RD16

Influence of Cooling Rate on the Properties of $Fe_{73.5}Si_{13.5}B_9Nb_3Au_1$ Ribbons

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$Fe_{73.5}Si_{13.5}B_9Nb_3Au1$ ribbons have been prepared by rapid cooling on a single copper wheel with different cooling rates of 10, 20, 30, and 40 m/s. The as-spun samples are amorphous. Upon annealing, the nanocrystalline phases are formed. Increasing the cooling rate leads to thinner ribbons, higher crystallization activation energy and crystallization volume fraction of the α-Fe(Si) phase, slightly increasing Curie temperature and weakening soft magnetic properties. The mechanism of the effects has been discussed.

RD17

Magnetoelastic Properties of Nanostructured Ribbons FeCoBSi Using for High-Sensitive Stress Sensors

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The high-sensitive stress sensors were simply constructed comprising magnetostrictive 30 μm-thick $(Fe_{80}Co_{20})_{78}Si_{12}B_{10}$ ribbons acting as sensitive magnetic cores inside aninduction coil. The stress (σ) can be determined indirectly by measuring the changes in the output voltage (V_{out}) in two-coil system. The results showed that the sensitivity (dV_{out}/d_σ) depended highly on the intrinsic properties of the ribbon cores. The optimum with both a high sensitivity and analmost linear stress dependence of output signal was obtained in the 250°C-annealed ribbon. This is attributed tothe correlation between the magnetic and magnetoelastic softness governed by the fine 10 nm nanograin structure. These high sensitivity and simple fabrication sensors are widely applicable to various fields, such as detecting very small faults in civil buildings or bridge structures.