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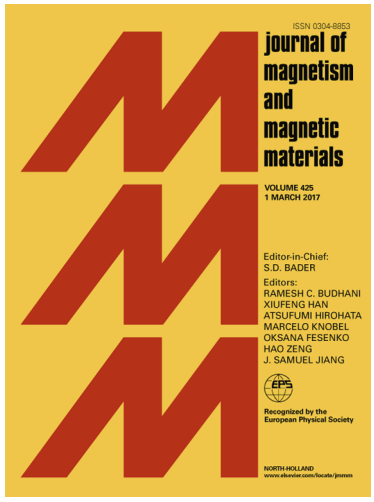

Magnetic and mechanical properties of cold-rolled permalloy

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PII: S0304-8853(18)31648-2
DOI: https://doi.org/10.1016/j.jmmm.2018.07.088
Reference: MAGMA 64194

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

Received Date: 29 May 2018
Revised Date: 21 July 2018
Accepted Date: 30 July 2018

Please cite this article as: P. Vahdati, A. Ghasemi, E.M. Sharifi, Magnetic and mechanical properties of cold-rolled permalloy, *Journal of Magnetism and Magnetic Materials* (2018), doi: https://doi.org/10.1016/j.jmmm.2018.07.088

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Abstract

The main goal of this study was to characterize the structural, mechanical and magnetic properties of Fe-48Ni alloy during annealing processes in different temperatures and holding times. The alloys were studied after 80% cold-rolling and annealing processes under different profile conditions to reach the best magnetic properties such as remanence, coercivity and saturation magnetization. The results were characterized using X-ray diffraction, field emission scanning electron microscopy, vibrating scanning magnetometer and hardness and tensile test to analyze magnetic and mechanical properties. The results about the metallography images indicate that the grain sizes of annealed samples grow with elevation of the heating temperature. The VSM and mechanical tests determine that 80% cold rolled samples require lower annealing temperature to attain optimum values of mechanical and magnetic properties. The experimental results show that both magnetic and mechanical properties improved after annealing at 900 ℃ for 20 min. In fact, the formation of FeNi intermetallic compounds during annealing in high temperature up to 900℃ has destructive effects on magnetic and mechanical properties.

Keywords: Fe-48Ni alloy, annealing treatment, magnetic and mechanical properties, maximum saturation magnetization.

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