

EPITAXIAL GROWTHS AND MAGNETIZATION DYNAMICS OF Ni₂MnSn HEUSLER ALLOY FILMS

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Ferromagnetic resonance (FMR) has been investigated in Ni₂MnSn Heusler alloy films. The films were deposited at $673 < T < 723$ K on MgO(001) substrates by means of magnetron sputtering. Structural characterization of the films was performed by x-ray diffraction (XRD). XRD confirmed that the films were epitaxial with the lattice parameter $a = 0.605$ and Ni₂MnSn(001)[100]||MgO(001)[110] relationship which matches well with $\sqrt{2}a_{\text{MgO}} = 0.6$ nm. The films had the saturation magnetization $M_S(4K) = 690$ G ($4\mu_B$ per formula unit) typical of bulk Ni₂MnSn with L2₁ structural order. From angular dependencies of the resonance field and the FMR linewidth as well as FMR dispersion characteristics measured with VNA-FMR the following magnetic parameters at room temperature were obtained: the spectroscopic splitting factor $g = 2.05$, the cubic magnetocrystalline anisotropy K_4 of -1×10^4 erg/cm³ and the Gilbert damping constant α of $4 - 7 \times 10^{-3}$. A very low spin-wave stiffness $D = 90 - 100$ meVÅ is responsible for a substantial extrinsic two-magnon contribution to the linewidth of the order of 50-100 Oe in these epitaxial soft magnetic Heusler alloy films.

9.7 cm

13.4 cm

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