Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Magnetic Characterization of heavily proton-irradiated MnAl Hall bars[1] MARC COSTANTINE, NATTAWUT ANUNIWAT, YISHEN CUI, STU WOLF, JIWEI LU, University of Virginia, BRAD WEAVER, Navy Research laboratory — $\tau-$MnAl has $L1_0$ structure with the perpendicular magnetic anisotropy and it attracts some interests due to the potential application in magnetic recording media and spintronics. We fabricate $\sim$2um wide Hall bar devices from 40 nm MnAl thin film to study the transport properties. Anomalous Hall Effect (AHE) resistance loops of the devices and out-of-plane magnetization loops of unpatterned films mimic one another. This correlation shows that the electrical transport of the material is strongly spin dependent at room temperature. Crystallinity and chemical ordering characterization are performed using X-ray diffraction on unpatterned films. Both patterned and unpatterned films are then exposed to 2 MeV-energy protons for 2 hours at Naval Research Laboratory for displacement damages study. The magnetic and magneto-transport properties were not degraded after the irradiation, which shows promising radiation hardness for future spintronics devices. The heavier, more energetic beam sources and larger dose radiations will be performed and discussed.

[1]We acknowledge the financial support from DARPA and DTRA.

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Date submitted: 19 Nov 2011 Electronic form version 1.4