Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Nonlinear Hall effect in h-BN/graphene on ferri-magnetic substrates[1] CHI TANG, BIN CHENG, ZHIYONG WANG, ZILONG JIANG, MOHAMMED ALDOSARY, YAFIS BARLAS, MARC BOCKRATH, JING SHI, UCR, T. TANIGUCHI, K. WATANABE, Advanced Materials Laboratory Japan — In this work, we present a magnetotransport study of fabricated graphene devices transferred on atomically flat ferri-magentic insulator yttrium iron garnet (YIG) thin films. The graphene sheet is sandwiched between a hexagonal boron nitride (h-BN) top gate dielectric and YIG. Due to the atomically smooth surfaces of both h-BN and YIG, graphene devices exhibit high mobility. Furthermore, unlike traditional back-gated devices, the h-BN top-gated devices show negligible gate hysteresis and can achieve high carrier densities with relatively small gate voltages. To investigate the magnetotransport properties of graphene arising from the proximity-induced exchange interaction, we explore the behavior of the nonlinear Hall component over a wide range of carrier densities. The shape of nonlinear Hall part tracks the magnetization of the underneath YIG film after removal of the linear background that originates from the ordinary Hall Effect. A sign reversal of nonlinear Hall contribution is observed when graphene is tuned from electron- to hole- dominated transport regimes. The magnitude of the nonlinear Hall decreases as the density increases for both carrier types. The h-BN top gate dielectric enables us to probe the intrinsic proximity interaction of multilayered graphene heterostructures more efficiently.

[1]This work was supported by NSF/ECCS and DOE/BES.

Chi Tang
UCR

Date submitted: 14 Nov 2014 Electronic form version 1.4