Will lecture on:

**Epitaxial Oxide Heterostructures for Understanding Visible Light Harvesting and Water Photoelectrolysis**

Clean energy technology development is critically important in mitigating climate change and insuring a sustainable energy strategy over time. The Sun bathes the surface of the Earth with 120,000 TW which far exceeds human energy needs by any measure. Photocatalytic water splitting is one way to harness sunlight to generate a storable, high-energy, carbon-free fuel. Although the water splitting reaction is deceptively simple, it is also highly endothermic ($\Delta Go = +237.2$ KJ/mole $= 1.23$ eV), and consists of multiple steps. A key to efficiently utilizing the solar energy to drive this reaction lies in coupling solar photons to the hydrogen evolution reaction (HER: $4H2O + 4e^- \rightarrow 2H2 + 4OH^-$) and to the oxygen evolution reaction (OER: $4OH^- + 4h^+ \rightarrow 2H2O + O2$) via $e^- -h^+$ pair generation, propagation to the electrode surface, and electrochemical conversion. My group’s research in this area is oriented toward investigating the fundamental aspects of these processes using model crystalline materials made using molecular beam epitaxy (MBE). MBE facilitates the controlled synthesis of heterostructures involving layers with well-defined compositions and interface structures. In this talk, I will present recent work on two systems: (1) n-SrTiO3/p-Ge(001) and, (2) p-SrxLa1-xFeO3/n-SrTiO3(001). We have been exploring the relationships between the materials, electronic, optical and photoelectrochemical properties of these systems and highlights of these investigations will be presented.