



TECHNOLOGY
Partnerships
ANNUAL REPORT **FY2025**



Sandia
National
Laboratories



Sandia continues to demonstrate how strong partnerships and technology transfer can help move critical technologies from the lab to real-world applications. The laboratory's work with industry, universities, and other partners plays an important role in strengthening American innovation, competitiveness, and national security while helping ensure DOE research delivers meaningful impact for the nation.

ANTHONY PUGLIESE
Chief Commercialization Officer & Director
Office of Technology Commercialization
U.S. Department of Energy



Sandia possesses distinct and unique capabilities that, when synergistically combined with private sector expertise, are pivotal in achieving critical mission objectives. These partnerships are integral to effective technology transfer and commercialization, thereby advancing technological innovation and strengthening national security.

DAN SANCHEZ
Assistant Manager for Programs
National Nuclear Security Administration
Sandia Field Office



The pace of innovation today demands strong, trusted partnerships. At Sandia, technology transfer is a core element of how we deliver on mission and serve the nation through our technology advancements. By working closely with industry, universities and other labs, we connect our science and engineering with the tools and talent needed to solve today's toughest national security challenges. The stories in this report show what's possible when we do that well.

LAURA MCGILL
Laboratories Director
Sandia National Laboratories



Sandia National Laboratories, Albuquerque, New Mexico

Sandia National Laboratories, Livermore, California

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Industry partnerships are vital in helping us to fulfill our Sandia missions. These partnerships expose us to new problems that challenge our knowledge and expertise, while at the same time helping to ensure our nation's economic, energy, and national security. By working together on public-private challenges, we achieve increased speed and efficiency in delivering on our core mission requirements. Collaborating with companies whose technologies align with Sandia capabilities can also address mission gaps. In innovative areas like AI, where industry is taking the lead, partnerships with companies can help ensure that the AI tools being developed, in concert with Sandia developers, meet national security needs.

DOUG KOTHE

Associate Laboratories Director & Chief Research Officer
Advanced Science and Technology
Sandia National Laboratories



Federal investments in research must be converted into mission-ready solutions. This often involves commercialization. To aid in the process, we are aligning our partnership and technology transfer resources with investment opportunities as more VC firms are matching federal funding received by portfolio companies. While continuing to pursue commercialization through longstanding methods, new types of collaboration mechanisms allow for rapid access to industry technologies with greater flexibility and approval speed.

MARY MONSON

Senior Manager
Technology Partnerships & Business Development
Sandia National Laboratories

LDRD Program Essential to Mission Capabilities

Research conducted within the Laboratory Directed Research and Development program is essential to maintaining the vitality of Sandia's mission-critical science, technology, and engineering capabilities. The LDRD program has benefited Sandia's work in all of its national security mission areas, including nuclear security, homeland security, energy security, and global security.

The Labs and its strategic partners gain from collaborative research results. Many technological breakthroughs originating from or improved through the LDRD program are later transferred to industry, commercialized under licensing agreements, and brought to market for the U.S. public good.



Look for the LDRD logo in this report to discover which technologies grew out of the LDRD program.

To learn more about LDRD, visit www.sandia.gov/research/ldr

Partnering Within an Evolving Innovation Landscape

As we continue to build the value of technology transfer to our mission, we are engaging with two significant trends that are transforming the landscape of innovation in the United States. First, industry is continuing to increase its role in advancing basic science and technology. Second, a growing number of companies are adapting cutting-edge, commercially developed technologies, such as artificial intelligence, for applications in the defense and energy sectors.

As a diverse array of companies is ready to contribute to national security innovation, Sandia National Laboratories is pursuing innovative partnerships to meet mission needs. Sandia is also aligning its tech transfer resources with venture capital as funding for technology startups focused on national security has more than tripled since 2020.

Partnerships provide access to specialized expertise, enhance understanding of advanced technology, and reveal new efficiencies. Partnerships also enhance staff development and retention while driving economic growth by attracting new companies to New Mexico and California.

In this report's stories, you'll read about Sandia partnerships that are making a difference by:

- Supporting national defense by accelerating hypersonic manufacturing capacity while improving affordability.
- Improving the speed and lowering the cost of future high performance computers for stockpile stewardship missions
- Moving fusion power toward commercialization by combining Sandia's experience in pulsed-power with a company's work on inertial confinement fusion
- Commercializing a wearable patch radiation detector that can improve medical treatments and also be used for defense applications

Read the entire Sandia Partnerships Annual Report to learn about many more partnerships between Sandia and companies, other laboratories, and universities that are bringing benefits to our nation.



Astrotech



Above: Sandia Researcher Philip Miller, Technologist Haley Bennett, and Researcher Joshua Whiting showing a silicon wafer of miniature preconcentrator devices before a chemical collection film is spray coated onto them.

Inset: EN-SCAN Labrador Handheld GC for detection of volatile organic compounds and contaminants in air, soil, and water within minutes for real-time, on-site analysis.

“Sandia’s integrated MEMS infrastructure creates an ecosystem that is otherwise out of reach for most small businesses. By concentrating these capabilities in one place, Sandia removes major barriers to entry and enables small companies to innovate and compete on a global scale.”

PAT LEWIS
Product Integration Manager
Astrotech Corporation

Microfabrication Enables Chemical Detection on a Small Scale

Front-end sampling, or preconcentration, is an important analytical technique crucial to the success of many microanalytical detector systems. As chemical analyzers are becoming smaller and more portable for use in the field, components for these products are also becoming miniaturized.

Sandia National Laboratories has been doing work on microelectromechanical devices, including preconcentrators, for years. It uses this expertise and specialized facilities like MESA, the Microsystems and Engineering Sciences Applications facility, to build and test these MEMS devices. Originally created as part of Sandia’s chemical defense mission, now the micropreconcentrators are being licensed and used in industrial applications.

Federal regulations, including the recent HON rule or Hazardous Organic National Emission Standards for Hazardous Air Pollutants, are increasing demand for commercial gas chromatograph and mass spectrometry systems for use in detecting and monitoring chemical emissions at industrial facilities. With a long list of chemicals required to be monitored, instruments are needed to help companies run accurate analyses, with the ability to discern the chemicals of interest quickly.

Astrotech Corporation is an instrumentation company that creates, operates, and scales innovative businesses through its wholly owned subsidiaries. Its EN-SCAN subsidiary provides real-time data through portable instruments for on-site monitoring and analysis of soil, water and air.

The company licensed the latest version of the Sandia tortuous path preconcentrator technology to use in their new Labrador line of products. The preconcentrator’s design improvements made by Sandia scientists, including a narrower injection pulse which results in more chemicals being resolved in the gas chromatography column in less time, resulted in a new patent. Astrotech also licensed Sandia’s hybrid integration techniques, which allow microfabricated components made from different materials, such as stainless steel and silicon, to be united into one system.

EN-SCAN customers are anticipating the release of the new Labrador gas chromatography products incorporating the licensed Sandia technology. The Labrador product line, to be on the market in 2026, includes a larger stationary detector and smaller handheld version.



Partnership Type: License

Goal: To integrate Sandia’s micropreconcentrators into a mass spectrometer-based product line, enabling portable, high-resolution detection of regulated chemical emissions at industrial sites.

Castelion



Above: Castelion CFO Andrew Kreitz, Director of NAVAIR Rapid Capabilities Cell Paul McGinty, CEO Bryon Hargis, New Mexico Governor Michelle Lynn Lujan Grisham, Lt General Frank J. Lozano, Castelion COO Sean Pitt, Rio Rancho Mayor Gregory D. Hull, and New Mexico State Senator Jay Block participate in the groundbreaking ceremony in January 2026.

Inset: Castelion conducts a flight test at Point Mugu, California, in December 2025.

“We’re proud to partner with Sandia National Laboratories to accelerate the fielding of next-generation defense capabilities. By combining Sandia’s deep technical expertise and mission-driven rigor with Castelion’s speed, manufacturing focus, and commitment to affordability, we’re demonstrating a new model for delivering critical national security technologies at scale.”

ANDREW KREITZ
CFO & Co-founder
Castelion Corporation

Hypersonic Strike System Manufacturing Moves to Warp Speed

Castelion’s 1,000-acre hypersonic manufacturing campus, known as Project Ranger, is rapidly taking shape near Sandia National Laboratories in New Mexico. The site is a major step in Castelion’s commitment to expanding the nation’s capacity to produce hypersonic strike systems, aligning with broader U.S. efforts to scale up manufacturing. As adversaries have accelerated investments in maneuverable hypersonic weapons, capable of traveling above Mach 5 and difficult to detect or intercept, the need for expanded U.S. production has become increasingly urgent.

Domestic hypersonic manufacturing capacity remains limited and costly. Castelion, founded in 2022 by former SpaceX executives, is working to change that by applying rapid, affordable, and scalable production practices to hypersonic systems.

The company chose to build its new manufacturing campus in New Mexico due in part to its proximity to Sandia. With more than 40 years’ experience with hypersonics, Sandia has developed specialized tools, facilities and deep technical expertise to support this critical national security mission. Sandia invented elements of the hypersonic boost-glide systems now being developed for the U.S. military.

Castelion sets manufacturability and affordability constraints as one of the first steps when it embarks on a future system design. Through its partnership with Sandia, these designs can be quickly evaluated using the Labs’ specialized modeling and simulation tools, pairing Castelion’s iterative development

approach with Sandia’s unique technical insight and classified analysis capabilities. Leveraging Sandia-designed technologies, such as attitude control systems, can also help Castelion to accelerate development.

Project Ranger will support solid rocket motor manufacturing, static fire testing, and final assembly of hypersonic weapons, with the first building opening in the summer of 2026, and weapon manufacturing operations beginning by the end of the year. Once constructed, it will be the largest dedicated hypersonic production facility in the U.S., capable of producing thousands of Blackbeard missiles and future hypersonic systems annually. Blackbeard, Castelion’s first product, is engineered for mass production and rapid fielding, and has already secured contracts to integrate with U.S. Army and U.S. Navy platforms.

Castelion will be a major economic driver in New Mexico, planning to hire more than 300 people for high-paying manufacturing jobs, and investing more than \$250 million in private capital to stand up this new production facility. Sandia and Castelion will continue to partner, accelerating the development of future hypersonic systems that will be built in New Mexico, furthering the state’s long tradition of supporting the nation’s defense.

Partnership Type: Cooperative Research and Development Agreement

Goal: To rapidly manufacture hypersonic strike systems at scale and for a lower cost to support national defense.

GridFlow



Above: Sandia Materials Scientist Leo Small looks on as GridFlow Senior Lab Technician Rudy Parra works on a prototype flow battery inside a glovebox at GridFlow.

Inset: An early prototype of a flow battery at GridFlow's facility in the Sandia Science & Technology Park.

“Working with our colleagues at Sandia has been and will continue to be a critical factor in our success as we move toward commercialization.”

CHUCK CALL
CTO
GridFlow Inc.

Flow Battery is Affordable, Safe Way to Increase Grid Stability

There is no good source of affordable and safe long-duration energy storage for homes, microgrids, and grid-scale systems. One choice has been lithium-ion batteries. They have high energy density and performance, but also issues around safety and sensitivity to environmental conditions.

The other choice is lithium iron phosphate, or LFP batteries, which are a bit safer but have lower energy density. Neither choice is ideal for long duration storage of over four hours. Then there's the fact that some materials needed to manufacture these batteries come from foreign countries, raising supply chain concerns.

Sandia National Laboratories developed a lithium-sulfur flow battery with materials that can be sourced domestically as part of a project funded by the DOE Office of Electricity. The goal was to make a safer, more scalable battery that could be adapted for grid-scale energy storage.

By separating the anode and cathode, the lithium-sulfur flow battery provides safety, energy density, and scalability. It also uses very inexpensive raw materials.

Entrepreneur Chuck Call was looking for new battery technologies for his next business venture when he was introduced to the Sandia lithium-sulfur flow battery through the DOE Boost program. Call and Sandia Scientist Leo Small were able to collaborate on evaluating the market opportunity for this technology through Boost. Call then licensed the technology from Sandia.

The partners have continued collaboration on bringing the technology to market through the TRGR Technology Readiness Initiative and New Mexico Small Business Assistance Program.

GridFlow, Call's startup company, now has six employees, received funding for a research and demonstration project from Northern New Mexico College, and scaled up the technology to create a demonstration unit.

Grid stability is a national goal and ties to Sandia's energy security mission. This technology can be used for distributed energy storage at any level, from residential to grid scale, enhancing grid stability. Plug-in solar is a new trend which currently uses LFP batteries. GridFlow is working on a lithium-sulfur battery that would allow plug-in solar users to upgrade their system with an affordable way to have 40 hours of energy storage vs. four. This could be the company's entry point into the market, as they work on scaling up to larger grid-scale batteries.

Partnership Type: License

Goal: To bring a new type of battery to market that could increase grid stability and energy security while overcoming safety and supply chain issues plaguing current technology.

Michael Thomas Coffee



Above: Sandia Researcher Kenneth Armijo with Michael Thomas Coffee Owners Michael and Kate Sweeney operating a modified industrial coffee roaster connected to Sandia's Radial Packed Bed Thermal Energy Storage system.

Inset: Coffee beans from various regions of the world roasted using the Sandia-developed solar TES drying and roasting system at the Sandia NSTTF Solar Tower Facility.

“Partnering with Sandia provides our coffee business with the ability to think bigger. This project let us try out roasting coffee with solar energy, which fits in with our company goals, and the results exceeded our expectations.”

MICHAEL SWEENEY
Owner
Michael Thomas Coffee Co. LLC

Rock Battery Brings the Heat to Roast Delicious Coffee

Many industrial processes require heat as an input. These processes include pasteurization, drying, roasting, and textile manufacturing. They often use natural gas, but other energy sources are being explored as more efficient and lower cost alternatives.

One of the challenges with solar or other renewable energy sources is energy storage. A novel “rock battery” is being tested as a method for long-duration energy storage for commercial food and beverage processes requiring heat, including coffee roasting. The rock battery can store energy for 6-8 hours, longer than lithium-ion batteries. It can also hit high temperatures at a low cost per kilowatt hour.

Sandia National Laboratories created a radial packed bed system that uses common landscaping gravel as the storage medium. Located at the National Solar Thermal Test Facility, it was invented as part of the Labs’ energy resiliency mission. A TRGR Technology Readiness Initiative partnership with Michael Thomas Coffee, a New Mexico commercial coffee roaster, was formed to test the system on a real-world commercial process requiring high heat.

Michael Thomas Coffee has a very detailed roasting process to coax the best flavor from coffee beans, tailored for each variety. The company brought its coffee expertise to complement the Labs’ testing of its thermal heat transfer and energy storage technology. The original idea was to design

a novel volumetric, indirect-solar heated drum roaster. But once Sandia scientists looked at the coffee roaster currently being used, they realized they could easily adapt it for this stored thermal energy source.

The coffee validation tests exceeded expectations, with beans roasted quickly and efficiently. With gas roasting, the heat is focused on one location within the rotating metal drum. With the new method, hot air is consistently circulated around the drum, providing a higher-quality heat that envelops the beans, evenly and gently. In later blind taste testing by over 100 people, the coffee roasted with the hot air method was much more preferred. These results were consistent with earlier tests where chile peppers were roasted and tasted—the new solar method won out.

The partners are continuing to improve this industrial process, moving it closer toward commercialization. Potentially, coffee and cacao roasting machine manufacturers could sell kits to adapt existing roasters so they can accept the stored heat as an energy source. They could also build new roasters designed for this type of stored heat battery, which could be connected to solar or other energy sources.

Partnership Type: Cooperative Research and Development Agreement

Goal: To use stored solar heat to create exceptional flavor in coffee and other food and beverage products.

Pacific Fusion



Above: The Sandia and Pacific Fusion teams convened in front of Sandia's Z Pulsed Power Facility, where they are conducting a series of tests.

Inset: The Z machine, located in Albuquerque, New Mexico, has been part of Sandia's Pulsed Power Program since the 1960s.

“After having the opportunity to collaborate with Sandia and test our concepts at the Z Facility, we now have the confidence to design inexpensive targets to enable us to reach high-gain fusion and carve a path toward economically viable fusion power.”

KEITH LeCHIEN
Chief Technology Officer
Pacific Fusion

Unlocking the Potential of Affordable Commercial Fusion Power

Fusion, the same process that powers the sun, holds promise as an abundant energy source. There are a number of technical challenges to be overcome on the way to commercialization, so research is continuing across government, academia, and industry.

A significant barrier to deploying inertial confinement fusion, or ICF, for commercial fusion energy production has been that the target and any surrounding material are vaporized on each shot and need to be replaced about every 10 seconds. Rapidly replacing targets and associated components between experiments is a recognized engineering and cost challenge, motivating research into simpler designs.

A CRADA between Sandia National Laboratories and Pacific Fusion, a company founded in 2023 to deliver affordable fusion energy, enabled a series of tests at Sandia's Z Pulsed Power Facility. Sandia's Z facility has supported decades of pulsed-power science and fusion-related experiments. The company's work draws on established research in inertial fusion and pulsed power. This collaboration between Sandia and Pacific Fusion strengthens the scientific foundation Sandia applies to its national security mission.

ICF uses fast pulses of energy to implode small targets containing fusion fuel, causing them to release massive amounts of energy on each shot. The experiments measured how magnetic fields diffused through a simplified target design made of just plastic wrapped in aluminum. The targets were designed to facilitate the fuel

becoming magnetized without large, expensive magnetic field coils that are typically used in Sandia's fusion experiments. The magnetization of the fuel is critical as it helps trap heat in the fusion fuel, allowing it to more easily ignite.

During four tests at the Z machine, researchers delivered a 22-million-amp pulse in just 120 nanoseconds—roughly a million times faster than the blink of an eye. Magnetic sensors embedded in the targets measured how the magnetic field moved through the material, confirming that the magnetic diffusion design works as intended.

The work directly informs the design of Pacific Fusion's planned Demonstration System, which will be built in New Mexico and is aimed at achieving net facility gain—producing more fusion energy in a single experiment than all of the wall-plug energy used to conduct the experiment—by 2030. This milestone is considered essential for unlocking commercial fusion power in the United States. Pacific Fusion selected Albuquerque as the site for its first Research and Manufacturing Campus in 2025, a major step toward building a commercial fusion system.

Partnership Type: Cooperative Research and Development Agreement

Goal: To move toward affordable commercial fusion power in the U.S.

WearableDose



Above: Sandia Researcher Isaac Aviña uses a laser etching printer at Sandia's California site to create a disposable dosimeter patch.

Inset: The dosimeter patch technology is a flexible, wearable, disposable way to protect cancer patients, health providers, first responders and warfighters from toxic radiation exposure.

“Partnering with Sandia National Laboratories accelerates innovation from breakthrough science to real-world impact — combining world-class national lab expertise with entrepreneurial execution to deliver trusted, mission-ready technology.”

JOHN SANWO
CEO & Founder
WearableDose Inc.

Radiation Sensor Takes on New Mission: Improving Cancer Treatment

Cancer patients receiving proton radiation treatment risk having healthy tissue damaged if the radiation is not aimed precisely on their tumor. No matter how hard people try, it's almost impossible to stay perfectly still during treatment—this is especially true for children. Until now, trying to prevent radiation damage has meant limiting the radiation dose and performing pre- and post-treatment CT scans. For young patients, trying to prevent damage can also include physical restraints and sedation.

A neutron/proton radiation sensor was developed at Sandia National Laboratories for the detection of special nuclear material as part of the Labs' national defense mission. The scientists who invented the technology, Patrick Doty and Isaac Aviña, realized the polymer detector might also be able to improve radiation treatments for cancer patients.

The two scientists decided to take part in the DOE's Energy I-Corps program to research the technology's potential for medical applications. After speaking with numerous oncologists and discovering that there was a real need, they developed the Electronic Polymer Dosimeter for Radiotherapy, a disposable, adhesive patch that can be applied directly to the patient's skin to measure radiation intensity and spatial distribution in real time.

Startup WearableDose negotiated an exclusive license with Sandia for the EPDR technology. The company continues to work with Sandia through a CRADA to keep making improvements. Sandia scientists have

developed more than 100 design iterations of the radiation detector on its way to use on patients.

Now clinical trials are underway through partnerships WearableDose has developed with renowned children's hospitals. They are testing if the patch can turn off radiation to patients if the beam is hitting healthy tissue. They're also using real-time data collected by the patch to get the beam back on target if the patient has moved. In addition, the patch is being evaluated for measuring accumulated radiation exposure for medical professionals and patients. These trials are an important milestone on the path toward FDA approval.

In 2025, WearableDose was selected from over 2000 global entries to win the MedTech Innovation of the Year award for its “wearable, adhesive electronic patch that accurately detects, directs, and measures radiation delivered to tumours—enhancing safety, efficacy, and patient outcomes.” The company also raised more than \$1 million, made Pepperdine University Graziadio Business School's list of Most Fundable Companies, and is looking at other markets for the EPDR technology beyond cancer treatment, including defense applications.

Partnership Type: License and Cooperative Research and Development Agreement

Goal: To commercialize a wearable patch radiation detector that can be used to improve cancer treatment, as well as for other medical and defense applications.

Tri-Labs and Cerebras Systems



Above: The program leads, team leads, and team members from Sandia, Los Alamos, and Lawrence Livermore national laboratories convened at Sandia's Computer Science Research Institute with personnel from Cerebras for a workshop where they collaborated in person.

Inset: A worker at Cerebras Systems holds the world's largest computer wafer, to be used as part of the collaboration between Cerebras and three national laboratories.

“Most systems hide the distance between compute and data. We eliminated it. The results with the Tri-Labs are showing what becomes scientifically possible when you stop apologizing for physics and start designing with it.”

MICHAEL JAMES
Co-founder & Chief Architect
of Advanced Technologies
Cerebras Systems

World's Largest Chip Accelerates High Performance Computing

In high performance computing, computational capabilities have drastically outpaced improvements in memory. This means that although there is the ability to perform computations more quickly, retrieving the data needed has become a bottleneck, restricting performance.

The Advanced Memory Technology program at Sandia National Laboratories collaborates with industry partners to drastically improve memory technologies. These collaborations, by extension, improve the ability to accelerate the performance of Advanced Simulation and Computing program mission applications. Sandia partners with multiple commercial technology providers, each with unique hardware products, to help achieve the goals of the AMT program. Working closely with commercial partners helps companies create technology Sandia and other national laboratories need for stockpile stewardship and other programs.

An AMT collaboration between the Tri-Labs—Sandia, Los Alamos, and Lawrence Livermore national laboratories—and Cerebras Systems is now in Phase 3. Each of the Tri-Labs has expertise in high performance computing, advanced architecture, molecular dynamics, and fluid dynamics as part of their stockpile stewardship missions. Cerebras' flagship technology, the Wafer Scale Engine 3, is the world's largest and fastest AI processor, 56 times larger than the largest GPU.

WSE-3 rethinks the memory bottleneck. Where conventional processors chop silicon wafers into

individual chips that must then communicate across high-latency interconnects, WSE-3 keeps the wafer intact, housing 900,000 processors on a single substrate with memory physically adjacent to every core. This eliminates the distance between computation and data, matching memory bandwidth to computational bandwidth. Sandia, and the Tri-Labs, partnered with Cerebras to explore the potential of leveraging this innovative technology for modeling and simulation, a foundational capability of the ASC program.

Led by Sandia, the Tri-Labs partnership has already achieved significant results in earlier phases of the AMT computing initiative collaboration. The original goal was to reach 40 times higher performance than the world's leading exascale supercomputer and cut costs for future computer architectures. The team demonstrated 750 times better performance on molecular dynamics calculations in 2024 using a single Cerebras wafer and was named a finalist for the Gordon Bell Prize.

The Tri-Labs/Cerebras team is now working to achieve similar results for computer performance on a wide range of applications including complex modeling and simulations using a cluster of wafer scale engines. Across these domains, from molecular dynamics to fluid mechanics, the same architectural principle applies: when data never travels far from compute, high-performance simulation science breaks free from the constraints of weak scaling and finally can operate in the strong-scaling regime.

Partnership Type: Funded through the NNSA Advanced Simulation and Computing program

Goal: To push the boundaries of performance for the ASC mission by leveraging Cerebras' disruptive wafer scale technology.

Texas A&M University

Sandia concentrates on four primary areas of research with Texas A&M: Cybersecurity & Intelligence, Energy Security, Nuclear Deterrence, and Applied Information Sciences (including AI). Over the last year, we've focused on building institutional partnerships with the Texas A&M Semiconductor Institute and collaborative research in rad-hard microelectronics. Emerging areas of strategic collaboration include High Explosives & Energetics and Advanced Manufacturing.

Above: Graduate Student Theresa McEnroe places fresh cement paste on a rotational rheometer with a parallel plate configuration. The rheometer measures the paste's resistance to shear flow.

Inset: A digital holographic microscope used to measure very rapid changes in the three-dimensional surface topography of a sample.

“Sandia has world-class resources and materials expertise that perfectly complemented our research capabilities and increased the breadth and rigor of what we achieved through our partnership. Collaborating with Jessica’s team was especially enriching for my students because it gave them a heightened sense of the national importance of work they are doing.”

JEFFREY BULLARD
Professor
Department of Materials Science and Engineering
Texas A&M University

Mixing Up New Cement Formulations That Are Strong and Sustainable

Concrete is the world’s most abundant manmade material. Between 25 billion and 30 billion metric tons of concrete are poured worldwide annually. It’s used to build and renew bridges, dams, roads, piers, and other civil infrastructure. Because it is so essential, the U.S. must ensure a robust domestic supply of cement. But in 2024, the U.S. imported 22% of the cement it consumed.

Research is under way to discover concrete mixes with the needed strength and other engineering properties while diversifying the materials used to make it. Finding domestically available components would increase U.S. security and ties to Sandia National Laboratories’ national security mission. Zeolites, crystalline aluminosilicates that can be mined domestically or created synthetically, are a family of materials being tested as a partial replacement for the portland cement that binds concrete together.

With its Concrete Innovation Lab, Texas A&M University is a leader in cement research. The university is also a member of Sandia’s University Partnerships Network. The SUPN promotes collaborative research and helps attract top talent to Sandia as employees to work on problems of national and international significance. In one joint project, Texas A&M teamed with the Labs to work on ways to improve cement performance by evaluating different additives.



Partnership Type: Sandia University Partnerships Network

Goal: To create advanced and sustainable cement formulations using non-traditional, sustainable, and domestically sourced components.

Sandia Researcher Jessica Rimsza and her team did testing on the impact of synthetic zeolite content on cement properties utilizing the Labs’ highly refined characterization capabilities. Texas A&M Materials Science Professor Jeff Bullard and Doctoral Student Theresa McEnroe evaluated the impact of mined zeolites on cement properties, including the presence of impurities that can complicate its implementation. The university researchers, along with Postdoc Sk S. Hossain, then used the joint research, which identified the high reactivity of some zeolites in cement, to create a new type of geopolymer material, which could potentially replace cement. A joint provisional patent application has been filed.

Collaborative research between Sandia and Texas A&M can help create cement formulations that meet modern construction needs while supporting the development of more advanced and sustainable construction technologies. The team’s findings were published in an article in the journal Construction and Building Materials.

Work on development of additives to enable concrete formation with non-traditional aggregates is ongoing at Sandia, along with evaluation of concrete degradation mechanisms through a partnership with the U.S. Army Corps of Engineers following the recent signing of a memorandum of understanding.

The University of Texas at Austin

Sandia engages broadly across all research areas with UT Austin. Our key strategic focus areas for partnership development are currently: Quantum, Advanced Manufacturing (including critical minerals), AI for National Security, and Microelectronics. We strive to make researcher-to-researcher connections and connect with top UT Austin student talent.



Above: Sandia Postdoctoral Researcher Meghan Kiker and Polymer Scientist Erica Redline with a proprietary molecule they developed.

Inset: A rotary evaporator that is used to remove solvents from samples.

“The partnership with Sandia was highly impactful. It provided our group with a valuable perspective on nationally relevant scientific challenges while allowing us to pair our expertise in polymer chemistry with Sandia’s unique characterization capabilities.”

ZACHARIAH PAGE
Associate Professor
Department of Chemistry
College of Natural Science
The University of Texas at Austin

New Molecule Improves Plastic Properties for Longer Lasting Products

Materials generally expand when they get hot and contract when they get cold. This property, called the coefficient of thermal expansion, or CTE, can make the difference in whether a product has a long life or fails prematurely. When multiple types of materials are bonded together, in your cell phone, for example, and are subjected to temperature changes, the CTE mismatch can cause products to crack or fail prematurely.

Polymers, which include plastics, can have extreme changes with temperature. Since polymers are used for many applications, in electronics, automotive components, aerospace, defense systems, renewable energy, and more, solving this issue is very important. Currently, fillers like ceramic or glass can be added to the polymer so it won't expand or contract as much. However, these fillers can make the polymer heavier and more difficult to process.

Sandia National Laboratories Scientist Erica Redline and her team decided to tackle this problem. They determined that if they could adapt the chemistry of a polymer to change its CTE, it would be more stable against temperature change. So the team created a low CTE molecule that can easily be chemically incorporated into a polymer to control its properties.

UT Austin is a member of Sandia's University Partnerships Network. SUPN promotes collaborative research and helps attract top talent to Sandia as employees to work on problems of national and international significance. Meghan Kiker was a graduate student working in Zachariah Page's materials chemistry group at UT Austin, which has the special expertise needed to characterize polymers. Kiker helped make a different variation of the CTE molecule Redline had created at Sandia. Through the SUPN partnership, Kiker also had the opportunity to be a summer intern at the Labs.

Tetramer Technologies is an advanced materials company that supplies proprietary custom materials. Tetramer provided suggestions that helped make the new molecule easier to synthesize and more commercially viable, while also scaling up production.

These partnerships with academia and industry contributed to the success of the low CTE molecule which won an R&D 100 Award in 2025. A joint patent with UT Austin is pending, in addition to several other Sandia patents for IP related to this technological innovation. Kiker is now a postdoctoral researcher working full-time at Sandia and the low CTE polymers might be used soon for electronic coatings or solar panel backsheets.



Partnership Type: Sandia University Partnerships Network

Goal: To develop a new, low CTE molecule to improve polymers so that products containing multiple material types will not fail prematurely due to CTE mismatch.

Fuel Injection Technology Invented at CRF Moves Toward Production

Located in Livermore, California, the Combustion Research Facility at Sandia National Laboratories has served as a national and international leader in combustion science and technology for more than 40 years. It was established as the first DOE user facility in the 1970s and designated a DOE collaborative research facility in 2008.

The CRF is a center of scientific discovery and an important component of national economic competitiveness and Sandia's national energy security mission. With a focus on difficult real-world challenges and a mandate to share results openly, the CRF continues to be instrumental in helping the transportation sector develop and deploy innovative, efficient, and affordable solutions that meet customer requirements.

Ducted Fuel Injection is a patented technology invented at the CRF that slashes emissions of soot and nitrogen oxides (NOx) from diesel engines. A three-year collaborative project funded by the DOE Technology Commercialization Fund and industry that concluded in FY2025 helped advance

the technology a step closer to successful deployment into production applications.

The CRF partnered with a DFI consortium comprising John Deere, Clean Fuels Alliance America, Coordinating Research Council, and Cummins. Additional organizations participated through CRC. The DFI technology was installed on a production six-cylinder, 9-liter John Deere engine for testing.

The project successfully demonstrated the viability of DFI in the multi-cylinder heavy-duty engine, marking a significant advance from laboratory experiments to validation on near-production hardware with domestically sourced alternative fuels. In addition to the multi-cylinder engine testing, optical-engine research was conducted to explore a new strategy facilitated by DFI that can yield zero engine-out soot and >50% NOx reductions at higher efficiency. Results of the project have been shared with industry through presentations and publications. The partners are looking forward to starting a follow-on two-year government/industry collaborative project in 2026 focused on successfully transitioning these technologies to production vehicles and machines.



Dan Nehmer and Ryan Ogren of John Deere and Craig Allen of Denso inspect a multi-cylinder engine head equipped with DFI.

To learn more about the Combustion Research Facility, visit <https://crf.sandia.gov>

Large Centrifuge Makes Sure Rover is Ready for Moon Mission

The Large Centrifuge, or Superfuge, at Sandia National Laboratories is a facility like none other in the world. A 29-foot underground centrifuge, it is used to create realistic flight simulation environments, including g-forces.

Beyond launch, re-entry, and flight inertial loads that can be simulated, the Superfuge can also combine controlled vibration, spin, thermal, shock, and other environments encountered in flight. It has a 1.6 million g-pound capacity, meaning a payload of up to 16,000 lb. can be tested at up to 100 g; 5300 lb. loads can be tested up to 300 g. Payloads for the Superfuge include satellite components, re-entry vehicles, rocket components, weapons systems, and more—all of which are tested as part of Sandia's national security mission.

So when NASA needed to test its VIPER rover, designed to map water on the moon, they chose the Superfuge. They knew that certifying the large, 1,000 pound rover, with its solar panels and other sensitive equipment would require a very specialized facility.

NASA's team spent three weeks testing the rover at Sandia's centrifuge facility to make sure it was built to survive the mission. The Sandia Superfuge team spent months preparing before that. Their job goes far beyond running the centrifuge. They engineer each test, determine

how to load the article, and connect all the required instrumentation. They also have to troubleshoot when things don't go as planned. On the VIPER rover, there were 48 different points of data to be collected and analyzed.

The Sandia team is eager to see the VIPER rover head to the moon, but will have to wait until late 2027. NASA has selected Blue Origin of Kent, Washington, to deliver the rover to the moon's South Pole using a Blue Moon MK1 lander.

The Sandia team discusses testing of VIPER at the Superfuge and works on sensors prior to the test.



To learn more about the Sandia Centrifuge Complex and Superfuge, visit www.sandia.gov/vqsec/facilities/centrifuge

Inventors Join Company to Transfer Smart Tag Technology

Christian Arrington and Jamin Pillars developed a chip-scale magnetic smart tagging and sensing platform at Sandia National Laboratories in order to track nuclear materials. Since these materials are often stored in heavy metal containers, radio frequency tags don't work.

The patented MagTag technology was made available for licensing and noticed by students at the University of New Mexico who presented it at a business competition. In attendance was VastVision CEO Kyle Guin, who was intrigued. He realized that the new technology could fill a niche in his company's product offerings of GPS and RF tracking products.

After meeting, Guin, Pillars, and Arrington jumped on the opportunity to take part in the DOE Energy I-Corps program, where they researched market applications for the Sandia technology. This led to VastVision licensing the technology and a TRGR Technology Readiness Initiative Project where the partners worked together to move the technology closer to market readiness.

Arrington and Pillars then learned about Sandia's Entrepreneurial Separation to Transfer Technology program. ESTT supports Sandia's technology transfer mission and allows employees to leave the Labs to start up or expand technology companies, with guaranteed reinstatement for up to two years. Taking part in the program would help them join VastVision to work on research and product development full time.

The "insurance policy" of ESTT gave long-time Sandia employees Arrington and Pillars more confidence about making the move to industry. They were excited to help transition their technology out of the Labs into the marketplace for public benefit. Now, as they interact with potential customers, new applications for their sensors are being investigated in health monitoring, environmental sensing, and tracking of various products, as well as applications related to national security and high radiation environments, which was the original intent for the technology.



VastVision Director of Electroplating and Magnetic Materials Research Jamin Pillars and Head of Microfabrication Christian Arrington stand together in their company's new research lab in Albuquerque, New Mexico.

300x Faster Engineering Simulations Possible with New Software

Engineers at startup company Aperi Computational Mechanics Consulting had an idea for creating engineering simulation software that could work on a graphics processing unit, or GPU, instead of a central processing unit, or CPU. This method would be much faster than current methods, would cost half as much, and give the company a major advantage.

Shortly after starting her new company, Aperi CMC CEO Megan Ford learned about the New Mexico Small Business Assistance Program, which partners local businesses with the expertise and capabilities of the state's national laboratories. NMSBA supports Sandia's technology transfer mission.

After successfully applying to NMSBA, Aperi CMC engineers were able to work with Alan Williams of Sandia National Laboratories and tap into Sandia's expertise with the Labs-developed software, Trilinos and its Toolkit Libraries which help Aperi CMC's simulation code run on a GPU.

While speeds 150 times faster than current methods were expected, preliminary testing has already shown speeds exceeding 300 times faster. With the compelling proof of concept from the NMSBA project, Aperi CMC was able to win three Small Business Innovation Research grants totaling \$575,000, which included funding for more assistance from Sandia. The grants also let the company hire another engineer.

Now Aperi CMC has applied for Phase II SBIR funding of \$1.5 million. It is also taking part in the TRGR Technology Readiness Initiative and a second NMSBA project which will allow further collaboration with Sandia and help move the company's software to market much sooner than expected.

Aperi CMC is also discussing terms with angel investors outside of New Mexico and plans to hire six additional people this year. Based on these results, the project received NMSBA's Honorable Speaker Ben Luján Award for Small Business Excellence for demonstrating the most economic impact.



Aperi CMC CEO Megan Ford presents a new capability in Aperi software that uses high-resolution 3D scan data to predict the long-term stability of nuclear waste storage tunnels.

To learn more about NMSBA, visit
www.NMSBAprogram.org

It's Time to Learn About Quantum with QSA Educational Offerings

The Quantum Systems Accelerator expanded its educational offerings in 2025, with QCaMP introducing quantum training to high schools in more states, and the inception of QuanTime NM, which is providing engaging quantum activities to K-12 classrooms. This growth is further bolstered by the development of the Quantum Learning Lab, a first-of-its-kind technician training program at Central New Mexico Community College.

Co-led by Sandia National Laboratories and Lawrence Berkeley National Laboratory, QSA is a leader in quantum information science and workforce development, delivering scientific impact in quantum computing and sensing for the Department of Energy through a number of programs and initiatives. QSA's mission aligns closely with Sandia's missions in national security and economic development.

In 2025, QCaMP was held at 14 physical locations in 8 different states, attracting 133 attendees. The successful program has had incredible growth since its inception in 2022. As teachers implement QCaMP curriculum

in their classrooms, an estimated 3,300 high school students were expected to be reached from the 2025 program alone, breaking down barriers to quantum and helping to build a domestic quantum workforce. Further growth is planned for 2026.

QuanTime NM was a new program launched in January 2025 with six virtual professional development sessions for teachers. Educators from across New Mexico learned lessons that they could subsequently teach in their classes. A community event held at Explora in Albuquerque on February 8 drew over 500 attendees. Sandia scientists and volunteer teachers who had attended the online sessions presented hands-on quantum demonstrations and activities throughout the museum.

QuanTime NM will continue in 2026 with professional development sessions and another event at Explora for young students and their families. The program is part of the national K-12 QuanTime partnership designed to create bite-sized quantum lessons, planned by teachers, for teachers.



Attendees at the Explora kickoff event learning about quantum sensing using nitrogen-vacancy center diamond from Sandian Andy Mounce.

To learn more about QSA, visit
www.quantumsystemsaccelerator.org

Park Experiences a Year of Growth as Companies and Facilities Move In

The Sandia Science & Technology Park fosters high-wage private-sector job creation through economic partnerships among companies in the SS&TP, Sandia National Laboratories, the Air Force Research Laboratory, and the U.S. Space Force. Its location adjacent to Sandia and Kirtland Air Force Base gives companies proximity and helps further the Labs' technology transfer mission. New companies moved in, an energy storage facility began construction, and a building was renovated for a Sandia rapid prototyping hub.

Advanced Inspection Services provides contract dimensional measurement services for the medical, aerospace, defense, automotive and agricultural industries. AIS is headquartered in Plymouth, Minnesota.

Critical Materials, a New Mexico-based company, is developing technology, licensed from Sandia, that uses food-grade ingredients, including citric acid, to extract critical minerals from mine tailings.

Genuen addresses complex development and testing challenges across various industries, including aerospace, automotive, transportation, medical, and national security. Genuen is headquartered in Lenexa, Kansas.

I-Pulse Albuquerque has developed proprietary technologies using high-voltage, pulsed electrical power for industrial, mining, and geothermal applications. I-Pulse also has offices and facilities in the U.S., U.K., France, and Japan.

Zenthos Energy, based in Albuquerque, is developing and scaling rechargeable aluminum battery technology for battery energy storage systems. Like the other companies, they opened their office in the SS&TP due to its convenient location for continuing collaborations with Sandia and for building new partnerships.

Construction commenced on PNM's Sandia Energy Battery Storage System, located on 5.3-acres the company owns. The 60 megawatt, 4-hour resource is interconnected with the Sandia Substation and will address energy needs for southeast Albuquerque, including Sandia and the SS&TP.

Sandia leased a building in the Park for the new Center for Advanced Manufacturing and Innovation, also known as CAMINO. This space will bring together several advanced manufacturing capabilities under one roof, supporting expedited design and prototyping of components essential to the nuclear security enterprise mission.



PNM's Sandia Energy Battery Storage System under construction.

To learn more about the SS&TP, visit
www.sstp.org

Dry Mist System Moves Fast to Clean Up Real-World Contaminants

NeoSan Systems, in conjunction with NeoSan Labs, engineers automated decontamination systems for indoor environments. The company's patented Total Reset Technology® combines advanced dry mist systems with the nontoxic decontamination formula NeoSan Labs licenses from Sandia National Laboratories. The automated system atomizes the formula and decontaminates and disinfects a room or entire building in 15 minutes. It is effective for both biological and chemical agents. No wiping or rinsing is required, and the formula is so safe, people can return to the area immediately.

Through the TRGR Technology Readiness Initiative, the company was able to receive assistance with analyzing its dry mist system's nozzles to see how they would perform in a large volume space. Sandia Researcher Andres Sanchez also tested how well the system would neutralize a surrogate fentanyl deposited on materials found inside New Mexico Rail Runner Express commuter train cars.

TRGR is a program focused on technology maturation for New Mexico companies that

have licensed technology from either Sandia or Los Alamos National Laboratory, or are engaged in a Cooperative Research and Development Agreement with one of the labs. TRGR supports Sandia's technology transfer mission.

The successful demonstration using a prototype system under normal operating parameters validated NeoSan Systems' Total Reset Technology and helped move the TRL from 5 to 7. It also expanded Sandia's aerosol science protocols to address mitigations against pharmaceutical-based agents.

The resulting data were used by NeoSan Systems to close a deal with Herzog, the company that provides operations and maintenance services for the Rail Runner Express. This was an important transition from R&D to real-world commercial applications for NeoSan Systems' Total Reset product line. NeoSan Systems is also getting ready to deliver a system to a customer in the property restoration business. Total Reset systems are available for commercial, residential, and healthcare settings.



NeoSan Technician Matt Alldredge, Intern Software Engineer Diego Ornelas, and CEO Wayne Berry at the company's facility.

Soft Magnetic Material Reduces Pressure on Electric Power Demands

Boost is a partnership between the DOE Office of Technology Commercialization, industry partner FedTech, and Sandia National Laboratories that is working to commercialize promising lab-created energy technologies. Teams are formed to assess markets and then develop a commercialization strategy and product roadmap. The two-phase Boost program, which ties to Sandia's technology transfer mission, culminates in a pitch showcase.

One of the companies developed as a result of Boost is PeraWatt Energy. PeraWatt is working to commercialize a new class of soft magnetics, an R&D 100 Award-winning technology co-developed by Sandia Researcher Todd Monson with the University of California, Irvine.

As power demands increase for everything from heating and air conditioning to manufacturing and data centers, the electric grid infrastructure is under pressure. Even a 1% increase in power conversion efficiency in one data center can help stabilize the grid and lead to millions of dollars in savings. However, much of the innovation in this space has centered on semiconductor technologies, while the soft magnetic materials that operate alongside them have seen little change in decades. These legacy materials are now becoming a bottleneck to further efficiency improvements.



PeraWatt Co-founders Edson Perez and Lucy Wu at their California facility, where they fabricate and test next-generation magnetic materials.

Sandia's advanced iron-nitride soft magnetic material overcomes that bottleneck with higher-efficiency performance at modern switching frequencies, minimizing waste heat, lowering cooling costs, and supporting more compact designs. Also, unlike currently used magnetics, the new technology uses abundant, non-critical materials that are available domestically.

PeraWatt is continuing to collaborate with Sandia on research funded by a National Science Foundation Small Business Technology Transfer grant which has led to the filing of a new patent application with the two partners as co-inventors. The company is also having in-depth conversations with customers so they can begin piloting their systems in 2026. PeraWatt's long-term vision is to unlock the potential of modern energy systems and AI.



To learn more about TRGR, visit www.NMTRGR.org

To learn more about Boost, visit www.boostplatform.org

Selective Membranes Help Move Zinc Batteries Toward the Marketplace

Funded by the DOE Office of Technology Commercialization, Energy I-Corps helps bring lab ideas to the market, aligning with Sandia National Laboratories' technology transfer mission. This year, Sandia took part in Energy I-Corps Topic 3, a program that offers follow-on funding for the most promising Topic 2 graduates, helping them continue their path toward commercialization.

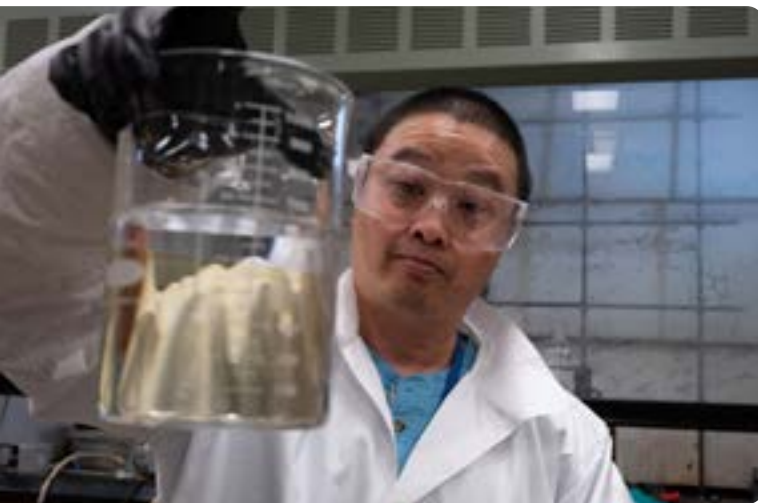
Ion-selective membranes, invented by Sandia Scientist Cy Fujimoto, were originally patented for proton and anion exchange applications in fuel cells and flow batteries. With the Topic 3 award, Fujimoto was able to proceed with testing the membranes for use in zinc batteries for large-scale energy storage.

Zinc is inexpensive at only \$1.30 per pound compared to \$95 per pound for lithium. It is also commonly mined in the U.S., making it readily available. Despite zinc's advantages, the membranes that divide the anode and cathode have performance issues, keeping zinc batteries from widespread use.

An Australian grid-scale battery manufacturer was interested in seeing more test results on the ion-selective Sandia membrane before potentially using them in their batteries. Partnering with Sandia, Harvard University was able to provide testing that showed significant performance improvements.

These results led to Coulomb Technology, a startup based in Tennessee, collaborating with Sandia on more research with the goal of advancing their aqueous zinc-ion battery initiative. The company makes sodium-ion batteries for energy storage in residential, industrial, and military applications. They now have a clear direction for enhancing energy density, extending operational lifespan, and achieving commercial viability for zinc batteries.

Additional funding from the DOE Office of Electricity is aimed at improving the Sandia technology to a point where Coulomb could potentially license it.



Sandia Scientist Cy Fujimoto prepares polymer separator for shipment to alternative energy device manufacturers.

Scaling Up and Commercializing Sandia Technologies in CA and NM

Royalty-funded Technology Maturation Programs at Sandia National Laboratories' New Mexico and California sites are designed to accelerate the commercialization of selected Sandia-developed technologies so they can be deployed for the U.S. public good. These programs are part of the Labs' technology transfer mission. Activities may include benchtop demonstrations, initial steps to scale-up, data generation for further decision-making, or other activities. The programs also support engagement with prospective commercial licensees.

California Royalty-funded

Some of the selected technologies were an acoustic sensor and an acoustic lysis system, which serve as the foundation for a diagnostic platform. Diagnostic delays in infectious disease contribute to inappropriate treatment and poor outcomes across healthcare and industrial settings. Sandia's acoustic sensing and microfabrication expertise, combined with Resonantia Diagnostics' system integration, enables rapid, culture-independent pathogen detection and treatment assessment directly from complex samples.

This project advanced prototype development, system integration, and performance validation of the technologies, demonstrating the potential to reduce diagnostic timelines from days to minutes. The technology is being commercialized by Resonantia, which is partnering with Sandia to build these components into a scalable diagnostic system for clinical and non-clinical markets.

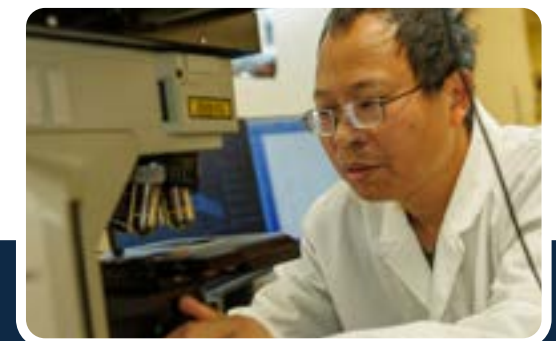


Resonantia CEO Matt Jones, center, and the Sandia acoustic sensing technology team.

New Mexico Royalty-funded

One of the projects selected was Environmentally Benign Mining of Critical Minerals from Mine Waste which uses food-grade ingredients, including citric acid, to extract critical minerals from mine tailings. Finding domestic sources of critical minerals is crucial. STM funding helped scale up testing of this environmentally friendly method of mineral extraction. Tests were conducted on mine tailings and other metal bearing geomaterials, increasing the technology readiness level.

This new method is moving toward economic viability. Critical Materials LLC, a New Mexico-based company, is continuing to partner with Sandia on commercializing the technology through a license.



Sandia Geochemist Guangping Xu examines coal ash using a Raman microscope.

To learn more about Energy I-Corps, visit
www.energy.gov/technologycommercialization/energy-i-corps

C4 Teamwork Takes on Industry Manufacturing Challenges

The Co-location, Collaboration, Community, and Communication project, referred to as C4, was funded by the DOE's Technology Commercialization Fund. It focused on rapid technology development using a novel industry-informed partnering approach and solved manufacturing challenges by connecting industry and universities with mentors from Sandia National Laboratories.

Five cohorts have taken part in C4's challenges since 2022 when the program began. Over the course of the project, C4 worked with 43 partners including more than 15 industry partners and 15 universities. Approximately 90 college students participated, providing a potential pipeline for future Sandia interns.

The fifth cohort was a collaboration between Sandia, Castelion Corporation, and a university partner. Castelion is a California-based company focused on new approaches to defense development and production, prioritizing short, iterative design cycles, rapid testing, and modern commercial manufacturing strategies. The company is endeavoring to produce

next-generation hypersonic systems at scale to strengthen national security and outpace evolving threats.

The cohort explored advanced materials and manufacturing techniques for multiple applications. C4 was a catalyst, providing a connection for prototyping and scaling with a university partner as well as in establishing a Cooperative Research and Development Agreement between Sandia and Castelion. Only months after completion of the prototypes, in early 2026, Castelion broke ground on a new 1,000-acre manufacturing campus in New Mexico.

As part of Sandia's technology transfer mission, C4 also engaged in outreach activities to expand the regional manufacturing ecosystem. One event with the New Mexico Manufacturing Extension Partnership shared efforts surrounding Sandia's new Center for Advanced Manufacturing Innovation, or CAMINO, with defense contractors, manufacturers, and interested businesses. The project supported the early development stages of CAMINO and surveyed relevant capabilities across the Labs.

Although the C4 project has formally concluded, CAMINO and the partnerships the project initiated will continue to build a hub for advanced manufacturing.

Advanced Manufacturing Luncheon hosted by C4 at the Q Station in Albuquerque, New Mexico.

Innovation and Intellectual Property Celebrations

Sandia National Laboratories Integrated Partnerships Organizations hosted Innovation and Intellectual Property Celebrations in New Mexico at Hotel Andaluz in Albuquerque and in California at McGrail Vineyards in Livermore. The annual events recognize staff whose work furthers Sandia's technical innovation and engineering excellence.

Along with granted patent inventors and commercial copyright authors, the events recognize Mission Innovators for their contributions to the Labs' national security mission. Director-nominated Up & Coming Innovators are also recognized for their impactful solutions to complex challenges in addition to entrepreneurial talent.

In New Mexico, awards were presented to 141 patent inventors, 30 copyright authors, 16 Mission Innovators, 18 Up & Coming Innovators, and two R&D100 award winning teams.

In California, 35 patent inventors, 5 copyright authors, 1 Classified Innovation Recognition Award recipient, and 1 DOE Lifetime Achievement Award winner were recognized.

NMSBA Innovation Celebration

The New Mexico Small Business Assistance Program held a celebration at Roadrunner Venture Studios in Albuquerque to recognize teams comprising New Mexico small businesses and Sandia and Los Alamos national laboratories principal investigators that achieved outstanding innovations through NMSBA. Sponsored by New Mexico MEP, the celebrations offered an opportunity for small businesses, local economic development representatives, elected officials, and community leaders to network and learn about NMSBA. Five Sandia projects featured in the 2024 NMSBA Perspectives Annual Report were showcased: Aperi Computational Mechanics Consulting, Mecca Enterprises, Ridgeline Manufacturing and Engineering, Sagecore Technologies, and Sandia Biotech.

The Honorable Speaker Ben Luján Award for Small Business Excellence for demonstrating the greatest economic impact was awarded to Aperi Computational Mechanics Consulting. As a result of rapid progress on its new type of commercial engineering simulation software, in 2024 Aperi CMC won \$575,000 in Small Business Innovation Research grants, \$100,000 from NIST, and \$100,000 in matching grants from the state of New Mexico Economic Development Department, as well as \$35,000 from a lunar mining company, with more funding from various sources on the way.



To learn more about TCF, visit

www.energy.gov/technologytransitions/technology-commercialization-fund

R&D 100 Awards

The R&D 100 Awards celebrate the year's 100 most innovative technologies. Sandia National Laboratories competes with universities, corporations, and other government laboratories for these prestigious awards.



IT/ELECTRICAL

Electro-Optical Sensor for High-Energy Environments and Applications



A new solution to a long-standing challenge in measuring high voltages, the EOS uses a tiny crystal, about the size of a dime, and a laser smaller than a shoebox to measure voltages up to 20 million volts without touching the electrical source. This non-contact method makes it safer and more reliable to operate in high-energy environments. Applications range from lightning and high-energy physics research to fusion science and electrical utility monitoring.



ANALYTICAL/TEST

Colorized Hyperspectral X-Ray Imaging with Multi-Metal Targets



CHXI-MMT is a major breakthrough in X-ray imaging combining nano-patterned X-ray sources with advanced detection methods, this technology provides incredibly detailed images that enhance diagnostic accuracy and analysis depth. The process reduces reliance on costly accelerator facilities and could expand options for biomedical imaging, transportation security, nondestructive testing and advanced manufacturing.



Fentanyl Analog Independent Detector



FAID is a hand-portable technology that revolutionizes public safety by delivering critical detection capabilities anytime, anywhere. Unlike older detection tools, FAID can recognize the basic chemical patterns found in fentanyl, which allows it to identify current and new versions of the drug. FAID can find fentanyl and its variations even in very small amounts, even when mixed with other substances.

MECHANICAL/MATERIALS

Low Coefficient of Thermal Expansion Molecules to Resolve Thermal Expansion Problems in Polymers



Harsh environments can wreak havoc on products, especially when multiple types of materials are bonded together and they expand and contract at different rates. This mismatch in thermal expansion can lead to product failures. Sandia partnered with the University of Texas at Austin and scale-up partner Tetramer Technologies Inc. to develop a special molecule that can adjust thermal expansion properties of polymers/plastics. Potential applications include industrial settings and the aerospace, automotive and electronics industries.

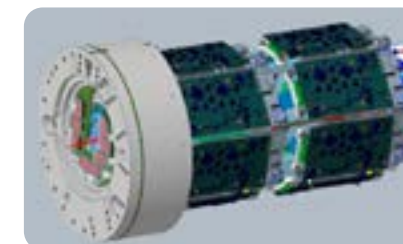


Time-Resolved Diffraction for National Ignition Facility



Sandia researchers won this award as a partner with Lawrence Livermore National Laboratory and Advanced hCMOS Systems

Measuring the properties of materials under extreme conditions is important for research, which includes studying the Earth's core and improving fusion ignition at facilities like the NIF. For a new time-resolved detector, the nanosecond-gated hybrid CMOS sensors from Sandia were selected. FIDDLE, short for Flexible Imaging Diffraction Diagnostic for Laser Experiments, is one of the most complex diagnostics ever fielded at NIF, housing all the electronics, cables, and water lines to support up to eight hybrid CMOS sensors and an X-ray streak camera.



PROCESS/PROTOTYPING

Hafnia Gate Dielectrics for Energy Conversion

Sandia has developed the first commercially viable hafnia (HfO₂) gate dielectric for wide-bandgap power semiconductors, enabling a step-change in performance and cost. The technology delivers >50% device performance improvement, a 25× reduction in channel resistance, and up to 50% lower manufacturing cost through increased device density. As power electronics scale to meet demand from AI, transportation, and the grid, even modest efficiency gains translate to large energy savings. This innovation enables more efficient, reliable power conversion across data centers, electric vehicles, and grid infrastructure.



SOFTWARE SERVICES

Bleeding Materials & Enclosures



Tamper-indicating seals are widely used from over-the-counter medication bottles to containers protecting national security materials. This product uses commercial-off-the-shelf materials that allow rapid and conclusive inspections for potential tamper or damage. The material irreversibly turns from multi-colored to black upon tamper. The dramatic color change begins at the site of the damage or penetration and spreads with time, similar to bruising or bleeding.



PROFESSIONAL

Researcher of the Year Award



Sandia Materials Scientist Hongyou Fan is an internationally recognized leader in chemical science, materials science, nanoscience, whose pioneering research has significantly advanced DOE missions in science, energy, and national security. His research work has resulted in 24 patents and the founding of two companies, Lunano LLC, and Critical Materials LLC. He has won six R&D 100 Awards and six Federal Laboratory Consortium Awards in Technology Transfer. Fan's achievements have also been widely recognized by leading professional societies, and both state and national legislators.



FLC Awards

The Federal Laboratory Consortium for Technology Transfer Awards Program annually recognizes federal laboratories and their industry partners for outstanding technology transfer efforts.

NATIONAL AWARD Outstanding Researcher Award

Hongyou Fan was recognized for his 25-year career marked by exceptional leadership in technology transfer activities.

DOE TTWG Awards

The Technology Transfer Working Group awards celebrate the exceptional work done by the 17 Department of Energy national laboratories to support American competitiveness and security through a streamlined commercialization process.

Economic Development Award

Jake Douglass was recognized for his efforts with Elevate Quantum, a Designated TechHub and the largest regional consortium in America.

Partnering Award

Janna Corro, Jessica Knight, Scott Puetz, Meg Davidson, Viviana Baudry, and Debi Hudgens were recognized for their efforts on the Co-location, Collaboration, Community, and Communication project, referred to as C4, funded by the DOE's Technology Commercialization Fund.

Early Career Professional of the Year Award

Matt Meyer was recognized for his efforts in partnering with Jared Lynch of Lawrence Livermore National Laboratory on a Hydrogen Partnership Day with the Livermore Open Valley Campus.

NNSA Defense Programs Award of Excellence

Each year the NNSA Defense Programs recognizes individuals and teams for exceptional and significant achievements in quality, productivity, cost savings, safety, and creativity in support of NNSA's Stockpile Stewardship Program.

Exceptional Achievement Team Award: Tech Transfer

Sal Rodriguez (now retired) led a Sandia team to advance refractory high-entropy alloys, a material capable of withstanding severe conditions, including extreme neutron radiation and high temperatures associated with fusion and hypersonic vehicles. This development led to a partnership with Westwind Computer Products to commercialize the technology, which is an instrumental resource for national security and deterrence missions.

National Academy of Inventors

The NAI fellowship is the highest professional distinction awarded solely to academic inventors. Spanning every major field of discovery, including quantum computing, artificial intelligence, and regenerative medicine, NAI Fellows are tackling the biggest and most pressing issues of our time. Their success in translating research into products and services that improve lives demonstrates the continuing importance of the U.S. patent system.

NAI Fellows

Sandia Scientists Igal Brener and Hongyou Fan were elected as NAI fellows for their impressive portfolios of patents and publications, as well as their passion for research, discovery, and leadership.

Brener is a senior scientist in the Microsystems Engineering, Science and Applications center and co-leader of the nanophotonics thrust at the Center for Integrated Nanotechnologies. Fan is a manager at Sandia and the program manager for the Labs' DOE Basic Energy Sciences-funded geoscience and critical minerals portfolios.

NMTC Women in Technology Awards

The New Mexico Technology Council awards celebrate trailblazing women who embody innovation, mentorship, and community impact, exhibiting excellence in their fields while paving the way for future generations.



Women in Tech Honorees

Chrisma Jackson and Megan Ivory were named Women in Tech Honorees.

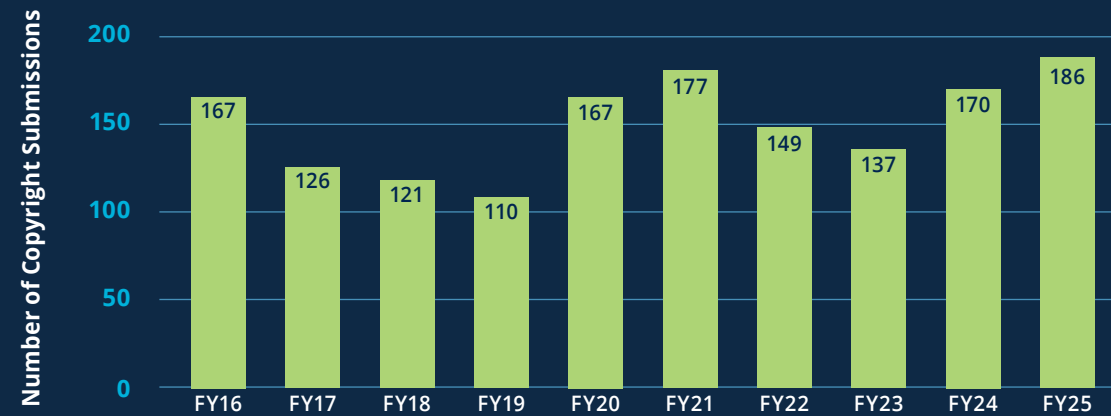


Emerging Leaders

Bethany Cannon and Kachina Ganz were honored as Emerging Leaders.

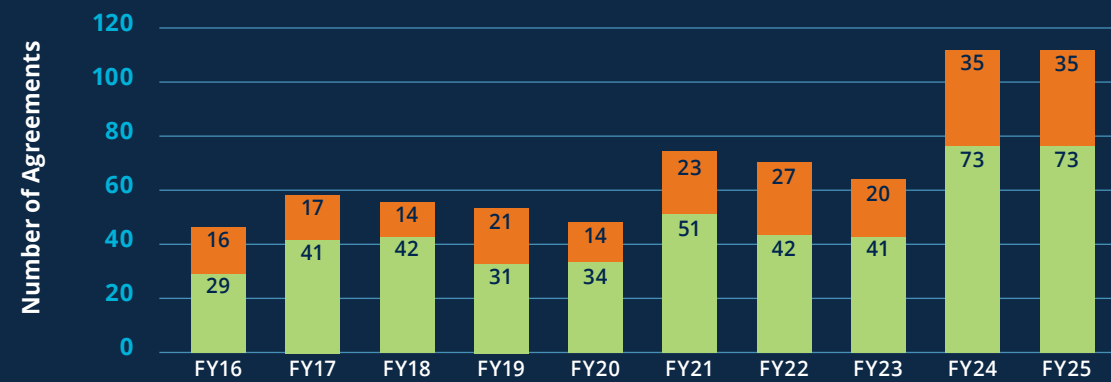
Copyrights

Copyright Submissions

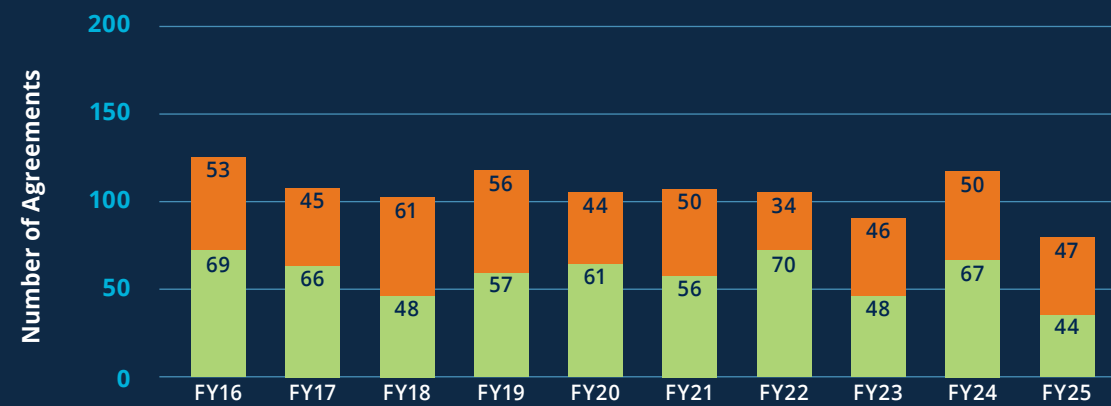


CRADAs & SPP/NFE Agreements

New Agreements ■ Amendments ■
Cooperative Research and Development Agreements (CRADAs)

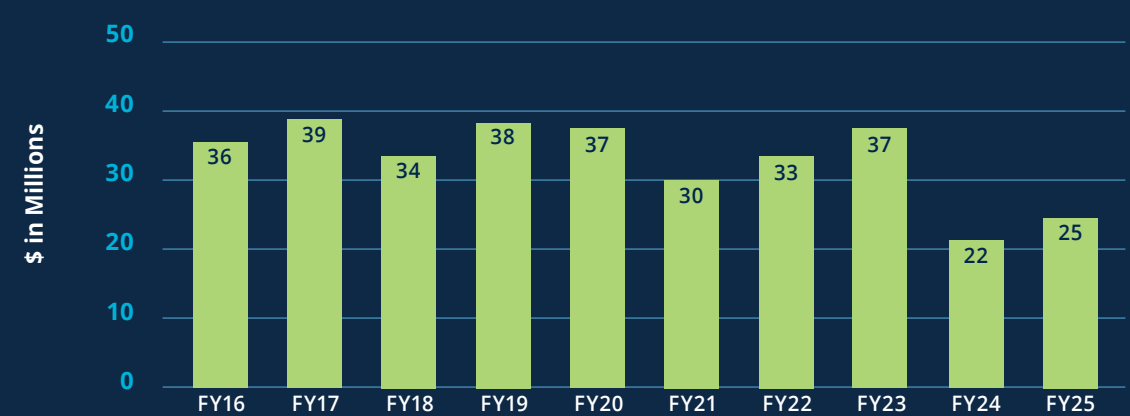


New Agreements ■ Amendments ■
Strategic Partnership Project/Non-Federal Entity SPP/NFE Agreements



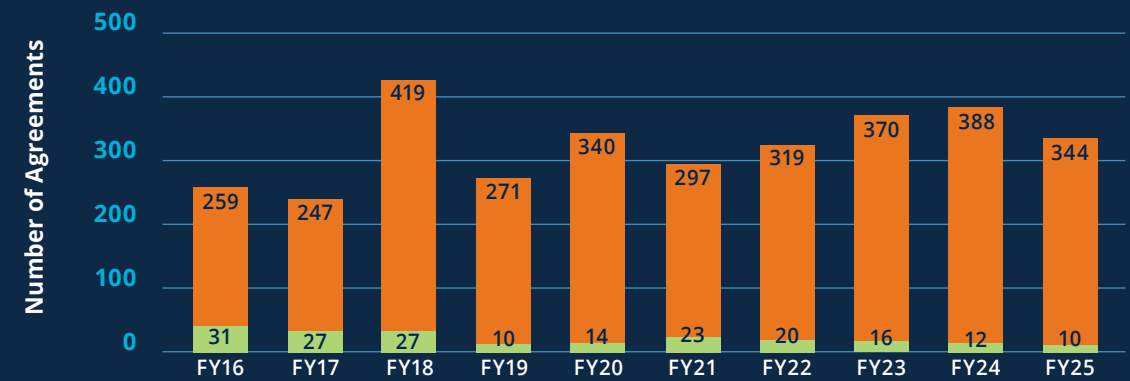
Industry Funds-In

Industry Funds-In to Sandia (\$M)

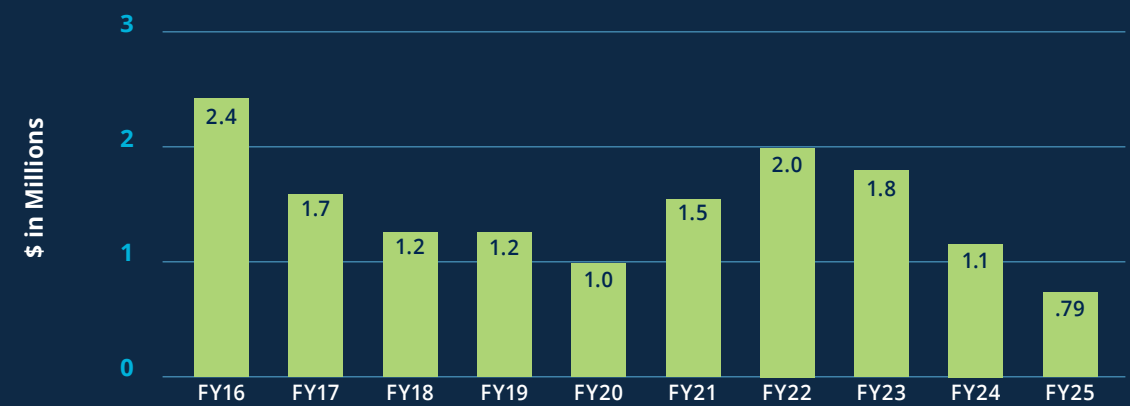


Licenses

Commercial ■ Non-Commercial ■

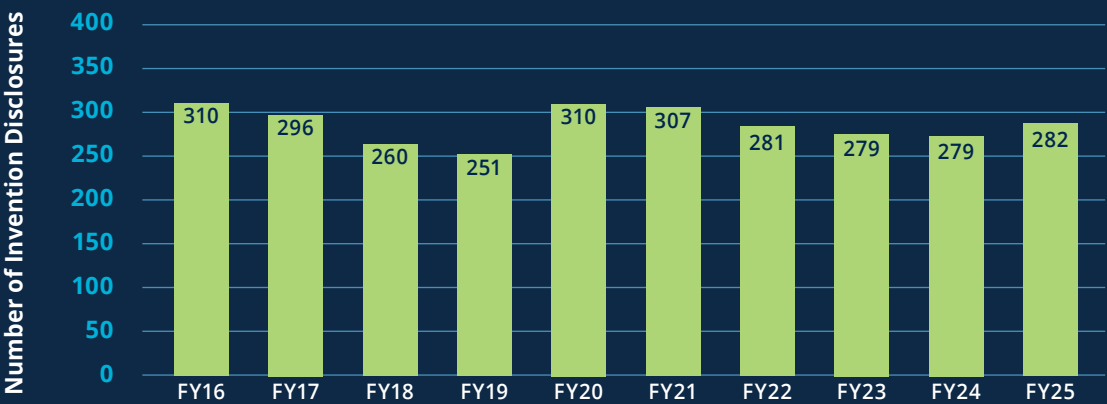


Licensing Income (\$M)

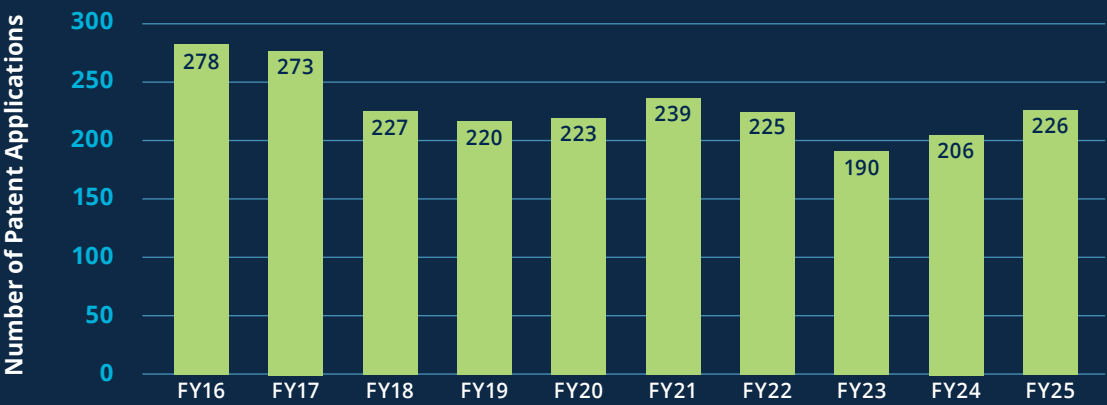


Patent Activity

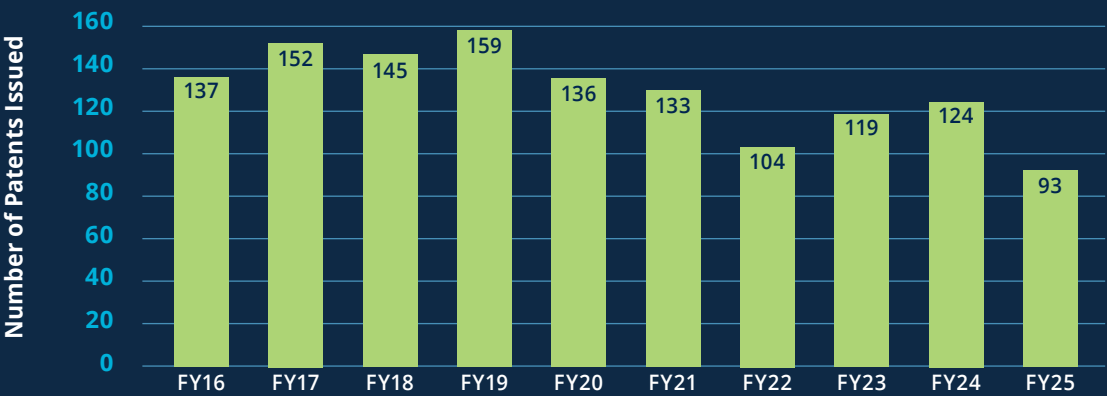
Invention Disclosures



Patent Applications



Patents Issued



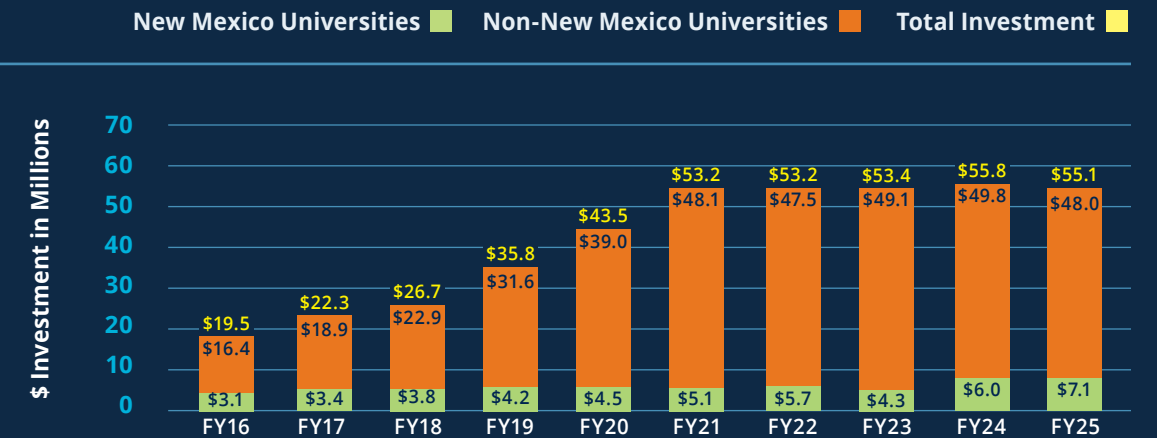
University Partnerships

Since 1997, when the Campus Executive program was established, Sandia National Laboratories has formally cultivated university research to expand its science and technology base. Through the Campus Executive program, Sandia formalized agreements with about 20 schools that defined partnership goals, including research collaboration areas and talent pipeline objectives. In 2016, Sandia began more focused collaborations with a subset of the Campus Executive schools under its Sandia Academic Alliance Program. These schools had strong historical partnerships with Sandia, possessed synergistic research competencies and capabilities, and shared Sandia values and an affinity for national security work. In 2021, Securing Top Academic Research and Talent with Historically Black Colleges and Universities (START HBCU) was founded to foster workforce development.

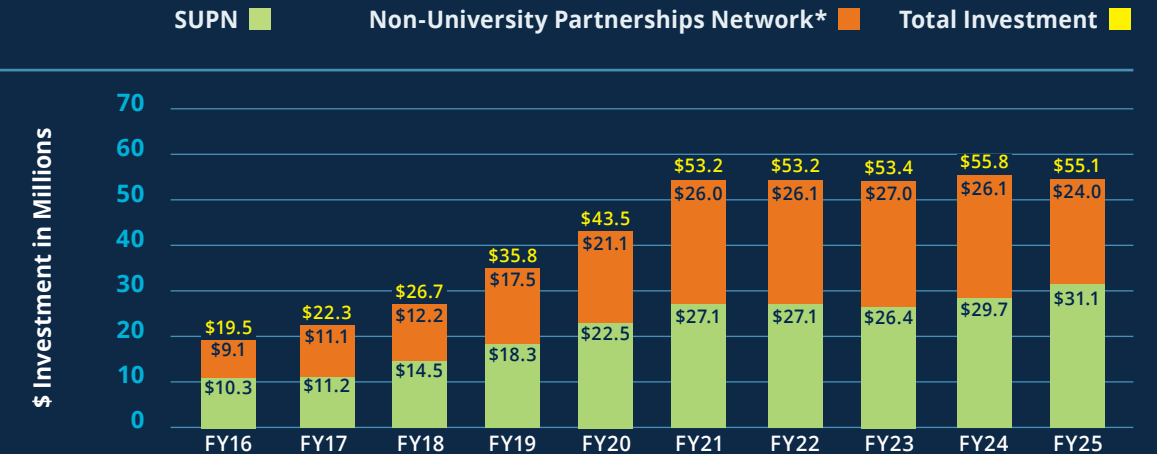
Sandia also revisited its strategy for university engagement in 2021, and implemented the new Sandia University Partnerships Network in 2022. The SUPN is a graduated spectrum of relationships with universities across the United States. The objectives of this network are to partner broadly with universities based on merit to ensure a robust pipeline of top talent and innovative ideas, and to establish and cultivate enduring strategic and mutually beneficial relationships with a focused set of schools. The Academic Programs Office, under the auspices of the Chief Research Officer, serves as the point of contact for university research, and implements those processes that enable and enhance university partnerships.

University Partnerships programs pair Sandia executives with University officials at schools that share research interests and capabilities.

Investments in Research at New Mexico Universities*



Investments in Research with Sandia University Partnerships Network*



* Historic data has been updated to reflect current university structure and some investment numbers may have changed from previous reports.



Sandia Science & Technology Park

Companies and Organizations	47
Employees	1879
Buildings	27
Public Investment in the Park*	\$67.7M
Private Investment in the Park*	\$446.6M
Total Investment in the Park*	\$514.3M
Taxable Consumer Spending*	\$4.9B
Increase in Wages*	\$8.6B
Average Salary of Full-time Jobs in Park	\$115K
Average Salary of Full-time Jobs in Metro Albuquerque	\$64K

*Since Park opened in 1998.

New Mexico Small Business Assistance

	Sandia: 2000-2025
New Mexico Small Businesses Assisted	2,608
Rural vs. Urban Businesses	
Rural (57%)	1,498
Urban (43%)	1,110
Combined	2,608
Dollar Amount of Assistance	\$55.5M

	Sandia and Los Alamos: 2000-2025*
Return on Investment (ROI)**	\$1.80
(For every \$1.00 of state tax credit invested)	

Economic Impact

Small Business Jobs Created and Retained	13,275
Average Reported Salary (2024)	\$63.6K
Increase in Revenue	\$591M
Decrease in Operating Costs	\$409M
Investment in NM Goods/Services	\$210M
New Funding/Financing Received	\$383M

*Surveys are performed six months to one year after project completion.

**ROI is based on salaries of jobs created and retained.

Entrepreneurial Separation to Transfer Technology*

Sandians Who Left on ESTT	190
To start up a company	84
To expand a company	106
Companies Affected by ESTT	140
Start-up companies	69
Expansion companies	71

*Since ESTT began in 1994.

TRGR Technology Readiness Initiative*

	Sandia and Los Alamos: 2000-2025
Companies Assisted	36**
New Licenses	24
New CRADAs	16

*Since TRGR began in 2020.

**Some companies had both a CRADA and a License.

There were 6 new companies that moved into the SS&TP, along with the construction and renovation of 2 new facilities.



During the calendar year, Sandia invested \$2.4M helping 123 small businesses in 14 counties throughout New Mexico. There were 54 Sandia Principal Investigators across 44 departments that supported NMSBA.



During the fiscal year, 7 Sandians were approved to leave on ESTT.



During the fiscal year, Sandia invested \$1M assisting 11 companies.



Integrated Partnerships Organizations

Technology Partnerships & Business Development
Mary Monson, 505-844-3289, mamonso@sandia.gov

Business Development & Proposal Management
Monica Lee Martinez, 505-844-6131, monmart@sandia.gov

Technology Partnership Agreements, Licensing & Intellectual Property
Joel Sikora, 505-284-1009, jsikora@sandia.gov

Technology & Economic Development
David Kistin, 505-205-3598, dkistin@sandia.gov

National Security Partnerships & Business Development
Cara Garretson, 505-284-1251, cgarre@sandia.gov

Global & Nuclear Security Partnerships & Business Development
Nicholas Lee Velasquez, 505-284-2498, nlvelas@sandia.gov

Business Competitive Intelligence & Data Analysis, Visualization, & Communications
Kelli Howie, 505-284-1092, khowie@sandia.gov

Academic Programs

For information, contact:

Academic Programs
James Redmond, 505-844-3136, jmredmo@sandia.gov

Partnerships National Reach

Explore our interactive data map which illustrates the amazing breadth of work Sandia National Laboratories does with industry, university, government, and lab partners around the U.S.



To learn more about Partnerships National Reach, visit:
www.sandia.gov/partnerships_reach



Thank you to everyone who contributed to this report.

Partnerships Annual Report Team
Sandia National Laboratories

David Kistin
Manager

Linda von Boetticher
Annual Report Project Manager

Ray Johnson
Designer

Contractor
Ellen Cline
Copywriter

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Sandia National Laboratories



To learn more about the Center for Collaboration and Commercialization, contact David Kistin at dkistin@sandia.gov or stop by our partnership space in downtown Albuquerque at 101 Broadway NE.



To learn more about industry or university partnership opportunities with Sandia, visit www.sandia.gov/partnerships or contact us at partnerships@sandia.gov.

To learn more about licensing and technology transfer at Sandia, visit ip.sandia.gov or contact us at ip@sandia.gov.



Academic
Programs

To learn more about academic partnerships at Sandia, visit www.sandia.gov/working-with-sandia/academic-partnerships or contact us at acadalli@sandia.gov.



Small
Business
First

To learn more about how to do business with Sandia, visit sbu.sandia.gov or contact us at supplier@sandia.gov.

TECHNOLOGY
Partnerships
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