Magnetization reversal in cobalt nanocolumn structures obtained by glancing angle deposition

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9.7 cm

An advanced deposition technique known as glancing angle deposition (GLAD) was used to fabricate randomly seeded magnetic cobalt nanocolumn structures. The existence of nanocolumns was confirmed by the cross-section scanning electron microscope (SEM). The surface analysis, performed via atomic force microscopy (AFM), showed that the cobalt forms elongated nanosized grains. The magnetic properties of the samples prepared by MBE were found to depend upon shape anisotropy. The evolution in the magnetization reversal mechanism as a function of film thickness was investigated. The coercivity H_C and M_R/M_S ratio (where M_R and M_S denote the remanent and saturation magnetization, respectively) were derived from the magnetic hysteresis loops as a function of the angle between the external magnetic field and the inclined columns. The direction of the easy/hard axis of the magnetization and inclination angle of columns were determined on the basis of the angular dependencies of the coercivity and the normalized remanent magnetization. A cross-over from the coherent rotation, based on Stoner Wohlfarth model, to the curling reversal mode was observed for films thicker than 30 nm.

13.4 cm

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