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*Established Program to Stimulate Competitive Research
Institutional Development Award Program*

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For the U.S. National Science Foundation's 28th EPSCoR Conference, hosted in Omaha, more than 35 U.S. states and territories were represented among the approximately 500 attendees – including 100+ student research poster presenters. Learn more on pages 10-11.

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NSF EPSCoR 28th National Conference photos by Madison Sobolka, Light Works Photo and Video Productions

Nebraska EPSCoR 2024 Annual Report

2024 DIRECTOR'S REPORT



2024 WILL BE REMEMBERED as the year when the EPSCoR nation came to Nebraska. That's because the Good Life State hosted the 28th National Science Foundation EPSCoR National Conference for the first time. Nebraska has been an EPSCoR jurisdiction since 1991, but our home state had never hosted this biennial conference. Since it was clearly our turn, the Nebraska EPSCoR office rolled-up its sleeves and organized the October 13-16 meeting at the

Hilton Omaha. Over 500 scientists, engineers, administrators, and students from all 28 EPSCoR jurisdictions attended the event which was jam-packed with research posters, break-out sessions, and plenary talks featuring speakers with Nebraska connections. The keynote speaker on October 15 was NSF Director **Sethuraman Panchanathan**. Each day, different topics important to our nation's research and development enterprise were rolled-out and discussed in detail.

Presenters from tribal colleges, research universities, community colleges, comprehensive four-year institutions, and private industry all contributed their findings on a diverse array of projects featuring Science, Technology, Engineering and Mathematics (STEM) research, education, and outreach. This "coming together" of people from different disciplines and institutions is a hallmark of the NSF EPSCoR program and was the overall highlight of the Conference. Over the course of the meeting, from Sunday through Wednesday, the massive potential of our entire nation in furthering STEM activity was on full display.

With record-setting attendance, I was both encouraged and inspired by the number of enthusiastic researchers that I met over those four days in Omaha. The Nebraska EPSCoR office staff (see below) worked hard to make this event a great success. Afterwards, there was a wonderful sense of accomplishment that we achieved our goal of showcasing scientific potential in all corners of the country, and that the Conference represented a step towards increasing U.S. participation in the STEM workforce.

I hope you enjoy reading more about the National Conference in this issue, as well as Nebraska's flourishing research, education, and outreach activities in 2024. ■

Matthew T. Andrews



★ The Nebraska EPSCoR team that coordinated NSF's 2024 National EPSCoR Conference in Omaha was (from left) Judi Sangster, Corde Allen, Nancy Sinnitt, Aaron An, and Matt Andrews.

STATE COMMITTEE

THE NEBRASKA EPSCoR STATE Committee is a 19-member group, appointed by the governor, to oversee Nebraska EPSCoR's mission.

DEPARTURE

Dr. **Sherri Jones**, who served as Interim Vice Chancellor with the University of Nebraska-Lincoln Office of Research and Innovation, retired. She is succeeded by Dr. **Jennifer Nelson**. Jones joined UNL in 2012 and had served as professor and chair of the Department of Special Education and Communication Disorders, director of the Barkley Memorial Center, as dean of the College of Education and Human Sciences, prior to her work as interim vice chancellor. Previously Nelson led UNL's research strategy and infrastructure and served as Nebraska's research integrity officer. She became a Husker faculty member in 2011 and worked as director of administration with the Center for Brain, Biology and Behavior.

ADDITION

With Dr. **Jeffrey Gold's** elevation to president of the University of Nebraska (NU) system, his successor on this committee is Dr. **David Jackson**. In his 35-year career, Jackson was a professor in UNL Food Science & Technology who rose to interim department head and then associate dean for agricultural research. He began working in the NU President's Office six years ago, and currently is in his second term as NU's Interim Executive Vice President and Provost.



ROLE CHANGE

Dr. **Julie Shaffer** had been Interim Senior Vice Chancellor for Academic Affairs at the University of Nebraska at Kearney; in 2024 she was named to this position permanently.

REAPPOINTED BY NEBRASKA'S GOVERNOR

Dr. **Janet Seger**, Creighton University professor of physics. ■



NESTIP Internship Aids Displaced Company

GARNER INDUSTRIES IS A manufacturing operation that was based in Waverly until a tornado on April 28, 2024 hit its plant facility there. The business office has since relocated to Nebraska Innovation Campus in Lincoln, while restoring its production capabilities. Founded in 1953, Garner Industries specializes in plastic injection molding of small to medium sized parts, precision machining of metals and plastics, and custom tool building. In mid-2024, Garner applied to Nebraska EPSCoR to fund an intern following its relocation. The Nebraska EPSCoR Science and Technology Internship Program (NESTIP) was glad to assist Garner, along with nearly 200 other Nebraska company requests since Nebraska EPSCoR started NESTIP in 2001. ■

NSF RII TRACK-1: EQUATE

THIS YEAR NEBRASKA'S EMERGENT Quantum Materials and Technologies (EQUATE) project, funded by the U.S. National Science Foundation EPSCoR, entered Year 4 of its five-year term. EQUATE's quantum-focused collaboration spans the University of Nebraska-Lincoln (UNL), the University of Nebraska at Omaha (UNO), the University of Nebraska at Kearney (UNK), and Creighton University — plus engages participants at Little Priest Tribal College and Nebraska Indian Community College. EQUATE includes three teams of scientists and engineers, called "Focused Research Groups" or "FRGs"; FRG1 works on Quantum Materials, FRG2 focuses on Quantum Technologies, and FRG3 explores Quantum Information Processing. So far, EQUATE has generated more than 175 research publications and its 20+ Senior Investigators (SIs) have trained more than 100 students in quantum physics, materials science, and engineering. In October 2024, a dozen EQUATE participants shared their research posters at the NSF National EPSCoR Conference in Omaha (see story on page 10).



Annual Conference Gathers Quantum Expertise

THE 2024 NEBRASKA RESEARCH and Innovation Conference, themed "Diamond Quantum Sensing: Challenges and Opportunities," was led by **Abdelghani Laraoui**, assistant professor of Mechanical and Materials Engineering at UNL, who heads EQUATE's Focused Research Group (FRG) 2. The symposium gathered 100+ attendees plus speakers from Princeton University, Georgia Tech, UC Berkeley, and the University of Chicago. EQUATE's External Advisory Board attended the event and met with EQUATE leaders on an adjacent day. ■

♦ Students, faculty, and event guests discuss EQUATE research posters at the 2024 NRC event

Guo Gains NSF CAREER Award to Grow Perovskite Research, Chemistry Teaching

YINSHENG GUO, ASSISTANT PROFESSOR of chemistry at the University of Nebraska-Lincoln (UNL), earned a Faculty Early Career Development (CAREER) Award from the U.S. National Science Foundation in 2024. His five-year research project, Structural dynamics and optoelectronics of anharmonic soft semiconductors, includes \$648,335 in funding.



According to UNL, Guo is investigating the origins of the properties of metal halide perovskites, a low-cost, highly efficient semiconducting material used for solar energy,

solid-state lighting and more. His focus on this family of materials has served in his work with FRG1, a Focused Research Group with Nebraska's Emergent Quantum Materials and Technologies (EQUATE) project; a five-year, \$20 million research collaboration.

For this CAREER Award, Guo is also innovating techniques for teaching physical chemistry, with an emphasis on computational and experiential approaches and potential benefits for translating skills from the classroom to the laboratory or STEM workplaces. With EQUATE, Guo has mentored several visiting students via Research Experience for Undergraduates (REU) and Young Nebraska Scientists High School Researcher opportunities. ■

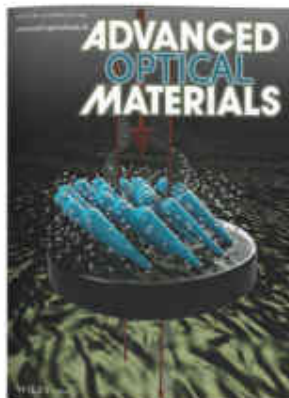
UNO Gains \$2.8M DOE Funding

RENAT SABIRIANOV, PROFESSOR WITH the University of Nebraska at Omaha's Department of Physics, received a DOE Implementation Award of \$2,800,000 for a two-year project: "A High-Throughput Computational and Experimental Approach to the Design of unconventional magnets." Sabirianov is a Science Investigator (SI) with EQUATE's FRG3 research group. ■

Advanced Optical Materials Cover Features EQUATE FRG2 Research

RESEARCH BY THE SCHUBERT group, part of EQUATE's FRG2, was selected as the front cover image and article for *Advanced Optical Materials* October 24, 2024 edition.

This work, "Nanocolumnar Metamaterial Platforms: Scaling Rules for Structural Parameters Revealed from Optical Anisotropy," was led by University of Nebraska-Lincoln's **Ufuk Kilic** and includes collaboration with **Yousra Traouli, Matthew Hilfiker, Khalil Bryant, Stefan Schoeche, Rene Feder, Christos Argyropoulos, Eva Schubert, and Mathias Schubert.** Their journal article shows how nanocolumnar platforms exhibit characteristic anisotropy (physical property having a different value when measured in different directions), following a geometric scaling rule that enables prediction of the directional properties based on structural dimensions. ■



Small College Undergraduate Research Experience Awards

EACH OF THE 2024 recipients of Nebraska EPSCoR's Small College/University Undergraduate Research Experiences receives up to \$5,000 per proposed project — thanks to funding from the National Science Foundation. The successful applicants — limited to faculty from Nebraska higher education institutions with <\$8 million annual research expenditures — engage undergraduates in a variety of projects, as follows:

Haishi Cao, University of Nebraska at Kearney, Chemistry, *Synthesis Of Naphthalimide Derivatives By Click-Reaction And Suzuki Coupling Reaction For Investigating Photophysical Properties*

Kimberly Carlson, University of Nebraska at Kearney, Biology, *Differential Effects of Drosophila melanogaster Nora virus Infection on Longevity and Viral Load in Relationship to Sex and Mating Status*

Clint Evrard, Chadron State College, Physical Sciences, *Computational and Quantum Chemical Research*

Keith Geluso, University of Nebraska at Kearney, Biology, *Summer Roost Sites of Migratory Tree Bats in Nebraska*

John Kyndt, Bellevue University, College of Science and Technology, *Nebraska Salt Marsh Microbiome: an exploration of spatial and temporal microbial diversity*

Julie Lanz, University of Nebraska at Kearney, Psychology, *Refining Measures for Stressor Voice*

EQUATE-Funded New Hire Zhang Boosts UNL's Physics Faculty



ZUOCHENG ZHANG is a new faculty hire at the University of Nebraska-Lincoln (UNL) Department of Physics and Astronomy. After being a postdoc and assistant project scientist at the University of California, Berkeley, Zhang arrived at UNL to begin work as an assistant professor in August of 2024. He teaches PHYS 212H, an introductory physics course for honors students, and is setting up his research laboratory at UNL's Jorgensen Hall.

"In a word, it's been busy," Zhang said. "I'm feeling very supported, grateful, and positive" about launching his faculty and research career at Nebraska.

Zhang's hiring was made possible through Nebraska's Emergent Quantum Materials and Technologies (EQUATE) project, a five-year collaboration funded by the U.S. National Science Foundation for \$40 million. As part of EQUATE's Focused Research Group (FRG) 1, Zhang is mentored by its leader, **Xia Hong**. Zhang also appreciates the collegiality extended by FRG1 colleague, **Xiaoshan Xu**.

"It's great to join an established research group," Zhang said. As an experimental physicist, he is excited to work with highly-regarded theoretical physicists, including UNL's **Evgeny Tsymbal**.

Zhang said he values departmental support from UNL Physics and Astronomy; department chair **Ken Bloom** put Zhang forward to attend a four-day Physics and Astronomy Faculty Teaching Institute, hosted by the American Association of Physics Teachers, American Physical Society, and American Astronomical Society. The cohort continues to meet on Zoom, which extends Zhang's networking with peers throughout the nation. Zhang is also serving on the department's graduate student admissions committee, which will help him meet new talent that could join his nascent UNL laboratory.

UNL's College of Arts and Sciences has extended a seed grant to Zhang, and he's also glad to be in a Research Development Fellowship Program, led by UNL's Office of Research. The latter is helping him polish his skills, particularly for pursuing research grants.

While aligning toward funding opportunities, Zhang has measured each square foot of his lab near the Nebraska Center for Materials and Nanoscience (NCMN). He praises NCMN's extensive equipment and network, as he outfits his research space with instruments and students. ■

EQUATE Graduate Students Earn Fellowships

THIS YEAR EQUATE'S FUNDING via NSF EPSCoR allowed for merit-based awards to several graduate student participants. Below are the recipients (in bold), followed by the names of their EQUATE advisors:

Arjun Subedi
Peter Dowben

Qiuchen Wu
Xia Hong

Suvechhya Lamichhane
Sy-Hwang Liou

Ian Green
Mathias Schubert

Omar Taha
Robert Streubel

Naafis Ahnaf Shahed
Evgeny Tsymbal

Nebraska's NSF EPSCoR Research Fellows Named in 2024

Jeffrey Price, a research assistant professor with the University of Nebraska-Lincoln (UNL) Dept. of Food Science & Technology, gained a \$145,150 NSF EPSCoR Research Fellowship to collaborate with the University of Washington in Seattle. The project is titled "Determining the Functional Consequences of Co-adaptation Between Host and Gut Microbiota Across Closely Related Host Species."

Seunghee Kim, Vranek Associate Professor with the UNL Dept. of Civil & Environmental Engineering in Omaha, received an NSF EPSCoR Research Fellowship for \$290,078. His project, Fundamental study on hydrogen flow in porous media during repetitive drainage-imbibition processes and upscaling for underground energy storage, involves collaborative work with the Idaho National Laboratory.

FOCUSED EPSCOR COLLABORATIONS (FECS)

THE U.S. NATIONAL SCIENCE FOUNDATION'S RII-FEC program builds inter-jurisdictional collaborative teams of EPSCoR investigators in focus areas consistent with the NSF Strategic Plan. RII-FEC projects include researchers from at least two EPSCoR-eligible jurisdictions with complementary expertise and resources necessary to address challenges, which neither party could address independently as well or as rapidly.

TRACK-2 FEC

Western Nebraska Researcher Works with Data-Advanced Research and Education Team



WEATHER IS A BIG CONCERN in the central U.S. states of Kansas, Arkansas, Nebraska, and Iowa (collectively known as "KANI") because it affects many economic sectors, particularly in agriculture-based communities. The scarcity of observation stations that deliver real-time soil and atmospheric data in these areas makes environmental assessment for climate and weather prediction an added challenge. A new collaboration, Data-Advanced Research and Education (DARE), earned nearly \$6 million in funding from the

U.S. National Science Foundation, for increasing infrastructure to boost climate change resilience in KANI states' agriculture-based communities.

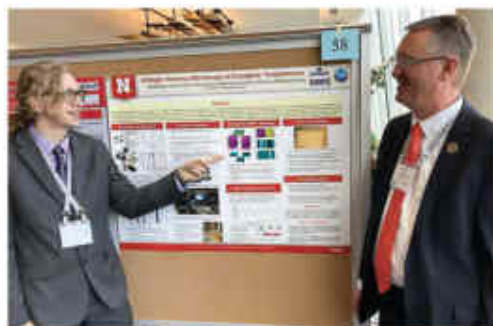
A professor from the University of Iowa leads the project, and **Xin Qiao** is the team's Nebraska lead. Qiao works with the Panhandle Research, Extension & Education Center (PREEC) in Scottsbluff, where he focuses on Irrigation Management and Engineering.

The four-year DARE project integrates workforce development with classroom teaching, research, extracurricular activities, community engagement and communication: working together to identify, assess, and, to some degree, mitigate the localized impacts of climate change and environmental justice issues. DARE aims to contribute to a paradigm shift of readiness and infrastructure development in agriculture-based communities, to embrace new technology for economic growth and adaptation to climate change. ■



28th NSF EPSCoR NATIONAL CONFERENCE

Oct. 13-16, 2024 • NEBRASKA



HOSTING NATIONAL CONFERENCE

Nebraska Wows the Crowd

MORE THAN 500 GUESTS from across the nation attended the National EPSCoR Conference hosted by Nebraska EPSCoR. The event, Oct. 13-16 at Hilton Omaha, was sponsored by the U.S. National Science Foundation. Additional sponsors included the University of Nebraska-Lincoln (UNL) Office of Research and Innovation, Creighton University, the Nebraska Department of Economic Development, and Invest Nebraska.

For the first time, NSF Director **Sethuraman Panchanathan** spoke at this 28th edition of the biennial conference. His talk was titled, "Innovation Anywhere, Opportunities Everywhere: Accelerating the Frontiers of Science and Technology Through Talent, Ideas and Innovation." Other plenary sessions featured Nebraska photographers **Michael Forsberg** and **Cole Sartore**, as well as **Jesse Bell** from University of Nebraska Medical Center and **Shannon Bartelt-Hunt** with the University of Nebraska-Lincoln (UNL) College of Engineering, and **Ed Louis** from Omaha's Henry Doorly Zoo. Attendees were on their feet for hands-on science activities from the energetic **Professor Sko Science Show**.

Breakout sessions included topics on Science Communication — with **Heather Akin** from UNL Department of Agricultural Leadership, Education and Communication in the College of Agricultural Sciences and Natural Resources — as well as Using Time-Lapse Images as a Tool for Research, a panel led by UNL's **Troy Gilmore** and **Mary Harner** with the University of Nebraska at Kearney. **Marianna Burks** and **Kristi Montooth**, faculty with UNL's School of Biological Sciences, co-led a session on their innovative NSF-funded efforts to mentor research opportunities and resources for UNL students. And the University of Nebraska's Assistant Vice President for External Relations and Director of Federal Relations, **Matt Hammons**, co-developed "Equipping You for Advocacy" — with a panel that included **Amanda Greenwell**, head of NSF's Office of Legislative and Public Affairs, and **John Fuller**, counsel with the EPSCoR/IDeA Foundation.

The 2024 EPSCoR conference also showcased more than 115 posters, presented by students whose research was funded by NSF EPSCoR. Conference chair **Matt Andrews**, director of Nebraska EPSCoR and professor with UNL's School of Natural Resources, praised the advisory group that helped conduct



this national conference, with registration completely full a month before the event.

"It was a busy year of preparation for Nebraska EPSCoR's staff of five: coordinating the event's website, logistics, and even a 'field trip' for attendees to visit the research facilities at Omaha's Henry Doorly Zoo," said Andrews. "On-site we appreciated having student helpers from Nebraska Wesleyan University's WISE program (an honors cohort for future teachers). And we were honored to have University of Nebraska President **Jeffrey Gold**, plus the chancellors of the University of Nebraska-Lincoln and the University of Nebraska at Omaha, **Rodney Bennett** and **Joanne LI**, to welcome scientists, administrators, students, and NSF leaders at our conference." ■



FIRST AWARDS

30
YEARS

30 Years of Serving State's Higher Education Faculty Development

WITH FUNDING FROM the U.S. National Science Foundation (NSF), Nebraska EPSCoR conducts its annual FIRST Awards to help the state's early-career scientist-educators prepare to pursue initial large research grants from federal agencies.

Thanks to the funding and expert proposal reviews engaged by Nebraska EPSCoR, many FIRST Awards participants succeed in securing NSF CAREER Awards or comparable distinctions.

This year, 11 CAREER Award aspirants submitted pre-proposals to Nebraska EPSCoR's FIRST Awards competition; several of these applicants merited FIRST Award "Finalist" status. In early fall 2024, these finalists were invited to advance and prepare full proposals patterned after the NSF CAREER Award format; all FIRST Award Finalists gain expert scientific reviews on these submissions. From the finalists group, FIRST Award Recipients are chosen by the Nebraska EPSCoR State Committee to receive \$25,000 for their further national award submission efforts (along with contributions from each host department) — in addition to the valuable reviews by relevant science leaders nationwide via Nebraska EPSCoR.

On November 4, at the annual meeting of Nebraska EPSCoR's State Committee, the following FIRST Award Recipients were selected:

- **Liang Chen**, University of Nebraska-Lincoln, Department of Earth and Atmospheric Sciences
- **Madhur Mangalam**, University of Nebraska at Omaha, Department of Biomechanics
- **Yury Salkovskiy**, University of Nebraska at Omaha, Department of Biomechanics
- **Joe (Xinqiu) Yao**, University of Nebraska at Omaha, Department of Chemistry
- **Xiaoqian (Tiffany) Zhang**, University of Nebraska at Omaha, Department of Computer Science
- **Peng Zhong**, University of Nebraska Medical Center, Department of Neurological Sciences

Steps to Success: from FIRST Award to CAREER Award

EACH YEAR, FIRST AWARD Recipients funded by Nebraska EPSCoR compete for major grants such as the U.S. National Science Foundation's CAREER Award. In 2024, the following FIRST Award Recipients earned NSF CAREER Awards to elevate their research and teaching.



Shuai Nie (left), assistant professor with the University of Nebraska-Lincoln School of Computing, gained U.S. National Science Foundation CAREER Award funding of more than \$812,000 for work to enable reliable wideband connectivity — anywhere, for anyone, at any time. Her project will also provide inclusive multi-generational learning experiences in America's rural areas, to increase technological literacy, boost a skilled workforce, and stimulate entrepreneurship.

According to Nie, wireless data traffic builds with ever-increasing demand for high-speed wireless connectivity, ubiquitous network access, and end-user experience. She said the majority of internet traffic is from mobile networks' end-users requiring last-mile service — linking the radio access network to end-users. With increasing demand and limited solutions, wireless connectivity is bottle-necked and hinders the advancement of new applications that require wide bandwidth — particularly in rural areas.

Nie plans an integrated research and education program for a Midwestern hub to add scientific understanding of a wireless last mile to enhance bandwidth, flexibility, and scalability — while also being more cost efficient. With new applications — such as extended reality and digital twins — more mobile traffic requires more bandwidth resources. Meeting this need can stimulate the U.S. economy, create jobs, and benefit rural areas.

In addition, Nie's education and outreach objectives aim to generate new curriculum for convergence learning, with interdisciplinary research opportunities, entrepreneurial skill-set training, and interaction with rural communities to grow stakeholder participation in the process of technology development.



Ashley Votruba (*above*), assistant professor of psychology at the University of Nebraska-Lincoln, received a CAREER Award for \$660,000 from the U.S. National Science Foundation for research on challenges in the civil legal system.

Her CAREER project includes national surveys and community workshop activities, where UNL students can take part in related outreach and engagement; she'll also convey relevant topics in her classes.

Votruba's researchers will interview individuals at multiple timepoints about how the situations resolved and participants' views on the outcomes. She aims to connect this research to aid policy development.

The project's outreach includes Nebraska sites, spanning rural and urban settings. Votruba's team will develop resources to be shared. Posting these items online can serve communities throughout the nation.

Nebraska EPSCoR 2024 Annual Report

Jorge Fandinno (*below*), an assistant professor of computer science at the University of Nebraska at Omaha (UNO), received a U.S. National Science Foundation (NSF) CAREER award — a significant milestone for himself and for UNO's College of Information Science and Technology. He is the first faculty member in ISS&T to receive the NSF CAREER award, and is only the third UNO faculty member honored with this award.

For this \$566,213 project's research, Fandinno focuses on advancing the field of *Knowledge Representation and Reasoning within AI*. He aims to develop methodologies to create AI systems that are not only effective and robust but also clear and comprehensible.

This work seeks to improve how computers understand information and make decisions: vital for AI systems used in important fields like healthcare and national security. Fandinno strives to make sure these knowledge-intensive systems can use both qualitative and quantitative data effectively while still being easy for people to understand.

Fandinno's project innovates by bridging the gap between human-readable languages and the effective handling of numerical data. Traditional methods have often focused on either readability or quantitative analysis, but not both; Fandinno seeks to integrate these aspects.

"In high-stakes applications, trust in AI is crucial, and requires an understanding of its operations," Fandinno said. His project also extends to teach upcoming computer scientists how to create and use transparent AI systems, fostering the next generation of computer scientists.

Funded by NSF's Division of Information & Intelligent Systems / Robust Intelligence and EPSCoR, Fandinno's project exemplifies NSF's commitment to support research with intellectual merit and broader impacts benefiting society. ■





UNMC Heart, Vascular Research Gains COBRE Award

IN JANUARY 2024 THE University of Nebraska Medical Center reported its Center for Heart and Vascular Research (CHVR), led by principal investigator **Rebekah Gundry, PhD**, was awarded more than \$11.8 million by the National Institutes of Health to create a Centers of Biomedical Research Excellence (COBRE) focused on finding answers for heart and vascular diseases. A COBRE involves substantial multi-year funding from the National Institutes of Health and its National Institute of General Medical Sciences.

According to UNMC, this COBRE will grow a center that develops early career researchers, promotes collaborative research, and supports study of heart and vascular diseases through cutting-edge infrastructure and invaluable mentoring.

The COBRE benefits not only the early career scientist's ability to do research, but also supports a senior scientist's ability to mentor the early career scientist in all aspects of the job — which creates more senior scientists, operating at the top of their respective games. This grant also allows UNMC to develop and support critical research infrastructure that catalyzes innovative heart and vascular disease research including a new CHVR Bioassay Core.

The CHVR already capitalizes upon the Nebraska Cardiovascular Biobank and Registry, "one of the most amazing human specimen biobanks that exist," Dr. Gundry said. The CHVR also benefits tremendously from a partnership with Nebraska Medicine, which has one of the largest heart failure and transplant programs in the country and one of the busiest academic vascular surgery services in the Midwest. ■



Photo courtesy of UNMC Strategic Communications

UNO Adds COBRE Research in Cardiovascular Biomechanics

THE UNIVERSITY OF NEBRASKA at Omaha (UNO) gained an \$11 million grant from the National Institutes of Health (NIH) to establish the Center for Cardiovascular Research in Biomechanics (CRiB). The center aims to develop innovative materials and devices to address the challenges posed by vascular diseases, a leading cause of death and disability globally.

Led by **Alexey Kamenskiy**, Ph.D., Chair of the Department of Biomechanics, CRiB looks to revolutionize cardiovascular disease treatment through advanced research in arterial biomechanics and the creation of novel biomedical materials and devices. The center plans to leverage human tissues, preclinical animal models, and extensive scientific collaborations to drive transformative advancements in the field. Within UNO's Department of Biomechanics, CRiB will boost faculty and graduate student research and collaborations with industry partners to translate laboratory innovations into clinical applications.

CRiB includes a Tissue Analysis Core (TAC), led by **Anastasia Desyatova**, Ph.D., assistant professor in Biomechanics. Building upon UNO's expertise in vascular research, TAC will provide specialized services in mechanical and structural soft tissue analyses to support pioneering research projects within the Center. In addition, **Majid Jadidi**, Ph.D., will explore elastin regeneration in human peripheral arteries; **Kaspars Maleckis**, Ph.D., will develop an innovative elastomeric bypass graft mimicking healthy human lower extremity arteries; and **Yury Salkovskiy**, Ph.D., will design a biodegradable, infection-resistant wound dressing to enhance the healing of ischemic ulcers commonly observed in peripheral arterial disease (PAD) patients. To bridge the gap between academic research and commercial application, CRiB will collaborate with the biomedical device industry through UneMed, UNO's technology transfer office.

This NIH grant, awarded through the competitive Centers of Biomedical Research Excellence (COBRE) program, is the second COBRE grant received by UNO; the first grant, also awarded to UNO's Department of Biomechanics, focused on human movement variability research. ■

Nebraska EPSCoR 2024 Annual Report

BACK ROW FROM LEFT: Yury Salkovskiy, Ph.D.; Majid Jadidi, Ph.D.; and Kaspars Maleckis, Ph.D.; FRONT ROW FROM LEFT: Anastasia Desyatova, Ph.D.; and Alexey Kamenskiy, Ph.D.



OUTREACH

Sunday With a Scientist Goes Quantum

THE NEBRASKA STATE MUSEUM in Morrill Hall has a mammoth as its mascot, but the scientists and engineers with a nanoscale research team were welcomed to share their expertise. Emergent Quantum Materials and Technologies (EQUATE), funded by the U.S. National Science Foundation (NSF), engaged 200 guests in the tiny realm of nanoscience. EQUATE representatives demonstrated hands-on activities featuring magnetics, electrical charges, and mysterious materials such as graphene—which helps set the scene for future learning in science, technology, engineering and math (STEM). ■



■ Clockwise from top: A student representative of Nebraska's EQUATE project (left) helps two younger students learn about the special properties of graphene. Families try hands-on activities presented by EQUATE during the Sunday With A Scientist event in November 2024. Assistant Professor Robert Strubei with UNL Physics and Astronomy shows a family the speedy movement of magnet on a track.

Young Nebraska Scientists (YNS) Debuts New Nano Camp

MAKENZIE LONG, ASSISTANT PROFESSOR

with Creighton University, teaches chemistry and biochemistry courses and believes high-school students could get excited about topics she especially loves: computational modeling of metal ion effects on nanoscale materials using classical and quantum methods. In June, Long tested her hypothesis by working with the Young Nebraska Scientists (YNS) program to offer a preview of a camp she dreamed and developed. Long's first cohort of campers came from Girls, Inc., in Omaha. The young women gained lab skills and will revisit Creighton in Summer 2025 to help guide a new group of campers, when this YNS offering opens registration to the public. ■



▲ Young women from Omaha's Girls, Inc. learned nanoscience skills during a YNS camp at Creighton University in Summer 2024.

Dishari Earns Engineering Awards for Outreach Efforts

THE AMERICAN SOCIETY FOR Engineering Education Midwest Section named University of Nebraska-Lincoln College of

Engineering's **Shudipto Dishari** its 2024 Outstanding Teaching Awardee. At this ASEE gathering, Dishari and team were also recognized with the event's Best Paper Award. Dishari is the Ross McCollum Associate Professor in the UNL Department of Chemical and Biomolecular Engineering, and posted on LinkedIn about her work for Nebraska and K-12 STEM education:



Through the National Science Foundation (NSF) CAREER Award, I first investigated the energy literacy infrastructure across high schools of Nebraska and then designed data-driven K-12 STEM Outreach activities. This state-level database revealed that more than half of the teachers feel inadequately prepared to teach advanced energy-related topics, citing a lack of relevant academic background, experience and knowledge. Teachers also reported a lack of adequate resources and guidance for implementing hands-on STEM activities in the classroom....

We can establish a one-of-a-kind framework for the Midwest on how to take the STEM literacy and virtual training of teachers and students to the next level to support them.

Nebraska EPSCoR Outreach Coordinator **Jodi Sangster** said, "Dr. Dishari is not only passionate about her research — she is passionate about sharing her work with students and teachers alike, to help build the next generation of STEM professionals. She has worked closely with Nebraska EPSCoR to host summer camps and mentor high school researchers in her lab. More recently, she taught a portion of EQUATE's Summer Institute for Middle School Teachers, a virtual hands-on camp for teachers across the state — and two attendees from last summer described their favorite activities from that event (and how those were incorporated into their classrooms) with other teachers at the statewide Nebraska Association of Teachers of Science (NATS) conference. Her passion about science and engineering positively impacts teachers and students, and it's great to know Nebraska EPSCoR played a role in that success." ■

2024 NSF EPSCoR Co-Funding for Nebraska

U.S. NATIONAL SCIENCE FOUNDATION (NSF) EPSCoR co-funds specific NSF units in support of meritorious proposals from individual investigators and teams in EPSCoR jurisdictions. These proposals have been peer-reviewed and recommended for award, but could not be funded without the combined, leveraged support of NSF EPSCoR and the corresponding directorates. Co-funding leverages EPSCoR investment and facilitates participation of EPSCoR scientists and engineers in NSF-wide programs and initiatives.

In 2024, NSF EPSCoR Co-Funded projects brought \$8,069,769 to Nebraska. Recipients were:

Yu-Che Chen, Richard Knepper, and Xiaoyue Cheng | University of Nebraska at Omaha School of Public Administration | Data-enabled Pathways to Equity in Cyberinfrastructure Utilization for Scientific Discovery.

Jorge Fandinno | University of Nebraska at Omaha Dept. of Computer Science, University of Nebraska at Omaha | CAREER: Answer Set Programming for Quantitative Information.

Nirmimesh Ghose and Mehmet Vuran | University of Nebraska-Lincoln School of Computing | SaTC: CORE: Medium: SATTVA: Soil-Assisted Things Trust Verification for Ag-IoT.

Yinsheng Guo | University of Nebraska-Lincoln Dept. of Chemistry | CAREER: Structural dynamics and optoelectronics of anharmonic soft semiconductors.

Ying Hu | University of Nebraska at Omaha Dept. of Mathematics | Orderability of Groups, and Foliations and Flows on 3-Manifolds.

Seunghye Kim, Karrie Weber, and Hyun-Seob Song | University of Nebraska-Lincoln Dept. of Civil and Environmental Engineering | RAISE: CET: Natural hydrogen and microbial life in the deep subsurface of midcontinent USA impacting geological production and storage.

Eric Markvicka | University of Nebraska-Lincoln Dept. of Mechanical and Materials Engineering | CAREER: Manufacturing of Solid Particle-Liquid Metal Mixtures for Soft Robotics and Stretchable Electronics.

A.T. Miller and Morgan Vogel | University of Nebraska at Omaha Office of the Chancellor | A Catalyst for Intersectional Gender Equity in STEM at the University of Nebraska at Omaha.

Nitesh Nama | University of Nebraska-Lincoln Dept. of Mechanical and Materials Engineering | Collaborative Research: Ultrasound driven microbubble clusters for biomedical applications.

Shuai Nie | University of Nebraska-Lincoln School of Computing | CAREER: Terahertz on the Move: Enabling a Dynamic Last Mile for 6G Wireless Networks.

Grace Panther | University of Nebraska-Lincoln Dept. of Civil and Environmental Engineering | CAREER: Re-envisioning Engineering Pedagogy to Support a Range of Visuo-spatial Skills.

Alexandra Seceleanu | University of Nebraska-Lincoln Dept. of Mathematics | Polynomial Interpolation, Symmetric Ideals, and Lefschetz Properties.

Rebecca Swanson, Meredith Portsmore and Xin Wang | University of Nebraska-Lincoln Nebraska Extension | Facilitating Constructive Engineering Talk.

Joel TerMaat and Christopher Wentworth | Doane University Dept. of Engineering and Physics | RUI: Research Initiation: Investigating the impact of the liberal arts on the ethical development of engineers.

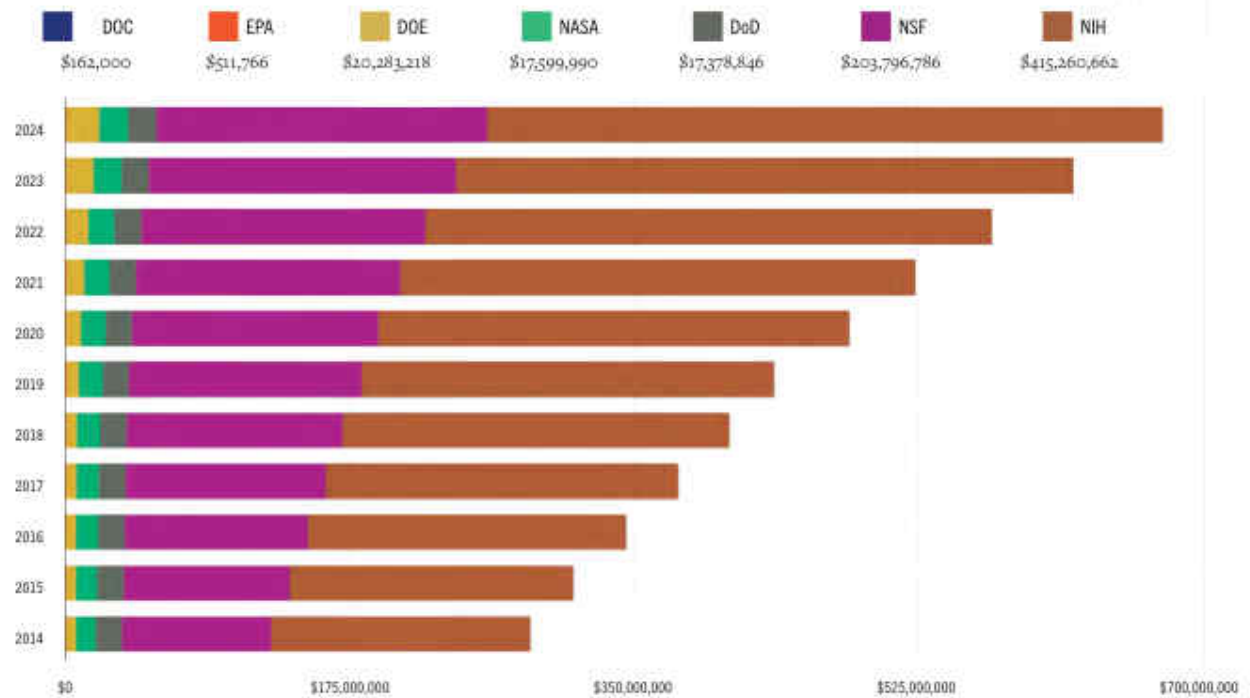
Ashley Votruba | University of Nebraska-Lincoln Dept. of Psychology | CAREER: Equitable Access to Justice: Determinants of Engagement with the Civil Justice System.

Mark Walker, Brian Harbourne, Alexandra Seceleanu, Jack Jeffries and Eloisa Grifo | University of Nebraska-Lincoln Dept. of Mathematics | RTG: Commutative Algebra at Nebraska.

Christine Wittich | University of Nebraska-Lincoln Dept. of Civil and Environmental Engineering | CAREER: Integration of Steel Grain Bin Vulnerability and Rural Community Resilience for Multiple Hazards.

Cumulative Federal EPSCoR/IDeA Funding in Nebraska

NEBRASKA BECAME AN EPSCoR jurisdiction in 1991 and has successfully competed for nearly \$675 million in federal EPSCoR or EPSCoR-like research funding. This chart shows funding by agency and the cumulative growth of funding over time for the most recent decade: 2014-2024. ■



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