Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Correlating microstructure and magnetization configurations with local spin transport in MgO-based nano-MTJs LEI HUANG, Brookhaven National Lab, JUNE LAU, PAUL MORROW, JOHN READ, WILLIAM EGELHOFF, NIST, YIMEI ZHU, Brookhaven National Lab — Magnetic tunneling junctions (MTJs), the key components for many spin-based technologies, are commonly found on the order of 100nm in lateral dimensions due to the continuing trend of device miniaturization. Pinpointing the variations in transport properties due to local structural defects in these nano-MTJs is extremely difficult to accomplish using traditional experimental techniques. Here, we explore directly, the local structural-transport correlations on a series of 100nm by 100nm cross-sectional MgO MTJs by performing simultaneous structural characterization, magnetic imaging and *in-situ* point contact tunneling experiments inside a transmission electron microscope. By changing the magnetic field at the specimen region, the two ferromagnetic electrodes in the MTJs can be controllably toggled between parallel and antiparallel (low and high resistance) states. I-V curves of the two resistance states are measured and quantitatively compared with the Simmons model. We found different barrier heights among nominally identical MTJs patterned from a single continuous film. The correlation of such barrier variations with the unique microstructure of individual devices will also be presented.

Lei Huang
Brookhaven National Lab

Date submitted: 20 Nov 2009 Electronic form version 1.4