BP04

Magnetic Anisotropy of Obliquely Evaporated FeCo Films

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In-plane large coercive forces were obtained by oblique evaporation [1]. The evaporation technique is utilized for the production of the magnetic recording tapes. We studied the anisotropies of Co and Fe films [2,3]. To increase saturation magnetization, Fe-Co alloys are suited. We prepared magnetic films by electron-beam evaporation from an $Fe_{50}Co_{50}$ source on glass substrates. Incident angle (η) was changed from 0^o (normal) to 90^o. Film thicknesses were 500 and 1000 Å. Uniaxial tilt anisotropy field (H_{k1}), in-plane anisotropy fields (H_{k2}) and the tilt angle (α) were determined by ferromagnetic resonance [2,3]. In-plane magnetic anisotropies were measured by vibrating sample magnetometer (VSM). Figure 1 shows the values of H_{k1}, H_{k2} and α. To determine the three values, gyromagnetic factor ($\gamma/2\pi$) was separately determined for normal incident angle films with five different thicknesses. The obtained value of $\gamma/2\pi$ is 3.06 GHz/kOe. The large tilt anisotropy field (H_{k1}) of 10 kOe is obtained for thickness of 500 Å films made under $\eta=60^o$. However, it decreases with film thickness. For 1000 Å film, H_{k1} is 5 kOe. Coercive forces of the films are about 400 Oe which are not so large compared to those of Co films [2]. The value of saturation magnetization (M_s) was 1200-1300 G for the $\eta=60^o$ films.

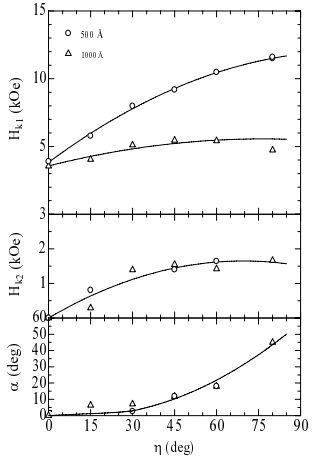

Fig. 1. H_{k1}, H_{k2}, α versus incident angle (η).

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BP05

Nanocomposite CoPt-SiN_x /Ag Films for High Density Magnetic Recording Media

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Recently, CoPt alloy has been investigated for ultra-high magnetic recording media application due to its high magnetic crystalline anisotropy and high thermal stability. The as-deposited CoPt film possesses a face-centered-cubic (fcc) phase which could be transferred to a face-centered-tetragonal (fct) phase by introducing a proper under layer beneath the CoPt film [1, 2]. It has been reported that the strain energy caused by the misfit between the CoPt layer and Ag provides a driving force to order the CoPt film as the Ag under layer is introduced beneath the CoPt films [3]. Moreover, the exchange coupling effect should be minimized in order to lower the media noise. Therefore, a granular microstructure of CoPt film is preferred. In this work, we studied the magnetic properties and microstructure of nanocomposite CoPt-SiN_x /Ag films. It is found that when a 30 nm Ag under layer is introduced under the CoPt alloy film, the CoPt (16nm)/Ag (30 nm) films has great out-of-plane squareness ($S_\perp$), saturation magnetization (M_s) and out-of-plane coercivity ($H_{c\perp}$) which are 0.95, 390 emu/cm^3 and 18 kOe, respectively. Further, the different volume percent of SiN_x ceramic materials are co-sputtered with the CoPt film on the Ag under layer at room temperature to reduce the grain size of CoPt films. After deposition the films are annealed at 700^oC for 30 mins.. From the field emission gun high resolution transmission electron microscope (FEG-TEM) analysis, we found that the particle size of CoPt was very uniform and smaller than 10 nm as the SiNx content was increased to 55.1 vol. %.

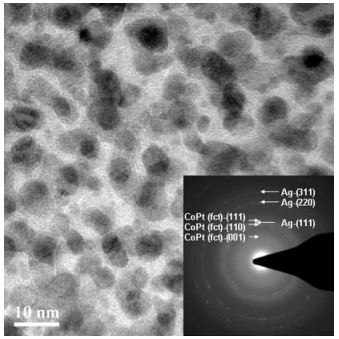

Fig. 1. FEG-TEM images and selected area electron diffraction patterns of the $(CoPt)_{44.9}$– $(SiNx)_{55.1}$/ Ag films which annealed at 700^oC for 30 minutes.

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