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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 ($Bi2S^{e3}$) and an insulating magneticfilm (YIG). The YIG film is grown by pulsed laser deposition with an atomically flat surface and in-plane magnetic anisotopy, and $Bi2S^{e3}$films of different thicknesses are grown on YIG ina molecular beam epitaxy system.Excellent crystallinity of TI films is confirmed by RHEED. Th topological surface states from the top TI surface are confirmedby 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 anomalousHall effect (AHE) is observedat low temperatures which clearly demonstrates the magnetic proximity induced magnetic momentin the surface of TI, andthemagnitudestrongly decreass a the temperature increases.Moreover, the positive magnetoresistance is affected bythe induced magnetic layer andthe 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.

Zilong Jiang
UC riverside

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