

## Accepted Manuscript

Effect of cobalt doping on structural and magnetic characterization of nanocrystalline  $\text{Fe}_{72-x}\text{Co}_x\text{Cr}_{28}$  ( $10 < X < 22$ ) alloys

E. Ghasemi, A. Ghasemi, M. Tavoosi, G.R. Gordani

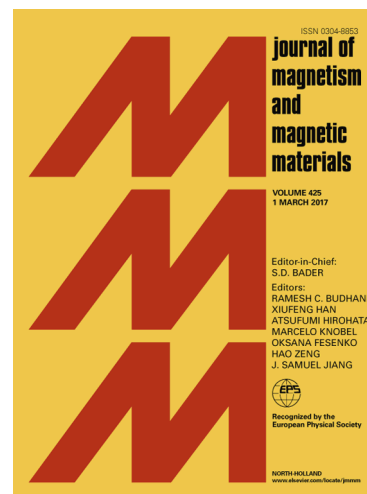
PII: S0304-8853(18)31288-5  
DOI: <https://doi.org/10.1016/j.jmmm.2018.07.062>  
Reference: MAGMA 64168

To appear in: *Journal of Magnetism and Magnetic Materials*

Received Date: 30 April 2018  
Revised Date: 30 June 2018  
Accepted Date: 20 July 2018

Please cite this article as: E. Ghasemi, A. Ghasemi, M. Tavoosi, G.R. Gordani, Effect of cobalt doping on structural and magnetic characterization of nanocrystalline  $\text{Fe}_{72-x}\text{Co}_x\text{Cr}_{28}$  ( $10 < X < 22$ ) alloys, *Journal of Magnetism and Magnetic Materials* (2018), doi: <https://doi.org/10.1016/j.jmmm.2018.07.062>

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 proof before it is published in its final 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.



**Effect of cobalt doping on structural and magnetic characterization of nanocrystalline****Fe<sub>72-x</sub>Co<sub>x</sub>Cr<sub>28</sub> (10<X<22) alloys**

E. Ghasemi, A. Ghasemi, M. Tavoosi, G.R. Gordani

Department of Materials Engineering, Malek-Ashtar University of Technology (MUT), Iran

Corresponding author contact:

Email:

**Abstract**

In this study, the effect of substitution of Co with Fe on structural and magnetic characteristics of nanocrystalline Fe-Co-Cr alloys has been investigated. In this regard, different combinations of Fe, Co and Cr elements with nominal composition of Fe<sub>72-x</sub>Co<sub>x</sub>Cr<sub>28</sub> (10<X<22) were mechanically milled and subsequently annealed in the range of 560-640 °C. The samples were characterized using X-ray diffraction, scanning electron microscopy and vibrating sample magnetometer. Based on results, during milling process Cr and Co elements have been dissolved in Fe matrix and Fe-Cr-Co solid solution (with combination of  $\alpha_1$  and  $\alpha_2$  spinodal phases) has been formed. The coercivity and saturation of magnetization of formed alloys were in the range of 110-187 Oe and 150-175 emu/g, respectively. The coercivity of Fe<sub>72-x</sub>Co<sub>x</sub>Cr<sub>28</sub> (10<X<22) alloys showed an anomalous behavior at 18 at.% of Co as a result of optimal interaction between  $\alpha_1$  and  $\alpha_2$  phases in this composition. The formed Fe-Co-Cr  $\alpha$ -phase solid solutions were not stable and transformed to  $\sigma$  and  $\gamma$  phases during annealing process at temperatures higher than 600 °C. The formation of non-magnetic  $\sigma$  and  $\gamma$  phases had destructive effect on magnetic properties of prepared samples with different composition.

**Keywords:** Fe-Cr-Co, Mechanical alloying, Spinodal, Magnetic properties.

Download English Version:

<https://daneshyari.com/en/article/8152446>

Download Persian Version:

<https://daneshyari.com/article/8152446>

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