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Electric field tuning of magnetic domains in permalloy thin films using elastic coupling with ferroelectric PZT bilayers[1] ANBUSATHAIAH VARATHARAJAN, ARUN LUYKX, LUZ SANCHEZ, University of Maryland, R. POLCAWICH, Army Research Lab, ICHIRO TAKEUCHI, University of Maryland — We are investigating electric field controlled magnetic domain motion in permalloy films deposited on $Pb(Zr_xTi_{(1-x)})$ O_3 (PZT) bilayers. Previously, we have shown that bilayered heterostructures consisting of a tetragonal $PbZr_{0.3}Ti_{0.7}O_3$ film (70 nm) deposited on a rhombohedral $PbZr_{0.7}Ti_{0.3}O_3$ (70 nm) display large ferroelastic domains in the top tetragonal PZT layer (Adv. Mat. 21, 3497, 2009). The reversible non-volatile twin boundary motion in this layer can serve as a basis for inducing controlled strain on magnetic thin films deposited on top. We find that permalloy films (50 nm) sputtered on top of the ferroelastic layer exhibit out-of-plane magnetization whose domains can be imaged by magnetic force microscopy (MFM). Voltage pulses are applied between patterned pads of the permalloy film and the bottom electrode underneath the PZT bilayer. This results in different twin configurations in the tetragonal PZT layer, which in turn leads to changes in magnetic domains in the permalloy film as monitored by MFM.

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Ichiro Takeuchi
University of Maryland

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