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Magnetic proximity effect induced effects in topological insulator/YIG heterostructure ZILONG JIANG, CHI TANG, UC riverside, BO ZHOU, Stanford University, YULIN CHEN, Oxford University, JING SHI, UC riverside — The broken time-reversal symmetry in topological insulator (TI) can lead to quantized anomalous Hall effect (QAHE). QAHE has recently been observed in TI doped with Cr which turns ferromagnetic at very low temperatures.Here we carry out an experimental study on induced ferromagnetism in heterostructures of a thin TI film (Bi2Se3) and an insulating magnetic film (YIG). The YIG film is grown by pulsed laser deposition with an atomically flat surface and in-plane magnetic anisotropy, and Bi2Se3 films of different thicknesses are grown on YIG in a molecular beam epitaxy system.Excellent crystallinity of TI films is confirmed by RHEED. Th topological surface states from the top TI surface are confirmed by ARPES. In the 3nm TI sample, a non-linear current-voltage is observed at all temperature, indicating the existence of the quantum confinement induced gap. In the 5 nm TI sample, the current-voltage characteristic is linear.The anomalous Hall effect (AHE) is observed at low temperatures which clearly demonstrates the magnetic proximity induced magnetic moment in the surface of TI, and the magnitude strongly decreases as the temperature increases.Moreover, the positive magnetoresistance is affected by the induced magnetic layer and the weak anti-localization effect is clearly weakened. This and the AHE indicate a proximity effect between TI and YIG. This research was supported by UC Lab Fees Program.

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