



materials research science  
+ engineering center

# MRSEC

UNIVERSITY OF MINNESOTA

[www.mrsec.umn.edu](http://www.mrsec.umn.edu)

“ 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 ”

DIRECTOR TIMOTHY P. LODGE



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Materials Research Science  
and Engineering Center

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integrating **interdisciplinary research** with **innovative outreach**  
to **inspire excellence** in Materials Science and Engineering



## University of Minnesota MRSEC

The University of Minnesota MRSEC enables important areas of future technology, ranging from biomedicine, separations, and plastic electronics to security, renewable energy, and information technology. The UMN MRSEC manages an extensive program in education and career development. Center research activities are integrated with educational programs, providing interdisciplinary training of students and postdocs. The MRSEC is bolstered by a broad complement of over 35 companies that contribute directly to IRG research through intellectual, technological, and financial support. International research collaborations and student exchanges are pursued with leading research labs in Asia and Europe. The UMN MRSEC benefits from an extensive suite of materials synthesis, characterization and computational facilities.



The research program addresses the meticulous control of composition, structure, and properties in three exciting categories of advanced materials:

- + **IRG-1: Electrostatic Control of Materials**
- + **IRG-2: Sustainable Nanocrystal Materials**
- + **IRG-3: Hierarchical Multifunctional Macromolecular Materials**

**Electrostatic Control of Materials:** Faculty and students in Electrostatic Control of Materials are using new techniques for electrostatic manipulation of charge carrier densities at material surfaces as a universal platform to probe and control electronic properties in novel materials.

**Sustainable Nanocrystal Materials:** The focus of the Sustainable Nanocrystal Materials team is the design, synthesis, processing, and thin film properties of environmentally benign nanocrystal-based electronic and optoelectronic materials.

**Hierarchical Multifunctional Macromolecular Materials:** Researchers in Hierarchical Multifunctional Macromolecular Materials focus on developing a multiple interaction approach to polymer materials design that enables multifunctional applications by decoupling the optimization of two or more desired attributes.



**PREM:** Partnerships for Research and Education in Materials with the University of Texas, Rio Grande Valley

**MRFN:** Charter member of the Materials Research Facilities Network, to expand the use of Shared Experimental Facilities

**Science Museum of Minnesota:** Partnership in conceiving, developing, and presenting exhibits

**IPrime:** Industrial Partnership for Research in Interfacial and Materials Engineering – a broad-based University/Industry partnership supporting fundamental collaborative research on materials

### Summer Research Programs:

Collaborative research experiences for undergraduates, pre-college teachers, and college faculty:

- + Research Experiences for Undergraduates (REU)
- + Research Experiences for Teachers (RET)
- + Native American Fellows
- + Faculty-Student Teams

**Materials Week:** Summer camps for high school students with hands-on activities and demonstrations

**Energy and U, Physics Force:** Entertaining and instructive shows for K-12 audiences



more information about the workshops, internships, partnerships, and educational opportunities available at:

[www.mrsec.umn.edu/ehr/](http://www.mrsec.umn.edu/ehr/)