INDUSTRIAL PARTNERSHIP
FOR RESEARCH IN
INTERFACIAL AND MATERIALS ENGINEERING

Electronic Materials and Devices Program

The scientific advances that continue to fuel the rapid progress seen in the area of electronic materials and devices now rely heavily on research that is fundamentally interdisciplinary in nature. Such research draws upon many disciplines, encompassing materials science, electrical engineering, physics, and chemistry, to name only a few. The focus of the IPRIME Electronic Materials and Devices program is on precisely this form of collaborative interdisciplinary effort, building on faculty expertise across multiple departments, and covering synthesis, structural and chemical characterization, and a plethora of electronic, optical and magnetic characterization techniques. Particular emphasis is placed on the understanding of the fundamentals of electronic structure and transport in electronic and magnetic materials, in addition to the materials science, physics and chemistry of the interfaces and nanostructures that play such a vital role in devices.

Current research areas in our program span a wide range from complex oxides, metal chalcogenides, organic conductors, and next generation solar absorbers, to superconductors, magnetism, and magnetic materials. A particular current emphasis is the use of new techniques using ionic liquids and gels to induce ultra-high charge densities in transistor-type structures. We provide expertise in synthesis and structural characterization techniques as varied as molecular beam epitaxy, sputtering, crystal growth, x-ray and neutron scattering, and high resolution electron microscopy. A vast range of electrical characterization techniques are also used, in addition to theoretical studies based on electronic structure computation and modeling techniques.

Principal Investigators and Primary Expertise:

Steve Koester (ECE) Co-Program Leader	Electronic devices, semiconductors
Bharat Jalan (CEMS) Co-Program Leader	Complex oxides, molecular beam epitaxy
Chris Leighton (CEMS)	Electronic/magnetic properties, film/crystal growth
Paul Crowell (Physics)	Magnetism, transport, ultra-fast spectroscopy
Renata Wentzcovitch (CEMS)	Electronic structure theory
Stephen Campbell (ECE)	Device fabrication and characterization; ALD
Eray Aydil (CEMS)	Solar cells, batteries, and photovoltaics
Uwe Kortshagen (Mech Eng)	Si nanoparticle based solar cells and thermoelectrics

Associated Investigators: Russ Holmes, Andre Mkhoyan.

Contact: To learn more about the Electronic Materials and Devices program & IPRIME, contact Bob Lewis, Director of Technology Transfer, at 612-625-1269 or boblewis@umn.edu, and visit the IPRIME website www.iprime.umn.edu.

UNIVERSITY OF MINNESOTA