P-105

A STUDY ON THE MAGNETIC AND MAGNETO - OPTIC PROPERTIES OF AU / FEPT THIN FILMS GROWN ON THE SI SUBSTRATE. YOUNG W. LEE ,W. S. CHO,C. O. KIM(Dept. of Mat. Eng., Chungnam National Univ., Taejon 305-764, Korea)

There have been many interesting reports on FePt intermetallic compound film which is a candidate of magneto-optic recording material. Since it showed perpendicular magnetic anisotropy in the c axis direction and large Kerr rotation angle at 630nm wavelength. However it also requires epitaxial growth on the MgO single crystal substrate at high(~500℃) temperature. We tried to grow at low temperature on Si substrate using a Au layer instead of a Pt layer which was used before because the melting point of Au is much lower than that of Pt. So it will enable us to get c-axis oriented crystalline structure at a low temperature or substrate temperature.

P-106

Magnetic Properties in IrMn/Ni-Fe Exchange-coupled Bilayers with Various Buffer Layer Materials, J. C. RO and Y. S. CHOI, D. H. YOON, S. J. SUH (Dep. of Met. Eng., Sung Kyun Kwan Univ., Suwon 440-746, Korea), H. FUJIMORI and K. TAKANASHI(Inst. Mat. Re., Tohoku Univ., Sendai 980-77, Japan)

Exchange anisotropy effects have been found in many bilayers which are composed of antiferromagnetic and ferromagnetic layers, such as FeMn/NiFe, NiO/NiFe, NiMn/NiFe and IrMn/NiFe. In this study, Permalloy/IrMn bilayers showing exchange anisotropy were deposited on the Si(100) substrate with D.C. magnetron sputtering system. We have investigated the dependance of exchange anisotropy of the Si/buffer/Permalloy/IrMn on various buffer materials(Cu, Al, Co, Fe, Ta, Zr) as well as various composition of IrMn. It was observed that exchange anisotropy field(H_{ex}) was significantly related to the (111) texture and the composition of IrMn antiferromagnet layer. Permalloy/IrMn bilayers with Ta or Zr buffer materials show higher exchange anisotropy field than these without buffer layer. The higher H_{ex} was believed to be due to the enhanced (111) texture of Permalloy/IrMn bilayer, which was confirmed by TEM and XRD analysis. However, Permalloy/IrMn bilayers with Cu buffer layer show a poor (111) texture and hence results in low exchange anisotropy field(H_{ex}). In addition, our study indicated that the optimum composition of antiferromagnetic layer for maximun exchange anisotropy is about Mn-22 at. %Ir.

P-107

EFFECT OF ALLOYING ON THE MAGNETIC ANISOTROPY OF Au/Co MULTILAYERS

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Several calculations of the magneto-crystalline anisotropy energies of metallic multilayers from the electronic structure have been reported. The first-principles calculations support the conclusion that the anisotropy energy depends on the type of nonmagnetic atom in the layer adjacent to the magnetic layer. It can be predicted from our calculations that by reducing the bandfilling of Au/Co, the relative position of the Fermi level to the characteristic peak will move to a lower energy. We can, therefore, expect that by alloying Fe and Co, i.e. controlling the bandfilling between 30 and 31, the Fermi level will come right at the top of the peak and the perpendicular magnetic anisotropy will be enhanced.

The aim of this research is the experimental verification of the prediction mentioned above. The surface magnetic anisotropy energy was 0.58 erg/cm^2, 0.75 erg/cm^2 for Au/(Fe-Co) multilayers deposited on Si(111) and Al_2O_3(0001) substrates, respectively. The latter is larger value than that of reported previously for the Au/Co multilayers by 33%.

P-108

PERPENDICULAR MAGNETIC ANISOTROPY AND MAGNETO-OPTICAL PROPERTIES OF (Co-Tb)/Pd MULTILAYERS

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RE-TM alloy film has many excellent magnetic and thermomagnetic properties and is currently used as high density magneto-optical recording material, while Co/Pd multilayers shows perpendicular anisotropy and large magnetic-optical effects at short wavelength range. We study the adding effects of rare earth elements into Co layers in the Co/Pd multilayers. (Co-Tb)/Pd multilayers were prepared with sputtering and the perpendicular magnetic anisotropy and magneto-optical properties were measured. X-ray diffraction indicates that thick Co-Tb layers with high Tb concentration were amorphous. Like for crystalline Co/Pd multilayers, perpendicular magnetic anisotropy was observed only for the case of thin Co-Tb. However, the magnetic layer thickness range is much broader for (Co-Tb)/Pd multilayers than that for Co/Pd multilayers. The volume anisotropy was found to decrease a lot with the introduction of Tb, which is attributed to the ferrimagnetic coupling of Co and Tb. Kerr rotation angle was found to decrease with increasing Tb concentration.

POSTER SESSION