Investigation of structural and magnetic properties of rapidly-solidified iron-silicon alloys at ambient and elevated temperatures


PII: S0925-8388(18)30089-6
DOI: 10.1016/j.jallcom.2018.01.088
Reference: JALCOM 44552

To appear in: Journal of Alloys and Compounds

Received Date: 27 September 2017
Revised Date: 26 December 2017
Accepted Date: 6 January 2018


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.
Investigation of structural and magnetic properties of rapidly-solidified iron-silicon alloys at ambient and elevated temperatures

T. V. Jayaraman¹*, V. M. Meka¹, X. Jiang², N. R. Overman², J. Doyle³,
J. E. Shield³, and S. N. Mathaudhu²,⁴

¹Department of Mechanical Engineering, University of Michigan, Dearborn MI, USA
²Pacific Northwest National Laboratory, Richland WA, USA
³Department of Mechanical and Materials Engineering, University of Nebraska, Lincoln NE, USA
⁴Department of Mechanical Engineering, University of California, Riverside CA, USA

Abstract

We investigated the ambient temperature structural properties (thickness, width, microstructure, and lattice parameter), and the ambient and high temperature (up to 900 K) direct current (DC) magnetic properties—saturation magnetization (\(M_S\)) and intrinsic coercivity (\(H_{CI}\))—of rapidly-solidified (melt-spun) Fe-\(x\) wt.% Si (\(x = 3, 5, \& 8\)) alloys. The wheel surface speeds selected for the study were 30 m/s and 40 m/s. The ribbons produced at the lower wheel surface speed (30 m/s) were continuous having relatively uniform edges compared to the ribbons produced at the higher wheel surface speed. The thickness and the width of the melt-spun ribbons ranged between ~15-60 µm and 500-800 µm, respectively. The x-ray diffraction spectra of the melt-spun ribbons indicated the presence of disordered \(\alpha\)-phase, irrespective of the composition, and the wheel surface speed. The lattice parameter decreased gradually as a function of increasing silicon content from ~0.2862 nm (Fe-3 wt.% Si) to ~0.2847 nm (Fe-8 wt.% Si). The wheel surface speed showed an insignificant effect on \(M_S\) while increased silicon content resulted in a decreasing trend in \(M_S\). Elevated temperature evaluation of the magnetization (\(M-T\) curves at ~7.96 kA/m) in the case of Fe-3 & 5 wt.% Si alloy ribbons was distinctly different from that of the Fe-8 wt.% Si alloy ribbons. The curves of
دریافت فوری
متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات