ASU at the heart of the state's revitalized microelectronics industry

ASU microelectronics research: Creating powerful technology and prosperity for Arizona

By Lisa Robbins, ASU News
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A stronger local economy, more reliable technology, and a future where our computers and devices do the impossible: that’s the transformation ASU is driving through its microelectronics research right here in Arizona.

The world runs on microchips — from your phone and laptop to cars, medical devices and even national defense systems. But for years, the U.S. has relied on foreign manufacturing for these critical components, leading to supply chain disruptions that have affected everything from car production to military readiness.

About this story

There's a reason research matters. It creates technologies, medicines and other solutions to the biggest challenges we face. It touches your life in numerous ways every day, from the roads you drive on to the phone in your pocket.

Arizona, once known for its copper and cotton industries, is now becoming a global leader in microelectronics, and ASU is driving the transformation. The university has expanded engineering programs, repurposed high-tech research facilities and helped attract billions of dollars in semiconductor investment to the state.

What does that mean for you?

Whether it’s ensuring that your next smartphone is made with cutting-edge materials right here in the state or strengthening national security with homegrown semiconductor production, here are some of the ways Arizona — and ASU — are securing America’s technological future.

Advanced packaging

If you've ever had a laptop overheat, a phone battery die too soon, or a smart device slow down over time, the problem isn't just the chips inside — it’s how those chips are “packaged” and connected. Right now, the U.S. lags behind in making chips work efficiently in smaller, more powerful designs.

A new national lab at ASU, funded by the federal government’s bipartisan CHIPS and Science Act, will be tackling that problem head-on. By advancing semiconductor packaging, researchers here will make future phones charge faster, medical devices last longer, and make the software and platforms we depend on, from AI systems to video streaming and gaming, run smoother.

A collaboration between ASU and Deca Technologies is revolutionizing how microchips are packaged and connected. Their research in fan-out wafer-level packaging allows for smaller, more efficient, and more powerful chips.

And ASU is one of the few universities in the country that is teaching advanced packaging to its students, creating the skilled workforce that’s desperately needed by the semiconductor industry.

International partnerships

The ASU research in this article was possible only because of the longstanding agreement between the U.S. government and America’s research universities. That compact provides that universities would not only undertake the research but would also build the necessary infrastructure in exchange for grants from the government.

That agreement and all the economic and societal benefits that come from such research have recently been put at risk.

Learn about more solutions to come out of ASU research at news.asu.edu/research-matters.

You've probably noticed that the price of everything is up: from cars that cost more and have electronic components that are hard to repair to more expensive appliances and increased medical costs caused by scarcity of cutting-edge medical equipment at hospitals. It's not just inflation — global microelectronics supply chain issues are driving up costs and creating shortages, and one of the biggest culprits is a lack of skilled workers.

And not all of that can happen in the United States. We need allies in other countries.

That's why ASU is partnering with Panama and institutions in Mexico to train the next generation of semiconductor experts, and working with the U.S. Department of State on a $13.8 million initiative to strengthen semiconductor manufacturing worldwide.

Energy and efficiency

Imagine a future where your smartphone charges in minutes or electric cars travel longer distances on a single charge. The new Materials-to-Fab Center at ASU, supported by a $200 million investment from industry giant Applied Materials, is poised to make these advancements a reality. By providing a platform where innovators can rapidly prototype and test new semiconductor technologies, the center accelerates the development of faster, more energy-efficient chips.

But the future of technology isn't just about faster devices — it's about smarter systems that work efficiently in the world around us. Right now, these innovations are held back by one major problem: microchips waste too much power. That's why Sarma Vrudhula, a professor of computer science and engineering, is designing new microchips and systems to power the next phase of the AI revolution with a $2 million grant from the U.S. National Science Foundation.

Space expansion

Every time you check the weather, use GPS or watch a live broadcast, you're benefiting from technology that was made possible by space research.

But what if space wasn't just a place where technology is used — but also where it's built? That's what ASU researchers are exploring: manufacturing semiconductors in microgravity to unlock new possibilities in chip design and production. These advancements pave the way for technology that shapes life here on Earth, from more powerful electronics to faster computing and innovations in clean energy and medicine.

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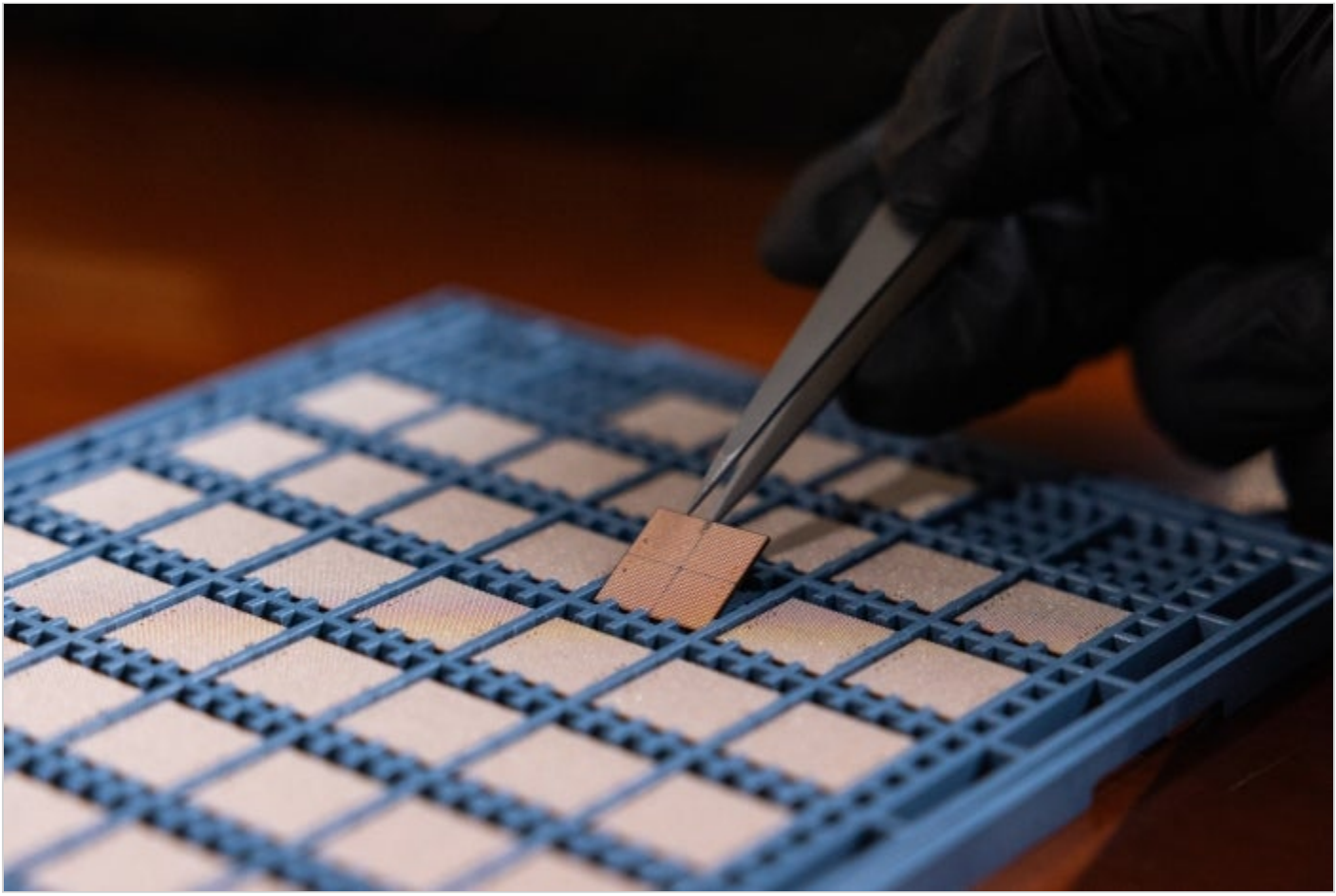
Main image



A processor test vehicle manufactured by Deca Technologies, an ASU partner focused on advanced packaging research and development, is shown at their corporate office in Tempe. Photo by Samantha Chow/Arizona State University