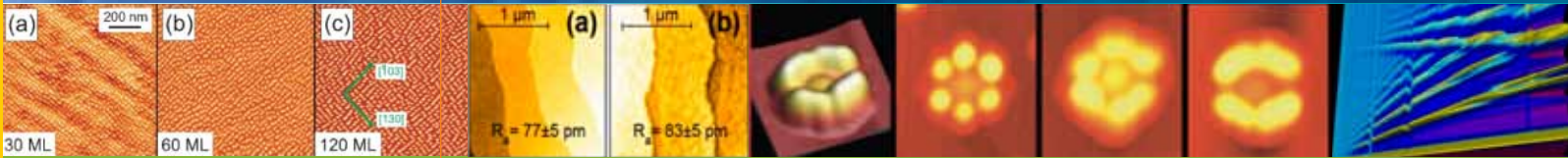




Leading the Discovery, Measurement, and Understanding of Novel Nanomaterials to Inspire Transformative Technologies

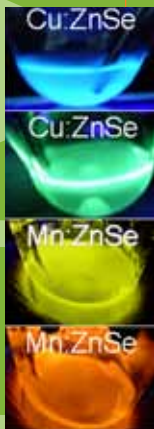


At C-SPIN we explore material nano-science of a scope and complexity not feasible under traditional funding of individual research projects.

For example, we explore and develop the behavior of individual and arrays of nanostructures and uncover and use the science of mesoscopic narrow-bandgap systems by means of our unique breadth of fabrication techniques and range of material synthesis. We leverage this knowledge of synthesis and understanding of behavior into applications for efficient white light sources, bio-medical imagers, and nonlinear optical devices and the highest room-temperature mobility for any semiconductor quantum well.

In addition to its research mission, since neither Arkansas nor Oklahoma are traditionally high-tech economies, the Center not only trains the next generation of scientists and engineers, it sows the seeds for the future economic development of the region by improving science education, inspiring the spin-off of small businesses, promoting careers in materials science, and assisting local industry with the opportunity to exploit the advantage of the sum of the Center's expertise and facilities.

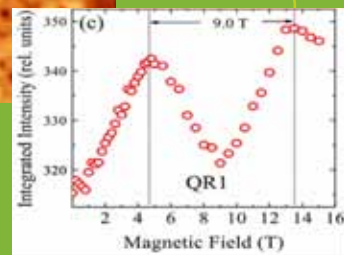
HIGHLIGHTS . . .



This research has resulted in broad band emission dots and the development of an efficient white light source by our spin-off company — NNLabs



Atomic force microscope image of InAs rings



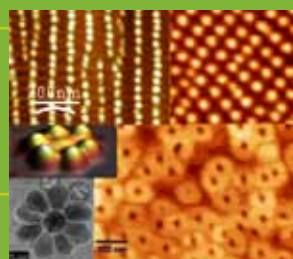
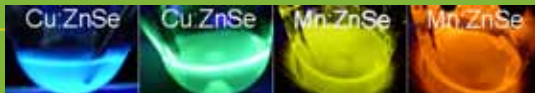
Oscillations in the photoluminescence from the quantum rings with magnetic field indicate an Aharonov-Bohm effect.

University of Oklahoma
ARKANSAS
OF
NORMAN

DIRECTORS: MATTHEW JOHNSON, OU
AND GREG SALAMO, UA
Center for Semiconductor Physics in
Nanostructures (C-SPIN)

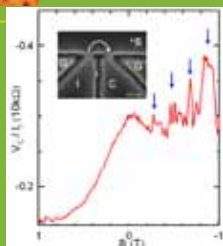
RESEARCH FUNDAMENTALS . . .

Understand the chemistry of colloidal growth including surface adsorption, lattice incorporation, diffusion, ejection, etc.; to open new techniques for growth and doping.

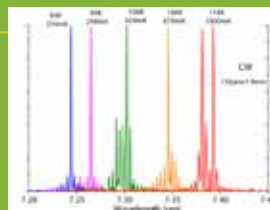


Uncover and exploit the role of diffusion, strain, surface reconstruction, etc., to synthesize organized arrays of quantum dots, wires, rings, and molecules.

Characterize and control electron-spin effects for applications of low-dimensional structures made from narrow-gap semiconductors. Above, we show the first observation of current focusing peaks in InSb heterostructures.



Exploit a broken-gap band alignment in narrow-gap heterostructures to develop efficient interband cascade (IC) infrared lasers, detectors, and photovoltaic devices. Above we demonstrate an IC laser with 7.4 μm emission at 118 K – a record.



A measure of our contribution to the science of nanomaterials is that in 5 years the research of our faculty and students has produced over 400 publications in the most prestigious journals, appeared on the cover of 7 journals, cited over 3000 times by peers, produced two spin-off companies, graduated over 30 Ph.D. students trained at growth, characterization and device fabrication, and supplied samples to over 30 research institutions in the US, Japan, Ukraine, Germany, France, and Brazil. //

Name?



MRSEC OFFERS DIVERSE EDUCATION AND PARTNERSHIPS...

- **RETs:** Mentorship for materials science.
- **REUs:** OU/UA have successful programs.
- **K-12:** Partnership with: SeeS brings science to life at Wilson Elementary (Norman); GK-12 KIDS improves math/science education for middle-school students (AR).
- **Informal Science Education:** Museums: Partnerships with science museums (OK/AR). Pre-school Outreach: Developed pre-K-5 activities.
- **Minorities:** Partner with Louis Stokes Alliance programs.
- **In-Reach:** Undergraduate: OU continues their hands-on NanoLab. UA developed a program called "STUDIO".
- **Postdoc Mentoring:** To improve their experiences, PDs develop short- and long-term priorities based on their career goals.
- **Evaluation/Assessment:** We work with other MRSECs to evaluate tools to determine the effectiveness of our outreach programs.

More information about the workshops, internships, partnerships, and educational opportunities are available at:
<http://www.nhn.ou.edu/cspin/educational/overview.html>

