

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Fabrication and Characterization of Microstructured Magnetic thin films** Y.C. CHANG, J.Y. OU, LANCE HORNG, J.C. WU, Taiwan SPIN Research Center and Dept. of Physics, Natl. Changhua Univ. of Ed., ZUNG-HANG WEI, MEI-FENG LAI, CHING-RAY CHANG, Cntr. for Nanostorage Research, Dept. of Physics, Natl. Taiwan Univ. — Patterned magnetic thin films have been of great interest due to their potential uses in ultrahigh density data storage as well as magnetic field sensors. However, as the size becomes smaller and smaller towards nanometer scales, the shape anisotropy effect turns out to be crucial among all magnetic anisotropies. Herein, we present a systematic study on the magnetic domain configurations and magnetoresistance curves of laterally microstructured permalloy thin films having thickness ranging from 10 to 100 nanometers and various shapes of ellipse and rectangle arrays with aspect ratios ranging from 1 to 12. A commercial scanning electron microscope modified for direct writing was used to define microstructured patterns. The permalloy film was thermally evaporated in the absence of any external magnetic field. Finally, the patterned films were transferred through a lift-off process in acetone. The magnetic domain configurations were imaged by using a Digital Instruments made magnetic force microscope (MFM) at the remanent states as well as in-situ under external magnetic fields applied in the film plane. A home-made high coercivity CoPt-coated magnetic tip was used to avoid any effects from the stray fields of patterned films and the external magnetic fields. The MR measurements were carried out at room temperature using a standard four-terminal technique. Details of the MFM images and MR curves will be presented and discussed.

J.C. Wu  
Taiwan SPIN Research Center and Department of Physics  
National Changhua University of Education, Changhua, Taiwan

Date submitted: 04 Dec 2004

Electronic form version 1.4