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Study of Magnetization Relaxation in Co Thin Films Prepared by Substrate Rotation

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Magnetization relaxation and surface morphology have been studied for Co thin films prepared by sputtering with oblique deposition and by varying the substrate rotation (ω) at 0, 10 and 20 rpm. The films prepared with ω = 10 and 20 rpm during deposition exhibit high dispersion of local grain anisotropy. The average grain size for the samples prepared with ω = 10, 20 rpm is smaller than that of the sample prepared with ω = 0 rpm. Uniform distribution of grains is observed for the sample prepared with ω = 10 rpm. However, the sample prepared with ω = 20 rpm revealed the formation of non-uniformly distributed island like structures due to the lack of sufficient time for the adatoms to relax. Magnetization relaxation for all the samples was performed using magneto-optic Kerr effect (MOKE) based microscopy in the longitudinal mode. Sample prepared with ω = 0 rpm exhibits slow relaxation due to nucleation followed by fast domain wall motion. On the contrary, for the sample prepared with ω = 10 rpm, uniform grains and high exchange interaction leads to fast relaxation. However, the relaxation is slow in the sample prepared with ω = 20 rpm due to decrease in exchange energy arising from non-uniformity of grains.

Keywords: Magnetic thin films, Magnetization relaxation, Anisotropy field, Magnetic domains

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