4CF14-2014-000134

Abstract for an Invited Paper
for the 4CF14 Meeting of
the American Physical Society

Stress Control of Magnetic Properties[1]

JOSE DE LA VENTA, Colorado State University

Controlling the magnetic properties of ferromagnetic (FM) thin films without magnetic fields is an on-going challenge in condensed matter physics with multiple technological implications. External stimuli and proximity effects are the most used methods to control the magnetic properties. An interesting possibility arises when ferromagnets are in proximity to materials that undergo structural phase transition (SPT). The stress associated with the structural changes produces a magnetoelastic anisotropy in proximity coupled ferromagnetic films that allows controlling the magnetic properties without magnetic fields. Canonical examples of materials that undergo SPT and a metal to insulator transitions are the vanadium oxides (VO_2 and V_2O_3). Here I show that the coercivities and magnetizations of the ferromagnetic films grown on vanadium oxides are strongly affected by the phase transition. The changes in coercivity can be as large as 300% and occur in a very narrow temperature interval. These effects can be controlled by the thickness and deposition conditions of the different ferromagnetic films. This work has been done in collaboration with S. Wang, T. Saerbeck, J. G. Ramirez and Ivan K. Schuller, Dept. of Physics, UC San Diego.

[1]The magnetism aspects of this work were supported by the Office of Basic Energy Science, U.S. Department of Energy, under Grant No. DE FG03-87ER-45332 and the oxide related science by the AFOSR Grant No. FA9550-12-1-0381.