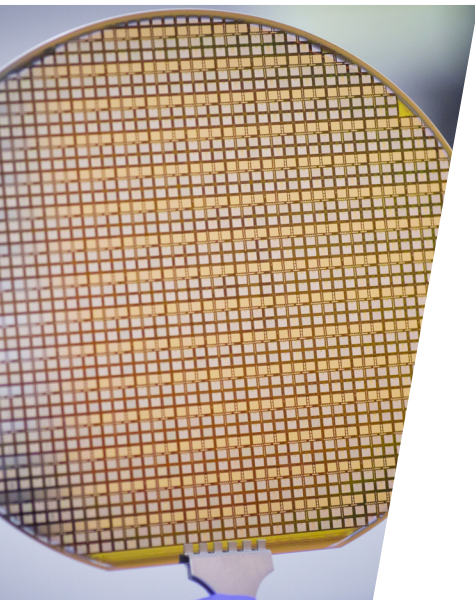


ACCELERATING THE NEXT GENERATION OF POWER ELECTRONICS

PowerAmerica, a Manufacturing USA® institute, is making smaller and more energy-efficient power electronics using wide bandgap semiconductor technology, with the goal of making this technology affordable and accessible to all U.S. manufacturers and consumers.

Manufacturing USA, a public-private partnership with 14 manufacturing institutes across the nation, connects companies, academic institutes, non-profits, and local, state, and federal entities to solve industry-relevant advanced manufacturing challenges in new technology areas with the goals of enhancing industrial competitiveness and economic growth and strengthening national security.



Technology Focus Area

Conventional silicon-based electronics cannot reach the high voltages, frequencies, and temperatures needed for many of today's critical applications. **Wide bandgap semiconductors, which are made from silicon carbide and gallium nitride, have the capacity to meet these needs.** Smaller and more energy-efficient, these semiconductors are suitable for compact power adaptors for consumer electronics. They also increase efficiency in vehicle charging systems and industrial motors, provide more effective energy conversion and distribution for the electric grid and for renewable energy systems, and improve the efficiency of power supplies for data centers.

Approach to Innovation and Collaboration

PowerAmerica brings together partners from industry, academia, and government to transition this technology from the lab to products, directly impacting system-level efficiencies. This is done through:



Demonstrations and **projects** to scale technology innovations and applications



Networking and promotion to share tested benefits to engineers and **accelerate the transition of silicon-based systems to wide bandgap technology**



Training in the design, production, and application of wide bandgap power electronics through university partnerships and short courses for professional development

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Raleigh, North Carolina

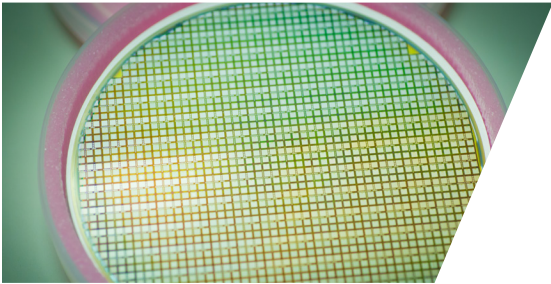
919-515-6013

poweramericainstitute.org

COLLABORATIVE PROJECT EXAMPLES

“Through our collaboration with PowerAmerica, we believe our silicon carbide technology work has been advanced by five years.”

– Brij Singh, Sr. Engineer, John Deere



PRESiCE™: Researchers from North Carolina State University introduced a new manufacturing process and chip design for silicon carbide devices, which will enable companies to more quickly use the X-Fab silicon carbide production line and more readily incorporate these devices into their products. This saves start-up cost and time and expedites commercialization of silicon carbide devices.

PRODUCING NEW SIC PRODUCTS AT THE FIRST U.S. OPEN FOUNDRY: The lack of cost-effective silicon carbide devices limits widespread adoption in commercial power electronic applications. Monolith Semiconductor, a Texas startup and PowerAmerica member, perfected a process to manufacture silicon carbide power MOSFET's and diodes at the X-FAB Texas silicon carbide foundry. Last year, the company successfully released both products to market through its majority investor, Littelfuse, Inc.

ELECTRIC VEHICLE FAST CHARGER: Commercially available electric vehicle chargers require large transformers that are expensive to install in densely populated areas. This project eliminates the need for the large transformer by connecting the charger directly to the power company's distribution power lines, which operate at much higher voltages than the low-voltage lines used for connecting customers to the utility. Directly using higher voltages reduces installation costs. In addition, the use of silicon carbide devices for the charger design cuts power conversion losses in half, and allows for a prototype that is ten times smaller than the current state-of-the-art fast charger.



AGILESWITCH EVALUATION SYSTEMS: Working through a PowerAmerica project, AgileSwitch has developed a new type of intelligent power module evaluation kit that enables commercial, industrial, and research organizations to immediately evaluate and incorporate power silicon carbide devices into existing applications. The kit delivers improved performance and cost-savings compared to conventional gate drive technology.

“PowerAmerica provides an example of a successful private-public partnership. The institute is a unique model of collaboration that connects people, ideas, and technology to solve advanced manufacturing challenges that ultimately enhance economic competitiveness and strengthen national security.”

– Captain Frank Fatcher, Lead, Advanced Manufacturing Industry Study, National Defense University