



# NCI Southwest

"At its core, the National Nanotechnology Coordinated Infrastructure (NNCI) exists to help scientists and engineers from around the country access the state-of-the-art resources necessary to participate in the nanotechnology revolution. As the southwest regional node of the NNCI, the goals of the NCI-SW are to build a regional infrastructure for nanotechnology discovery and innovation, to address societal needs through education and entrepreneurship, and to serve as a model site of the NNCI."

Dr. Trevor Thornton  
<https://ncisouthwest.org/>

## Southwest Advanced Prototyping (SWAP) Hub

The Arizona State University-led Southwest Advanced Prototyping (SWAP) Hub rapidly delivers flexible, scalable, and low-cost microelectronics prototyping capabilities. SWAP Hub unites 70+ semiconductor and defense companies, academia, and national laboratories from Arizona, Colorado, New Mexico, and across the nation. Hub members share lab-to-fab capabilities and deliver prototype projects tailored to Department of Defense needs in AI Hardware, 5G/6G Technologies, and Commercial Leap Ahead.



### Advancing Chip-Making Innovation: SWAP Hub Success

The Southwest Advanced Prototyping (SWAP) Hub has been awarded \$29.6 million for five projects aimed at boosting the nation's chip-making capabilities and reducing dependence on foreign microelectronics. These initiatives are part of 33 projects across the nation, which have collectively received \$269 million through the bipartisan CHIPS and Science Act-funded Microelectronics Commons program, as announced by the U.S. Department of Defense during their visit to MacroTechnology Works at ASU. Learn more about the [Five SWAP Hub projects recently awarded](#).

Trevor Thornton, Director of NCI-SW and Professor in the School of Electrical, Computer, and Energy Engineering at Arizona State University, serves as the Power and RF Electronics Capability Lead for SWAP. The RF + Power Capability Area of the SWAP Hub offers expertise in growth and fabrication for the prototype demonstration of ultra-wide bandgap (UWBG) devices made from materials like diamond, boron nitride, aluminum nitride, and gallium oxide. Key measurements, such as carrier concentration, mobility, and resistivity, can be extracted using Hall effect techniques at temperatures up to 500°C. Additionally, a FormFactor probe station automates high-voltage/high-current (3 kV/100 A) I-V and C-V measurements for sample sizes ranging from pieces to 300 mm wafers. A similar FormFactor station facilitates automated on-wafer DC and small-signal parameter extraction for RF measurements up to 110 GHz. [Learn more about the SWAP Hub](#)

<https://news.asu.edu/20240917-science-and-technology-5-microtechnology-projects-win-nearly-30-million-federal-funding>



## **¡MIRA! at NAU Travels to the Center for Integrated Nanotechnologies**

Recently, ¡MIRA! at NAU, SparCQS, and PHY399 Nanoscience and Nanotechnology students and team had the incredible opportunity to visit the Center for Integrated Nanotechnologies (CINT). During their visit, they were given an outstanding tour of the CINT facilities, engaged with world-class researchers, and explored the Integration Lab in depth. CINT offers open access to advanced instrumentation and specialized expertise to a global community of researchers from universities, national laboratories, and industry. Its research priorities span Microelectronics, Clean Energy, Quantum Information Science, Biosecurity, AI/Machine Learning, and Advanced/Sustainable Manufacturing. The CINT user community benefits from access to national research capabilities, including the CORE Facility in Albuquerque, NM, and the Gateway Facility in Los Alamos, NM. We extend our heartfelt thanks to the CINT team and researchers who took time out of their schedules to inspire and educate our students: Jeff Nelson, Sergei Ivanov, Dale Huber, John Watt, John Nogan, and Heather Brown. Their efforts made this visit an unforgettable experience. To learn more about CINT and its groundbreaking capabilities, visit the [Center for Integrated Nanotechnologies](https://cint.lanl.gov/).



## **Integrating Ethics and Policy: Dr. Jamey Wetmore's Impact on Nanotechnology Education**

Jameson Wetmore, Associate Director for Societal and Ethical Implications (SEI) at the National Science Foundation's National Nanotechnology Coordinated Infrastructure (NNCI) Coordinating Office, also serves as the NCI-SW Site Co-director and SEI Coordinator. Dr. Wetmore plays a crucial role in integrating the social studies of nanotechnology into the technical development of the field.

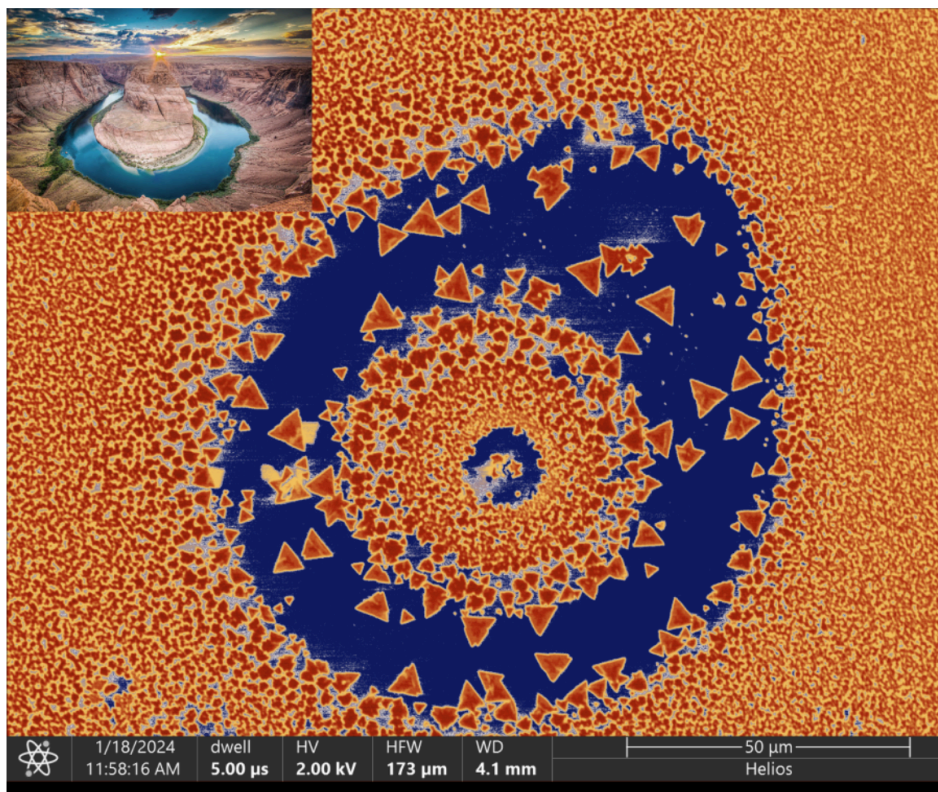
One of the initiatives Dr. Wetmore leads is the annual Science Outside the Lab (SOTL) program. With the growing impact of science, politics, and society on our daily lives, it is more essential than ever for scientists and engineers to understand how decisions affecting their work are made. SOTL takes participants to Washington, D.C., where \$150 billion of federal R&D funding and numerous policy decisions are made, to explore the intricate connections between science, policy, and societal outcomes.

During the week-long workshops, graduate students, postdocs, and faculty interact with key stakeholders who fund, regulate, shape, critique, and publicize science. This includes congressional staffers, funding agency officers, lobbyists, regulators, journalists, academics, and museum curators. Participants gain insights into how science policy is shaped and learn skills that provide a competitive edge when seeking jobs and funding. It is more essential than ever for scientists and engineers to understand how decisions affecting their work are made and how their work can be used by policymakers to make better decisions for all of us. NCI-SW and the NNCI Coordinating Office offer support by covering program fees, housing, most meals, local transportation, and round-trip travel to Washington, D.C., for many participants. [Applications for SOTL 2025 are now open!](#)

Additionally, Dr. Wetmore directs the annual Winter School on Emerging Technologies, supported by the NNCI and ASU's School for the Future of Innovation in Society. This program provides junior scholars and scientists with practical experience and theoretical knowledge to better understand the social dimensions of emerging technologies. The recent Winter School was held January 3-10, 2025, at Saguaro Lake Ranch in Mesa, AZ, with a focus on accelerating impactful scholarship. Participants engaged in interactive sessions exploring how research can positively impact society beyond its immediate context. [Learn more about the annual Winter School on Emerging Technologies.](#)

<https://cspo.org/program/science-outside-the-lab/>

<https://nnci.net/winter-school>



## Nanoscience Image Contest

In honor of National Nanotechnology Day on October 9th, the NNCI hosted its annual *Plenty of Beauty at the Bottom* image contest, inspired by Richard Feynman's 1959 lecture, "There's Plenty of Room at the Bottom." The contest celebrates the beauty of the micro and nanoscale, showcasing images produced at the 16 NNCI sites over the past two years. Categories included Most Stunning, Most Unique Capability, and Most Whimsical, with the public casting over 2,100 votes to select the winners. The first-place artists receive up to \$1,000 in travel support to a professional conference of their choice, and their sites will receive a framed print of the winning image, while honorable mentions will also receive a framed print.

This year, NCI-SW was pleased to submit for the competition a mesmerizing entry from the Eyring Materials Center at Arizona State University showcasing a scanning electron microscopy (SEM) image of MoS<sub>2</sub>, a 2D material grown on a sapphire substrate. Created by graduate student Md Ashiqur Rahman Laskar and Associate Professor Umberto Celano, the image resembles the iconic Horseshoe Bend, a natural wonder in Arizona.

Captured using the Helios 5UX SEM/FIB tool, the image highlights the continuity of the MoS<sub>2</sub> material while drawing a striking parallel between the beauty of nanotechnology and the grandeur of nature. An inset photograph of the real Horseshoe Bend completes the breathtaking comparison. Additionally, NNCI invites all to participate in the Nanoscience Community Image Contest, open to everyone with submissions due in Spring 2024. Learn more and access resources for preparing entries, including remote tool usage, on the [NCI-SW website](https://nci-sw.org).

<https://nci.net/plenty-beauty-bottom-2024>



## **PBS NewsHour Story on Shaping the Future of the Semiconductor Workforce**

Curious about how innovative partnerships are transforming the future of semiconductor manufacturing? PBS NewsHour recently highlighted the critical efforts to prepare students and professionals with the skills needed to support the rapid growth of this essential industry. NCI-SW partners, including Arizona State University (ASU) and Rio Salado College, are working together to develop workforce training programs specifically for semiconductor manufacturing. This collaboration addresses the rising demand for skilled professionals by offering specialized education and training. NCI-SW provides expertise in nanoelectronics and advanced manufacturing processes, while Rio Salado College offers accessible educational platforms. Together, they are creating pathways that equip participants with the knowledge and skills required to excel in semiconductor manufacturing, strengthening the local workforce and fostering industry growth.

Watch this compelling PBS NewsHour story to learn how NCI-SW and its partners are driving workforce development in this crucial field. Catch the full story, [How Arizona is Building the Workforce to Manufacture Semiconductors in the U.S.](https://www.youtube.com/watch?v=uR6xaHmqsDM)

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## **¡MIRA! at NAU Education and Workforce Development Expansion**

Congratulations to ¡MIRA! at NAU researcher and NCI-SW Co-PI, [Inès Montañó](#), NCI-SW collaborator and REU mentor NAU's Miguel Yacaman and their partners, Dirk Bouwmeester (UCSB) and Peter Rakich (Yale) on being awarded an [ExpandQISE-Track](#) \$5 Million dollar grant. This is a game changer for QIS at NAU and includes plans to expand programs such as SparCQS - Sparking Curiosity through Quantum Science- throughout the southwest and beyond. The project's education and workforce development efforts are organized according to a multi-tiered plan, providing training opportunities spanning from the Ph.D.-level researcher to K12 community engagement. Deliberate interconnections between the tiers are designed to increase recruitment and retention by allowing multiple entry points and supporting different career destinations. To learn more, visit [SparCQS](#).

<https://www.hpcwire.com/off-the-wire/nsf-invests-39m-in-quantum-research-to-expand-capacity-across-us-institutions/>

<https://mira.nau.edu/mira-sparcqs/>



## NNCI Annual Meeting

The [2024 NNCI Annual Meeting](https://nnci.net/nnci-annual-conference-2024) convened in Louisville, Kentucky, from October 28–30, bringing together researchers, educators, and innovators from across the country to advance the field of nanotechnology. Hosted by the KY Multi-Scale Manufacturing and Nanointegration Node (KY MMNIN), this year's event was a vibrant exchange of ideas and strategies, reaffirming NNCI's pivotal role in supporting groundbreaking research and fostering meaningful societal impacts. In addition to sessions dedicated to education, outreach, and innovation, the conference set the tone for dynamic discussions on the societal implications of nanotechnology.

NNCI leadership shared key updates and insights into the infrastructure's progress and priorities. Discussions centered on forging strategic partnerships with the Department of Energy Nanoscience Research Centers and aligning nanotechnology research with national priorities. Panels delved into critical topics such as strengthening ties with community colleges to build a robust talent pipeline, and bridging the gap between laboratory breakthroughs and commercial applications. In addition to engaging presentations and panels, the event provided valuable networking opportunities, allowing attendees to connect, collaborate, and envision the future of nanotechnology research and development. This year, NCI-SW Education Outreach Coordinator Jessica Hauer received one of several Staff Awards for her contribution to education and outreach. As NNCI continues to drive innovation and societal progress, this annual meeting highlighted the collective power of collaboration and the boundless potential of nanotechnology.

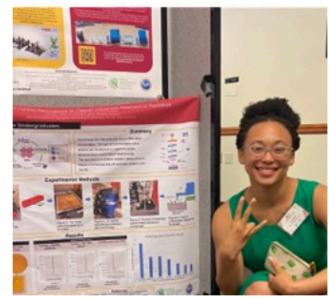
<https://nnci.net/nnci-annual-conference-2024>



## Arizona State University Tempe Campus Open Door Outreach Event

Unlock your curiosity and join the ASU community for dozens of interactive events, simulations, challenges, games and more at ASU Open Door. Join in the fun and visit NCI-SW at ASU's Tempe campus on Saturday, Feb. 22, 2025, 1–5 pm. [Learn more...](#)

<https://opendoor.asu.edu/>



## Summer 2025 Research Experience for Undergraduates (REU) Program Applications Now Open

The Nanotechnology Collaborative Infrastructure-Southwest (NCI-SW) at ASU and NAU offers an annual innovative summer research program for continuing undergraduate students who have not graduated by the end of the program. Participants will have the opportunity to work with nationally recognized scholars in nanotechnology research and science education at the southwest regional hub of the NNCI. Research may take place at Arizona State University or Northern Arizona University, depending on project availability. Applicants must live within driving distance of ASU in Tempe, AZ, or be prepared to stay in dorms at NAU in Flagstaff, AZ.

The NSF REU program allows students to explore areas such as solid-state physics and chemistry, materials science, quantum science, electronic devices and materials, or biology/biomedical engineering in state-of-the-art laboratories, while conducting research with leading nanotechnology scientists and developing connections between the lab, education, and industry. Participation Stipend is \$6,000 for 9 weeks of research, held this year between June 2 - August 1, 2025. Students that successfully complete the program are eligible to attend (at no cost) NNCI's REU Convocation at the University of California-San Diego. Applicants will be reviewed and accepted on a rolling basis, beginning February 1, 2025. The application process closes on March 31, 2025, 5:00 pm MT. For more details, visit [NCI-SW website](https://ncisouthwest.org/education/research-experiences/).

<https://ncisouthwest.org/education/research-experiences/>

### ASU NanoFab Cleanroom Virtual Tour

Looking for a way to introduce or explain a cleanroom space that is easy to navigate? Check out the ASU NanoFab Virtual Field Trip. The experience offers a unique visual of the ASU Tempe Campus Engineering Research Center flexible foundry that offers state-of-the-art device processing and characterization tools to individuals and companies. [Find the virtual tour here.](#)

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