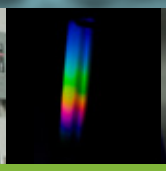
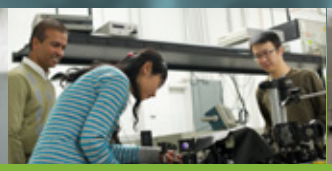
Next-Generation Materials for Plasmonics and Organic Spintronics








University of Utah MRSEC

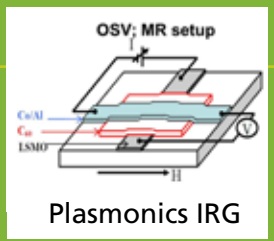
MRSEC on Organic Spintronics and Plasmonics at the University of Utah The Plasmonic IRG seeks to understand the basic properties of surface plasmon polaritons in conventional metals, their alloys and exotic metals, from THz to the UV spectral range. This knowledge facilitates development of new devices and spectroscopic capabilities.

The Organic Spintronics IRG seeks to answer fundamental questions about the basic properties of spin excitations in organic semiconductors. This knowledge will then be applied toward development and fabrication of:

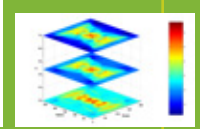
- organic semiconductor devices such as spin valves, that may lead to inexpensive mass-producible magnetic sensors (data storage);
- spin-organic LEDs with color tuned by magnetic field (displays);
- organic optoelectronic devices (environmental sensors);
- and organic photovoltaics (more efficient, inexpensive, and robust solar cells).

HIGHLIGHTS . . .

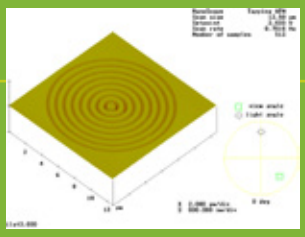
The organic spin valve (made from carbon-60) changes it's resistance in response to a magnetic field; may be applied to fabricating inexpensive, magnetic sensors.



Plasmonics IRG



Electric field map for a bowtie antenna: Plasmonic structures can be used to focus radiation to regions much smaller than a wavelength.

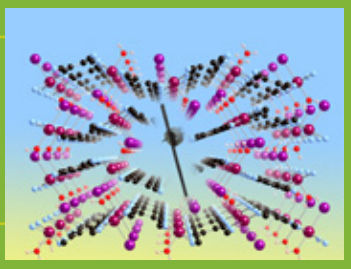


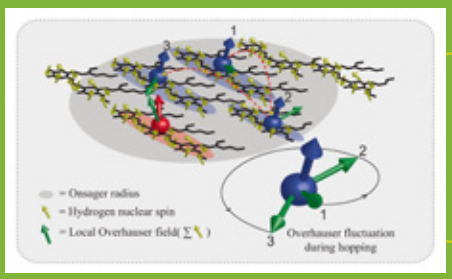
Optical bulls-eye structure: Nanoscale and microscale structures fabricated in metals will be used to manipulate the propagation properties of light.

DIRECTOR: Anil Virkar, PhD.
www.mrsec.utah.edu

RESEARCH FUNDAMENTALS . . .

Organic ferromagnets pioneered in our Department of Chemistry will be used as "spin-injectors" into organic semiconductors.





The spin symmetry of loosely-bound polaron (electron-hole) pairs is crucial to understanding organic semiconductors.

Electron magnetic resonance detects coherent spin motion. Signals at left are specific imprints of the spin-interactions of electrons and can be used to characterize these polymer materials in exquisite detail.

"Our cutting-edge research on next-generation materials for Plasmonics and Organic Spintronics will lead to novel materials and devices in the electronics and energy industries. Through the center's outreach we'll create excitement and curiosity for science and engineering among the nation's youth."

Anil Virkar, Director
MRSEC Utah

REU

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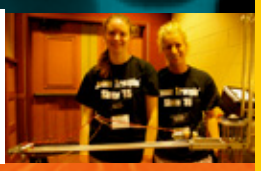

MRSEC EDUCATION & OUTREACH PROGRAMS...

- **REU – Research Experience for Undergraduates**: Brings undergraduate students from around the county to participate in cutting-edge Plasmonic and Organic Spintronic research. MRSEC faculty present seminars and mentor students in their labs for 10 weeks.
- **ACCESS Program for Women in Science and Mathematics:** Provides integrated summer science courses and places students in research labs for their freshmen year.
- **Adelante Program:** Provides University experiences to elementary-aged Hispanic females with a goal of creating a college-going culture and facilitating exploration of STEM academic and career paths. MRSEC faculty and students host regular scientific lessons and hands-on activities for the Adelante students.
- **Science Olympiad:** Promotes hands-on learning experiences in STEM through an annual state competition for 7th-12th grade students, with division winners advancing to the national competition. A new division in Materials with emphasis on Nanomaterials provides opportunity for MRSEC to provide mentorship, expertise and resources.

OUTREACH

More information about the workshops, internships, partnerships, and educational opportunities are available at: http://www.mrsec.utah.edu/eodg_overview

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