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Ferromagnetism in Mn-doped Bi_2Te_3 Thin Films by Molecular Beam Epitaxy JOON SUE LEE, ANTHONY RICHARDELLA, DAVID W. RENCH, DUMING ZHANG, NITIN SAMARTH, Dept. of Physics, Penn State University, University Park, PA 16802 — We demonstrate the ferromagnetic properties of Mn-doped thin films of the topological insulator Bi_2Te_3 grown by molecular beam epitaxy. Films with Mn concentrations up to 10% and thickness up to 60 nm were studied. The electrical transport measurements reveal a strong anomalous Hall effect (AHE) with a coercive field of 3000 Oe at 500 mK. The onset (10 - 16 K) of the AHE is at about the same temperature with the Tc obtained by the superconducting quantum interference device (SQUID) measurements. The magneto-conductivity shows hysteresis and a crossover from weak antilocalization to weak localization when going below Tc. The carrier type and the carrier concentration are modified by varying the Mn doping and the film thickness. Most of films are n-type, but some films thicker than 50 nm at a certain Mn concentration are p-type. Shifts in x-ray diffraction indicate that the n-type films have Mn atoms between quintuple layers, but the p-type films are substitutional. Funded by ONR and DARPA.

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