Magnetic, M??ssbauer and magnetostrictive studies of amorphous $Tb(Fe_{0.55}Co_{0.45})_{1.5}$ films

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Abstract: The $Tb(Fe_{0.55}Co_{0.45})_{1.5}$ films were fabricated by rf magnetron sputtering from a composite target. Samples were investigated by means of x-ray diffraction, vibrating sample magnetometer, conversion electron M??ssbauer spectra, and magnetostriction measurements. The as-deposited film is an amorphous alloy with a perpendicular magnetic anisotropy and an intrinsic magnetostriction ?=1080??10^{-6} in an applied field of 0.7 T. In this state, it was determined that the hyperfine field B_{hf}=23.5 T and the cone-angle between the Fe moment direction and the film-normal direction ?=12?. After annealing in the temperature range of T_A=250-450&C the amorphous structure still remained, however the anisotropy was changed to a parallel one. The soft magnetostrictive behavior has also been improved by these heat treatments: the parallel magnetostriction $?_?$=465??10^{-6} was almost developed in low applied fields of less than 0.1 T and, especially, a huge magnetostrictive susceptibility ??$_?$=d?$_?$/d(? $_0$H)=1.8??$10^{-2}T^{-1}$ was obtained at ?$_0$H=15 mT. ?? 2000 American Institute of Physics.

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