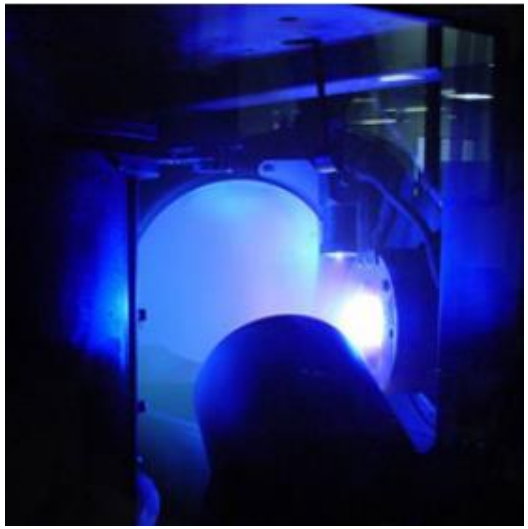

My research group is focused on the study of spin dependent phenomenon in thin films and alternating multilayers of magnetic and non-magnetic metals, semiconductors and insulators. These structures exhibit large changes in resistance depending on the relative orientation of the magnetic layers and can be utilized for novel non-volatile random access memories or for read heads for magnetic hard drives and as nano-oscillators for a new paradigm of computation. (see below) Related structures that can utilize spin as a new state variable consisting of magnetic nanopillars embedded in a ferroelectric matrix can also be utilized as a novel non-volatile memory, and as reconfigurable logic, a potential replacement for conventional CMOS. The ultimate spintronic structure contains a single electron in either self-organized or electrically confined nano-structures and the electron spin can be manipulated by electric fields. Finally, we continue to explore multiferroics and novel metal magnetic oxide materials including iron, bismuth iron and manganese based materials. We have recently initiated a small effort on developing new hybrid superconducting/magnetic nanostructures and we hope this work will be expanded in the near future. We are also exploring strongly correlated oxides, especially those that exhibit a metal to insulator transition. Our main focus has been on vanadium dioxide but more recently have been exploring other transition metal oxides.

Nanoelectronics Research

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