

Title: Dilute Magnetic Semiconducting Oxide Thin Films and Nanostructures  
Type: Postdoc  
Awardee: Kannan M. Krishnan  
Mentors: Kannan M. Krishnan – UW; Scott Chambers – PNNL  
Description: We propose to investigate the growth, magnetic properties and spin-dependant transport in the recently discovered Co-doped anatase ferromagnetic semiconductor thin films. Emphasis will be on the development of a novel, low-temperature, solution chemistry synthesis route to obtain thin film heterostructures on a variety of lattice-matched substrates. In addition, one-dimensional nanorods will also be synthesized by electrophoretic deposition of the sols using nanoporous membranes as templates. A wide range of temperature-dependant magnetometry and transport measurements as well as characterization methods using electron, photon and scanning probes will be employed to understand the microstructure at relevant length scales. This project will not only complement the recently initiated oxygen plasma assisted MBE growth of these materials at PNNL but will benefit immensely from the synergy between our coordinated research efforts in this rapidly emerging research area of both fundamental importance and technological impact. Finally, we will provide these unique materials to Prof. D. Gamelin (see separate JIN proposal) to carry out optical and magneto-optical studies of transition metal ions using their recently constructed magnetic circular dichroism spectropolarimeter.