Abstract Submitted
for the SES12 Meeting of
The American Physical Society

Magnetic and Structural Investigations on As-grown and Annealed Pulsed Laser Deposited SnO_2:Co Thin Films[1] GRATIELA M. STOIAN, Florida State University, P.A. STAMPE, R.J. KENNEDY, Florida A&M University, Y. XIN, National High Magnetic Field Laboratory, FL, S. VON MOLNAR, Florida State University, FLORIDA STATE UNIVERSITY TEAM, FLORIDA A&M UNIVERSITY TEAM, NATIONAL HIGH MAGNETIC FIELD LABORATORY, FL COLLABORATION — Dilute Magnetic Semiconductor SnO_2:Co films were deposited on r-cut sapphire substrates via PLD from a doped target with a nominal Co concentration of 5 at.%. To study the role of oxygen vacancies and other defects in tuning the ferromagnetic (FM) and electrical properties of these materials, films were deposited at different growth rates, temperatures and oxygen pressures. In addition, some films were annealed at various conditions. For samples grown at optimal conditions, magnetometer measurements show that films are FM at room temperature for thicknesses between 30 nm and 100 nm, with a saturation magnetization of approximately 20 emu/cm^3. Crystallinity improves as the thickness decreases and the moment per surface area varies linearly with the film thickness increase, suggesting the magnetism in our materials is a volume property of the films rather than a surface effect. Moreover, we have also noticed a decrease of the saturation magnetization with increasing growth rate. Annealing films grown at a higher deposition rate than optimal under the same conditions used for their growth, led to an initial rapid increase in the saturation magnetization for short annealing times followed by constant saturation magnetization after further annealing.

[1]Grant no. NSF DMR-0605734

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Date submitted: 18 Sep 2012 Electronic form version 1.4