Valve behavior of giant magnetoimpedance in field-annealed Co_{70} Fe_5 Si_{15} $Nb_{2.2}$ $Cu_{0.8}$ B_7 amorphous ribbon

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Abstract: The influence of longitudinal field annealing on the giant magnetoimpedance (GMI) effect in Co70 Fe5 Si15 Nb2.2 Cu0.8 B7 amorphous ribbons has been investigated. It was found that annealing in the open air at magnetic fields smaller than the anisotropy field along the ribbon gave rise to the GMI-valve phenomenon, while annealing at magnetic fields higher than the anisotropy field significantly reduced the GMI effect. The GMI-valve behavior corresponding to the highest field sensitivity of GMI (125%Oe) was observed at a frequency of 0.1 MHz in the ribbon annealed under an applied field of 2 Oe. This is ideal for developing sensitive and quick-response magnetic sensors. The GMI-valve behavior observed in the Co-based amorphous ribbon due to field annealing can be explained by considering the complex permeability spectra in relation to the rotational dc magnetization.

Index Keywords: Anisotropy; Cobalt compounds; Electric impedance; Electron tubes; Frequencies; Giant magnetoresistance; Magnetic permeability; Magnetostriction; Sensitivity analysis; Substitution reactions; Amorphous ribbon; Asymmetric giant magnetoimpedance (AGMI); Giant magnetoimpedance; Valve behavior; Amorphous materials

Year: 2005
Source title: Journal of Applied Physics
Volume: 97
Issue: 10
Art. No.: 10M108
Page : 1-3
Cited by: 1
Link: Scorpus Link
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ISSN: 218979
CODEN: JAPIA
DOI: 10.1063/1.1854891
Language of Original Document: English
Abbreviated Source Title: Journal of Applied Physics
Document Type: Conference Paper

Source: Scopus

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References:

- Panina, L.V., Mohri, K., (1994) Appl. Phys. Lett., 65, p. 1189
- Sommer, R.L., Chien, C.L., (1995) Appl. Phys. Lett., 67, p. 857
- Mohri, K., Panina, L.V., Uchiyama, T., Bushida, K., Noda, M., (1995) IEEE Trans. Magn., 31, p. 1266
- Kim, C.G., Jang, K.J., Kim, H.C., Yoon, S.S., (1999) J. Appl. Phys., 85, p. 5447
- Jang, K.H., Kim, C.G., Kim, H.C., Yu, S.C., Shin, K.H., (2000) J. Appl. Phys., 87, p. 5260
- Phan, M.H., Peng, H.X., Wisnom, M.R., Yu, S.C., Chau, N., (2004) Phys. Status Solidi a, 201, p. 1558
- Phan, M.H., Peng, H.X., Wisnom, M.R., Yu, S.C., Nghi, N.H., Sens. Actuators, a
- Von Helmolt, R., Wecker, J., Holzapfel, B., Schultz, L., Samwer, K., (1993) Phys. Rev. Lett., 71, p. 2331
- Phan, M.H., Yu, S.C., Kim, C.G., Vazquez, M., (2003) Appl. Phys. Lett., 83, p. 2871
- Shin, K.H., Graham Jr., C.D., Zhou, P.Y., (1992) IEEE Trans. Magn., 28, p. 2772