

(SP-02)

Influence of structural disorder on the various physical properties of Ni₂MnGe alloy films

R. J. Kim, N. N. Lee, K. K. Yu, J. Y. Kim, Y. P. Lee, Y. V. Kudryavtsev* and K. W. Kim**

q-Psi & Department of Physics, Hanyang University, Seoul, Korea,

*Institute of Metal Physics, Kiev, Ukraine,

**Department of Physics, Sunmoon University, Asan, Korea

In this study, Ni₂MnGe Heusler alloy (HA) films with noticeably different structural orders were fabricated, and the influence of structural disorder on the magnetic, the optical, and the magneto-optical (MO) properties has been investigated. The bulk Ni₂MnGe HA was prepared by arc melting, and the films were deposited by flash evaporation onto glass substrates at several substrate temperatures from 150 to 730 K. The structural characterization was performed by x-ray diffraction (XRD). The temperature dependence of magnetic properties was investigated with a superconducting quantum interference device. The optical properties were obtained using a spectroscopic ellipsometer and the MO properties were understood by measuring the equatorial Kerr effect. The XRD spectra indicate that the bulk Ni₂MnGe HA exhibits the cubic $L2_1$ structure with $a = b = c = 0.5761$ nm, and the annealed (at 573 K) bulk alloy is in the tetragonal structure with $a = b = 0.5720$ nm and $c = 0.5865$ nm. While the films deposited at 720 K show a well-ordered $L2_1$ structure, deposition at $150 \text{ K} < T < 710 \text{ K}$ results in the formation of a nanocrystalline or an amorphous microstructure. It was found that the structural disorder in the films leads to the loss of ferromagnetic order. It was also understood that the optical and the MO properties were strongly depend on the film structures.