

SECURING

MICROELECTRONICS SUPERIORITY

(ABOVE) Purdue University/John Underwood

Microelectronics research, workforce development and partnerships at Purdue University span from first principles to the factory floor.

The continued security and prosperity of the United States presumes access to the advanced trusted microelectronics embedded into systems that power defense, infrastructure, healthcare, industry and our homes. Purdue University leads the nation in areas ranging from fundamental and applied research to training a skilled domestic workforce.

FULL-SPECTRUM INNOVATION

- Atomistic simulation of materials and electronic and photonic devices
- Next generation information processing (probabilistic, quantum, and cognitive computing)
- Materials research (advanced semiconductor materials, nanomaterials)
- Reliable electronics (radiation hardening, standards and testing, failure analysis)
- Advanced packaging and heterogeneous integration
- Sustainable electronics
- Manufacturing and supply chain management
- Workforce development

(RIGHT) A student places solder balls on a BGA test board in the electrical materials lab. (Purdue University/Charles Jischke)

70+
COMPANIES

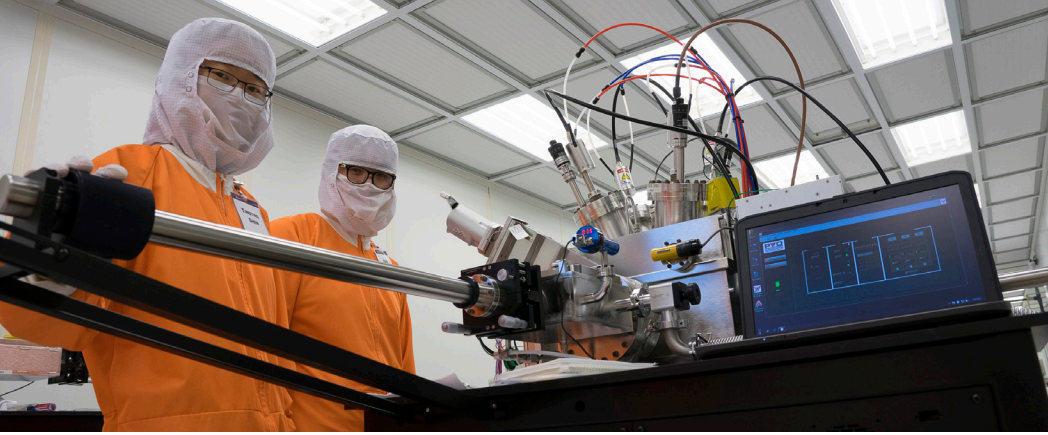
Partner with Purdue to advance
microelectronics research

250+

Postdocs, PhDs, graduate and domestic
undergraduate students specially trained in

MICROELECTRONICS





Researchers work on thin film deposition in the Birck Scifres Nanofabrication cleanroom at the Birck Nanotechnology Center. (Purdue University/Vincent Walter)

NATIONAL EXCELLENCE

Purdue centers, programs, and partnerships span the ecosystem in microelectronics research, design and manufacturing.

Center for Brain Inspired Computing (C-BRIC)

With \$32 million in funding from the SRC, C-BRIC delivers key advances in cognitive computing via next generation neuro-inspired algorithms and theory, neuromorphic computing fabrics and distributed intelligence.

Center for Heterogeneous Integration Research in Packaging (CHIRP)

Jointly run by Purdue and SUNY Binghamton University, the SRC-funded CHIRP addresses critical roadblocks to achieving “more than Moore” functionality by heterogeneously packaging advanced microchips. Founding members include ARM, IBM, Intel, NXP Semiconductors, Samsung and Texas Instruments.

NEW materials for Logic, Memory and InTerconnectS (NEW LIMITS)

Funded by the SRC, the NEW LIMITS develops synthesis, integration, and evaluation schemes for new materials to be applied in unique logic, memory, and interconnect applications to stretch the capabilities of conventional CMOS.

Center for Secure Microelectronics Ecosystem (CSME)

With funding from the U.S. DOD, Taiwan Semiconductor Manufacturing Co. (TSMC), and Synopsys, Inc. CSME enlists academia, industry and government to advance research and workforce development in designing secure microelectronics based on a zero-trust model.

Cooling Technologies Research Center (CTRC)

A graduated NSF Industry/University Cooperative Research Center funded by 64 industry members, sponsors and collaborators, CTRC addresses pre-competitive, longer-term research and development issues in the area of high-performance heat removal from compact spaces with an emphasis on the thermal management of electronic systems.

Purdue Quantum Science and Engineering Institute (PQSEI)

Investigating new materials and basic physical quantum systems best suited for integration into tomorrow’s technology. Research areas include atomic & molecular optics, solid-state quantum systems, quantum nanophotonics, quantum information & communication.

WORKFORCE DEVELOPMENT

Projects to train highly-skilled U.S. microelectronics experts for the defense sector.

Scalable Asymmetric Lifecycle Engagement (SCALE)

Led by Purdue and funded by the DOD, the preeminent U.S. program for semiconductor workforce development facilitates a different approach to training highly-skilled U.S. microelectronics experts.

Purdue Semiconductor Degrees Program

A suite of innovative credentials and degrees for graduate and undergraduate students enables a quick ramp-up of skilled talent for this critical industry.

Partnership with Ivy Tech Community College

A new partnership is developing corporate training programs, curriculum, outreach and job placement.

UNIQUE ASSETS

Birck Nanotechnology Center/ Scifres Nanofabrication Laboratory

One of the world’s largest and cleanest university cleanrooms, comprising 25,000 sq. ft. of bay-chase cleanroom (20% designated class 1, with remainder as class 10, 100 and 1000). Scifres includes facilities for lithography, etching, deposition, furnaces, ultra-pure water and a bio-cleanroom.

nanoHUB

The NSF’s leading online science gateway for 20 years serves more than 2 million annual visitors with numerical simulations, education and collaboration.

NEMO5

Leading semiconductor companies, including intel, have incorporated aspects of this atomistic nanoelectronics modeling and simulation tool into their investigations of advanced physics phenomena aimed at extending Moore’s law.