

Magnetoelastic properties of nanostructured FeCoSiB ribbons used for high-sensitive stress sensors

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Abstract: High-sensitive stress sensor is simply constructed comprising magnetostrictive 30 μm -thick ($\text{Fe}_{80}\text{Co}_{20}$) $78\text{Si}_{12}\text{B}_{10}$ ribbon acting as a sensitive magnetic core inside an induction coil. The stress can be determined indirectly by measuring the change in the output voltage in the two-coil system. The results show that the sensitivity highly depends on the intrinsic properties of the ribbon cores. The optimum with both a high sensitivity and an almost linear stress dependence of output signal was obtained in the 250°C-annealed ribbon. This is attributed to the correlation between the magnetic and magnetoelastic softness governed by the fine 10 nm nanogram structure. These high sensitivity and simple fabrication sensors are widely applicable to various stress detecting fields. © 2007 WILEY-VCH Verlag GmbH & Co. KGaA.

Index Keywords: FeCoSiB ribbons; High-sensitive stress sensors; Nanogram structure; Annealing; Electric potential; Iron alloys; Magnetic cores; Nanostructured materials

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