

2025-2026 CNF Research Accomplishments

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PHOTOGRAPHY CREDITS

This year's front cover image is from the report "Fabrication Patterned Substrates for Cell Alignment"; CNF Project 3302-25, Principal Investigator: John Zimmerman; User: Iqra Sajid; Affiliation: Meinig School of Biomedical Engineering Graduate school, Cornell University — and was used with their permission. The full report starts on page 24.

This year's back cover image is from the report "Nanoelectronic Artificial Intelligence Processors"; CNF Project 3169-24, Principal Investigator: Peter McMahon; Users: Yongqi Zhang and Ruomin Zhu; Affiliation: Applied & Engineering Physics Department, Cornell University — and was used with their permission. The full report starts on page 50.

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2025-2026 CNF Research Accomplishments

DIRECTORS' INTRODUCTION

The Cornell NanoScale Science and Technology Facility (CNF) is pleased to present this year's Research Accomplishments, highlighting the outstanding achievements of our users and research groups who leverage CNF's extensive resources and expertise. We sincerely thank the many contributors who helped make this publication possible.

This year's publication showcases 95 research abstracts that demonstrate the breadth and impact of research conducted by our user community. Alongside these featured research accomplishments, this edition documents more than 205 CNF-related publications, presentations, and patents produced during 2025.

CNF 50TH ANNUAL MEETING: CELEBRATING 50 YEARS OF RESEARCH & INNOVATION

Please save the date for the Cornell NanoScale Facility's 50th Annual Meeting to be held on Tuesday, November 16, 2027.

As CNF approaches this significant milestone, we are taking a unique step by pausing our Annual Meeting in 2026 to focus our efforts on planning a memorable golden anniversary celebration in 2027. This special event will honor five decades of scientific innovation, technological advancement, and collaborative research that have established CNF as a world-class resource for the nanoscale science and engineering community.

The 50th Annual Meeting will bring together alumni, researchers, students, staff, industry partners, and friends of CNF to reflect on our rich history, celebrate the achievements and partnerships that have shaped our success, and explore the exciting opportunities that lie ahead. We look forward to recognizing the people and discoveries that have defined CNF over the past fifty years.

Additional details and registration information will be shared in the coming months. We hope you will join us for this landmark celebration.

NATIONAL SCIENCE FOUNDATION: NNCI AND NQNI

Since 2015, CNF has been a proud member of the National Nanotechnology Coordinated Infrastructure (NNCI), a nationwide network of NSF-supported user facilities. With the conclusion of the NNCI on August 31, 2026, CNF is looking ahead to participate in the next national research infrastructure initiative.

In May, CNF submitted a collaborative proposal to the National Quantum and Nanotechnology Infrastructure (NQNI) program. NQNI is NSF's new initiative to create a nationwide network of regional open-access facilities that support research in quantum technologies, semiconductors, nanotechnology, and other areas of national priority. Our proposal titled "Northeast Quantum Nanotechnology Network" (NE-QNET) brings together CNF, Princeton University's Micro/Nanofabrication Center (MNFC) and Advanced Micro Assembly & Packaging (AMAP) facilities, the City University of New York (CUNY) Advanced Science Research Center (ASRC) Nanofabrication Facility, and LaGuardia Community College to support quantum and nanotechnology research, education, and workforce development.

As we await NSF's decision, we remain committed to supporting our research community and look forward to the opportunities ahead.

NORDTECH AND NY SMART I-CORRIDOR TECH HUB

CNF is a founding partner of the Microelectronics Commons Hub NORDTECH, alongside IBM, NY CREATES, the University at Albany, and Rensselaer Polytechnic Institute. Through NORDTECH, CNF has received \$8.2 million to expand capabilities in quantum science and technology, heterointegration, and 200mm wafer processing.

NORDTECH funding also supports major multi-year development projects, the Lab-to-fab Innovation Fast Track (LIFT) program for short-term exploratory research, and student internships. In addition, funds have also been invested over the past couple of years to support the

development of virtual reality (VR) education modules to provide a wider access of cleanroom technologies to K-12 students and community college students.

CNF is also a core facility within the NY SMART I-Corridor Tech Hub, a semiconductor-focused innovation ecosystem supported by the U.S. Economic Development Administration and New York State. The NY SMART THRIVE program provides funding and voucher opportunities that help companies access CNF as well as other regional advanced research facilities and expertise.

CORNELL DUFFIELD COLLEGE OF ENGINEERING AND CORNELL RESEARCH AND INNOVATION

CCNF's future was strengthened by a \$9.5 million investment from the Cornell Duffield College of Engineering in partnership with Cornell Research and Innovation. This support will expand our research infrastructure, strengthen semiconductor and quantum technology capabilities, enhance workforce development programs, and accelerate the growth of our virtual reality training platform, helping to position CNF for continued leadership. https://www.cnf.cornell.edu/highlights/duffield_engineering_investment

As an initial strategic investment CNF purchased a Total Reflectance X-ray Fluorescence Spectroscopy (TXRF), a quality control tool to monitor potential cross-contamination of heavy metals between tools in CNF. TXRF is a surface sensitive technique that allows detection of trace amounts (<ppm) of heavy metals that can be detrimental to quantum and advanced microelectronic devices. CNF will be one of the few academic user facilities to house a TXRF, uniquely positioning CNF to be at the forefront of advanced microelectronics and QISE.

CNF will continue working with the Cornell Duffield College of Engineering and Cornell Research and Innovation to develop a strategic plan that aligns with the goals of this investment. The focus will be to strengthen our research infrastructure, expand workforce development and partnerships, increase funding opportunities, and build a sustainable future for CNF.

EDUCATION AND OUTREACH

CNF continues to have an incredible impact in the workforce development space in support of the rapidly expanding semiconductor industry both regionally and nationally. In this pursuit, we capitalize on the over 500 years of combined expertise in the CNF staff to engage students from across the learning spectrum. Last year, we engaged with several thousand k-12 students through various k-12 events that come in all sizes ranging from small classroom visits to large scale events like the annual Expanding Your Horizons event on campus led by a team of Cornell University graduate students. We also continue to maintain a positive relationship with Micron Technology, participating in five of their Chip Camp events geared toward junior high school students throughout the region.

To expand our impact beyond the walls of our cleanroom facility, the CNF has partnered with the Cornell Center for Teaching Innovation (CTI) Creative Technology Labs to build a series of immersive educational VR modules in the Uptale Immersive Learning Platform. To date the team has created 14 modules that bring students directly into our facility to learn from our expert staff. We are continuing to develop new educational modules with a target of over 20 learning experiences by the end of 2027.

In January of 2026 we launched the CNF VR content to schools across the country and have seen over 1,600 learning sessions with 450+ hours of time spent in our unique VR environment. This brings our total VR usage to over 5,000 learner sessions from students of all ages and educational backgrounds. For more information on how to participate in CNF public outreach activities or to try out the CNF VR content, please reach out to Tom Pennell, CNF's Workforce Development Program Manager at tjp83@cornell.edu.

STAFF UPDATES

Welcomes

We are thrilled to extend a warm welcome to Dr. Chris Martin who began in July and Ben Infante who joined us in August. Their knowledge and expertise will further enhance the CNF, and we look forward to their contributions.

Chris Martin joined CNF in July 2026 as a Senior Research Associate with a Ph.D. in Physics from the University of Missouri-Columbia with a research focus on optical properties of semiconductors. Chris has long history as a user of the CNF working on academic and industrial projects. Chris is currently supporting material deposition tools to enable the advancement of quantum devices fabricated in the CNF.

Ben Infante joined the CNF in August of 2026. Ben graduated from the Rochester Institute of Technology in May of 2026 with a B.S. in Microelectronic Engineering. He previously held co-op positions at the CNF as a NORDTECH intern, VOC Health as a CNF user, and OLEDWorks. Ben will support various etching tools, electroplating hoods, packaging, wire bonding, and electrical testing.

With your support, CNF remains committed to advancing technology by providing world-class facilities, technical expertise, and a collaborative environment that enables research and innovation. We are proud to highlight the accomplishments featured in this year's Research Accomplishments publication and to celebrate the achievements of our user community. We thank all those who contributed to this publication, which can also be found online at https://www.cnf.cornell.edu/publications/research_accomplishments. We welcome your comments, questions, and suggestions. Please share your feedback at <https://cornellcnf.link/feedback>.

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