Enhanced GMI effect in a $Co_{70}Fe_5Si_{15}B_{10}$ ribbon due to Cu and Nb substitution for B

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Abstract: We present here, the results of an investigation on giant magnetoimpedance (GMI) effect in both annealed and as-quenched $Co_{70}Fe_5Si_{15}B_{10}$ and $Co_{70}Fe_5Si_{15}Nb_{2.2}Cu_{0.8}B_7$ ribbons. Substitution of Cu and Nb for B in an initial $Co_{70}Fe_5Si_{15}B_{10}$ composition forming the $Co_{70}Fe_5Si_{15}Nb_{2.2}Cu_{0.8}B_7$ composition improves both GMI effect and its field sensitivity. The GMI effect was more pronounced in the annealed samples. The field sensitivity of both the longitudinal permeability ratio and the magnetoimpedance ratio for the annealed $Co_{70}Fe_5Si_{15}Nb_{2.2}Cu_{0.8}B_7$ ribbon increase exponentially as the testing temperature is increased, indicating that the magnetic permeability is very sensitive to the temperature. The results obtained are of significant importance in developing quick-response magnetic sensors. ?? 2003 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

Index Keywords: Annealing; Boron; Copper; Giant magnetoresistance; Magnetic domains; Magnetic permeability; Magnetostriction; Niobium; Substitution reactions; Domain wall motion; Magnetic permeability aftereffets (MAE); Magnetic sensors; Magnetoimpedance (MI); Cobalt alloys

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