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Large Magnetic Anisotropy in Cobalt Vanadate Thin Films[1]
SANGSOO KIM, CHRISTIE THOMPSON[2], CHRISTIANNE BEEKMAN, Florida State University — Cobalt Vanadate is a spinel oxide that displays competition between magnetic frustration, electron itinerancy, and orbital ordering. As a cubic bulk crystal, it is ferrimagnetic below 150 K, with low magnetic anisotropy. However, when CoV2O4 is grown on an [001] SrTiO3 substrate, an orthorhombic structure is formed. Due to this structural distortion, magnetometry and neutron scattering measurements[1] displays a new 90 K magnetic easy axis change from out-of-plane to in-plane upon cooling, and a K spin-canting transition at 75 K To explore the anisotropy of the thin film, torque magnetometry is performed as a function of temperature and external magnetic field. The resulting torque curves show uniaxial anisotropies in the ferrimagnetic state. Below the 90 K transition, the presence of an extremely hard axis causes the magnetization to lag behind the applied field, creating hysteretic effects around the hard axis. This work demonstrates how strain applied as a thin film can cause dramatic changes to the magnetization of a crystal and encourages further studies behind the role of crystal distortion in magnetic oxides. 1. Thompson, C. J. et al. Phys. Rev. Mater. 2, 104411 (2018).

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