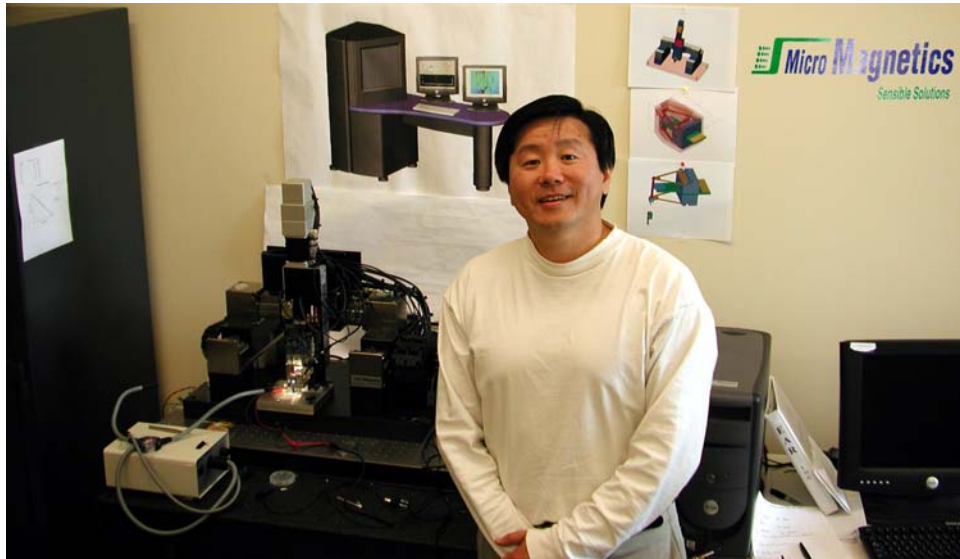


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By **Elizabeth Dinan**

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Dr. Gang Xiao compares his microscope technology to an X-ray machine. His nanoscale sensor scans a chip, revealing whether it is defective on the inside.

Micro Magnetics wins \$2M grant to start assembly of nanoscale sensors

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By **Elizabeth Dinan**

Dr. Gang Xiao has his own field of dreams. But instead of “if you build it, they will come,” the Brown University physics professor operates under the assumption that “as long as physics says we can do it, we can do it.”

It’s that thinking that has kept Xiao hard at work on the development of a nanoscale current sensing system for the inspection of circuits since beginning his research in 1995. It’s also the mantra that led the National Institute of Standards and Technology’s Advanced Technology Program (ATP) to award Micro Magnetics, the company Xiao founded in 1998, a \$2 million grant for further research to bring his technology to the assembly line.

As a simplified explanation of his complex science, Xiao compares his work to the invasion-free way an X-ray machine reveals images inside a human body. Like an X-ray machine, Xiao's patent-pending microscope technology reveals what's inside a chip without touching it.

Xiao's nanoscale sensor scans the surface of a chip while collecting a reading of the magnetic field it emanates. That information is fed into a computer where an image of the magnetic field is displayed, with color added to delineate varying spatial fields.

"It's really very beautiful," Xiao says.

Using physics, the map is converted into an electrical current density map, revealing whether the chip is defective. Current practice requires a hole to be made in a chip to locate defects.

Xiao's technology is now working on a small scale inside his lab, while he hopes the \$2 million federal grant will facilitate development of a microscope 10 to 50 times as powerful to be used in the chip manufacturing process. This means manufacturers will be able to spot defects or problems during the manufacturing process instead of after and that instead of a single sensor like the one in Xiao's lab, between 10 and 50 of them would be working in unison along an assembly line.

"It will save the industry hundreds of millions of dollars a year," he says.

While Xiao developed the technology and his name is on the patent application, that patent will belong to Brown University, where he developed it. He pays Brown a licensing fee through Fall River-based Micro Magnetics, located at the University of Massachusetts-Dartmouth Advanced Technology Manufacturing Center (ATMC). That gives the company exclusive rights to the technology, while the grant money is designated for research only.

Michael Sullivan is the director of business operations at ATMC, which partners with fledgling businesses, including Micro Magnetics, to spur economic development.

"When these companies succeed, we all succeed," he said. "We work with them to help them grow."

ATP funds projects with significant potential that are viewed as too risky for traditional venture sources. Xiao says he thinks the end result will have a national impact.

"The success of our research will help ensure that the U.S. semiconductor industry remains a significant component of our national economy," Xiao says. "The challenge is tremendous."