

# INTERFACES



The Newsletter of the Nebraska Center for Materials and Nanoscience at the University of Nebraska-Lincoln

## *from the Director...*

I am pleased to report on some of the events of note in NCMN in the Spring and Summer of 2013. After a vigorous round of interviewing this past academic year we are pleased that three new assistant professors will be joining us in the fall. Stephen Morin, a postdoc at Harvard, will be a new Assistant Professor of Chemistry, Alexey

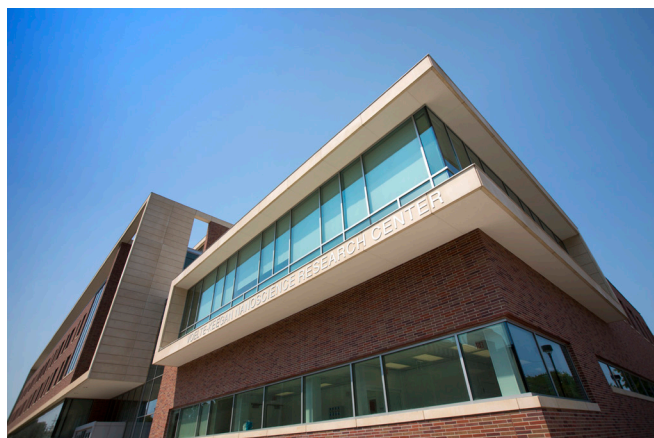


Kovalev, now at University of California, Riverside, will be an Assistant Professor of Physics, and Xiaoshan Xu, from Bryn Mawr College, will be an Assistant Professor of Physics. Morin and Xu will have partial appointments in NCMN and will be involved in the Nanoscale Science and

Technology Program of Excellence. This brings the total number of faculty partially or fully supported by NCMN, in both Arts and Sciences and Engineering, to eight. Additional faculty searches in nanoscale materials are underway.

A major activity of NCMN faculty and staff recently has been the specification, purchase and installation of major instrumentation for the NCMN Central Facilities.

## *The New Voelte-Keegan Nanoscience Research Center Dedication 2012*



...continued on page 5

Especially noteworthy are two state-of-the-art electron microscopes (FEI Tecnai Osiris (S)TEM, and FEI Nova NanoSEM450 *see photos below*). Purchase of two new x-ray diffractometers is imminent. These and other acquisitions will help to greatly strengthen our fabrication and characterization capabilities.

NCMN faculty and their research groups have had a

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## *The Voelte-Keegan Nanoscience Research Center*



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<http://www.unl.edu/ncmn>

UNIVERSITY OF  
**Nebraska**  
Lincoln

## from the Director...

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highly productive year in publishing research articles. At least 157 refereed publications appeared in 2012, many of them in high impact-factor journals such as Science, Advanced Materials, Proc. Nat. Acad. Sci., ACS Nano, Nano Letters, Nature Commun., J. Am. Chem. Soc., Nanoscale, Phys. Rev. Letters, and Applied Phys. Letters. The range and quality of these publications is truly impressive.

The quest for research support is a significant challenge in the present federal budget environment. A recent success of our Physics faculty is the award of a \$7.125 million research collaboration involving six universities and an industry consortium to develop a new generation of electronic devices. This is supported by the Semiconductor Research Corporation and the National Institute of Standards and Technology. The six-member group is led by Evgeny Tsymbal. Other collaborative efforts include the NSF-Materials Research Science and Engineering Center, ARPA-E consortia on magnetic materials, and work to obtain major funding through the National Security Research Institute, a developing University Applied Research Center (UARC) at Nebraska.

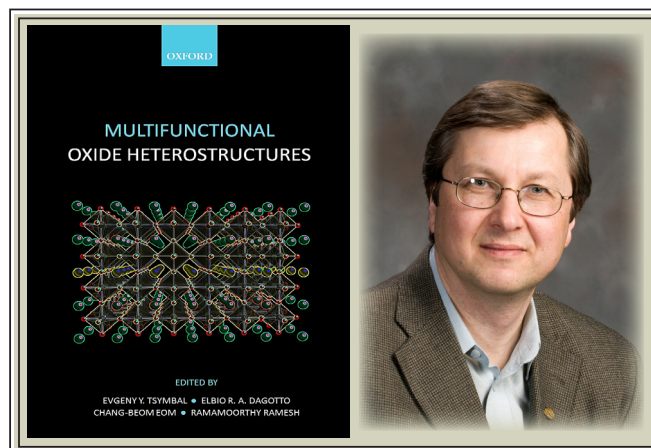
We are gratified by the many educational and research accomplishments of our students and postdoctoral research associates. Our graduates and postdocs are highly sought after for industrial research as well as faculty positions. In addition our NCMN Assistant Director and Education-Outreach Coordinator and our faculty have successfully brought many activities to K-12 students as well as the general public. Please read more about these and other accomplishments throughout this Newsletter. We invite your input and visits at any time.

*David J. Sellmyer*



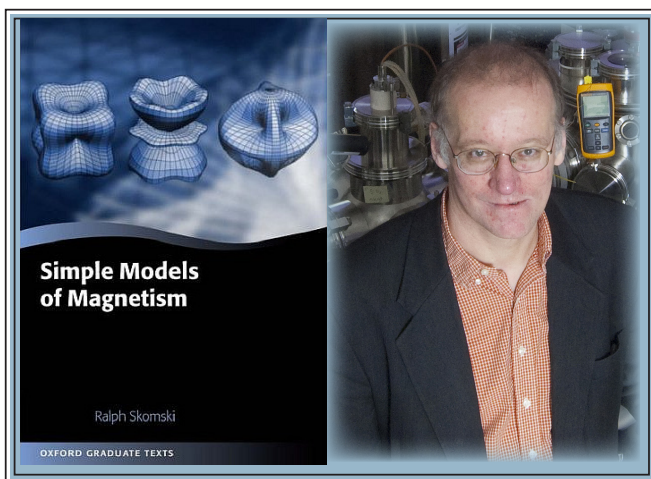
*FEI Tecnai Osiris (S)TEM, and FEI Nova NanoSEM450*

## Recent Books Published



*Co-edited by Evgeny Tsymbal, Elbio R. A. Dagotto, Chang-Beom Eom, and Ramamoorthy Ramesh*

The book "Multifunctional Oxide Heterostructures" is published by Oxford University Press. It is devoted to the rapidly developing field of oxide thin-films and heterostructures. The book covers the core principles, experimental approaches to fabricate and characterize oxide heterostructures, demonstrates new functional properties of these materials, and provides an overview of novel applications.



*by Ralph Skomski*

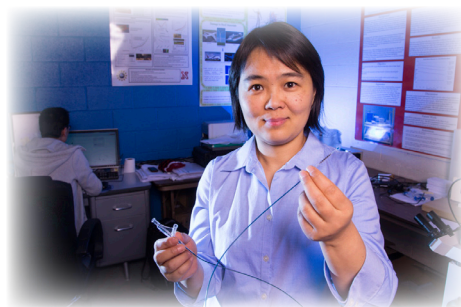
The updated book "Simple Models of Magnetism" is now available in paperback format. The book has been welcomed by the scientific community as a "highly readable and thorough account" and of "great use to graduate students and experts in the field alike". The original set of printed copies has been sold out, although hardback orders are still being accepted by Oxford University Press. The 2012 paperback edition differs from the hardcover edition by various minor additions and corrections, most notably two added special-topic sections on the "new" quantum mechanics involving the Berry phase and on orbital-free density-functional theory.

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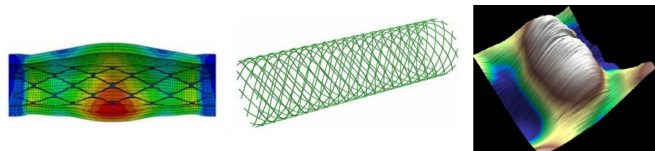
## NSF Early Career Awards - Xia Hong, Jinsong Huang & Linxia Gu

### *Reducing blood vessel stent complications*



Sometimes, vascular cells within the arterial wall react to the stent by making new cells that excessively build up and eventually

restrict blood flow, which may lead to strokes or heart attacks. This condition, called in-stent restenosis, sometimes occurs months later and without warning symptoms.



Linxia Gu said the challenge is to couple the mechanical behavior of cells with the mechanics occurring at the broader scale of tissues, a difficult mathematical task known as multi-scale modeling. This innovative method, however, will help Gu integrate cell and tissue behaviors to better predict what is occurring during in-stent restenosis. This knowledge will help researchers improve prevention and treatment options, and help manufacturers design better stents.

### *Designing New Nanomaterials*

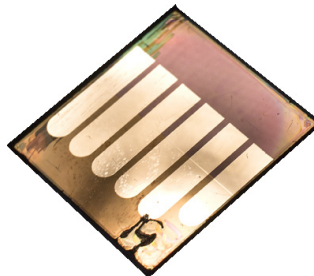
A key to making computers and other electronics smaller, faster and less expensive lies in overcoming the limitations of existing materials. UNL physicist Xia Hong's research into nanoscale materials may one day help break through current barriers.

For decades, scientists have been squeezing more power out of today's silicon-based electronics, which are approaching the material's fundamental limits. To continue advancing, researchers are exploring materials that exhibit unusual physical, chemical or biological properties at the nanoscale and fabricating new nanomaterials with multifunctional properties.

Hong predicts it will take one to two years to fabricate the new nanostructure. She'll then study the material's characteristics.

Her research promises to advance the understanding of magnetoelectric coupling and could lead to novel materials and devices.

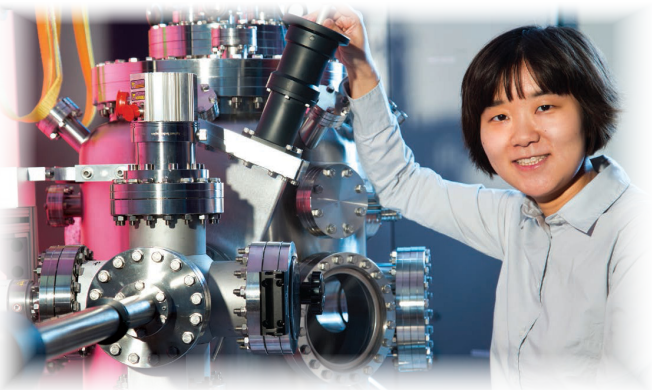
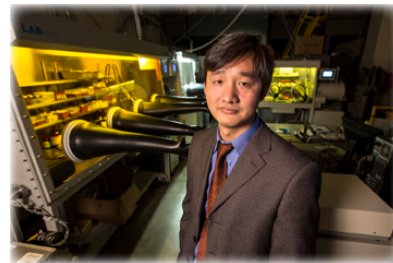
### *Producing Organic Solar Cells*



*Photos by Craig Chandler*

A close-up photo of a polymer solar cell developed by Jinsong Huang. The cell contains a layer of ultrathin ferroelectric polymer between the cathode and the semi-conducting polymer, which increases the device's energy conversion efficiency.

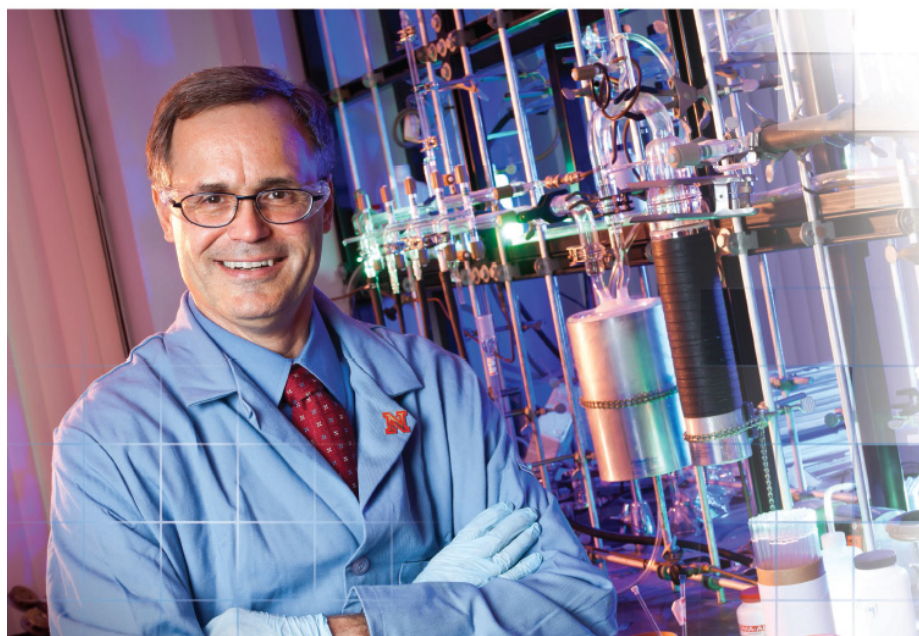
"At the first glance, it is surprising that an insulating plastic material can be used to enhance the efficiency of a polymer solar cell, because generally it makes the device worse," Huang says. "Our innovation lies in utilizing the large permanent electrical polarization of a ferroelectric polymer to increase a solar cell's internal electric field, thus generating more electricity. We designed a unique device structure so that these insulating layers facilitate the generation of more electric currents instead of less," he adds. "Also, this method won't add any cost to the polymer solar cells."



Hong is combining two oxides to create a nanomaterial with both magnetic and ferroelectric properties. Ferroelectric materials have positive and negative polarization directions. Applying electricity can reverse the polarization and control magnetism. Storing data with an electric charge alone or using electricity to manipulate magnetic signals would be more energy efficient and allow greater storage capacity in a smaller space.

**Phis's  
World**

*Hong takes "A Cartoon Approach to High School Physics Education."*



*Above: Pouring liquid nitrogen  
Left: Stephen DiMagno*

*2011-2012 Annual Report  
by the Office of Research &  
Economic Development*

## Game-changing Research Sparks Startup

UNL chemist Stephen DiMagno was confident his research could revolutionize medical imaging with positron emission tomography, or PET scans. But was it commercially viable?

With help from two National Science Foundation programs designed to guide promising NSF-supported scientific discoveries into the marketplace and assistance from NUtech Ventures, a nonprofit affiliate that helps commercialize UNL research, DiMagno realized the answer was yes.

His new company, Ground Fluor Pharmaceuticals, develops imaging agents for PET scans. PET is a widely used diagnostic tool for detecting and managing certain cancers, heart disease and neurodegenerative disorders including Alzheimer's and Parkinson's diseases. This technology might also help companies develop new drugs.

A nuclear medicine imaging technique, PET relies on radiotracers to give information about the function and metabolism in the body's organs. DiMagno developed a technique to attach the radioactive isotope fluorine-18 to different carrier molecules. The isotope enables a PET scanner to detect a compound's metabolic fate.

"Our methodology allows us to create more potent imaging agents more rapidly, reliably and in high yield," DiMagno said. "Previously, these agents were unknown or very difficult to synthesize."

A \$50,000 NSF Innovation Corps award, or I-Corps, enabled DiMagno to meet with more than 100 potential customers, suppliers and distributors to gauge their interest in the technology. These meetings helped DiMagno revise his business plans and identify potential partners.

NUtech Ventures helped him license the technology and introduced DiMagno to Allan Green, a Boston physician, scientist and lawyer who became Ground Fluor's co-founder and chief executive officer. The company is based in Lincoln, Neb.

A \$150,000 NSF Small Business Innovative Research award supports the startup's activities, including hiring two scientists and expanding its network of academic collaborators. Ground Fluor is testing its method in labs across the country to ensure it can be replicated in a variety of settings.

This technology could increase the availability of existing experimental PET agents and support development of new ones, DiMagno said.



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## The New Voelte-Keegan Nanoscience Research Center Dedication 2012

Released on 09/19/2012 by  
Office of University Communications

UNL boasts one of the nation's leading nanomagnetism research groups, expertise in laser-assisted nanotechnology and is home to a prestigious Materials Research Science and Engineering Center, which was established in 2002 with funding from the National Science Foundation.

The new facility offers researchers access to specialized tools like a \$2 million high-resolution electron microscope purchased with a grant from the National Science Foundation. Researchers also gain high-tech research space, including a clean room that eliminates dust particles. The center's administrative offices also are part of the new building.

"Having access to such powerful tools and an impeccably controlled research space will provide new insight into nanoscale materials and structures," Sellmyer said. "Our new facility creates an environment that better fosters innovation and will help pave the way to more research breakthroughs."

The building is named for UNL College of Engineering alumnus Don Voelte and his wife, Nancy Keegan, a former chair of the University of Nebraska Foundation's Board of Directors and current board member. They donated \$5 million toward the building. They cited UNL's established leadership in nanoscience among factors playing into their decision, along with the field's reach into their own backgrounds and interests.

In addition to the Voelte-Keegan gift, a \$7 million competitive federal grant from the National Institute of Standards and Technology, and a university commitment, funded the \$14 million building. The funding came from the American Recovery and Reinvestment Act of 2009.

Finding opportunities to fuel Nebraska's economy and identifying solutions to 21st-century challenges are at the heart of UNL's research enterprise and this new facility will only contribute to that effort, said Prem S. Paul, vice chancellor for research and economic development.

"This state-of-the-science facility coupled with our faculty's expertise is a powerful combination that strengthens our position as leaders in nanoscience and materials research," he said. "High-quality facilities are critical to enhancing our capabilities and fostering interdisciplinary research."

Writer: Jean Ortiz Jones

*Steve Michalski is NCMN's new Specialist in the Mechanical and Materials Characterization Facility, which is one of seven Central Facilities that NCMN operates and coordinates. [http://ncmn.unl.edu/mech\\_charact/](http://ncmn.unl.edu/mech_charact/)*

## Faculty Awards and Honors

**Linxia Gu** 2013 & **Jinsong Huang** 2012 win Edgerton Innovation Award. **Yusong Li** 2012 wins Henry Y. Kleinkauf Family Distinguished New Faculty Teaching Award. **Susan Hallbeck** 2012 wins College Faculty Research & Creative Activity Award. **David Sellmyer** was one of two recipients of the Louise Pound-George Howard Distinguished Career Award 2012. **Xiao Cheng Zeng** was given the Dean's Award for Excellence in Graduate Education and a two-year appointment to the College of Arts and Science's College Executive Committee. **Stephen DiMagno** received the 2012 College Award for Outstanding Research and Creative Achievements in the Sciences.

## Promotions & Tenure

**Axel Enders** was granted tenure and promoted to Associate Professor of Physics and Astronomy.

**Evgeny Tsymbal** was named a George W. Holmes University Professor of Physics and Astronomy.

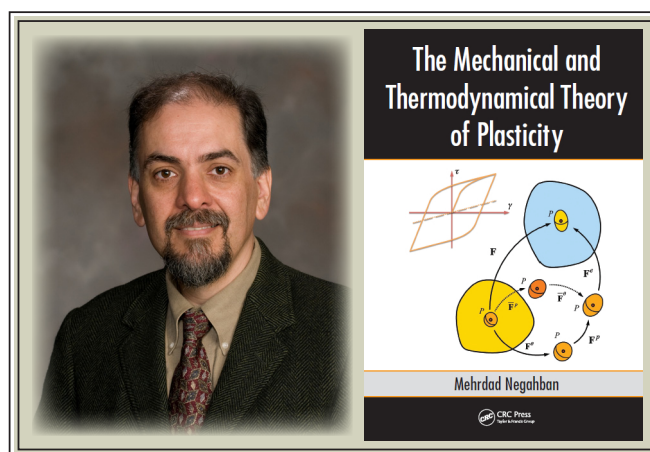
**Eva Franke-Schubert** was granted tenure and promoted to Associate Professor of Electrical Engineering, March 2013.

**Jody Redepenning** promoted to Vice Chair, Chemistry.

**Angela Pannier** was granted tenure and promoted to Associate Professor of Biological Systems Engineering.

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## Recent Books Published



by Mehrdad Negahban

"The Mechanical and Thermodynamical Theory of Plasticity," CRC Press, Taylor & Francis, Boca Raton, April 26, 2012. Covering a wide range of foundational subjects and presenting unique insights into the unification of disparate theories and practices, this book offers an extensive number of problems, figures, and examples to help the reader grasp the subject from many levels. Starting from one-dimensional axial motion in bars, the book builds a clear understanding of mechanics and continuum thermodynamics during plastic flow.

## Education and Outreach Highlights 2012

**Nano to Nature** - A 'Nano to Nature' display at the Pioneers Park Nature Center introduced nanoscale science through snowflakes, lotus leaves, butterflies, and minerals. Hands-on activities included real world examples like nano stain resistant clothing showing hydrophobic properties like the lotus leaf and computer screens inspired by iridescent butterfly wings. For more than 50 years, the Pioneers Park Nature Center has been helping children and families discover nature and is now part of sharing how nature's best ideas are being imitated to address human problems through nanotechnology.

**Nano Science Cafe** - NCMN faculty member Jody Redepening presented "Biomaterials for Battlefield Trauma" at The Mill in the Lincoln Haymarket, 800 P St., at 7 p.m. Thursday, Nov. 15. Science cafes are live events in casual settings like pubs or coffeehouses, where scientists engage the public in conversations about current science topics. UNL professors from Physics, Chemistry, and Engineering departments gave creative and interesting presentations about new discoveries related to stem cell research, DNA sensors, self-assembly at the nanoscale, nanowave properties, bone replacement, and other nanoscience topics.



**After School Program** - Faculty members, and NCMN students and staff presented an 8 week Nanoscience After School Program to junior high students at Culler Middle School. Presentations were given to students who had limited knowledge of nanoscience and included videos, hands-on activities, giveaways and discussions of nano applications which provided a broad overview of nanotechnology as a field with many career opportunities. Professors participating were: Steve Ducharme (Physics), Christian Binek (Physics), Yunshen Zhou (Engineering), Rebecca Lai (Chemistry), Eva Franke-Schubert (Engineering), and graduate student Chris Marin (Cheung group-Chemistry).

**Teachers Nanoscience Workshop** - Science teachers from Lincoln Public Schools and other education programs at UNL participated in a "Hands-on Nanoscience" NCMN Professional Development Workshop. The topic of "Squishy Circuits, Batteries and other Electronics" were covered by Physics Prof. Steve Ducharme and his colleagues who provided mentorship and one-on-one coaching on how to use the kits to enrich and support current nanoscience curriculum.

**NCMN/Bright Lights Nanocamp** - Junior high students participated in a weeklong summer NanoCamp where UNL faculty and graduate students, NCMN & Bright Lights staff, future science teachers and the Department of Physics & Astronomy all worked together to present an amazing mini-course about nanotechnology at UNL. Topics and supporting activities included synthetic polymers, carbon nanotubes, self-assembly, DNA, ferrofluids, stem cells, nanocomposites, alternative energy, and of course nano ice cream!

**Junior/Senior High Tours** - Interested junior and senior high teachers visited the UNL campus with students and parents to learn more about what UNL has to offer in nanoscience research. NCMN helped coordinate tours and hands-on experiences with a variety of departments on campus and introduced students to our new Voelte-Keegan Nanoscience Research Center!



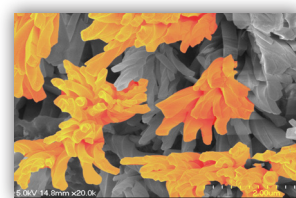
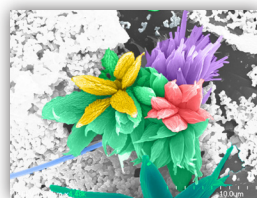
**Nano to Nature**  
photos by  
Kat Buchanan,  
Daily Nebraskan



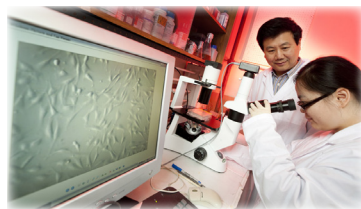
**Nanoscience Kits** - NCMN has a large variety of nanoscience kits available for faculty check-out through the NCMN education outreach office (N201C Voelte-Keegan Nanoscience Center). Each kit has all the materials needed to provide a hands-on activity for each topic as well as a 1-2 page reproducible summary of information about the activity. These kits are excellent for teaching purposes and community science demonstrations.

**NCMN Education/Outreach Fellows** - Five Undergraduate Education Outreach Fellows have been selected from a variety of UNL departments to regularly assist a multidisciplinary team of faculty, students, and staff at NCMN education and outreach events. Responsibilities will include communicating principles and applications of Nanoscience and Nanotechnology to audiences outside the university, such as schools, museums, public events, shopping malls, and fairs.

**2nd Annual Spring Science Art Competition** - Sponsored by NCMN, the purpose is to celebrate the aesthetic appeal and creativity of nanoscience. 1st - Tyler Holm & 2nd - Zhanping Xu, Honorable Mention (Qingfeng Dong, PremKumar Thirugnanam, Gilbert Mbah & Thomas Smith), Scientist/Artist Pair Group - Wei Xiong & Joel Brehm - 1st Place.



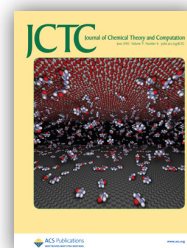
**NCMN, Nebraska EPSCoR & MRSEC** - held Lincoln's 3rd annual NANODAYS event from 1-4 p.m. April 6 at Gateway Shopping Mall, 61st & O St.



Dr. Yiqi Yang, Charles Bessey Professor and Professor of Textile Science with Ph.D. graduate student Qiuran Jiang. Yang's research focuses on developing "green" bio-materials including polymers for textile, composite, and medical applications. <http://cehs.unl.edu/tmfd/index.shtml>

## Outstanding Publications

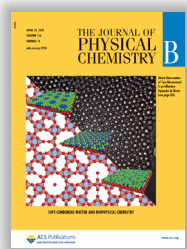
**Xiao Cheng Zeng**, Takahiro Koishi, Kenji Yasuoka, Soohaeng Yoo Willow, Shigenori Fujikawa (Cover Art) have designed different nano-slit systems. "Molecular Insight into Different Denaturing Efficiency of Urea, Guanidinium, and Methanol: A Comparative Simulation Study." J. Chem. Theory Comput., 2013, 9 (6), pp. 2540-2551 <http://go.unl.edu/wpn>





## Recent Achievements of Center Researchers

### Outstanding Publications

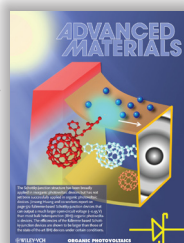
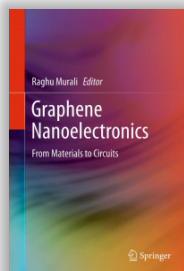


**Li Tan** (Cover Art), Z. G. Chen, Z. P. Xu, M. Zhang, **Y. Zhou**, M. Liu, T. Patten, G.-Y. Liu, H. Li, **X. C. Zeng** "Two-Dimensional Crystallization of Hexagonal Bilayer with Moiré Patterns", Journal of Physical Chemistry B, 2012, 116, 4363-4369. <http://dx.doi.org/10.1021/jp211369r>

**Alexander Sinitskii** has contributed to the chapter on graphene oxide One of the first books on Graphene titled: "Graphene Nanoelectronics" published by Springer.



**Xiao Cheng Zeng** group paper is featured in the Cover Art of Journal of Chemical Theory and Computation (IP > 5).



**Jinsong Huang's** image of Organic Solar Cells was on the cover of an Energy & Environmental Science magazine this month. MME article: MME's Huang uses nanocomposites to improve photodetectors.

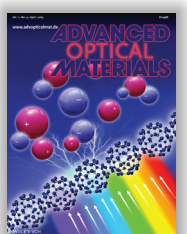


**David Sellmyer Group's** nanostructure design is featured as a cover image of the annual issue of Magnetic Technology International 2012.



**Xiao Cheng Zeng's** research on gold clusters as catalysts for fuel cell hydrogen was featured in the latest news on the NSF Science360 website. **Namas Chandra** with Trauma Mechanics Research Initiative appeared in an August 2012 story in Popular Science. <http://go.unl.edu/3hf>

**Yuris Dzenis**, Joel Brehm, Dimitry Papkov (Cover Art), Yan Zou, Mohammad Nahid Andalib, Alexander Goponenko, Stephen Z. D. Cheng article "Simultaneously Strong and Tough Ultrafine Continuous Nanofibers," in ACS NANO.



**Jinsong Huang**, Fawen Guo, Zhengguo Xiao "Photodetectors: Fullerene Photo-detectors with a Linear Dynamic Range of 90 dB Enabled by a Cross-Linkable Buffer Layer." Advanced Optical Materials 1(4), pp. 275-348, 2012.

### Faculty Awards and Honors

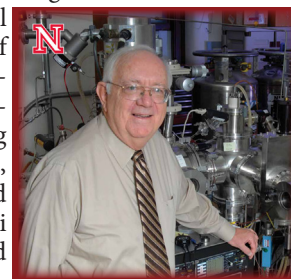
**Ralph Skomski** has been named APS Outstanding Referee, recognizing a small percentage of 48,000 referees.

**Xiao Cheng Zeng** became an Associate Editor for the journal "Nanoscale" of the Royal Society of Chemistry.

**David Sellmyer**, George Holmes University Professor of Physics, recently was honored with a Distinguished Achievement Award. The award was sponsored by the Iketani Science and Technology Foundation of Japan, and was presented in September at the 22nd International Conference on Rare-Earth Permanent Magnets and their Applications in Nagasaki, Japan.

The award recognizes Sellmyer's outstanding contributions to the fields of new magnetic materials, nanoscale structuring in permanent-magnet composites, magnetic nanowires, and novel high-anisotropy materials for data storage. Also honored with this award were Professor Helmut Kronmüller of the Max-Planck Institute, Stuttgart, Germany, and Dr. Masato Sagawa of Kyoto, Japan.

Sellmyer has authored or edited more than 540 research articles, chapters and reviews, and eight books. He is a Fellow of the American Physical Society, an Honorary Member of the State Key Magnetism Laboratory, Chinese Academy of Sciences, and won the Outstanding Research and Creativity Award, the Pound-Howard Distinguished Career Award, and the Sigma Xi Outstanding Research Award from the University of Nebraska.



**David Sellmyer** has been quoted by C&EN in an article, "Powerful Pull To New Magnets." A recent article published in NANO Letters (Nano Lett., DOI: 10.1021/nl200311w) was referenced. (Co-authored by Balamurugan Balasubramanian, Ralph Skomski, Xingzhong Li, Shah R. Valloppilly, Jeffrey E. Shield, George C. Hadjipanayis, and David J. Sellmyer.) <http://cen.acs.org/articles/91/i1/Powerful-Pull-New-Magnets.html>



**John Woollam** won the American Physical Society Prize for Industrial Applications of Physics. The award was for sustained commercialization of spectroscopic ellipsometry, including greatly improved instrumentation as well as new solutions to complex materials problems. Ellipsometers have sub-monolayer interface sensitivity and are used in a range of applications from materials research to metrology in manufacturing.

## NCMN-affiliated Graduates (Dec. 2011 - Aug. 2013)

### PhD Graduates (Aug. & Dec. 2011)

(Aug. 2011)

**Charles Schiaffo, PhD** -CHEM- **Dussault Thesis**: "I. Reductive Ozonolysis. II. Alkoxydioxolanes as a new class of antimalarials." Postdoc, The Center for Drug Design - Univ. of Minnesota.  
**Jing Liu, PhD** -PHY & ASTR- **Dowben Thesis**: "Photofragmentation Processes of the closo-Carboranes and the Local Structure of Transition Metal Doped Semiconducting Boron Carbide Thin Films." Postdoc, Northeastern University and staff, National Synchrotron Light Source.

**ZhengZheng Zhang, PhD** -PHY & ASTR-**Dowben Thesis**: "The interplay between symmetry and static dipoles with adsorption on molecular substrates." Journalism student at the University of Wisconsin - Madison.

(Dec. 2011)

**Tathagata Mukherjee, PhD** -PHY & ASTR- **Binek Thesis**: "Thermodynamics of Magnetic Multilayers."

### PhD Graduates (May, Aug. & Dec. 2012)

(May, 2012)

**Xiaohui Wei, PhD** -PHY & ASTR- **D.J. Sellmyer Thesis**: "Fabrication, Structure, and Magnetism of Transition Metal and Oxide Nanoclusters." Western Digital Corp.

**Jiliang Hang, PhD** -CHEM- **Dussault Thesis**: "1) Synthesis of Sterol Ethers and Esters; 2) a New Fragmentation of Peroxides that Generates Singlet Oxygen." Postdoc, UNL with Jiantao Guo.

**Juan Colón Santana, PhD** -EE- **Dowben Thesis**: "The Role of Rare Earth Dopants in Semiconducting Host System for Spin Electronic Devices." Postdoc, NCESR.

(Aug., 2012) - (Dec., 2012)

**Tom Fisher, PhD** -CHEM - **Dussault Thesis**: "New Chemistry of Carbonyl Oxides; Development and Applications of a new class of twin-chain amphiphiles." Postdoc, Ohio State University.

**Keisuke Fukutani, PhD** -PHY & ASTR- **Dowben Thesis**: "Electron-Phonon Coupling and Structural Phase Transitions on Au/Mo(112)." Assistant Professor, Tohoku University, Sendai, Japan.

**Lingmei Kong, PhD** -PHY & ASTR- **Dowben Thesis**: "Modifying the Fermi level density of states in graphene." Postdoc, Pacific Northwest National Laboratory.

**Rhitankar Pal, PhD** -CHEM- **Zeng Thesis**: "Structure Determination and Small Molecule Binding Studies of Novel Gold Nanoparticles."

**Menghao Wu, PhD** -CHEM- **Zeng Thesis**: "First-principles Studies on Physical and Chemical Properties of Nanostructures."

### PhD Graduates (May & Aug. 2013)

**Pinaki Mukherjee, PhD** -ME- **Shield Thesis**: "Crystal structures and phase formation thermodynamics of iron-gold nanoclusters."

**Farhad Reza Golkar-Fard, PhD** -ME- **Shield Thesis**: "Mechanical Milling of Co-Rich Melt-Spun Sm-Co Alloys."

### MS Graduates (Aug. & Dec. 2011)

### MS Graduates (May, Aug. & Dec. 2012)

(May, 2012)

**Brian Dick, MS** -ME- **Shield Thesis**: "Microstructure Selection of Sm-Co-Al Alloys to Increase Magnetization."

(Aug., 2012)

**Mary C. Regier, MS** -BSE- **Pannier Thesis**: "Zein microspheres for DNA delivery."

**Santanu Mukherjee, MS** -ME- **Shield Thesis**: "Analysis of Mechanically Milled Exchange Coupled Nanocomposite Permanent Magnets."

**Timothy Prost, MS** -ME- **Shield Thesis**: "Magnetic Properties Study of the Mn-Al System with Additions of B or C and Mechanical Milling Techniques."

(Dec., 2012)

**Ben Puffer, MS** -CHEM - **Dussault Thesis**: "Investigations of Inter- And Intramolecular C-O Bond Forming Reactions Of Peroxide Electrophiles." Teva Pharmaceuticals, Salt Lake City, UT.

**Mike Richardson, MS** -CHEM - **Dussault Thesis**: "The use of Rhenium (VII) Oxide as a Catalyst for the Substitution of Hemiacetals."

## Student Awards and Honors

**Charles Schiaffo, PhD** (Dussault) Cromwell Award (Best Organic Student) (2011) **Jing Liu, Ph.D** (Dowben) Chinese National Award for Outstanding Students Studying Abroad (2011) **ZhengZheng Zhang, PhD** (Dowben) Outstanding Graduate Student award, honorable mention (2011) **Juan Colón Santana, PhD** (Dowben) Leo Falicov Prize from the American Vacuum Society (2011) & Folsom Dissertation Award (2012) **Rhitankar Pal** (Zeng) UN Presidential Fellowship (2011-12) & Outstanding Graduate Research Assistant Award (2012) **Zachary Connell, (Shield)** NSF Graduate Fellowship Awardee (2012) **Zhiqiang Xie** (Lu) Best Poster Paper Award at the 28th International Congress on Applications of Lasers & Electro-Optics (ICALEO 2010) second place & **Yang Gao** (Lu) Student Paper Awards third place



## BIG NCMN NEWS BRIEFS BIG



**NIST VISTORS**  
UNL Office of  
Research and  
Economic  
Development -  
Representatives  
from the Na-  
tional Institutes  
of Standards  
and Technology

visited UNL for a celebratory workshop during the UNL Research Fair on the new Voelte-Keegan Nanoscience Research Center.

*Photo by Craig Chandler*

### New Building Details



A plaque commemorating the collaboration between UNL and NIST was unveiled at the Fall 2012 UNL Research Fair. It will hang in the new VOELTE-KEEGAN Nanoscience Research Center building. Two additional plaques: Bust-reliefs of the Voelte-Keegan couple and the Board of Regents 2012.





*Above: Design Detail*






*Left: A Two Story Wall  
with Nano Images*

*Below: Front Sign*

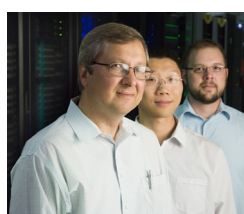


### NCMN Welcomes New Faculty Members

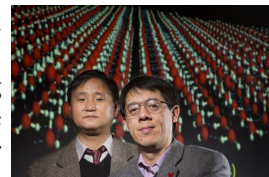




*Alexander Sinitskii (Chemistry), Sidy Ndao (Mechanical & Materials Engineering), Jian Zhang (Chemistry), Alexandra Fursina (Chemistry), Timothy J. Reece (Physics & Physical Science - UNK), and Valery E. Forbes (School of Biological Sciences).*



New class of materials discovered; could boost computer memory - Evgeny Tsymlal and an international team of scientists have discovered that a new class of materials boasts a very attractive property ferroelectricity, which may be used to create new types of data storage devices.

**Xiao Cheng Zeng** and his research team - "Nebraska Ice" is the discovery that just keeps on giving as three separate discoveries have been made in a series of computer experiments.



**Jinsong Huang** earned a five-year, \$400,000 Faculty Early Career Development Program Award from NSF.

**Linxia Gu** earned a five-year, \$406,248 Faculty Early Career Development Program Award from NSF.

**Xia Hong** earned a five-year, \$600,000 Faculty Early Career Development Program Award from NSF.

**Angela Pannier** earned a five-year, \$419,051 Faculty Early Career Development Program Award from NSF. She is using nanotechnology to develop a gene delivery tool. <http://newsroom.unl.edu/announce/todayatunl/2427/13486>

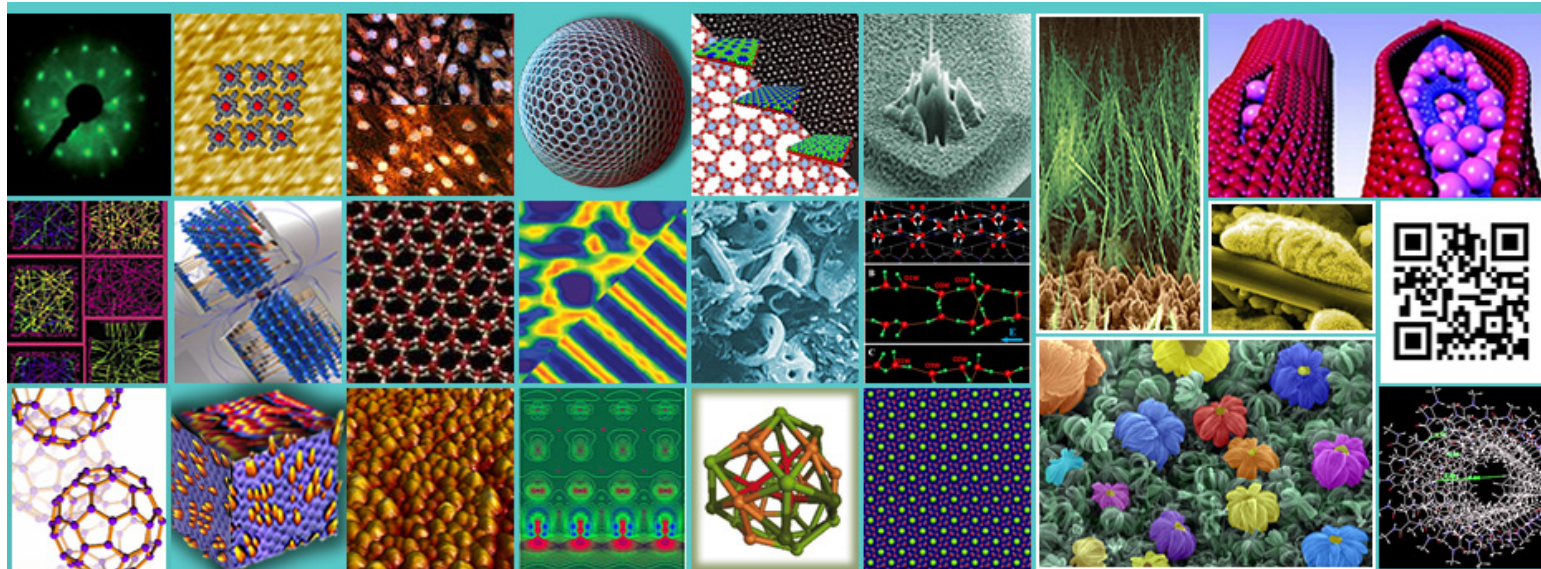


**Axel Enders (chair)** The theme of the October 18 - 20, 2012 conference was "The nanoworld is not enough." Highlighting progress in Materials Science, with scientific talks covering all aspects of physics and astronomy. <http://wophy.unl.edu/>

Voelte-Keegan Nanoscience Research Center  
855 N. 16th Street,  
N201 NANO  
Lincoln, NE 68588-0298

NCMN MEMBERS CELEBRATE RESEARCH BREAKTHROUGHS IN MATERIALS & NANOSCIENCE !

....at the Nebraska Center for Materials and Nanoscience



The TEXTURED Images of NANOSCIENCE...