Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Non-volatile electric field tuning of magnetic domains in permalloy thin films coupled to ferroelastic PZT bilayers[1] ICHIRO TAKEUCHI, ANBUSATHAIAH VARATHARAJAN, Department of Materials Science and Engineering, University of Maryland, College Park, MD 20424, SAMUEL BOWDEN, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, USA, SEAN FACKLER, TIEREN GAO, PARIS ALEXANDER, JOHN CUMINGS, Department of Materials Science and Engineering, University of Maryland, College Park, MD 20424, DAN PIERCE, JOHN UNGURIS, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, USA, UNIVERSITY OF MARYLAND TEAM, NIST COLLABORATION — We are investigating electric field controlled magnetic domain motion in Py films on Pb(ZrxTi(1-x))O3 (PZT) bilayers. Previously, we have shown that bilayered heterostructures consisting of a tetragonal PbZr0.3Ti0.7O3 film (70 nm) above a rhombohedral PbZr0.7Ti0.3O3 film (70 nm) display large ferroelastic domains in tetragonal PZT layer. The reversible non-volatile ferroelastic domain wall motion in this layer can serve as a basis for inducing controlled strain on magnetic thin films. This results in different ferroelastic domain configurations in the tetragonal PZT layer. This in turn leads to changes in magnetic domains of Py film. We find that a Py film on the ferroelastic PZT layer exhibits sharp magnetic domain patterns usually associated with out-of-plane magnetization by MFM. SEMPA imaging reveals that the magnetic domains are indeed in-plane magnetized as expected for Pyfilms. OOMMF analysis indicates presence of unusual metastable in-plane anisotropy modulation in the Py film.

[1]This work is supported by NSF MRSEC.

Tieren Gao
Department of Materials Science and Engineering,
University of Maryland, College Park, MD 20424

Date submitted: 23 Nov 2011 Electronic form version 1.4