

**Abstract:**

**Non-Technical:** With previous funding support from NSF, silicon carbide (SiC) Schottky barrier diodes which can operate reliably at 600 °C have been developed. This I-Corps Team project seeks to investigate the commercialization potential of Schottky diodes capable of operating at temperatures in excess of 600 °C. Schottky barrier diodes are used in wireless technologies for commercial and military needs, high efficiency switches for power distribution, sensors, photovoltaic inverters, and in the automobile industry. Schottky barrier diodes made from SiC currently available commercially are limited to operating temperatures below 300°C. It is widely accepted that the development of electronic systems capable of high temperature operations above 300°C, without the need for cooling, is a critical technology for current and future applications. The ability to operate electronic components in harsh conditions advances technology across a broad spectrum of applications. Our new technology is poised to expand the innovation boundaries set by current temperature limitations. If successful, this could lead to commercialization of other electronic components. Target applications include power systems for oil-drilling, automotive, aerospace and space exploration.

**Technical:** The goal of this project is to determine the commercialization potential of Schottky diodes capable of operating at temperatures in excess of 600 °C. The innovation in our technology comes from the materials used as the metal contacts (refractory metal borides and nickel gallide) as well as the unique processing techniques employed. This process removes deleterious but inherent oxides that form at the interface. This technology can also be extended to fabricate transistors with similarly improved high temperature reliability. The new technology could lead to the reduction or complete elimination of expensive cooling systems in high temperature electronics operation. This will allow new efficient design concepts with less weight, less volume and improved performance and reliability. The resulting cost and energy saving will be a direct positive impact to the environment and society. Further impact is realized in the opportunity of training it offers both to the PI and the Entrepreneurial Lead in conducting necessary out-of-laboratory research to gain understanding on customer needs in relation to new technologies as a prelude to making smart decision regarding commercialization ventures. Funds from this I-Corps Team project will enable assessment of interest among the electronics community addressing our target markets. This project offers opportunity to further our understanding of the market opportunity for the technology. The workshops and interviews will help us gain perspectives on the target customers and thereby lead us to either a licensing pathway, a spin-out SBIR/STTR pathway for further development, or a commercial partnership to accomplish both. Since the scope of the opportunity is rather wide, we will use information gathered from this project to prioritize the deployment of limited resources towards sectors that offer the highest probability of commercial success.