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Seminar

Materials Science & Engineering

Presents:

Dr. Michael Snure
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"Magnetism in Transition Metal Doped ZnO Semiconductors"

Spintronics has the potential to revolutionize semiconductor device technology; however, in order to realize the full potential of such devices ferromagnetic semiconductors with Curie temperatures above room temperature are required. For nearly a decade transition metal (TM) doped ZnO has been considered a prime candidate for realizing these ferromagnetic semiconductors. Over this time, almost all TM doped ZnO systems have been tried and ferromagnetism has been reported in many of these systems. However, these reports have generated a considerable amount of controversy too. The research community is still split over whether the observed ferromagnetism in these materials originates from ferromagnetic TM clusters, or if the ferromagnetism is an intrinsic property of the material. In this presentation I will review some of the issues with this field and show strong examples of both intrinsic and extrinsic ferromagnetism in TM doped ZnO films. In my research I have explored both ferromagnetic and non-ferromagnetic TM elements as potential dopents. Thin films of TM doped ZnO were deposited by pulsed laser deposition (PLD) using high purity single-phase targets. Ferromagnetic hysteresis was observed above room temperature in single phase Cu and Co doped ZnO thin films. Ferromagnetism in Cu doped ZnO was quite unexpected considering all elements present in the film (as well as their oxide phases) are non-ferromagnetic. In Ni doped ZnO ferromagnetic hysteresis was not found to be an intrinsic property of the material. From these films a direct correltation between measured ferromagnetic hysteresis and the presence of Ni metal clusters was made.

Wednesday September 9, 2009
4:10-5:00 p.m.
1230 WEB