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Magnetic anisotropy research of L2₁-Co₂MnAl films grown by magnetron sputtering

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Abstract

The Co₂MnAl films (5 nm, 7 nm, 15 nm, 30 nm, and 50 nm) with L2₁ ordered structure were successfully prepared on GaAs (100) substrate by magnetron sputtering. The switching behavior of hysteresis curves was found to be dependent on both the thickness and the measurement temperature. In order to well understand this, the in-plane magnetic anisotropies in the films were investigated quantitatively by rotating magneto-optical Kerr effect measurement (ROTMOKE). Both the uniaxial anisotropy and the cubic anisotropy were found to show the similar dependency on the temperature, but exhibit inverse changing tendency with the thickness. Combining with the hysteresis loop results, it is suggested that the switching behavior is related to the ratio of K_C/K_U , this switching behavior exists only when the ratio is below a turning value of about 10. Our results may provide a new aspect for understanding and modulating the switching behavior in Co₂MnAl/GaAs systems.

Keywords:

Heusler alloy, L2₁ structure, Magneto-optical Kerr effect, Magnetic anisotropy

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