

Magnetic viscosity in soft magnetic nanocrystalline FeNbB alloys

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The attention of the present work is focused on the study of the magnetic viscosity at elevated temperatures in the nanocrystalline ternary $\text{Fe}_{80.5}\text{Nb}_7\text{B}_{12}$ alloy with a low and medium volumetric fraction of nanocrystalline particles. An analysis of the logarithmic-like time creep of magnetization below and above the Curie temperature of the amorphous matrix, $T_c(am)$, enabled us to calculate the corresponding values of the fluctuation field, H_f , and the activation volume, V_{act} , of the soft magnetic specimens. We have found that slightly below $T_c(am)$, the estimated activation volume is rather large and involves more than 10^2 grains. Above $T_c(am)$, V_{act} is strongly reduced but it is still larger than the size of single nanocrystalline grains. This indicates that above $T_c(am)$, the bcc-Fe particles are still interacting and V_{act} involves several grains coherently reversing their magnetic moments.

9.7 cm

13.4 cm

Subject category :

2. Magnetic Films, Surfaces, Multilayers and Nanostructures

Presentation mode :

poster

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