

Download File PDF Ni Fe2o3 Magnetic Composite Synthesized By Mechanical Alloying

#Jenny



Finally I get this ebook, thanks for all these I can get now!

#Rio



Cool! I'am really happy

#Markus Jensen



I did not think that this would work, my best friend showed me this website, and it does! I get my most wanted eBook

#Hun Tsu



wtf this great ebook for free?!

#Che Salsa



My friends are so mad that they do not know how I have all the high quality ebook which they do not!

#Diego Butler



so many fake sites. this is the first one which worked! Many thanks

Abstract Materials Research
ISSN: 1662-2940, Vol. 2, pp. 126-132
doi:10.4236/amr.2014.22012
© 2014 Trans Tech Publications, Switzerland

Article ID: 55111

Synthesis of nickel/Ba-hexaferrite magnetic nano-composite via mechanical alloying route

Issa Sobhani¹, Abolghasem Ataie^{2*}, Mahdyo Javai³, Zoya Sadighi⁴
¹School of Metallurgy and Materials Engineering, College of Engineering, University of Tehran, Tehran, Iran
²issasobhani@ut.ac.ir, ³ataaie@ut.ac.ir, ⁴mahdyo.javai@ut.ac.ir, ⁵zoya.sadighi@alumna.ut.ac.ir

Keywords: Nano-composite, Mechanical alloying, Magnetic properties, Ni/BaFe₂O₇
Abstract: In this study, nickel and Ba-hexaferrite powders were subjected to high energy mechanical milling in argon atmosphere to produce nickel/Ba-hexaferrite magnetic nano-composite. Effects of milling time and Ni amount on the phase evolution, morphology and magnetic properties of the products have been investigated by XRD, FESEM/SEM and VSM, respectively. XRD analysis of nano-composite indicated only Ni peaks after 5 h milling which implied the embedding of Ba-hexaferrite particles inside the metallic nickel. FESEM results revealed that the increasing of the milling time up to 30 h reduced nano-composite particles size into 20 nm. VSM results showed that the magnetic properties of the nickel/Ba-hexaferrite nano-composite were affected by the process conditions. The highest saturation magnetization (33.8 emu/g) was obtained for the sample containing 30 wt% Ni milled for 20 h. Ni series of powder mixture. In addition, it was found that by increasing the milling time coercive field decreases.

Introduction
The M-type ferrites, MFe₂O₄ (M= Ba, Sr or Pb), are interesting magnetic materials. They are well-known as permanent magnets, microwave device materials and high-density magnetic recording media [1-3]. Several methods such as co-precipitation, sol-gel and solid state conventional have been employed to process ultrafine particles of Ba-hexaferrite [4]. If Ba-hexaferrite and an element, with known values of saturation magnetization (M_s) and coercivity (H_c), are assumed to produce a composite, the weight percent of each part can alter the magnetic properties [5,6]. In this study, the BaFe₂O₇ and Ni were used as hard and soft magnet, respectively, which can be considered as an exchange-coupled system. The exchange-coupled system, which is based on the exchange coupling of hard and soft ferromagnetic phases, contemporary satisfies the high magnetization of soft phase with the high H_c of hard phase to obtain a high energy product, (BH)_{max} [7].

Experiment
Mixtures of barium carbonate (BaCO₃, 99%) and hematite (Fe₂O₃, 99%) powder with a Fe/Ba molar ratio of 11 were ground in a Jar mill for 2 h. The rotation speed and Ball to Powder mass Ratio (BPR) were 60 rpm and 50:1, respectively. The mixed powder were then calcined at 1100°C for 1 h [8]. Two powder mixtures of 30 wt% Ni/70 wt% Ba-hexaferrite (A) and 50 wt% Ni/50 wt% Ba-hexaferrite (B) were milled in a high energy planetary ball mill at room temperature in argon atmosphere. The vial and balls were both made from hardened chromium steel. The rotation speed and BPR were 300 rpm and 20:1, respectively.
The phase structure was studied by X-ray Diffraction XRD (Philips X'pert pro) using Cu K_α radiation (λ=1.5406 Å). The morphology of the as-milled samples was examined by Scanning Electron Microscopy. Cam Scan MV2500 SEM. The micro-structures and morphology of nano-composites investigated by Field Emission Scanning Electron Microscopy. Hitachi S4100 FESEM equipped with the EDS point chemical analysis. The magnetic properties of nano-composites were measured by a Vibratory Sample Magnetometer (VSM) under the maximum magnetic field of 10 kOe.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, without the written permission of Trans Tech Publications, www.trans-tech.com

[Download PDF version of :](#)

[Ni Fe2o3 Magnetic Composite Synthesized By Mechanical Alloying](#)