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Chiral modulations in MnSi thin films THEODORE MONCHESKY, ERIC KARHU, Dalhousie University, ULRICH RÖßLER, ALEXEI BOGDANOV, Institut fur Festkoerper- und Werkstoffforschung Dresden, SAMER KAHWAJI, Dalhousie University, BRIAN KIRBY, NIST Center for Neutron Research, HELMUT FRITZSCHE, Canadian Neutron Beam Centre, Chalk River, MICHAEL ROBERTSON, Acadia University, CHARLES MAJKRZAK, NIST Center for Neutron Research — We present an investigation of the magnetic textures present in MnSi thin films grown on Si(111) by molecular beam epitaxy. The magnetic structure is investigated with SQUID magnetometry and polarized neutron reflectometry (PNR). For an out-of-plane magnetic field, a conical phase is formed with a reduced wavelength of $2\pi/Q = 13.9$ nm that has both left-handed and right-handed chirality due to the presence of inversion domains in the films. We show that the epitaxially induced tensile stress in the MnSi thin films creates an easy-plane uniaxial anisotropy. The magnetoelastic coefficient is obtained from SQUID measurements in combination with transmission electron microscopy and x-ray diffraction data. The agreement between density functional calculations of the coefficient with the experimental value support the conclusion that the uniaxial anisotropy originates from the magnetoelastic coupling. For an in-plane magnetic field, theoretical calculations based on a Dzyaloshinskii model that includes an easy-plane anisotropy predict a variety of modulations to the magnetic order that are not observed in bulk MnSi crystals. Evidence for these states is found in the SQUID and PNR measurements.

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