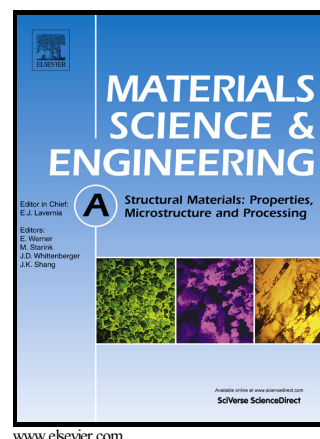


Author's Accepted Manuscript

Structural transition and softening in Al-Fe intermetallic compounds induced by high energy ball milling

M. Raviathul Basariya, Rajat K. Roy, A.K. Pramanick, V.C. Srivastava, N.K. Mukhopadhyay



PII: S0921-5093(15)00483-9
DOI: <http://dx.doi.org/10.1016/j.msea.2015.04.076>
Reference: MSA32300

To appear in: *Materials Science & Engineering A*

Received date: 14 April 2015

Revised date: 24 April 2015

Accepted date: 25 April 2015

Cite this article as: M. Raviathul Basariya, Rajat K. Roy, A.K. Pramanick, V.C. Srivastava and N.K. Mukhopadhyay, Structural transition and softening in Al-Fe intermetallic compounds induced by high energy ball milling, *Materials Science & Engineering A*, <http://dx.doi.org/10.1016/j.msea.2015.04.076>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Structural transition and softening in Al-Fe intermetallic compounds induced by high energy ball milling

M. Raviathul Basariya^{a, b*}, Rajat K. Roy^a, A.K. Pramanick^a, V.C. Srivastava^a, N.K. Mukhopadhyay^b

^aCSIR-National Metallurgical Laboratory, Jamshedpur 831 007, India

^bDepartment of Metallurgical Engineering, Indian Institute of Technology (BHU),

Varanasi 221005, India

*Corresponding author: ravia80@gmail.com

ABSTRACT

In the present investigation, powders of as-cast ingots of Al-25 at.%Fe and Al-34.5 at.%Fe alloys close to Al₃Fe and Al₂Fe intermetallic phases are subjected to high energy ball milling to understand the possibility of formation of amorphous and/or nanocrystalline phases or any other metastable phases. The development of microstructure, evolution of various metastable phases and their stability are investigated by x-ray diffraction (XRD) and transmission electron microscopy (TEM) techniques. Mechanical milling of the alloys, up to 50 h, was carried out in high energy planetary ball mill. It resulted in phase transformation from monoclinic and triclinic structures of Al₃Fe and Al₂Fe, respectively, to orthorhombic structure pertaining to Al₅Fe₂ phase and structural transformation from crystalline to amorphous phase. Hardness measurements revealed a transition from hardening to softening behavior in these mechanically milled alloys undergoing prolonged milling. The softening effect in the milled powders, having a composite structure involving nanocrystalline and amorphous phases, is attributed to the competing phenomenon of grain size reduction and amorphous phase formation with increasing milling time.

Download English Version:

<https://daneshyari.com/en/article/7978131>

Download Persian Version:

<https://daneshyari.com/article/7978131>

[Daneshyari.com](https://daneshyari.com)