Georgia Tech

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$32 MILLION MICROELECTRONICS CENTER "OPEN FOR BUSINESS" IN KEY TECHNOLOGIES INCLUDING INTEGRATED OPTICS

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Photography Available

Researchers at the Georgia Institute of Technology believe a new 100,000 square foot addition to their Microelectronics Research Center will help position the Institute as a leader in areas becoming increasingly important to the U.S. electronics industry -- particularly electro-optics and integrated optics.

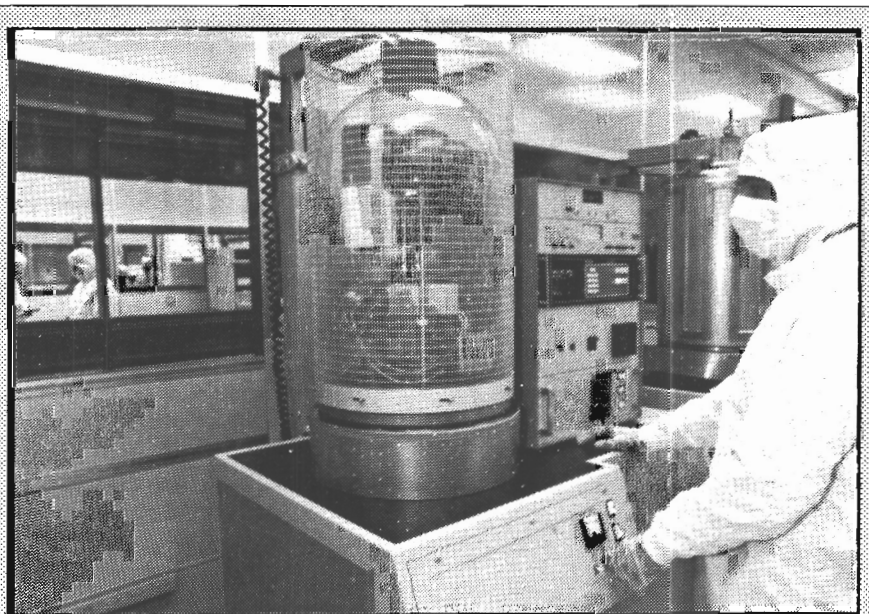
The new facilities were dedicated in January of 1990, and the first semiconductors were produced in July.

The new Joseph M. Pettit Microelectronics Research Center will also allow Georgia Tech to expand its research efforts in such areas as compound semiconductor materials, advanced silicon solar cells, superconducting thin films and wires, new semiconductor processing techniques and analog silicon circuits, said Center Director Dr. Richard Higgins.

"We are positioning ourselves for the 'next wave' in the electronics industry, which includes electro-optics and integrated optics -- devices which communicate to and from optical fibers," he explained. "Georgia Tech has developed basic strengths that make it possible for us to develop very fundamental new advances as well as practical applications in these areas."

Close ties with Tech's Manufacturing Research Center -- whose new building is now under construction -- provide a unique capability for both developing new technology and moving it into production. "There is a natural bridge between the two centers," Higgins noted. "We can fabricate new integrated circuits, and they can determine how to package and assemble them into reliable working equipment."

The Center is seeking partnerships with industry in a common effort to advance technological efforts that may be too costly or too risky for a single company to develop. The new building contains office space to house corporate researchers visiting Georgia Tech, and so far researchers from three major U.S. computer, communications and chip manufacturing companies have become Center residents.



A Researcher in Georgia Tech's Microelectronics Research Center operates a vacuum evaporator for metallization of semiconductor wafers.

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The new three-story building features a novel "photon corridor" for optical research and 7,000 square feet of clean room space, 40 percent of it ultra-clean Class 10. Also included is laboratory, office and conference room space for 40 researchers and 80 students.

The new building's facilities for making semiconductor chips will boost Georgia Tech's ability to study novel electronic devices and semiconductor materials, Higgins said. Researchers previously had to design their devices through computer-aided design tools, then send magnetic tapes containing the information to commercial chip foundries for manufacture.

"When you get into more exotic materials or combine electronics with photonics, you really have to have the circuit making under your control," he explained. "Having this capability in-house allows you to get into the process and fine-tune it to where you can really understand what is going on."

Researchers are already looking at ways of using electron wave effects to build smaller and faster circuits. They also hope to develop methods for carrying information through fiber optics at speeds approaching fiber capacity: a billion bits per second.

Optics laboratories in the new Center will share more than a million dollars' worth of laser equipment, thanks to a "photon corridor" through which researchers pipe laser beams.

Though new semiconductor materials such as gallium arsenide and mercury cadmium telluride are a major research interest because of their potential in integrated optics, Georgia Tech has not abandoned silicon. Tech researchers are developing high-efficiency solar cells which combine silicon with other materials, along with novel analog silicon devices based on neural networks for applications in instrumentation.

"If you are doing measurements," Higgins explained, "you have to do some manipulation of signals in an analog way. To increase the accuracy and lower the cost, neural network circuits are being incorporated into chip designs that can be trained by experience to higher performance after the semiconductor chips are fabricated."

Microelectronics research at Georgia Tech involves a number departments which work together through the Center. One team involves chemists, chemical engineers, physicists and electronics engineers in a project to improve semiconductor fabrication processes through a better understanding of fundamental reaction dynamics.

"The competitive future of microelectronics in the United States has to involve taking a look at the fundamental basis for microelectronics," said Higgins. "In the same way that hot type for newspapers is obsolete, a lot of microelectronics processing techniques need to be replaced -- especially as shrinking scales make existing empirical techniques obsolete."

The Center headquarters, named for former Georgia Tech president Dr. Joseph M. Pettit, was built and equipped with $15 million in funding from the State of Georgia. That state funding has so far been matched by more than $17 million in corporate and government support.

With the first processed semiconductor wafer emerging from the clean room in July, Center participants say they are now "ready for business" to boost Georgia's growing electronic industry and contribute to national industry-university research partnerships.

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