

Annealing Temperature Dependence of Permeability spectrum in Co-based Amorphous Ribbon

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Co-rich amorphous ribbons are usually annealed to become a giant magnetoimpedance (MI) material for high sensitive field sensors. The frequency spectra of transverse permeability of annealed $\text{Co}_{66}\text{Fe}_4\text{Si}_{15}\text{B}_{15}$ amorphous ribbon are investigated in order to understand the annealing temperature dependence of MI in terms of magnetization dynamics.

The amorphous ribbon, $\text{Co}_{66}\text{Fe}_4\text{Si}_{15}\text{B}_{15}$, was annealed in vacuum under the magnetic field of 3 Oe for 8 hours at various temperatures, T_a , between 473 K and 773 K. The MI spectra were measured by HP4192A impedance analyser in the frequency range between 10 kHz to 10 MHz as a function of T_a and the complex transverse permeability spectra are extracted from the MI spectra. Figure 1 shows the T_a dependence of static initial permeabilities by magnetization rotation and domain wall motion, μ_{dw} and μ_{rot} , obtained by analysing the permeability spectra in terms of relaxation processes. The T_a dependence of μ_{dw} and μ_{rot} are discussed in terms of magnetic softening and the precipitation of nanocrystallines. The T_a dependence of maximum GMI ratio at various frequencies showed a peak around 620 K at which μ_{dw} and μ_{rot} have maximum values.

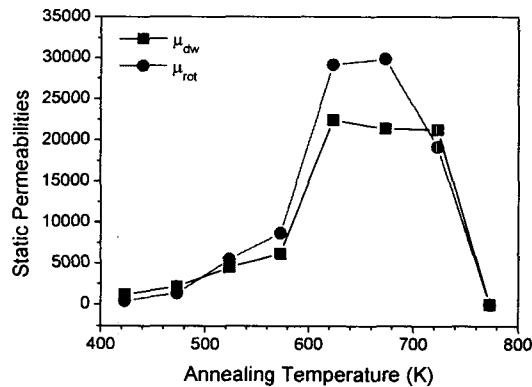


Fig.1 The variation of static permeabilities with annealing temperature