Influence of magnetic annealing on the magnetic properties in Fe-Co-M-B (M=Nb, Zr and Mo) nanocrystalline alloys

Jozef Marcin[a], Jana Turčanová[a], Jozef Kováč[a], Tibor Krenický[b], Peter Švec[c], Ivan Škorvánek[a]

[a]Institute of Experimental Physics, Slovak Academy of Sciences, Watsonova 47, 040 01 Košice, Slovakia

[b]Technical University Košice, Faculty of Manufacturing Technologies, Štúrova 31, 080 01 Prešov, Slovakia

[c]Institute of Physics, Slovak Academy of Sciences, Dúbravská cesta 9, 842 28 Bratislava, Slovakia

9.7 cm

The technological driving force behind this study is the optimization of the alloy composition and heat treatment process in order to obtain FeCo-based nanocrystalline materials with improved soft magnetic properties. A special attention has been devoted to the study of the effects of annealing under presence of external magnetic field in order to produce controllable uniaxial anisotropy in the samples. We report on the effects of both longitudinal and transverse magnetic field applied during the heat treatment on the magnetic behaviour in the series of Fe-Co-M-B type (M=Nb, Zr and Mo) nanocrystalline alloys. Sheared loops with good field linearity were achieved for all investigated alloys after annealing in transverse magnetic field. The stronger response to the transverse field-annealing is observed for the alloys containing Nb and Zr. Here, the values of the induced anisotropy constant up to $K_u \approx 1350$ Jm^{-3} can be reached. A heat treatment under the presence of longitudinal magnetic field results for the Mo-containing samples in squared hysteresis loops characterized by coercive field values in the range of 3 - 8 Am^{-1}. These values are superior to those previously reported for FeCo-based nanocrystalline materials and they remain fairly stable also at elevated temperatures.

13.4 cm

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Corresponding author :

Tibor Krenický

Address for correspondence :

Technical University Košice,
Faculty of Manufacturing Technologies,
Štúrova 31, 080 01 Prešov, Slovakia

Email address :

krenicky@fvt.sk