Centre for Nano Science and Engineering
Indian Institute of Science

A National Platform for Research and Technology Translation in Nano Science and Engineering

Indian Institute of Science:
Founded in 1909 through the vision of Jamsetji N. Tata, the Government of India, and the Maharaja of Mysore, the Indian Institute of Science (IISc) is India's premier institution for advanced research and education. From 2 departments and 21 students in 1911, IISc has grown to 43 departments and centres, with over 5,000 students and 500 faculty and scientific staff. IISc leads cutting-edge research across science and engineering, with strong emphasis on nanoscience and technology.

Centre for Nano Science and Engineering:
Founded in 2010 within the esteemed Indian Institute of Science, CeNSE is home to an interdisciplinary group of faculty, staff and students from all branches of science and engineering. From an initial focus on materials, devices, and systems for applications in electronics, photonics and MEMS (micro and nano electro-mechanical systems) research in CeNSE has evolved to encompass the quantum realm, applications in biology and medicine and new – neuromorphic and quantum- computation paradigms.

CeNSE at a Glance

Established: 2010

No. of Faculty: 20

Publications: 900+

No. of Patents: 85+

Technologies: 25+

Deep- Tech Startups founded: 7

No. of Users: 1000+

External Organizations Benefitted: 800+

Research Areas:
- Materials
- Electron-Devices
- Integrated Systems
- MEMS/NEMS
- Microfluidics
- Photonics
- Quantum
- Bio-medical

Scale and National Infrastructure

CeNSE is home to India's largest academic-level national facilities for fabrication, characterization and packaging. These ISO certified 24/7 operating facilities enables access to a wide and diverse user base, serving over 1000 users annually from academia, industry, startups, and strategic sectors. This scale positions CeNSE as a national hub for prototyping, pilot-scale development, and early-stage manufacturing readiness.

National Nano Fabrication Centre:

- NNFC is a 14,000 sq. ft. Class 100/1000 national cleanroom facility at CeNSE, IISc, supporting advanced micro- and nano-fabrication.
- Offers lithography (down to 10 nm), deposition, etching, process integration, and inline metrology.
- Enables research, prototyping, training, and industry access, including the GEECI GaN device foundry.

Micro and Nano Characterization Facility:

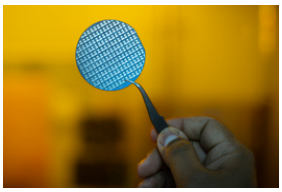
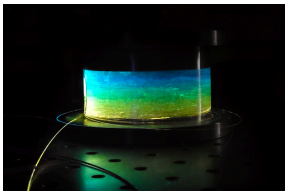
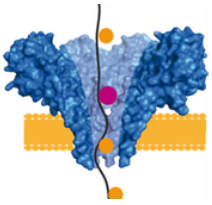
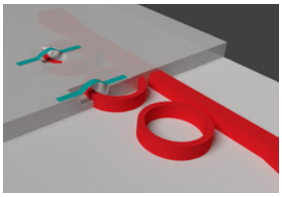
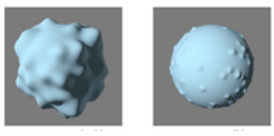
- MNCF is a 7,000 sq. ft. advanced characterization facility at CeNSE, IISc, with 50+ instruments and 20+ expert staff.
- Offers electrical testing (4 K–400°C, up to 67 GHz), mechanical and MEMS metrology, materials analysis (FESEM, TEM, XPS), and optical characterization (Raman, FTIR, XRD, UV–Vis–NIR).

Packaging and Systems Facility:

- PASF is a 2,500 sq. ft. packaging and systems facility at CeNSE, IISc, offering advanced semiconductor packaging, embedded design, and device testing with 20+ tools and expert staff.
- Services include wafer dicing, wire/flip-chip bonding, coatings, reliability testing, and end-to-end hardware, PCB, and product prototyping support.

Research Domains

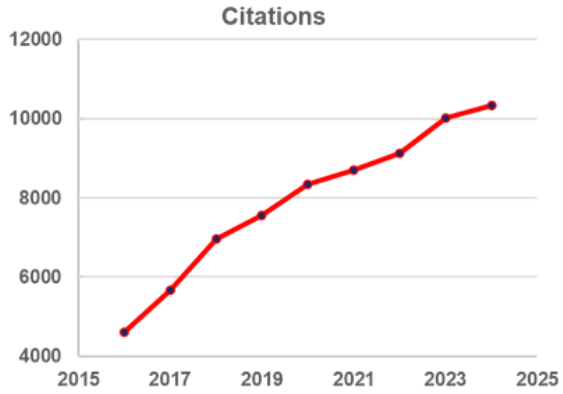
Research at CeNSE covers both – fundamental questions in the basic sciences and the development of technologies and devices for direct societal impact. With the involvement of almost 50 faculty members across 14 departments, the thrust is on interdisciplinary research, involving the following areas. While core faculty have been identified against specific areas, fact remains that it is very rare for them to work in isolation and most, if not all, projects involve many faculty members from multiple areas.

Electronic Devices	Power & RF devices · Sensors · Photovoltaics · Neuromorphic hardware · CMOS integration	
Materials	Functional oxides & nitrides · 2D materials · Thin-film growth · Ferro/piezo properties · Device-enabled materials	
Photonics and Lasers	Photonic integrated circuits · High-power lasers · Optical communication · Sensing · Quantum photonics	
Nano-bio-medicine	Biosensors · Nanopores for DNA sequencing · Neuro-regenerative devices · Nanorobots · Organ-on-chip systems	
MEMS/NEMS & Microfluidics	Piezo & RF MEMS · NEMS sensors · Optomechanics · Droplet Microfluidics · 3D integration & packaging	
Quantum	Quantum materials · Superconductors · Topological systems · Nanoscale quantum sensing · Atomic-scale devices	
Brain-Insipired Computing	Neuromorphic systems · Memristors · Spiking neural hardware · Energy-efficient AI computing · Analog processors	

High Impact Publications

Research and Academic Excellence

CeNSE faculty and researchers work across a broad range of frontier and futuristic research areas (*see the CeNSE at a Glance section*), resulting in high-impact publications with over 10,000 citations in the past decade. The Centre offers short-term training programs as well as Master's and PhD degrees, producing highly skilled graduates who are placed in leading global industries, deep-tech startups, and premier academic institutions, contributing to the advanced technology workforce in India and worldwide.



Journal Publications	Total Citations
>900	>10300

Publications with Impact Factor > 25	17

Ecosystem Engagement

CeNSE maintains strong engagement with industry, startups, government agencies, and strategic sector organisations, supporting collaborative R&D, problem-driven innovation, and indigenous technology development.

CeNSE engages with the ecosystem for:

- Facility Usage
- Trainings
- Project Execution
- Internships
- Placements
- Prototyping
- Low-volume production
- Course Development

IAP Members:
Lam Research
Applied Materials
YES
Sandisk

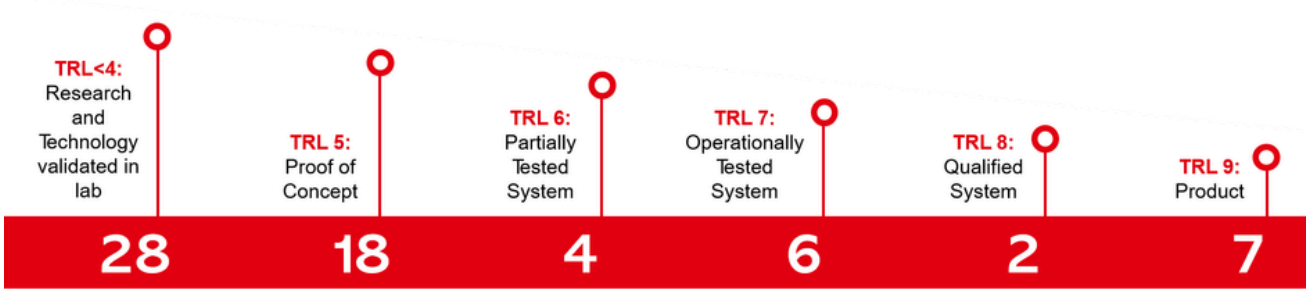
Talent Development

CeNSE is committed to developing skilled talent across nanoelectronics, semiconductors, and advanced technologies through academic programs, industry partnerships, and national initiatives

CeNSE Alumni Placements

Technology Development

CeNSE has a strong track record of translating deep-tech research into validated technologies, including MEMS and pressure sensors, GaN power and RF devices, photonics, microfluidics, solar technologies, gas and electrochemical sensors, lasers and advanced semiconductor devices. Several of these technologies have progressed beyond laboratory validation and have been transferred to organisations including BEL, KASTech, Antigone Solutions, IGCAR, VASMED, SCL and ISRO, demonstrating CeNSE's ability to take research through prototyping and validation towards real-world deployment.



Talent Development

CeNSE is committed to developing skilled talent across nanoelectronics, semiconductors, and advanced technologies through academic programs, industry partnerships, and national initiatives. The curriculum includes metrology, fab processes, packaging and equipment training offered at levels of exposure, foundationa, advanced and deep-dive.

Mission-Aligned Programs:
CeNSE offers short-term trainings and certifications, including **NSQF-certified foundation and advanced courses in nano science and technology**.

Lam Research-CeNSE, IISc Semulator 3D Training: Under a Train-the-Trainers model, this programme combines real-world semiconductor fabrication training at CeNSE with advanced process simulation using SEMulator3D® software.

Training on semiconductor fabrication & characterization - with MoTA, GoI:
In partnership with the Ministry of Tribal Affairs, CeNSE runs a specialized program for tribal students and faculty. A dedicated training fab was established to provide world-class, no-cost training to resource-constrained learners.

Research Experience Program:
Supported by the Ministry of Education, this 6-month / 1-year program enables reserved category students to pursue final semester projects (UG/PG) or gain immersive research experience post-graduation.

INUP – Indian Nanoelectronics Users Program
Funded by MeitY and MoE, INUP provides workshops, hands-on training, facility access, and mentorship to researchers nationwide. It supports applied research, hackathons, inter-institutional collaboration, and startup technical assistance.

Industry Trainings
Customized training programmes delivered to leading industry and startup organizations, designed to reduce onboarding time and strengthen semiconductor manufacturing capabilities.

Industry Partners Served: Applied Materials, Intel, GlobalFoundries, Tata Electronics, Lam Research, BEL, BHEL, DRDO ecosystem organizations

Technology Translation and Startup Ecosystem

The Centre has developed over 25 technologies, many of which have advanced beyond proof-of-concept to validation and deployment, leading to the creation of many faculty-led deep-technology startups.

INCeNSE, a specialised incubator under FSID, is housed at CeNSE, IISc and funded by the Government of Karnataka. It supports deep-tech hardware entrepreneurs by providing access to advanced infrastructure, technical expertise, and a robust innovation ecosystem. Startups benefit from independent access to state-of-the-art national facilities, along with mentoring and support in business development, legal, IP, and financial matters, as well as strong industry linkages—contributing significantly to India's growing deep-tech innovation landscape.

AgNIT Semiconductors
GaN solutions

Theranautilus
Nano robotics

Pathshodh
Heathcare Diagnostics

i2n Technologies
MEMS based sensors

ABX3 PV
Perovskite solar cells

Aagamiseq
Nano and Micro pore technology

Molecular Semiconductors
Organic molecules

Pravaaha Bio
Organ-on-a-chip

QuPar Microsystems
Vapour cells and subsystems for quantum sensors

Infab
MEMS - based Devices

Densepower
Microstructural materials engineering

14Si Solutions
Contamination mitigation

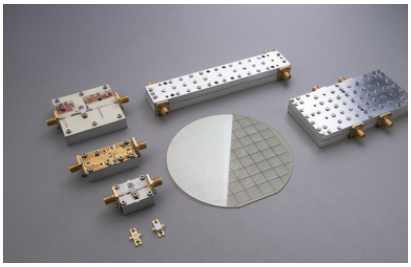
SuperQ Technologies
Superconducting devices

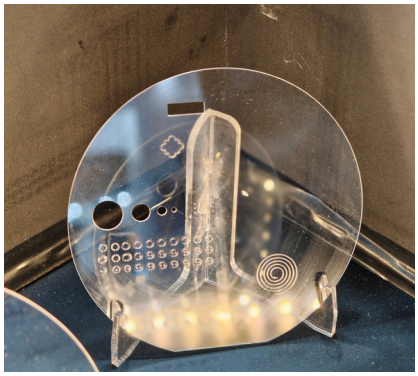
Meukron Technologies
Microfluidic devices

ICeND
Nanofluidic devices

Meerkats Heatcrafters
Thermal Management

Gyrfalcon
Intelligent Edge Devices

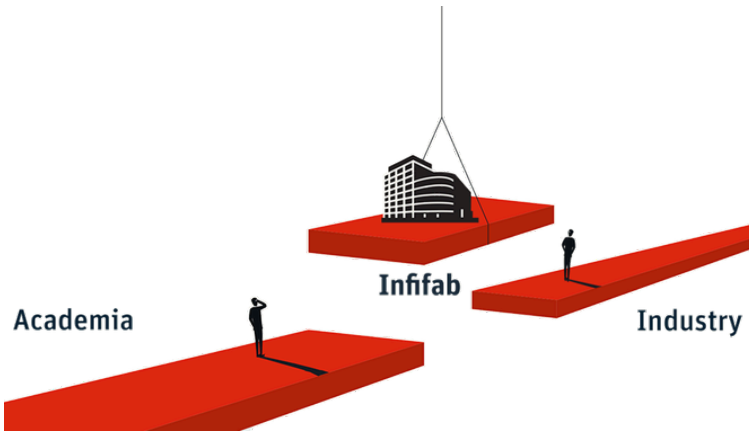




What's NEXT? What's NEW?

INFIfab: India's First Deep-Tech Translation Centre in Micro & Nano Fabrication

INFIfab is envisioned as India's first large-scale translation centre dedicated to deep-technology development based on micro- and nano-fabrication. Spanning **96,284 sq. ft**., this greenfield, state-of-the-art facility will bridge the critical gap between research and manufacturing, ensuring that innovations do not remain confined to laboratories but transition into scalable technologies and products.
INFIfab, a **₹1025 crore initiative**, will integrate research lines alongside low-volume manufacturing lines for **MEMS, quantum, photonics, advanced packaging, next-gen computing, and compound semiconductors**. Scheduled for inauguration in late 2029, the facility will triple CeNSE's current capacity.



INFIfab's objectives

- **Research Leadership:** Position India as a global producer in semiconductors, quantum technologies, and next-generation computing.
- **Research-to-Manufacturing Translation:** Provide prototyping, benchmarking, testing, and pilot-line capabilities.
- **Talent Development:** Train industry-ready talent through degree programs and inclusive training initiatives.
- **Startup Incubation:** Mentor microfabrication startups from concept to commercialization.
- **Atmanirbhar Bharat**: Through indigenous deep-tech capability INFIfab will power India's Semiconductor, Quantum, and Strategic Technology missions.

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जनजातीय कार्य मंत्रालय MINISTRY OF TRIBAL AFFAIRS
भारतीय विज्ञान संस्थान
K-tech
National Quantum Mission
इंडिया सेमीकंडक्टर मिशन India Semiconductor Mission Catalyzing India's Semiconductor Ecosystem
NSM NATIONAL SUPERCOMPUTING MISSION

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