Department of Physics, Astronomy, and Materials Science
Colloquium, Fall 2009

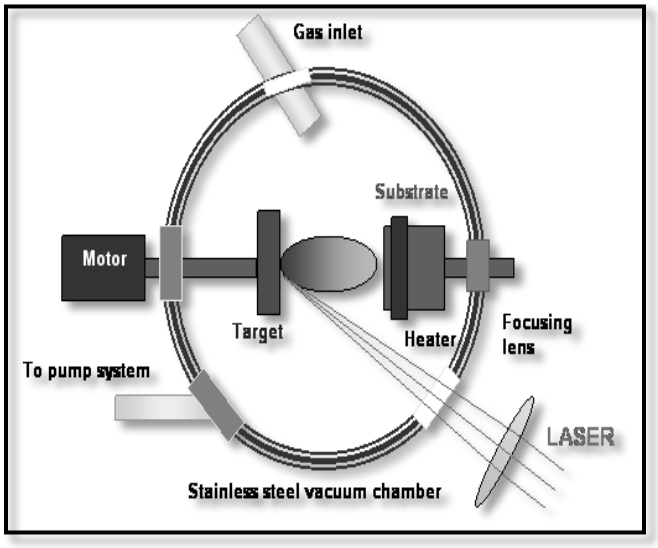
Wide Bandgap Oxide Semiconductors for Spintronics, Optoelectronics, and Biomedical Applications

Dr. Kartik Ghosh

Department of Physics, Astronomy, and Materials Science
Missouri State University, Springfield, MO 65897

4:00 to 5:00 pm, Thursday, October 1, 2009

Kemper Hall Room 100



Recently, wide bandgap oxide semiconductors and their heterostructures have attracted considerable attention because of their wide range of applications in spintronic, optoelectronic, and biomedical devices. The performance of these novel devices critically depends on materials' physical and chemical properties such as optical transparency, electrical conductivity, spin polarization, and biocompatibility. For example, optical transparency depends on materials intrinsic parameters such as band gap where as electrical conductivity depends on carrier concentration and carrier mobility. Wide bandgap is one of the most desired properties for optoelectronic and spintronic applications particularly for solar cell and low wavelength light emitting diodes. Over the last few years we have been investigating structural, electro-magnetic, and optical properties of pulsed laser ablated thin films and nanoparticles of wide bandgap transparent conducting oxide semiconductors as well as some devices such as p-n and Schottky junctions made of these films. In these materials, we could manipulate electronic, magnetic, and optical parameters such as band gap, carrier concentration, carrier mobility, and ferromagnetic transition temperature through chemical doping as well as growth parameters such as oxygen pressure during the growth, substrate temperature, and post deposition annealing. Recent results on electrical, magnetic, and optical properties of some novel oxide based thin films, biocompatible nano-conjugates, devices, and their implications will be discussed in this presentation.

Contact: Dr. Lifeng Dong
Tel.: (417) 836-3755 or (417) 836-3153
E-mail: LifengDong@MissouriState.edu