

The substitution effect of Cr about large magnetocaloric effect in amorphous Fe-Si-B-Nb-Au ribbons

Min S.G., Ligay L.G., Kim K.S., Yu S.C., Tho N.D., Chau N.

Department of Physics, Chungbuk Nat'l University, Cheongju, 361-763, South Korea; Department of Physics, Nat'l University, of Uzbekistan, Tashkent 700-174, Uzbekistan; Basic Science Research Institute, Chungbuk Nat'l University, Cheongju, 361-763, South Korea; Center for Materials Science, Department of Physics, Hanoi University of Science, 334 Nguyen Trai, Hanoi, Viet Nam

Abstract: The magnetization behaviors have been analyzed for amorphous $\text{Fe}_{73.5-x}\text{Cr}_x\text{Si}_{13.5}\text{B}_9\text{Nb}_3\text{Au}_1$ ($x=0, 3, 5$) alloys. An amorphous phase was formed after quenching by melt spinning with a copper wheel surface speed of 30 m/s. The structure analysis of as-cast was performed using X-ray diffractometer. The magnetic properties of the ribbons were measured by VSM. The Curie temperature is decreased from 629 to 491 K with increasing Cr concentration ($x=0-5$). Temperature dependence of the entropy variation ΔS_M was calculated from the isothermal magnetization. The maximum of ΔS_M was found to appear in the vicinity of the Curie temperature of the amorphous phase. The ΔS_M value is 1.7, 1.13 and 0.94 J/kg K at $x=0, 3$, and 5, respectively. ?? 2005 Published by Elsevier B.V.

Author Keywords: Amorphous ribbon; Isothermal magnetization; Magnetocaloric effect

Index Keywords: Amorphous materials; Chromium; Iron compounds; Magnetization; Melt spinning; X ray diffraction analysis; Amorphous phase; Amorphous ribbon; Curie temperature; Isothermal magnetization; Substitution effect; Iron alloys

Year: 2006

Source title: Journal of Magnetism and Magnetic Materials

Volume: 300

Issue: 1

Cited by: 2

Link: [Scorpus Link](#)

Correspondence Address: Yu, S.C.; Department of Physics, Chungbuk Nat'l University, Cheongju, 361-763, South Korea; email: scyu@chungbuk.ac.kr

Editors: Perov N.

Conference name: Third International Symposium on Magnetism 2005

Conference date: 26 June 2005 through 30 June 2005

Conference code: 66801

ISSN: 3048853

CODEN: JMMMD

DOI: 10.1016/j.jmmm.2005.10.125

Language of Original Document: English

Abbreviated Source Title: Journal of Magnetism and Magnetic Materials

Document Type: Article

Source: Scopus

Authors with affiliations:

1. Min, S.G., Department of Physics, Chungbuk Nat'l University, Cheongju, 361-763, South Korea
2. Ligay, L.G., Department of Physics, Nat'l University, of Uzbekistan, Tashkent 700-174, Uzbekistan
3. Kim, K.S., Department of Physics, Chungbuk Nat'l University, Cheongju, 361-763, South Korea, Basic Science Research Institute, Chungbuk Nat'l University, Cheongju, 361-763, South Korea
4. Yu, S.C., Department of Physics, Chungbuk Nat'l University, Cheongju, 361-763, South Korea
5. Tho, N.D., Center for Materials Science, Department of Physics, Hanoi University of Science, 334 Nguyen Trai, Hanoi, Viet Nam
6. Chau, N., Center for Materials Science, Department of Physics, Hanoi University of Science, 334 Nguyen Trai, Hanoi, Viet Nam

References:

1. Warburg, E., (1881) Ann. Phys., 13, p. 141
2. Debye, P., (1926) Ann. Phys., 81, p. 1154
3. Giaque, W.F., (1927) J. Am. Chem. Soc., 49, p. 1864
4. Pecharsky, V.K., Gschneidner Jr., K.A., (1999) J. Appl. Phys., 86 (1), p. 565
5. F??lde?ki, M., Chahine, R., Bose, T.K., (1995) J. Appl. Phys., 77 (7), p. 3528
6. Yoshizawa, Y., Oguma, S., Yamauchi, K., (1988) J. Appl. Phys., 64, p. 6044
7. Sawa, T., Takahashi, Y., (1990) J. Appl. Phys, 67, p. 5565
8. Franco, V., Conde, C.F., Conde, A., Kiss, L.F., Kem??ny, T., (2002) IEEE Trans. Magn., 38 (5), p. 3069
9. Franco, V., Conde, C.F., Conde, A., (1999) J. Magn. Magn. Mater., 203, p. 60
10. Franco, V., Conde, C.F., Conde, A., (1999) J. Magn. Magn. Mater, 203, p. 60
11. Franco, V., Conde, C.F., Conde, A., Kiss, L.F., Kem??ny, T., (2002) IEEE Trans. Magn., 38 (5), p. 3069
12. Banerjee, S.K., (1964) Phys. Lett., 12, p. 16
13. Chaudhary, S., Jumar, V.S., Roy, S.B., Chaddah, P., Krishnakumar, S.R., Sathe, V.G., Kumar, A., Sarma, D.D., (1999) J. Magn. Magn. Mater., 202, p. 47