

Study aims to help semiconductor industry be more sustainable

ASU partners on research into bio-based material that could improve performance, sustainability in electronics

By Rithwik Kalale, ASU News
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A yearlong research project is looking into how a plant-derived material might improve the performance and sustainability of semiconductor technologies.

The study, a collaboration between [Cargill Bioindustrial](#) and Arizona State University that will be based at ASU's [Biodesign Institute](#), will research Cargill's [Priamine](#) product — a monomer (or single molecule) made using naturally occurring fatty acids.

Monomers can combine to form very large molecules called polymers, which make up everything from the proteins in your body to the polyester in your clothing.

“Cargill is a longstanding industrial leader in bio-sourced polymers, and their location in the Phoenix area coupled with our keen attention on the semiconductor industry represented an exciting convergence,” said [Tim Long](#), professor in the [School of Molecular Sciences](#) and director of the [Biodesign Center for Sustainable Macromolecular Materials and Manufacturing](#). “The opportunity to partner with a leading nature-inspired company to facilitate a molecules-to-manufacturing-to-marketplace platform is exciting!”

The research will explore the fundamental structure-property relationships of the material to identify what makes it work and how to improve it. According to Long, Priamine offers a unique combination of performance and sustainability due to its molecular makeup.

“Priamine is perfectly suited for polymerization into high-performance materials for phones, computers and electric vehicles,” Long said. He notes that its molecular structure “potentially delivers safer manufacturing processes, sustainability with resiliency and economic competitiveness.”

The collaboration is part of a broader push to design materials not just for performance but also to take into account their full life cycle.

“We all recognize the residual value of our mobile phones. How do we capture that value? How do we design materials to function in extreme environments but then ask them to return as a feedstock for next-generation products?” Long said. “The mobile phone in your junk drawer becomes gold!”

Cargill sees the project as a chance to validate and expand the application of Priamine in a fast-growing industry. This project will help researchers better understand the material's potential in advanced electronics and ultimately help customers solve real-world challenges.

“ASU is a premier research institution and a trusted partner in advancing polymer performance and sustainability for next-generation semiconductor materials,” said Bryan Danek, global business director of coatings and polymers at Cargill Bioindustrial. “We’re excited to collaborate with them to bring our shared vision to life. This partnership empowers Cargill Bioindustrial to deliver high performing, bio-based innovations that meet the evolving needs of our customers in this rapidly growing market.”

Arizona has emerged as a key player in U.S. semiconductor manufacturing, with more than 40 related companies expanding operations in the state since 2020. ASU has been deeply involved in supporting this growth through materials research, workforce development and partnerships with industry.

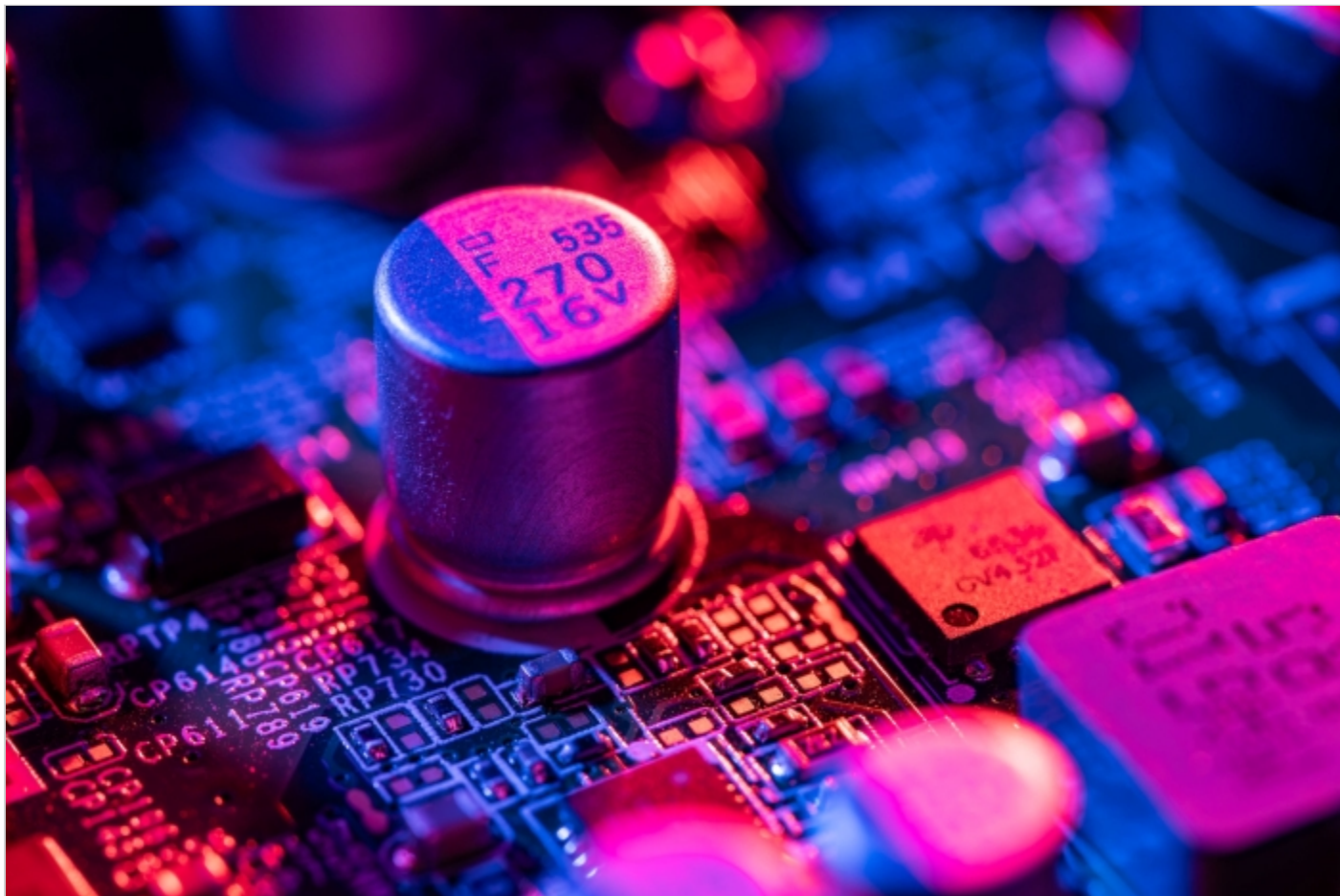
“University research plays a vital role in advancing the science and technology that underpin the semiconductor industry,” said Sally C. Morton, executive vice president of ASU Knowledge Enterprise. “As the U.S. cultivates investments in this industry, ASU’s ongoing research and workforce development are driving innovation and training the next generation of engineers and scientists.”

For Long, the Cargill collaboration also reflects his lab’s broader approach — combining fundamental science with real-world impact.

“ASU President Michael Crow has articulated that university researchers are the ‘[invisible hand](#)’ in technology. The program with Cargill demonstrates our passion to advance their technology, create new products and train the next-generation workforce, leading to U.S. leadership in semiconductor manufacturing,” Long said.

This story originally appeared on [ASU News](#).

Main image



Capacitors on a motherboard. Photo by Chris Goulet/Arizona State University

Text image(s)



Tim Long, professor in the School of Molecular Sciences and director of the Biodesign Center for Sustainable Macromolecular Materials and Manufacturing. Photo courtesy of ASU's School of Molecular Sciences