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Dependence of the microstructure and magnetic properties of amorphous TbFeCo films on the type and pressure of the gas in sputtering

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Abstract

Amorphous Tb₃₀Fe₆₀Co₁₀ films have been fabricated by magnetron sputtering. The dependences of the microstructure and magnetic properties of these films on the type and pressure of the gas in the sputtering chamber have been studied. The pressure of the Ar, Kr, and Xe gases used in the experiments is varied in the sputtering chamber from 0.01 to 4.00 Pa. It has been established that sputtering in the heavy gas (Kr) conducted within the pressure range covered does not permit fabricating TbFeCo films with the easy magnetization axis perpendicular to the film plane. With Xe used at pressures below 1.0 Pa, one observes in TbFeCo films an increase of the coercivity, with the hysteresis loop approaching rectangular shape. Sputtering and deposition in Ar at a pressure of ~0.67 Pa result in the formation of amorphous Tb₃₀Fe₆₀Co₁₀ films with magnetic characteristics satisfying the requirements imposed upon information carriers intended to be employed in perpendicular recording. It has been demonstrated that, by magnetron sputtering in an Ar atmosphere performed at pressures below 1 Pa, one can produce amorphous Tb₃₀Fe₆₀Co₁₀ films suitable for magneto-optical ultra-high-density information recording. © 2012 Pleiades Publishing, Ltd.

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