

## *Materials & Nanoscience Outreach News*

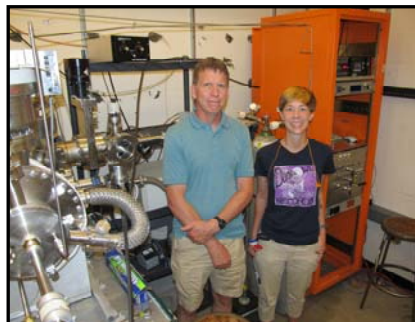
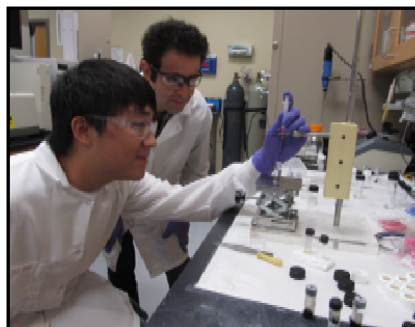
*Materials and Nanoscience Outreach and Education activities  
in Nebraska*

### **Recent Outreach Activities**

#### **Nano High School Intern and REU Program Student Successes**

Due to the generous support of the JA Woollam Foundation the Nebraska Center for Materials and Nanoscience (NCMN) at the University of Nebraska has offered a STEM summer high school internship program for many years now. The program supports select Lincoln-area high school students, 16 years and older, who receive guidance and training in experimental and theoretical techniques in NCMN labs at UNL during the summer. A few students have seen their hard work produce national success. The results for the National Siemens Competition in Math, Science, and Technology, one of the most prestigious national competitions for high school STEM research, was announced recently and two high school intern projects by Jesse Lin (Dr. Siamak Nejati advisor) and Jae Hyun Lim (Dr. Vitaly Alexandrov) were honored in the semifinals! A few other interns have also had their scientific research work published while still in high school.

The Nebraska Nanoscale Facility (NNF) supported individual students and Prof/Student pairs in Research Experiences for Undergraduates (REU's) who worked on research projects in nanoscale-science research labs for 10 weeks during the summer of 2017. Skye Tackkett, 2016 NNF REU student from the Missouri University of Science and Technology, was also chosen to participate in the international 2017 NNCI REU at the National Institute of Materials Science in Tsukuba, Japan last summer. Skye worked with Dr. Jeff Shields (Mechanical & Materials Engineering) as part of her REU at UNL and applied for a 2nd summer research experience in an international laboratory. The NNCI REU program gives students an advanced nanotechnology research experience, but more importantly, exposes them to research in an international context and helps them grow in their perception of research as an international endeavor.



#### **Administrative Support Available for NCMN Member Outreach Activities**

NCMN offers additional outreach help, including some administrative services to NCMN faculty members in fulfilling the Broader Impacts outreach component in NSF grants. **Contact:** [Terese Janovec](mailto:tjanovec3@unl.edu), Assistant Director and Education/Outreach Coordinator, 855 N. 16th Street, Room N201C, phone: 402 472-2716, fax: 402 472-6148, e-mail: [tjanovec3@unl.edu](mailto:tjanovec3@unl.edu).

## Training for New Nano Facility Users and Teachers

Education for new users included an annual Nanotech Workshop which introduced future users from industry, universities, and government entities to NNF resources. Also an annual three-day Minicourse for new users, both local and external, was taught by NNF's Facility Specialists and faculty and attendees who learned in depth information about NNF research thrusts and operational procedures. Nanotech Courses hosted regional and local university students and were designed to promote nanoscience understanding through use of UNL equipment. Development of equipment training videos provided new facility users with an effective and efficient method of learning information needed to work in UNL labs.

NCMN/NNF had the opportunity to train and resource hundreds of K-12 teachers with STEM/Nano related information at teacher fairs and conferences, preservice teacher workshops, and through online educational videos, lesson plans, and other materials. Training supported professional development and how to integrate nanoscience into the classroom using Nano/STEM kits and other activities. Events included the University of Nebraska-Lincoln Preservice Teacher Workshop, Science Matters Workshop, Nebraska Association for the Gifted Conference, and Project Lead the Way Engineering Conference.



## K-16 Student and Community Events



A variety of events throughout the year focused on bringing nanoscience to many different audiences.

- **NanoDays**, a nationwide festival of educational programs about nanoscale science and engineering was held at our local mall and attended by 400 students and interested general public.
- **Student Conferences** included the Conference for Undergraduate Women in Physical Sciences, WoPhyS where NCMN and NNF partnered with MRSEC, along with other sponsors, to bring together outstanding student researchers in Physics for [WoPHY Conferences](#). Students from across the US attended to build on their current research experiences, interact with physics students from other universities, and attend scientific talks given by scientists who are leaders in their field. Also the Nebraska Women in Science Conference attended by over 100 high school women and their teachers, the Nebraska Robotics Conference, and Nebraska Math Day where we had the opportunity to talk with the best and brightest high school students from across Nebraska at the 27th annual Nebraska Math Day.
- Many **Junior/Senior High Tours** were given to interested junior and senior high teachers visiting the UNL campus with students and parents to learn more about what UNL has to offer in nanoscience research.
- **2017 Summer Eclipse** celebration provided nano information to hundreds during this historical event.
- We explored **Science, Technology, Engineering, Art, and Mathematics (STEAM)** in a week-long partnership with LPS Foundation's new [Spark Summer Learning program](#). NCMN provided a high-energy, fun, and immersive summer-learning experience, centered around the theme of Magnetism, using a variety of science activities for 1st-5th graders.
- **Discover Engineering Days**—NCMN partnered with the College of Engineering to introduce middle school students and their teachers to the various fields in engineering and nanoscience at the University of Nebraska-Lincoln. Events are filled with hands-on activities that apply math, science and creative thinking skills.
- **Nanocamp**—Middle school students, participated in a weeklong NanoCamp at UNL where faculty and graduate students, NCMN & Bright Lights staff, future science teachers and the Department of Physics & Astronomy all worked together to present a mini-course about nanotechnology. Topics included nanolight technology, carbon nanotubes, self-assembly, hydrogels, magnetism, soft material robotics, nanocomposites, and alternative energy.

## K-16 Diversity Programs to Title 1 Schools

Nano After School and Summer Nano Camps were provided to diverse middle school student populations and 1<sup>st</sup> generation, college-bound high school students during 2017.

- Nanoscience Camp Partnership—NCPA high school students from Grand Island and Omaha participated in a Science Camp sponsored by [Epscor](#), and held on the UNL campus. Part of the camp included tours and activities related to nano related research in UNL faculty labs and facility tours of equipment. Students were a part of the [Nebraska College Prep Academy](#), a science/math focus program that encourages high school graduation and pursuit of a post-secondary degree.
- Summer Nano Camp—This summer, after school programming at a highly diverse middle school was extended into a 3 day STEM class involving over 100 students! Information included videos, hands-on activities, giveaways and discussions of science applications which provided a broad overview of STEM fields with many career opportunities. Students gained a more comprehensive understanding through activities that introduced them to STEM concepts.

Title 1 schools were also supported through thousands of dollars of free conference registration scholarships and Nano/STEM activity kits for Native American and Title 1 teachers at the Nebraska Association for the Gifted Conference in 2017.

NCMN was recently awarded a NASA Space Grant that allowed four underrepresented undergraduate students to work in mentor/mentee pairs and share nanoscience lessons with underrepresented middle school classes.



## Nano Outreach Upcoming Events 2018

### After School Program

January 22– March 26  
Culler Middle School, Lincoln

### NASA Space Grant Program

January & February  
Voelte-Keegan Nano Center

### Discover Engineering Day

March 8  
City Campus Union

### NanoDays

April 7  
Gateway Mall

### Traveling Nano Exhibit

February - May  
University State Museum

### NNF Nanotech Workshop

May 16  
Voelte-Keegan Nano Center

### Nanotech Minicourse

May 14-16  
Voelte-Keegan Nano Center

## Nebraska Center for Materials and Nanoscience

### *Bridging Nanoworld Opportunities in Nebraska...*

The Nebraska Center for Materials and Nanoscience (NCMN) at the University of Nebraska is a multidisciplinary research organization involving 100 faculty members from the Departments of Physics and Astronomy, Chemistry, Electrical Engineering, Mechanical and Materials Engineering, Chemical & Biomolecular Engineering, and others. The NCMN strives for excellence in research, graduate and postdoctoral education and service in materials science and engineering, and nanoscience. It is on the forefront of research in a high-priority national program, the National Nanotechnology Initiative. The NCMN also works with state and national industries in support of Nebraska's overall economic development.

#### NCMN

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