

Structural and magnetic properties of Co_2MnSi Heusler alloy films

W.C.Lim^{*}, S.Okamura^{**}, N.Tezuka^{**†}, K.Inomata^{**†}, J.Y.Bae^{*}, H.J.Kim^{*},
T.W.Kim[‡], and T.D.Lee^{*}

^{*} *Department of Materials Science and Engineering, KAIST, Daejeon, Korea*
E-mail: wclim@kaist.ac.kr

^{**} *Department of Materials Science, Tohoku University, Sendai, Miyagi, Japan*

[†] *CREST, Japan Science and Technology Agency, Kawaguchi, Saitama, Japan*

[‡] *Device Lab., SAIT, Suwon, Korea*

Heusler alloy films have attracted significant interests in recent years for spintronics devices. As Co_2MnSi full Heusler alloy has a high spin polarization and a high Curie temperature, it has been studied as a suitable candidate in spintronics[1-3]. In this study, the magnetic and structural properties of Co_2MnSi Heusler alloy films are investigated, and the magnetic tunnel junctions with a Co_2MnSi electrode are fabricated. Co_2MnSi thin films of 100 nm are deposited on thermally oxidized Si substrates by dc magnetron sputtering. In order to obtain the ordered structure, heated substrate during sputtering and post-annealing are used. The films of 100 nm are sputtered on the heated substrates up to 580 °C, and (111) XRD peaks of Co_2MnSi thin films appear above 330 °C, which means that they have the $L2_1$ ordered structure. The saturation magnetization for the ordered Co_2MnSi films is about 950emu/cc and the coercivity is about 10Oe. Co_2MnSi films on heated $\text{MgO}(100)$ substrates shows (111) peak above 470 °C. Saturation magnetization is 1120emu/cc and its coercivity is 27Oe. Maximum MR ratio is about 39% on SiO_2 substrate and 27% on $\text{MgO}(100)$ substrate. More detailed results will be presented.

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