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 Co$_{70}$ Fe$_5$ Si$_{15}$ Nb$_{2.2}$ Cu$_{0.8}$ B$_7$ 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. © 2005 American Institute of Physics.

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: Scopus 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
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