Abstract Submitted
for the NWS07 Meeting of
The American Physical Society

Magnetoelectric Properties of Magnetic Tunneling Junctions SHILPA CHAVA, AVISHESH DHAKAL, WEI JIANG YEH, University of Idaho, PHYSICS TEAM — Magnetic tunneling junctions(MTJ's) consisting of two ferromagnetic layers separated by a thin insulating barrier show large tunnel magnetoresistive effects when the magnetizations of the ferromagnetic layers change their relative orientation from parallel to antiparallel in an applied field. Tunnel magneto resistance (TMR) is defined as the relative difference in tunnel resistance between parallel and antiparallel oriented magnetizations of electrodes. The larger this TMR effect, the more sensitive the MTJ will be as magnetic read out device. This result has attracted considerable attention due to its potential applicability in digital storage industry and as magnetic field sensors. In this study we present our experimental evidence of magnetoelectric properties of MTJ's. Co(30nm)/Al2O3(1.5nm)/NiFe(30nm) tunnel junctions were fabricated on a Si wafer using DC plasma sputtering deposition with shadow mask technique. We used the RF plasma in-situ oxidation method to oxidize the thin Al layer. We measured the magnetoresistance(MR) ratio of these junctions at room temperature by applying magnetic field in plane and perpendicular to the direction of current. We could obtain MR values of 8% at room temperature and the resistances of these junctions were found to be 500O to 50 KO range.

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Date submitted: 20 Apr 2007 Electronic form version 1.4