

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Magnetoresistance of ZnO and SnO₂ diluted magnetic oxide thin films CHRISTER AKOUALA, SANDHYARANI PUNUGUPATI, RAJ KUMAR, YI-FANG LEE, JAGDISH NARAYAN, JUSTIN SCHWARTZ, FRANK HUNTE, Department of Materials Science and Engineering North Carolina State University — Robust ferromagnetism (FM) at room temperature (RT) in semiconductor materials is critical to the development of spintronic devices making use of both charge and spin of electrons. In this work, magnetotransport techniques were used to study the electronic and magnetic properties of pulsed laser-deposited ZnO and SnO₂ diluted magnetic semiconductor films on sapphire substrates. Results from thin films with high structural quality showed both semiconductor and ferromagnetic characteristics. Magnetization measurements of Co-doped ZnO showed clear hysteretic behavior indicative of ferromagnetic films even at room temperature. Measurements of resistance versus temperature and magnetic field showed consistency with semiconductor characteristics. All samples were n-type with magnetoresistance (MR) behavior being strongly dependent on carrier concentration.. The presence of magnetic ions significantly affects the scattering of the conduction electrons in cobalt-doped samples resulting in different MR behavior from undoped samples. Correlation of transport characteristics with magnetization will be discussed in the context of carrier-mediated ferromagnetism in diluted magnetic semiconductors.

Raj Kumar
Department of Materials Science and Engineering
North Carolina State University

Date submitted: 15 Nov 2013

Electronic form version 1.4