Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

A versatile variable field module for Asylum Cypher scanning probe system[1] HONGXUE LIU, RYAN COMES, JIWEI LU, STUART WOLF, Department of Materials Science and Engineering, University of Virginia, Charlottesville, VA 22904, JIM HODGSON, MAARTEN RUTGERS, Asylum Research, Santa Barbara, CA 93117 — Atomic force microscopy (AFM) has become one of the most widely used techniques for measuring and manipulating various characteristics of materials at the nanoscale. However, there are very limited option for the characterization of field dependence properties. In this work, we demonstrate a versatile variable field module (VFM) with magnetic field up to 1800 Oe for the Asylum Research Cypher system. The magnetic field is changed by adjusting the distance between a rare earth magnet and the AFM probe. A built-in Hall sensor makes it possible to perform in-situ measurements of the field. Rotating the magnet makes it possible to do angular field dependent measurements. The capability of the VFM system is demonstrated by degaussing a floppy disk media with increasing magnetic field. The written bits are erased at about 800 Oe. Angular dependence measurements clearly show the evolution of magnetic domain structures. A completely reversible magnetic force microscopy (MFM) phase contrast is observed when the magnetic field is rotated by 180°. Further demonstration of successful magnetic switching of $CoFe_2O_4$ pillars in $CoFe_2O_4$-$BiFeO_3$ nanocomposites will be presented and field dependent MFM and piezoresponse force microscopy (PFM) will be discussed.

[1]The work at University of Virginia was supported by DARPA under contract no. HR-0011-10-1-0072.

Hongxue Liu
Department of Materials Science and Engineering,
University of Virginia, Charlottesville, VA 22904

Date submitted: 28 Nov 2012 Electronic form version 1.4