C-TUE-12

The neutron powder diffraction and magnetization of MnNiSi alloys having values of x in the range of $0.03 \leq x \leq 0.10$ have been investigated as a function of magnetic field($0 \sim 12T$) and temperature($2 \sim 300K$). It is shown that after zero field cooling(ZFC) down to 2K the magnetization for the increasing temperature passes through a maximum at around 85K whereas for decreasing temperature with field cooling the magnetization continues to rise beyond the ZFC maximum and gradually levels out. After cooling in a high field the magnetization shows unusual properties at low temperature range of $2 \sim 20K$. All the samples examined displayed hysteresis loops after field cooling. AC susceptibility measurements showed a broad maximum at around 110K. These properties indicate reentrant spin glass behavior. Analyses of neutron diffraction gives evidences that magnetic properties is introduced by short range order, particularly x=0.07 alloy. Smaller hysteresis loops are observed with Si substitution and may be associated with the completely disordered structure indicated X-rays which results in weaker Mn-Ni ferromagnetic interactions.

C-TUE-13

COLD ROLLING CONDITION AND MAGNETIC INDUCTION IN THIN-GAUGED 3% Si-Fe STRIP

N. H. Heo, *K. H. Chai, J. H. Shin, *J. G. Na and **J. S. WOO,KEPRI, Taejon 305-380, Korea, *KIST, Seoul 136-791, Korea,**Pohang Iron and Steel Co.,Kyungbuk 790-785, Korea

A 3% silicon-iron was prepared through vacuum induction melting, and the ingot was hot-rolled to plates with thickness of 2 mm. The thickness of the plates was reduced to 150 or 100 ㎛ through one-step or three-steps cold-rolling process. Final annealing was performed at 1200℃ under a vacuum of 10^{-6} torr. After final annealing for 7.2 ks, the strip, three-steps cold-rolled, showed the magnetic induction [$B_{10}T$] higher than 1.90 T, but the other that of about 1.5 T. It has been reported[1] that under H_2S or S atmosphere (100) grain grows consuming other grains due to the surface energy difference. In the present study, sulfur segregation is observed up to the final annealing time of 1.2 ks. The (110) grains should, therefore, survive up to 1.2 ks, in order to grow and form a complete (110)[001] Goss texture with increasing final annealing time. Grain growth rate is 3-5 times faster in the strip one-step cold-rolled than in the other. From texture analyses by ODF, it was observed that only the strip, three-steps cold-rolled, showed a nearly complete (110)[001] Goss texture after final annealing. This implies that during final annealing the initial (110)[001] grains have completely been consumed in the strip one-step cold-rolled, due to the relatively faster growth rate up to 1.2 ks.

1. J. L. Walter, C. G. Dunn, Acta Met. 8, 497(1960).

C-TUE-14

EFFECTS OF HEAT TREATMENT ON THE MAGNETIC ANISOTROPY OF METALLIC FERROMAGNETIC THIN FILMS ON TILT-CUT Si (111) SUBSTRATES

Hyeong-Jun Kim, Byung-Il Lee and Seung-Ki Joo, Div. of MS. & E., College of Engineering, Seoul National University, San 56-1, Shillim-dong, Kwanak-ku, Seoul, 151-742, Korea

Fe, Ni, Co metallic ferromagnetic thin films were prepared on 4° tilt-cut Si(111) substrates with a 50 Å of Cu underlayer and heat treatment of those films were performed in a vacuum furnace during 1 hour. The film thickness was fixed at 50 and 500 Å. Before the heat treatment, in-plane uniaxial magnetic anisotropy was observed in all cases, which was independent of the materials. As the heat treatment was performed from 200 ℃ to 400 ℃, the magnetic anisotropy of each film was drastically changed so that various in-plane magnetic anisotropy was measured. For Fe thin films, uniaxial magnetic anisotropy moved into biaxial anisotropy at 200 ℃ and vanished with further increase of heat treatment temperature. Co, Ni thin films also showed severe changes in magnetic anisotropy so that the easy axis of each film was splitted into other directions in the film plane. The above experimental results were thought to imply the magnetic anisotropy of as-deposited films was from both magnetocrystalline and magnetoelastic effects.

C-TUE-15

STRUCTURE AND MAGNETIC PROPERTIES OF $(Co_{1-x}Fe_x)Pt$ THIN FILMS

C.H.PARK, J.G.NA(KIST, Seoul 136-791), **P.W.JANG**(Choungju Univ. Chongju 360-764, Korea), **S.R.LEE**(Korea Univ. Seoul 136-701, Korea)

$(Co_{1-x}Fe_x)Pt$ thin films (X = 0, 0.2, 0.4, 0.5, 0.6, 0.8 and 1.0) were prepared by using DC magnetron sputtering unit. The composition of the thin films was controlled by using composite target mode adjusting the number of Co, Fe and Pt chips. The thin films were annealed at 500, 600 and 700℃ for 10, 30 and 60 min under a high vacuum of 10^{-6} torr. CoPt thin films deposited at room temperature showed (111) texture, a closed packed plane of FCC structure. The (111) texture of the thin films became weaker with increasing deposition temperature and Fe content. With increasing Fe content in $(Co_{1-x}Fe_x)Pt$ thin films, (001) peaks were clearly seen and (111) peaks became weaker when the thin films were annealed at 700℃ for 1 hr. These indicated that Fe in CoPt promoted the formation of $L1_0$ structure.[1] Co atoms in $L1_0$ CoPt phase could be substituted with Fe atoms if Fe atoms was less than 20% at.%. In-plane coercivities of these films decreased linearly with increasing Fe contents. From TEM experiments, it can be seen that $(Co_{0.21}Fe_{0.79})Pt$ thin films annealed at 700℃ for 1 hr, is composed 2 phases : 1) (CoFe)Pt and 2) CoFe alloys.

[1] K.R.Coffey, M.A.Parker and J.K.Howard, IEEE Trans, Magn., 31(6) (1995) 2327.