Abstract Submitted
for the NWS07 Meeting of
The American Physical Society

Ultra-soft Magnetic Thin Films Deposited by Obliquely Energetic Fe Nanoclusters DANIEL MEYER, M. FAHEEM, AMIT SHARMA, ALAN MCCONNAUGHERY, JAMIE HASS, RYAN SOUZA, YOU QIANG, University of Idaho — We have generated magnetically ultra-soft films by energetic cluster impact. The charged nanoclusters ($\sim$ 40% of all particles) were accelerated onto substrates held at potentials of 0, 5, and 15 kV. The substrates were tilted at an angle of 30 degrees to the incident beam to generate elliptically shaped particles and thereby induce shape anisotropy. Visible changes of the film structure were observed for increasing potential with 0 kV sample being black due to the porous nature of the soft landed clusters. For the 5 and 15 kV samples, the films take on a metallic sheen due to the increased density. Dramatic magnetic softening of the films was observed for samples with applied potentials, and hence higher packing fractions, in agreement with the random anisotropy model. The coercivity (Hc) at 0 kV was measured to be 78 Oe. Along the easy axis the Hc of the 5 and 15 kV samples were 0.497 and 0.651 Oe respectively. Along the hard axis the Hc were 2.06 and 2.46 Oe. The Hc perpendicular to the substrates was 9.86 and 6.7 Oe. Hence, definite shape anisotropy is observed for the 5 and 15 kV samples with approximately a 70% increase in coercivity of the hard axis relative to the easy axis. In this experiment we have demonstrated a novel technique for directly controlling film morphology and thereby ability to tailor magnetic characteristics for applications in high frequency inductors.

You Qiang
University of Idaho

Date submitted: 13 Apr 2007 Electronic form version 1.4