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Magnetic and structural anisotropies in laser ablated epitaxial thin films of full-Heusler alloy Co_2MnSi on $SrTiO_3$[1] HIMANSHU PANDEY, P.K. ROUT, R.C. BUDHANI[2], Indian Institute of Technology Kanpur, India — We present the thickness dependent magnetic properties of laser ablated epitaxial Co_2MnSi (CMS)Heusler alloy thin films grown on (001) oriented $SrTiO_3$ substrate. In order to study the intrinsic magnetic anisotropy, a highly ordered single crystal thin film of Heusler alloys is necessary. This provides a unique opportunity to determine the behavior of magnetization reversal, and affect important properties such as the coercive field and remanence. The two important sources of the magnetic anisotropy are the magnetic dipolar interaction and the spin-orbit interaction. The strain in films due to the lattice mismatch with the substrate affects the shape anisotropy while spin-orbit coupling changes magneto-crystalline anisotropy. We have observed an in-plane biaxial compressive strain in the films which relaxes with increasing film thickness. Although the hysteresis loops show an in-plane easy axis for all films, the single-domain phase diagram reveals a gradual transition from in-plane to out-of-plane transition of magnetization as the film thickness is decreased. The magnetization starts to cant as film thickness start to decrease and we found a canting angle of $\approx 31.8^\circ$ with respect to the film plane for our thinnest 5 nm CMS films.

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