

Accepted Manuscript

Effect of rapid quenching on the magnetism and magnetocaloric effect of equiatomic rare earth intermetallic compounds RNi ($R = Gd, Tb$ and Ho)

R. Rajivgandhi, J. Arout Chelvane, S. Quezado, S.K. Malik, R. Nirmala

PII: S0304-8853(16)32103-5

DOI: <http://dx.doi.org/10.1016/j.jmmm.2017.03.011>

Reference: MAGMA 62532

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

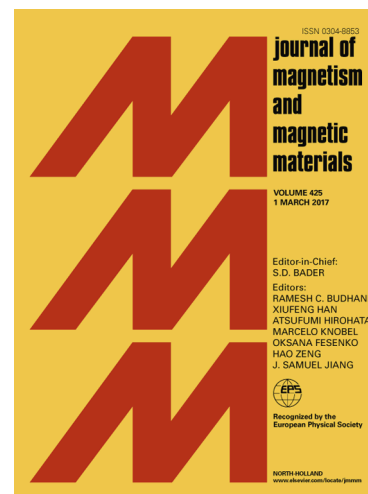
Received Date: 7 September 2016

Revised Date: 30 January 2017

Accepted Date: 4 March 2017

Please cite this article as: R. Rajivgandhi, J. Arout Chelvane, S. Quezado, S.K. Malik, R. Nirmala, Effect of rapid quenching on the magnetism and magnetocaloric effect of equiatomic rare earth intermetallic compounds RNi ($R = Gd, Tb$ and Ho), *Journal of Magnetism and Magnetic Materials* (2017), doi: <http://dx.doi.org/10.1016/j.jmmm.2017.03.011>

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 rapid quenching on the magnetism and magnetocaloric effect of equiatomic rare earth intermetallic compounds RNi (R = Gd, Tb and Ho)

R. Rajivgandhi ¹, J. Arout Chelvane ², S. Quezado³, S. K. Malik³ and R. Nirmala ^{1*}

¹*Department of Physics, Indian Institute of Technology Madras, Chennai 600 036, India*

²*Defence Metallurgical Research Laboratory, Hyderabad 500 058, India*

³*Departamento de Física Teórica e Experimental, Universidade Federal do Rio Grande do Norte, Natal, 59072-970, Brazil*

Abstract

Magnetocaloric effect (MCE) in RNi (where R = Gd, Tb and Ho) compounds has been studied in their arc-melted and melt-spun forms. The compound GdNi has the orthorhombic CrB-type structure (Space group *Cmcm*, No.63) and the compound HoNi has the orthorhombic FeB-type structure (Space group *Pnma*, No.62) at room temperature regardless of their synthesis condition. However, arc-melted TbNi orders in a monoclinic structure (Space group *P2₁/m*, No.11) and when it is rapidly quenched to a melt-spun form, it crystallizes in an orthorhombic structure (Space group *Pnma*, No.62). The arc-melted GdNi, TbNi and HoNi compounds order ferromagnetically at ~69 K, ~67 K and ~36 K (T_C) respectively. While the melt-spun GdNi shows about 6 K increase in T_C , the ordering temperature of TbNi remains nearly the same in both arc-melted and melt-spun forms. In contrast, a reduction in T_C by about 8 K is observed in melt-spun HoNi, when compared to its arc-melted counterpart. Isothermal magnetic entropy change, ΔS_m , calculated from the field dependent magnetization data indicates an enhanced relative cooling power (RCP) for melt-spun GdNi for field changes of 20 kOe and 50 kOe. A lowered RCP value is observed in melt-spun TbNi and HoNi. These changes could have resulted from the competing shape anisotropy and the granular microstructure induced by the melt-

Download English Version:

<https://daneshyari.com/en/article/5490293>

Download Persian Version:

<https://daneshyari.com/article/5490293>

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