Volume 13, Issue 1 WINTER 2011-12

INTERFACES

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

from the Director...

The past year has been one of great activity and excitement for the Nebraska materials and nanoscience community. An important event is the near completion of the Nanoscience Metrology Facility, recently renamed the Voelte-Keegan Nanoscience Research Center. An article on p. 4 explains the major gift provided by alumnus Don Voelte and his wife, Nancy Keegan who until recently was the chair of the University of Nebraska Foundation's Board of Directors. We are most appreciative of this gift, as well as the major grant from the National Institute of Standards and Technology.

Dr. David Sellmyer

The design, construction and furnishing of the Nano Center has been a significant part of my activity recently, as well as that of our Assistant Director, Terese Janovec. Interfacing between the architects, UNL Facilities group, and the faculty and specialist users has been a novel experience. We also have spent a good deal of time in obtaining the money for and purchasing major equipment items such as electron microscopes, etc.

Nanoscience Metrology Facility Completion Planned for February 2012

...continued on page 3

We are certain that the end result will give a big boost to materials and nanoscience research and education here. In addition to a large number of single-investigator and small-group grants, our faculty have been active and successful in obtaining large-group grants. Some of the notable ones are the six-year NSF Materials Research Science and Engineering Center grant, an NSF-EPSCoR

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Building from the Basement Up!

Several new NCMN facility labs were under construction in the T. Jorgensen Hall basement during the Spring of 2011. They are now operational and in use!

In This Newsletter...

http://www.unl.edu/ncmn

University of Nebraska Lincoln

from the Director...

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grant on hybrid materials, two DOE and ARPA-E grants in national consortia on magnetic materials for energy, two large DOD grants on sensors and energy materials, and an NSF-EPSCoR grant on cyberinfrastructure. Professors leading these efforts include Evgeny Tsymbal, Pat Dussault, Mathias Schubert, Sy-Hwang Liou and David Sellmyer. These grants and others in development are important for the support and growth of our faculty and students in the future.

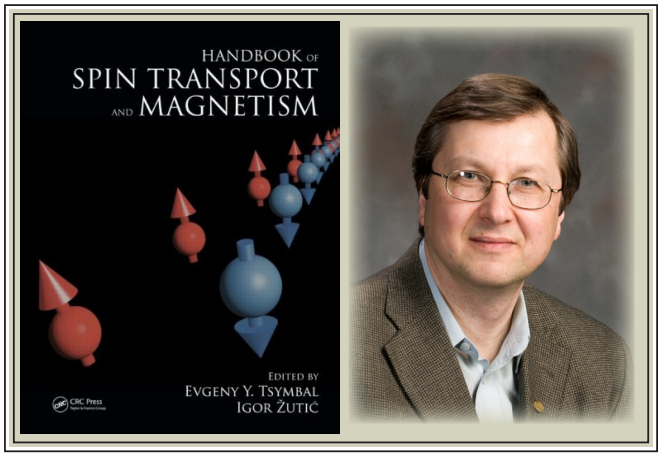
The entrance of UNL into the Big Ten Athletic Conference is leading to much academic activity here. Chancellor Perlman has adopted aggressive goals for growth of students, faculty and research funding for the next six years. NCMN is involved in these goals through its strategic plans, especially in its Nanoscale Science and Technology Program of Excellence. This Program, adopted in 2002, already has partially funded the hire of some 15 faculty, the two most recent of which are Xia Hong in Physics and Alex Sinitskii in Chemistry. We have plans to continue on a growth path, funded by the POE, and to expand its efforts into graduate education through specialized courses in nano-science and engineering.

Among the pleasant experiences I have had recently was a discussion with my long-time friend, Alan Heeger (see photo). Professor Heeger was the featured speaker at the dedication ceremonies for the opening of Jorgensen Hall, the new home of Physics and Astronomy and several NCMN Central Facilities. Alan graduated from Nebraska in Physics, is now a Professor at California-Santa Barbara, and won the Nobel Prize for Chemistry in 2000 for discovery of conductive polymers. Alan and I worked on Kondo phenomena in metals years ago, and he also was awarded an honorary degree by the University of Nebraska.

We are pleased and grateful for the strong support of the university administration, especially Vice Chancellor Prem Paul and Chancellor Harvey Perlman. Our faculty also deserve significant praise for their research discoveries, for educating our students, and for their hard work in advancing our university.

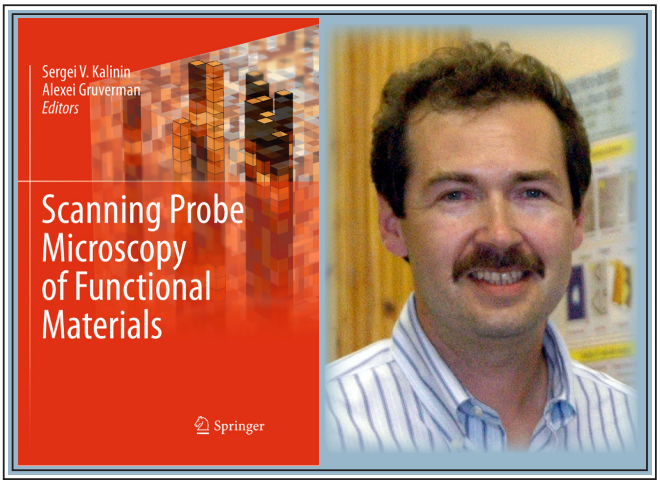
David J. Sellmyer

Recent Books Published



Edited by Evengy Tsymbal and Igor Źutić

This book provides a comprehensive, balanced account of the state of the art in the field known as spin electronics or spintronics. It reveals how key phenomena first discovered in one class of materials, such as spin injection in metals, have been revisited decades later in other materials systems, including silicon, organic semiconductors, carbon nanotubes, graphene, and carefully engineered nanostructures.



Edited by Alexei Gruverman and Sergei V. Kalinin

In this comprehensive overview, special emphasis is placed on emerging applications of spectroscopic imaging and multifrequency SPM methods, thermomechanical characterization, ion-conductance microscopy, as well as combined SPM-mass spectrometry, SPM-patch clamp, and SPM-focused X-ray applications. By bringing together critical reviews by leading researchers on the application of SPM to the nanoscale characterization of functional materials properties, Scanning Probe Microscopy of Functional Materials provides insight into fundamental and technological advances and future trends in key areas of nanoscience and nanotechnology.

Bright Lights Honors NCMN's Nanoscience Program

Released on 10/27/2011 by Today@UNL

The Nebraska Center for Materials and Nanoscience has received an award for a course that helped educators incorporate nanotechnology into middle and high-school science curriculum.

The award, "Building the Future Through Higher Education," was presented in September to UNL's David Sellmyer and Terese Janovec by the Lincoln-based Bright Lights program. Bright Lights, which started in 1987, is a summer enrichment program open to middle and high school students. Courses are designed to provide interesting, hands-on and minds-on learning.

The center received the award because of an innovative teaching approach that first showed educators how to teach nanotech lessons then gave them a chance to try out the new skills in a middle-school setting.

Terese Janovec, (left) David Sellmyer and Carol Moravec pose after receiving the Bright Lights "Buliding the Future Through Higher Education" award. Moravec is a science teacher at Lincoln Southeast High School who participated in the nanocamp program.

"We wanted to get kids and parents interested in nanoscience, recruit future students to UNL, and offer teachers an opportunity to use what they had learned from the workshop," said Janovec, the education and outreach coordinator for the center. "Middle-school students would benefit by learning information about nanoscience from UNL faculty and graduate students and teachers would get valuable experience."

The two-step approach began in early June when teachers enrolled in education programs in UNL's College of Education and Human Sciences attended a full-day "Hands-On Nanoscience" workshop. Organized by the NCMN, the workshop featured Professor Steve Ducharme and colleagues providing one-to-one coaching on how to use specialized nanoscience school kits.

In late June, these teachers were able to use those lessons in a Bright Lights "NanoCamp," organized by the NCMN and the UNL Department of Physics and Astronomy. The camp was open to students in grades six to nine. Instruction was provided by the "Hands-On Nanoscience" workshop participants working alongside UNL faculty, graduate students and Bright Lights staff. Topics and supporting categories included synthetic polymers, carbon nanotubes, self assembly, DNA, ferrofluids, stem cells, catalysts, alternative energy, physics of waves, and nano ice cream.

"NCMN partnering with Bright Lights was a win-win for everyone," said Sellmyer. "Bright Lights contributed excellent student recruitment and classroom management services while UNL faculty members and graduate students worked hard to provide high quality instruction and hands-on experience about nanoscience to teachers. We hope to expand our class offerings next year."

Nanoscience Metrology Facility Completion Planned for February 2012

The portion of the Nanoscience Facility in the basement of Theodore Jorgensen Hall was completed during summer 2011. This houses six NCMN Central Facilities including: Electron Microscopy, Scanning Probe Microscopy, Mechanical & Materials Characterization, Cryogenics and X-Ray Structural Characterization. The Nanofabrication and Materials Preparation Central Facilities will move from Behlen Lab to the Nanoscience Metrology Facility early in 2012.

UNL nanoscience facility to be named for Voelte, Keegan

Released on 09/15/2011 by the Office of University Communications

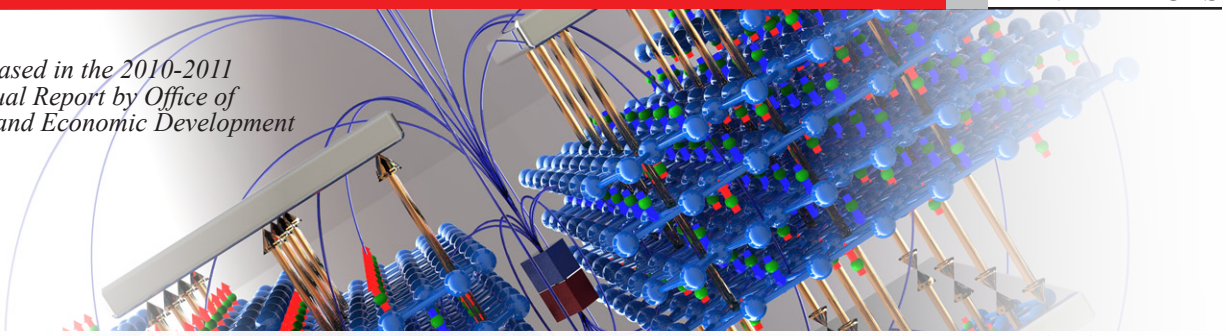
University of Nebraska-Lincoln College of Engineering alumnus Don Voelte and his wife, Nancy Keegan, chair of the University of Nebraska Foundation's board of directors, have given a $5 million campaign gift to UNL. In recognition of their gift, UNL's Nanoscience Metrology Facility will be named in their honor. In addition to the Voelte-Keegan gift, a $6.9 million competitive federal grant, and a university commitment now fully funds this $13.9 million building.

Don Voelte is an Omaha native and received his bachelor's degree in civil engineering from UNL in 1975. He is the former CEO of Woodside Petroleum, the largest energy company in Australia. Despite living in Australia for the last seven years, Voelte has never missed an opening game of the Nebraska Cornhuskers.

Nancy Keegan grew up in Omaha and received her degree in chemical and petroleum refining engineering from the Colorado School of the Mines and her MBA from Harvard. Most of her career has been in investment banking. Keegan's paternal grandfather was a graduate of NU's College of Medicine and later served as its dean. Her maternal grandfather was also an NU graduate and quarterback for the 1914 Cornhuskers. Keegan's two-year term as chair of the foundation board of directors will conclude in October.

The gift is part of the Campaign for Nebraska: Unlimited Possibilities, a $1.2 billion fundraising campaign conducted by the foundation on behalf of the University of Nebraska. The foundation is an independent, nonprofit organization that has connected the dreams and passions of donors to the mission of the university for the past 75 years. In 2010, donors designated more than $136 million in gifts to scholarships, academic programs, medical research and other priorities at the university. The foundation's current $1.2 billion fundraising initiative, the Campaign for Nebraska: Unlimited Possibilities, concludes in 2014. For more information, visit nufoundation.org.

Released in the 2010-2011 Annual Report by Office of Research and Economic Development



Spintronics illustration by grad student Xi He

Discovery Could Spark

SMALLER, FASTER ELECTRONICS

Nanopods, cameras the size of credit cards, computers that run trillions of calculations per second. Can gadgets get any smaller or more powerful?

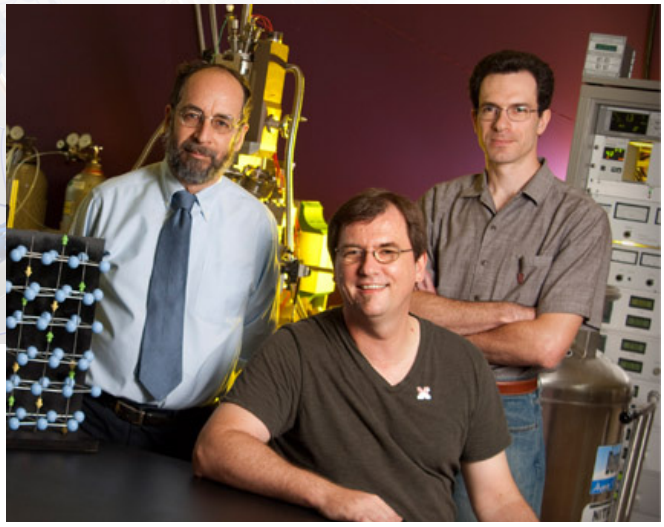
Yes, engineers say, but the limit is looming.

To help head off this predicted size barrier, a team at UNL's Materials Research Science and Engineering Center (MRSEC) has made an important breakthrough in spintronics, which exploits electron spin for use in advanced information technologies.

"In a nanometer, there are only so many atoms next to each other. After you reach that level, you can't make things smaller," said physicist Christian Binek, the project's lead investigator. "To move on from that point, we have to do something fundamentally new."

Today's electronics use an electric current to store and process information. But currents generate heat, limiting the number of transistors that can be packed onto a chip. Currents also use energy, reducing battery life. Based on their findings, the UNL researchers envision a conceptually new generation of ferromagnetic transistors overcoming these limitations.

Binek's team discovered how to switch ferromagnets' magnetization using voltage, which doesn't generate heat. The magic ingredient is chromia, the oxide form of chromium, which can be magnetized with voltage. Making a precisely ordered thin film of chromia, bringing it into contact with a ferromagnet and applying voltage also switches the ferromagnet's magnetization.



From left: Peter Dowben, Christian Binek and Kirill Belashchenko

Binek now is developing voltage-powered logical and memory devices, which could lead to less expensive, smaller and more powerful gadgets that use less energy. Consumers, for example, would be able to store more movies on longer-powered mobile devices. Researchers also may one day have the computing power to run mind-blowingly complex calculations, enabling new scientific discoveries.

"I was forced to leave my comfort zone and look more broadly, with different methods and different ideas. Working together gave us this breakthrough."

Binek credits collaborations made possible by MRSEC, which is funded by the National Science Foundation. Co-investigators, UNL physicists Kirill Belashchenko and Peter Dowben, a Charles Bessey Professor, contributed invaluable expertise. The team reported its discovery in Nature Materials.

"I was forced to leave my comfort zone and look more broadly, with different methods and different ideas. Working together gave us this breakthrough," Binek said.

Education and Outreach Highlights 2011

The Nebraska Center for Materials and Nanoscience Outreach program's Education and Outreach Coordinator, Terese Janovec, works with faculty committee members and partnering organizations to advocate Nanoscience.

The Seminar Series - Faculty and students continue to benefit from the NCMN seminar series, which partners with many departments and centers at UNL to bring high quality speakers in the materials and nanoscience area to campus. Speakers provide ongoing professional development and networking opportunities to participants.

NET Highlights NCMN Faculty Member Research UNL faculty research was emphasized before and after the NET "Making Stuff" national program which aired in January 2011 and reported on the exciting discoveries and applications being made in the materials and nanoscience areas.

UNL Speakers Bureau and NCMN work as outreach partners to promote Science Demonstrations in the Materials and Nanoscience area. UNL Faculty are given the opportunity to present science talks or demonstrations to schools and in other community venues. ***Dr. Christian Binek*** thrills students with his presentation at Bennet Elementary School.

Nano Science Café - ***Dr. Rebecca Lai***, Assistant Professor of Chemistry, was featured on January 20 at the Red 9 Nano Science Café. Lai explained how her research on electrochemical biosensing has the potential for diverse applications, ranging from cancer detection to finding toxins, explosives and even cocaine in the body and in the environment. Assisting Dr. Lai were graduate students Anita Zaitouna and Jennifer Gerasimov.

shown left: Graduate Students Anita Zaitouna and Jennifer Gerasimov.

NCMN members are recognized for contributions to Outreach/Edu Events on a new webpage at *http://www.unl.edu/ncmn/outreach/recognition.shtml* *Listed are:* Li Tan, Shireen Adenwalla, Alexei Gruverman, Axel Enders, Srivatsan Kidambi, Barry Cheung, Rebecca Lai, Yunshen Zhou, Steve Ducharme, Steve Wignall, Eva Frank-Schubert, Christian Binek, lab groups and graduate students.

Student Awards and Honors

Lowe R. & Mavis M. Folsom Distinguished Doctoral Dissertation Award *Nan Shao* completed her doctorate in Chemistry under Dr. Xiao Cheng Zeng. Her dissertation is titled, "Computational Studies of Clusters." Shao is from Hefei, Anhui, China.

Outstanding Graduate Research Assistant Award - *Xi He,* of Chongqing, China, is a doctoral student in Physics and is working as a research assistant with Associate Professor Christian Binek.

Jeffrey Lopez has been awarded the Goldwater scholarship. Lopez already does research through his participation in the Creative Activities and Research Experiences program with Prof. Ravi Saraf.

2010-11 T. Adrian George Outstanding Undergraduate Research Award was presented to *Brian Kempf* by Tom George for his research accomplishments under Professor Patrick Dussault.

2010-11 John J. Stezowski Graduate Teaching Assistant Award was presented by Professor James Takacs to *Monica Kinde-Carson, PhD* for outstanding efforts in undergraduate teaching under Professor Gerard Harbison.

Rhitankar Pal, a grad student in the Zeng lab, is one of 4 UNL Ph.D. candidates to win a 2011-12 Presidential Graduate Fellowship.

The Department of Chemical & Biomolecular Engineering and AIChE Student Awards Banquet was held on Tuesday, April 26, 2011. Students, faculty and staff were invited to celebrate academic and research achievements.

INTERFACES - The Newsletter of the Nebraska Center for Materials and Nanoscience is published periodically.
Information, Announcements and Research Updates should be sent to:
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Recent Achievements of Center Researchers

Outstanding Publications

The groups of ***David Sellmyer, Ralph Skomski and Steve Ducharme*** have published "*Synthesis of Monodisperse TiO_2-Paraffin Core-Shell Nanoparticles for Improved Dielectric Properties in ACS Nano*" 4, 1893 (2010).

B. Balamurugan, Ralph Skomski, Jeff Shield and David Sellmyer have published "*Cluster Synthesis and Direct Ordering of Rare-Earth Transition-Metal Nanomagnets*" in Nano Letters 11, 1747 (2011).

The groups of ***Xiao Zeng, Jeff Shield and David Sellmyer*** have published "*Theoretical and Experimental Characterization of Structures of MnAu Nanoclusters in the Size Range 1-3 nm*" in ACS Nano, Nov. 22 (2011).

Yi Liu, Ralph Skomski and David Sellmyer have published "*Aligned and Exchange-Coupled FePt-Based Films*" in Appl. Phys. Lett. 99, 172504 (2011).

Tino Hofmann, J. A. Woollam and Mathias Schubert's article: "*Hole-channel conductivity in epitaxial graphene determined by terahertz optical-Hall effect and midinfrared ellipsometry*," was published in *Appl. Phys. Lett*. 98, 041906.

Kirill Belashchenko's "*Equilibrium Magnetization at the Boundary of a Magnetoelectric Antiferromagnet*" was published 10/1/2010 in *Physical Review Letters*.

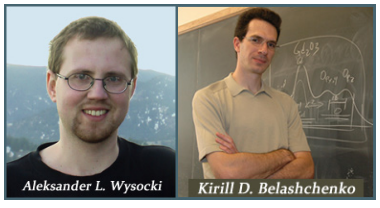
Kirill D. Belashchenko, Christian Binek, and Peter A. Dowben's collaborative research paper titled: "*Imaging and Control of Surface Magnetization Domains in a Magnetoelectric Antiferromagnet*" was published in *Physical Review Letters* on 2/23/2011.

Stephen Ducharme and James M. Takacs, "*Vibrational properties of ferroelectric b-vinylidene fluoride polymers and oligomers*," Physical Review B 81, 174120.1-8 (2010);

Hui Li, Post-doc and Xiao Cheng Zeng

Zeng Lab's recent paper about nano-ice wires was featured on the cover of PNAS called, "Transition from one-dimensional water to ferroelectric ice within a supramolecular architecture." vol. 108, no. 9 (3/23/2011).

Jinsong Huang, Stephen Ducharme and Alexei Gruverman's collaborative research publication "*Efficiency enhancement in organic solar cells with ferroelectric polymers*" has been published in "Nature Materials" and provides a new general mechanism to boost the efficiency of organic solar cell.



Kirill D. Belashchenko and postdoc Alex Wysocki's article, "*Consistent Model of Magnetism in Ferropnictides*" has been published in *Nature Physics*.

Faculty Awards and Honors

Ralph Skomski has been elected Fellow of the American Physical Society.

Tino Hofmann has been invited to serve on the Editorial Board of the *Journal of Review of Scientific Instruments.*

Rebecca Lai earned a five-year, $455,000 Faculty Early Career Development Program Award from the National Science Foundation to continue her research.

Srivatsan Kidambi has been named Research Development Fellow.

James Takacs has been selected as a recipient of the Charles J. Mach University Professorship.

David Berkowitz has been selected as a recipient of the Charles Bessey/Willa Cather Professorship of Chemistry.

Xiao Cheng Zeng has been named the 2011 recipient of the Midwest Award from the American Chemical Society's St. Louis section. The annual honor recognizes a scientist who has made contributions to the advancement of chemistry. He will receive the award in October 2011.

Rare Earth Solar will be the first solar panel manufacturer in Nebraska. ***Chin Li "Barry" Cheung***, assistant professor of chemistry at UNL and past doctoral student Joseph Brewer developed the patent-pending technology, which replaces the typical semiconductor materials now used in solar cell manufacture with rare earth elements. **NUtech Ventures** and Rare Earth Solar announced an exclusive license agreement expected to lead to the development of breakthrough solar panel technology made with rare earth elements.

Mathias Schubert has been nominated for Fellowship in the American Physical Society upon recommendation of the Forum on Industrial and Applied Physics. The Certificate citation will read as follows: "For the development of generalized ellipsometry and the invention of the Optical Hall Effect, and their transformative potential for inductrial characterization of materials properties, for example in liquid crystal displays and semiconductor device structures." This will be published in the March 2012 issue of *APS News*.

Shireen Adenwalla was elected as the Secretary/Treasurer of GMAG (Mar. 2011).

Promotions & Tenure

Kirill Belashchenko - PHYS & ASTR - Tenured and promoted to Associate Professor
Jiashi Yang - EM - Promoted to Full Professor
Patrick Dussault, Charles Bessey professor of Chemistry, has been selected the new Dean of Graduate Studies. Senior Vice Chancellor for Academic Affairs Ellen Weissinger announced the appointment.

Invited Talks and Presentations

Dave Berkowitz was one of the featured speakers at the 2010 *International Zing Conference on Biocatalysis.*

Recent Achievements of Center Researchers

Student Awards and Honors

Daniel Schmidt, *a grad student in* **M. & E. Schubert** *labs, is the recipient of the 2011 Paul Drude Medal. The Paul Drude Medal is given at each Workshop Ellipsometry to a young scientist for exceptional contributions to the field of ellipsometric metrology or spectroscopy.*

Rhitankar Pal, *a grad student in the* ***Zeng*** *lab, has been selected to receive a 2011 Outstanding Graduate Research Assistant Award Honorable Mention.*
Jennifer Gerasimov*, a grad student in the* ***Lai*** *lab, has been selected to receive a 2011 Folsom Distinguished Master's Thesis Award Honorable Mention.*
Daniel Schmidt, *a grad student in* ***M. & E. Schubert*** *labs, receives the 2010 Applied Surface Science Division Student Award at the 57th AVS Meeting in Albuquerque.*
Paul Goodman*, a Ph.D. candidate in* ***Dr. Redepenning's*** *lab, has accepted a highly competitive SMART scholarship.*

NCMN-affiliated Graduates (May 10 - Aug. 11)

MS Graduates *(May 2010)*
Lucus DeVries, MS - CHEM - ***Choe -*** Thesis: *"Classification, Synthesis and Characterization of Pyridyl Porphyrin Frameworks"*

PhD Graduates *(May 2010)*
Bija Wang, PhD - CHEM - ***DiMagno*** Thesis: *"Functionalization of aromatic organic molecules with anhydrous fluorides and by reductive elimination from I(III)"*
Jing Liu, PhD - PHYS & ASTR - ***Dowben*** Thesis: *"The photofragmentation processes of the closo-carborane and the local structure of transition metal doped semiconduting boron carbide thin films"*
Zhengzheng Zhang - PHYS & ASTR - ***Dowben*** Thesis: *"The Interplay between Symmetry and Static Dipoles with Adsorption on Molecular Substrates"*
Kitti Rattanadit, PhD - EM - ***Bobaru*** Thesis: *"Coupled DEM-FEM for dynamic analysis of granular systems in bending"*

MS Graduates *(August 2010)*
Jeremy Anderson, MS - ME- ***Shield***
Judy Miska, MS - CHEM - ***Takacs -*** *"Rhodium-Catalyzed Hydroboration: Directed Asymmetric Desymmetrization"*
Jennifer Gerasimov, MS - CHEM - ***Lai*** Thesis: "*Development of an Electrochemical Insulin Sensor Based on a High Affinity DNA Sequence Found in the Insulin-linked Polymorphic Region"*
Joseph Graskemper, MS - CHEM - ***DiMagno*** Thesis: "*Controlling Reductive Elimination From Novel I (III) Salts Using a SECURE Method"*

NCMN-affiliated Graduates (May 10 - Aug. 11)

PhD Graduates *(August 2010)*
Jun Wang, PhD - CHEM - ***Zeng*** Thesis: *"Molecular Dynamics Studies of Simple Model Fluids and Water Confined in Carbon Nanotube"*
Nan Shao, PhD - CHEM - ***Zeng***
Chris Schwartz, PhD - CHEM - ***Dussault***
Adrienne Roehrich, PhD - CHEM - ***Harbison*** Thesis: *"Theoretical and Experimental Studies in Nuclear Magnetic Resonance"*
Joseph R. Brewer, PhD - CHEM - ***Cheung*** Thesis: *"High Temperature Rare Earth Compounds: Synthesis, Characterization and Applications in Device Fabrication"*

MS Graduates *(December 2010)*
LaTravia Dobson (Robinson), MS - CHEM- ***Dussault*** *Thesis:*
Bradley Johnson, MS - CHEM - ***DiMagno*** Thesis: *"A New Synthetic Approach to the Synthetic of N-(Phosphonoacetyl)-L-Ornithine, II. The Influence of Pyridine on the Ozonolysis of Alkenes"*
Paul Barron, PhD - CHEM - ***Choe*** *Thesis: "Design, Synthesis, and Characterization of Porphyrin Paddlewheel Frameworks"*

PhD Graduates *(December 2010)*
Paul Barron, PhD - CHEM - ***Choe***
Harry Garcia Flores, PhD - CHEM - ***Langell*** Thesis: *"Characterization and Stability of Thin Oxide Films on Plutonium Surfaces" (supported 3 yrs. on a Los Alamos National Needs Ph.D. Fellowship)*
Daniel Schmidt, PhD - *EE* - ***E. Schubert / M. Schubert*** Thesis: *"Generalized Ellipsometry on Sculptured Thin Films made by Glancing Angle Deposition"*

MS Graduates *(May 2011)*
Eric Cutler, MS - ME - ***Gu*** Thesis: *"Gas Embolic Factors in Cardiovascular Health"*
Dhairyashil Aher, MS - ME - ***Robertson*** Thesis: *"Mechanical Properties of PECVD Boron Carbide"*

PhD Graduates *(May 2011)*
Monchai Duangpanya, PhD - EM - ***Bobaru*** Thesis: *"A Peridynamic Formulation for Transient Heat Conduction in Bodies with Evolving Discontinuities"*
Neil J. Lawrence, MS - CHEM - ***Cheung*** Thesis: *"Synthesis and Catalytic Activity of Nanostructured Cerium Oxide"*

MS Graduates *(August 2011)*
Ying Han, MS - ME - ***Gu*** Thesis: *"Modeling of Fluid-structure interaction in the aortic coarctation"*
Ananth Ram M. Kasavajhala, MS - ME - ***Gu*** Thesis: *"Fracture characterization of Aortic dissection"*

PhD Graduates *(August 2011)*
none listed

NCMN MEMBER NEWS BRIEFS

BIG Grants & Awards BIG

Major Grants Listed by the Office of Research - *M. Langell, R. Lai, A. Pannier, Y. Lu (x 3), J. Huang, A. Gruverman, B. Robertson-(Electron Microscope), D. Sellmyer, J. Shield, R. Skomski x 3), Y. Dzenis, J. Turner!*

Nebraska EPSCoR awarded a $3.3 million joint grant with Puerto Rico to create cyberinfrastructure and explore nanomaterials for energy efficiency. ***Evgeny Tsymbal*** is the chief scientist at the University of Nebraska on this project.

Andrzej Rajca received a 2011 NCESR Energy Grant for an energy project titled "Novel Supercapacitors based on nanostructured materials."

Xiao Cheng Zeng received a 2011 NCESR Energy Grant for his energy project titled "Nanostructured Design of Catalysts for Converting Glycerol to Value-Added Chemicals."

Joseph Turner was awarded a 2011 NCESR Energy Grant $70,000 for "Development of Combinaorial Approaches to Enhance Ethanol Production Efficience from Switchgrass Using Micro/Nanoscale Quantification Methods."

Nebraska EPSCoR's FIRST Award program is designed to help early career faculty initiate their research programs and compete more effectively for NSF CAREER grants. ***Xia Hong***, Physics and Astronomy and ***Yusong Li***, Civil Engineering are two of the 2011 Awardees.

Kirill Belashchenko's group has been awarded a new DMR-NFS Grant. This award supports computational and theoretical research and education aimed at understanding thermal effects in spin-dependent transport.

UNL scientists are using this new MRI machine to monitor biomaterials and engineered tissues. This research could lead one day to noninvasive biopsies of potentially cancerous tissues or regenerated organs. Angie Pannier and Shadi Othman, UNL biological systems engineers, are studying engineered bone and fat tissues that in the future could be implanted into the human body to replace tissue lost due to injury or disease.


NCMN Welcomes New Faculty Members




Yunshen Zhou (Electrical Engr.), Caren M. Barnes (Clinical Research / Dental Hygiene), David A. Covey (Restorative Dentistry), Xia Hong (Physics & Astronomy), Srivatsan Kidambi (Chemical & Biomolecular Engr.), Dennis Alexander (Electrical Engr.).

Hendrik Viljoen has developed new technologies that have the potential to diagnose tuberculosis (TB) in the developing world more quickly and more accurately than any test used today. *Autumn 2010 Engineering@Nebraska & UNMC Today.*

Stephen Ducharme was one of NCMN's members to judge at the Nebraska Science Olympiad *http://soinc.org*.

The Center for Nanohybrid Functional Materials will be led by ***Patrick Dussault*** & ***Mathias Schubert*** with new NSF-EPSCoR-supported projects on Nanoscale Hybrid Materials.

APPLICATION NOTES are something **NEW** from our Central Facility Specialists. These brief communications are intended to demonstrate data and capabilities of our Facilities, and to stimulate new users and applications.

Stephen DiMagno and his entrepreneurial team are among the inaugural recipients of NSF's Innovation Corps award, also known as the I-Corps. Winners were announced Oct. 6.

Axel Enders (chair) The theme of this year's Wophy conference was "Materials Girls," which highlighted progress in Materials Science. Scientific talks covered all aspects of Physics and Astronomy. *see more:* http://wophy.unl.edu/

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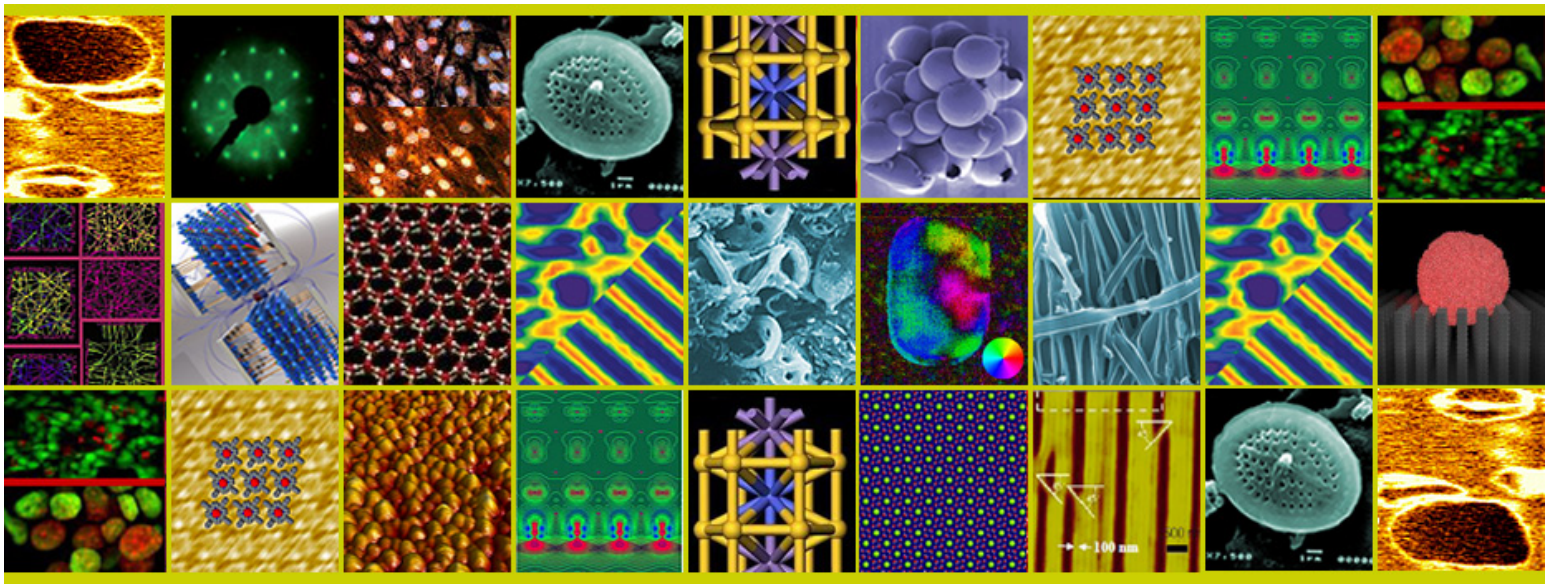
NCMN MEMBERS CELEBRATE RESEARCH BREAKTHROUGHS IN MATERIALS & NANOSCIENCE !

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



The TEXTURED Images of NANOSCIENCE...