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Abstract

The Co_2MnAl films (5 nm, 7 nm, 15 nm, 30 nm, and 50 nm) with $L2_1$ 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 Co_2MnAl/GaAs systems.

Keywords:

Heusler alloy, $L2_1$ structure, Magneto-optical Kerr effect, Magnetic anisotropy