IEN Research Highlights

Research in electronics and nanotechnology provides the foundation for a broad range of advances with many industrial applications. Georgia Tech has become a national leader in nanoscience and nanotechnology research pioneering developments such as epitaxial graphene for high-speed electronics; silicon germanium for specialized semiconductors; system-on-package technology; and zinc oxide structures for nanogenerators and other small-scale devices. Represented below are research highlights facilitated by IEN.

Biomedical Materials & Devices
- Biomimetics
- Biomaterial fabrication and characterization
- Biosensors
- Cancer detecting quantum dots
- Nanoparticles for drug delivery
- Diagnostics and theranostics
- Microfluids

Micro & Nanoelectronic Systems, Devices, & Components
- 3D electronics systems integration and packaging
- Silicon micromachining for high-frequency applications
- TSV structures
- Interconnects
- Electrical, thermal, mechanical design, modeling, testing, and characterization

Nanostructures & Nanomaterials
- Nanomaterials syntheses
- Nanogenerators
- Graphene nanoelectronics
- Nanomedicine
- Nanophotonics
- Nanocatalysis
- Bioconjugated nanoparticles
- Molecular profiling
- Pharmacogenomics
- Nano-biophotonics

Optoelectronics, Photonics, Phononics, & Photovoltaics
- Biophotonics
- Dielectric and holographic optics
- Non-Lin optics
- Optical communication systems
- Optical materials
- Optical systems and technology
- 3D Solar cells
- Organic PV cells

Semiconductor Materials, Processes, & Devices
- Metalorganic chemical vapor deposition (MOCVD)
- Molecular beam epitaxy (MBE)
- Semiconductor organic materials
- III-N based high-voltage field-effect transistors
- Thin-film transistors and sensors
- Memristors and organic transistors
- III-V and SiGe technologies

Microsystems & Microstructures
- MEMS/NEMS
- Microfluidics
- Transducers
- Energy-harvesting devices
- Navigation systems
- Environmental sensing
- Medical diagnostics
- Mini- and nanomachined sensors
- RF MEMS
- Power MEMS

IEN Shared-User Laboratories for Academic, Industry, and Government Researchers

Marcus Nanotechnology Building
Georgia Institute of Technology
745 Ferst Drive NW
Atlanta, GA 30318
404-894-1300
info@ien.gatech.edu
www.ien.gatech.edu
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The Institute for Electronics and Nanotechnology at Georgia Tech

The Institute for Electronics and Nanotechnology (IEN) at Georgia Tech operates under the office of the Georgia Tech Executive Vice President for Research. The IEN was established as an Interdisciplinary Research Institute to enable research in nanoscale technologies including micro and nanoelectronics, optoelectronics and micro/ nanomechanical systems. Globally recognized faculty and technical staff facilitate interdisciplinary research collaborations and offer educational and training capabilities utilizing an extensive array of fabrication and characterization tools within IEN’s state-of-the-art cleanrooms and laboratories.

- Advanced nano-, micro-, and bio- laboratories and tools, valued in excess of $400 million.
- Shared-user, fee-based tool access available to academic, industry, and government clients.
- Over 700 academic, industry, and government users served each year.
- State-of-the-art cleanrooms with over 200 fabrication, test, and characterization tools.
- Over 25,000 sq. ft. cleanroom and laboratory space.

The National Nanotechnology Infrastructure Network

Georgia Tech is a member of the National Nanotechnology Infrastructure Network (NNIN), supported by the National Science Foundation. The NNIN is an integrated networked partnership of user facilities serving the needs of nanoscale science, engineering, and technology. The NNIN is a research facilitator, providing state-of-the-art equipment, resources, staff expertise, and training to enable high-quality nanoscale research. These user facilities are open to researchers from academia, industry, and government. To learn more, please visit www.nnin.org.

How to Become a User of IEN’s Shared-User Laboratories

1. Contact IEN at 404-894-5100 or E-mail newusers@ien.gatech.edu, or visit cleanroom.ien.gatech.edu and click the “Become a user” link to learn about getting started at our facility.
2. Define your project goals and process and equipment needs. Both on-site (you do the work) and remote (we do the work) services available.
3. Set up a user agreement with the Georgia Tech IEN.
4. Attend orientation, safety, and equipment training.
5. Begin work.

National Nanotechnology Infrastructure Network

The Georgia Tech/NNIN site has dedicated expertise and facilities for a broad range of micro and nanofabrication and characterization projects, including focus on applications to biotechnology and biomedicine.

IEN Research Capabilities

The IEN Shared-User Laboratories provide researchers with high-quality and cost-effective access to advanced fabrication and materials characterization capabilities. The laboratories operate as an interdisciplinary, shared-user facility, and are available to Georgia Tech researchers from various schools and departments as well as to external users from other universities, industry, and government laboratories. The labs are open to all trained students, post docs, scientists, engineers, and faculty, and are used for both research and educational purposes.

Processes & Equipment Set

- Optical Lithography: Mask Production, Spin-Aligners, Mask Aligners, Spray-Coating
- Nano-Imprinting: E-beam Lithography, Nano Imprinter
- Thin Film Deposition: Thermal Growth, LPCVD, PECVD, ALD, Graphene, Carbon Nanotubes
- Etch Process: Wet Etching, Reactive Ion Etching, XeF2 Etching, Inductively Coupled Plasma Etching
- Metalization: E-beam Evaporation, Filament Evaporation, RFOC Spattering
- Packaging: Dicing, Bonding, Probe Stations, Lapping, Polishing
- Micro-scale Printing: Nano e-haller, Ink Jet Dispensing
- Imaging: TFM, SEM, AFM, FIB, X-Ray Tomography
- Laser Confocal Profilometry, Optical Microscopy
- Metrology & Microanalysis: Proflometry, Ellipsometry, Reflectometry, EDX, Tribometer, Mass Spectrometry, QCM-D, SPM, Particle Size, Raman, Contact Angle
- Black Magic: PECVD

nnin.org
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NANOTECHNOLOGY RESEARCH, EDUCATION, AND OUTREACH