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Fe/Bi_2Te_3/Fe Tunneling Magneto-Resistance with topological insulator barrier[1] VALLERY SALOMON, DEREJE SEIFU, Department of Physics, Morgan Stata University, Baltimore, MD 21251 — Thin film tri-layer structure Fe/Bi_2Te_3/Fe was synthesized using magnetron DC / RF sputtering. This sample was synthesized at a substrate temperature of 100 °C. It was studied using in-house built magneto-optic Kerr effect (MOKE) instrument. The operating principles of MOKE consist of measuring changes in polarization of light reflected from a magnetic sample. The bulk magnetization was measured using vibrating sample magnetometer (VSM) and torque magneto meter (TMM). Topographic structure and magnetic domains were studied using atomic force microscope (AFM) and magnetic force microscope (MFM). Tunnel magneto-resistance (TMR) effect occurs in a structure that is composed of two conductors separated by a thin insulator of the order of few nanometers, the insulator barrier in this case is a well known topological insulator, Bi_2Te_3. In this structure, electrons tunnel from one of the conductors to the other through the insulating barrier. This is a forbidden process in classical physics, tunnel magneto-resistance is a purely quantum mechanical effect which is key in developing magneto-resistive random access memory (MRAM), magnetic sensors, and novel logic devices.

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Dereje Seifu
Department of Physics, Morgan Stata University, Baltimore, MD 21251

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