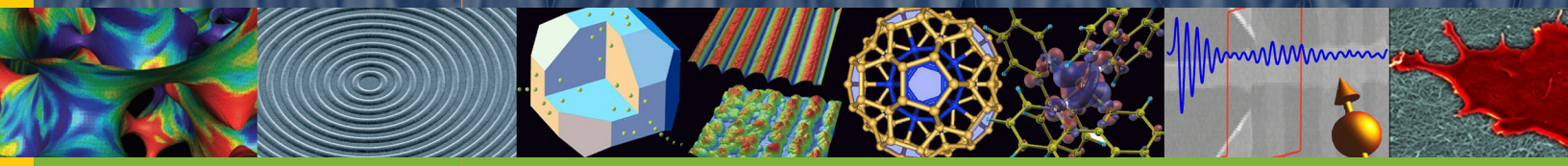
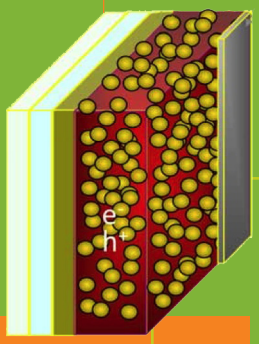
Integrating Interdisciplinary Research with Innovative Outreach to Inspire Excellence in Materials Science and Engineering



University of Minnesota MRSEC

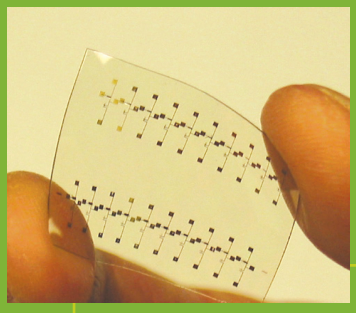
Building on a strong tradition of collaboration within the College of Science and Engineering, the UMN MRSEC unites forty established senior and promising junior faculty from six departments in an interlocking multidisciplinary endeavor.

The research program addresses the meticulous control of composition, structure, and properties in four exciting categories of advanced materials. Faculty and students in Engineered Multiblock Polymers are implementing powerful synthesis and processing strategies for next generation materials based on self-assembly of multiblock copolymers. The Organic Optoelectronic Interfaces team is developing a comprehensive understanding of structure-property relationships in a new class of active electronic materials. Researchers in Magnetic Heterostructures explore spin transport, spin transfer torque, and novel highly polarized materials in precisely engineered heterostructures. The Nanoparticle-Based Materials group is creating environmentally benign nanoparticle-based materials for applications in luminescence and photovoltaics.



HIGHLIGHTS . . .

Hybrid Silicon Nanocrystal-Polymer Solar Cells

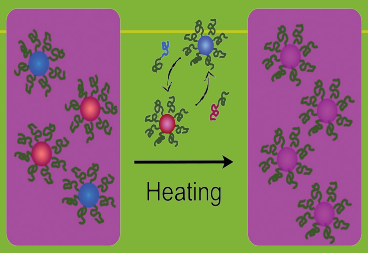


Low Voltage, Printed Organic Circuits on Plastic

DIRECTOR: Timothy P. Lodge
http://www.mrsec.umn.edu

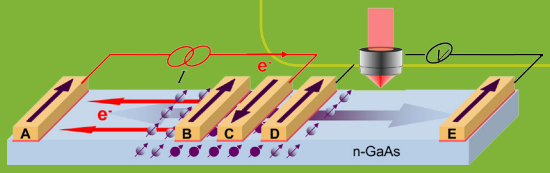
RESEARCH FUNDAMENTALS . . .

The mechanisms of molecular exchange in block polymer micelles control which systems can attain their equilibrium self-assembled nanostructure



How can we prepare nanoporous polymers that are mechanically robust?

Reliable, facile, and quantitative measurement of spin injection is essential to advance understanding and applications of spintronics



"It is incredibly energizing when two students from completely different academic backgrounds collaborate and achieve a research breakthrough; this is the enabling power of the MRSEC."

Timothy P. Lodge, Director
MRSEC

MRSEC OFFERS DIVERSE EDUCATION AND PARTNERSHIPS...

- **Summer Research Programs:** Research Experiences for Undergraduates (REU), Research Experiences for Teachers (RET), Faculty-Student Teams, Native American Fellows – Collaborative research experiences for undergraduates, pre-college teachers, and college faculty
- **Materials Week:** Summer camps for high school students, with hands-on activities and demonstrations
- **PREM:** Partnership for Research and Education in Materials with the University of Texas, Pan American
- **MRFN:** Charter member of the Materials Research Facilities Network, to expand the use of Shared Experimental Facilities
- **IPRIME:** Industrial Partnership for Research in Interfacial and Materials Engineering – a broad-based University/ Industry partnership supporting fundamental collaborative research on materials
- **Energy and U, Physics Force:** Entertaining and instructive shows for K-12 audiences
- **Science Museum of Minnesota:** Partnership in conceiving, developing, and presenting exhibits

OUTREACH

More information about the workshops, internships, partnerships, and educational opportunities are available at: http://www.mrsec.umn.edu/ehr/EHR.shtml