

Magnetic properties of MBE-grown MnSb_2Te_4

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Abstract

Magnetic topological insulators (TIs) are expected to open new doors in the field of spintronics, electronics, quantum computation and metrology. MnSb_2Te_4 has attracted great interest due to its ferromagnetic behaviour, thanks to Mn-Sb antisites [1], and its relatively high Curie temperature. In this work we study the MBE growth of highly crystalline MnSb_2Te_4 layers. SQUID magnetometry under zero-field-cooled (ZFC) show a Curie temperature around 40K and the average magnetic moment per Mn atom of the order of 1–1.5 μB , similar to that of bulk MnSb_2Te_4 single crystals [2]. Ferromagnetism is demonstrated by the $M(H)$ hysteresis loops, magnetotransport measurements and x-ray magnetic circular dichroism (XMCD). Finally, transmission electron microscopy (TEM) reveals that Mn is incorporated as a structural component to form septuple layers (SLs) with the presence of Mn-Sb antisites.

References

[1] Ido Levy et al. Cryst. Growth Des.2022, 22, 3007-3015.

[2] S. Wimmer, et al. Advanced Materials, volume 33, issue 42, (2021)

Figures

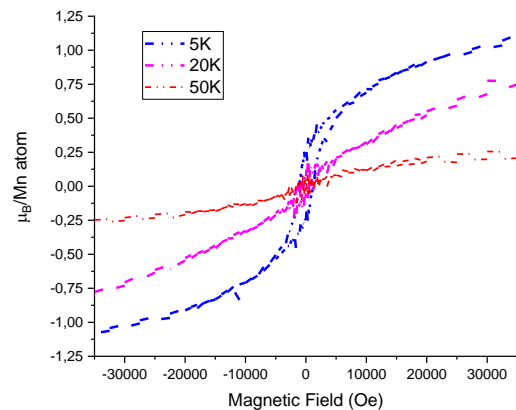


Figure 1: Magnetization in out of plane magnetic fields measured of 40 nm MnSb_2Te_4 .

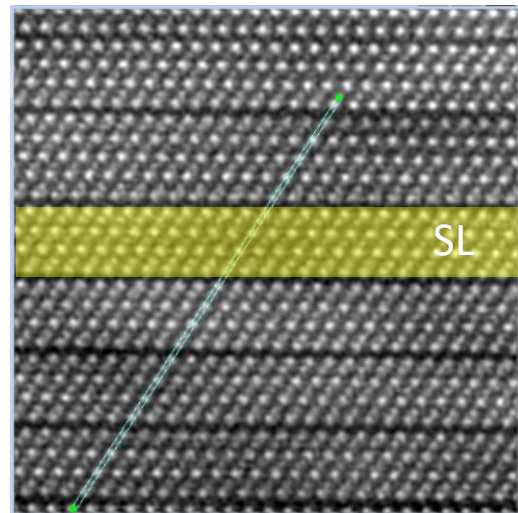


Figure 2: Cross-sectional HAADF-STEM image of 30nm MnSb_2Te_4 .