritsch) for various times up to several hours. We have studied the structural and magnetic properties of Al₄₀Ni₄₀(Fe₁₀) obtained powders, by X-rays diffraction, Scanning electron microscopy SEM and ⁵⁷Fe Mössbauer spectroscopy. The X-rays structure analysis was performed by MAUD program. Structural analysis by X ray diffraction reveal the formation, after 04 hours of milling, of the intermetallic NiAl (Fe). The nanocrystallite size has been estimated to be about 10 nm for the intermetallic. The Mössbauer spectroscopy showed that there was interdiffusion of pure elements. The Mossbauer spectra indicates that, in addition to a paramagnetic phase, a disordered ferromagnetic bcc phase Fe(Ni, Al) solid solution is observed after 2h and disappears after 12h and only the paramagnetic NiAl(Fe) is present.

Key-words: *Nanocrystalline materials, mechanical alloying, intermetallic NiAl(Fe), X-rays diffraction, Mössbauer spectroscopy..*