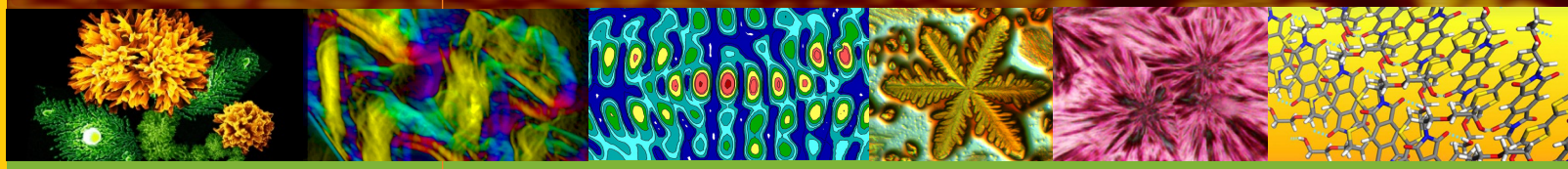
Polarization and Spin Phenomena in Nanoferroic Structures

P-SPINS



Nebraska MRSEC

P-SPINS

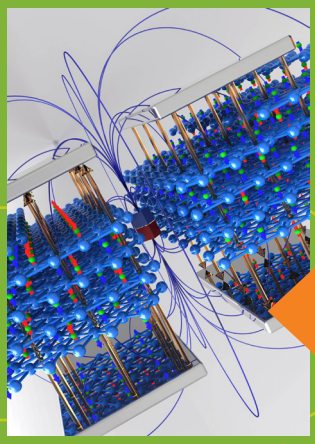
The Nebraska MRSEC is developing new materials with electronic, magnetic, structural and transport properties that can be controlled with an applied electric field or with electric polarization.

A particular emphasis is made on studies of new ferroic materials and structures aimed at developing the fundamental understanding of their properties and related phenomena important for information processing and storage, energy harvesting, and advanced electronics. P-SPINS relies on interdisciplinary collaborations, extensive use of shared facilities, partnerships with national laboratories and international institutions and interactions with industrial companies to leverage the expected scientific innovations for potential technological advances.

P-SPINS education and outreach programs encourage talented young people to pursue scientific careers, broaden the participation of underrepresented groups in science, and improve materials literacy among the general public.

HIGHLIGHTS . . .

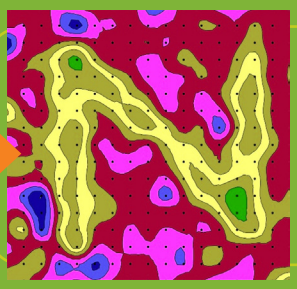
Polarization-induced resistive switching effects in ferroelectric tunnel junctions - promising candidates for novel non-volatile memories



Towards novel spin-electronics: Electrical control of collective spin states at room temperature

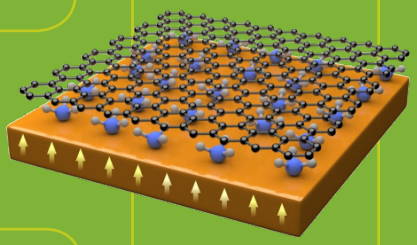
DIRECTOR: Evgeny Tsymbal
http://mrsec.unl.edu

MORE HIGHLIGHTS . . .

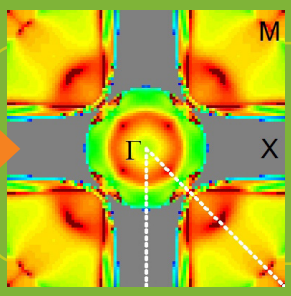


Local optical manipulation and mappig of the boundary magnetization of an antiferromagnetic magnetoelectric

Emerging two-dimensional materials and hybrid devices revealing



novel physical phenomena and functional properties



Advanced modeling of materials predicting new phenomena, such as magnetoelectrically driven tunneling electroresistance

"The Nebraska MRSEC is exploring new horizons in the electric field control of materials properties. The fundamental knowledge established in Nebraska may result in new materials that can change their properties with the simple push of a button."

Evgeny Tsymbal, Director
P-SPINS

EDUCATION AND OUTREACH...

As an intregral part of the center, P-SPINS maintains a portfolio of signature education and outreach activities designed to increase the number, quality, and diversity of individuals pursuing and succeeding at careers in materials science.

- The Professor-Student-Team program engages faculty and students from four-year-colleges in P-SPINS research. The knowledge and experiences gained through this program help improve the materials science curricula at the participant's home institutions.
- The Research Experience for Teachers provides high school teachers and students first-hand experience with cutting-edge research and engagement in the excitement of discovery.
- P-SPINS annual Conference for Undergraduate Women in Physical Sciences, WoPhyS, reaches out to research-active students to discuss nano- and materials science and to inform about career paths in STEM.
- The Bridge Program builds on successful partnerships with minority-serving institutions, University of Puerto Rico, California State University at San Bernardino, and North Carolina A&T, to provide access to minority students into graduate programs.
- Science Slams and Job Start are programs to improve participants' communication skills and job readiness.

OUTREACH

EDUCATION/OUTREACH DIRECTOR: Axel Enders
http://mrsec.unl.edu/education

University of Nebraska Lincoln