

Structural and Magnetic Properties Change of amorphous $\text{Co}_x\text{Tb}_{1-x}$ film on annealing

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Abstract

RE(Rare Earth)-TM(Transition metal) amorphous alloy thin films have drawn scientific interest because of its anisotropic magnetic properties though the structures are isotropic in large scale. This triggers us to study the relationship between atomic structural changes and magnetic properties of $\text{Co}_x\text{Tb}_{1-x}$ ($x=0.6\sim 0.88$) amorphous alloy thin films.

Thin films of 2000Å thick were made using e-beam co-evaporation. Pt protection layer of 50Å was deposited both top and bottom side of the films. It was then annealed in perpendicular magnetic field of several intensities at 300°C for 1 hour. Samples were characterized using grazing angle XRD and VSM. RDF(Radial Distribution Function) analysis was performed with the XRD data.

Annealing in a weak magnetic field reduced the H_c and squareness of the hysteresis curve in perpendicular direction. Annealing in a strong field reduced first nearest neighbor's structure factor but increased the second nearest neighbor's. The results implies that magnetic properties changes with structural change in short though the isotropic amorphous structure persists. It is supported by BOA(Bond Orientational Anisotropy) model, which states that the nearest atomic distance in perpendicular direction is larger than the distance in parallel plane direction.

References

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