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Ferromagnetism in chromium doped topological insulator thin films and nanoplate crystals[1] ZHIYI CHEN, LUKAS ZHAO, INNA KORZHOVSKA, HAIMING DENG, LIMIN HUANG, City College of New York - CUNY, SIMONE RAOUX, JEAN JORDAN-SWEET, STEPHEN O'BRIEN, IBM Research - Yorktown, LIA KRUSIN-ELBAUM, City College of New York - CUNY — The surface states of topological insulators are protected by time-reversal symmetry. Introducing magnetic impurities should break this symmetry and open a gap in the otherwise gapless surface states. Recent first-principle calculations predict that when topological insulators are doped with transition metal elements, such as Cr or Fe, a *magnetically ordered* insulating state will form – a state that in thin (quasi-2D) samples may support a quantized Hall conductance. Here we report on electrical and magnetic characterization of thin Cr doped topological insulators: Sb_2Te_3 nanoplate crystals and ~ 50 nm thin films of Bi_2Te_3. Electrical contacts to samples were lithographically defined, with *rf* sputtered films grown on pre-patterned substrates. Low-temperature in-plane resistivity, Hall, and magnetization measurements were performed in up to 5 T magnetic fields. For 5 at% Cr content, a distinct ferromagnetic hysteretic response is observed at temperatures below 10 K. Hysteretic loops, also observed in Hall resistivity, indicate low-T coercive fields of the order of 0.5 T. Correlation of transport and magnetic measurements indicating anomalous Hall effect, and strong dependence on dopant concentration and sample thickness will be presented.

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