



Endevco Corporation Licenses Three NASA Patents to Enable a New Line of High-Temperature, Harsh-Environment Silicon Carbide Pressure Sensors



In October 2007, Endevco Corporation licensed three patents covering two technologies from NASA's Glenn Research Center that will enable it to jump start a new line of high-temperature, harsh-environment pressure sensors. By leveraging NASA's technology, the time-to-market for Endevco's new product line can be significantly reduced. Additionally, once Endevco has completed its product development, NASA can purchase the finished product for use in aeronautic, space, and planetary missions, thereby saving development time and reducing mission cost. The new silicon carbide (SiC) pressure sensors will offer significant advantages including reduced cost, increased device lifetime and robustness, and a simplified fabrication method.

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Benefits of Technology Transfer

- Endevco's new sensors will enable these robust silicon carbide (SiC) pressure sensors to be inserted in closer proximity of jet engine combustion chambers, thereby leading to increased accuracy in pressure measurement needed for more accurate validation.
- The reduction in production costs through simultaneous manufacturing of multiple sensors on a single SiC wafer will give Endevco a significant advantage over other manufacturers.
- The production of these sensors will open up opportunities for use in commercial aviation, military aviation, oil and gas drilling, missiles and fuses, space exploration, land- and sea-based vehicles, and power generation (nuclear, gas and steam turbines, geothermal, and coal gasification).
- NASA will benefit both from royalties from Endevco's sales and through purchasing the sensors for more accurate code validation.

SENSORS

On the Record

“The significant advantages of this innovation are very exciting. We are in the process of transferring the NASA SiC process into our MEMS manufacturing operation in Sunnyvale, with product availability for field testing in high-temperature applications targeted for late 2008. We have also formed partnerships with companies that have an immediate need for this breakthrough technology.” — *Scott Silcock, President, Endevo*

“The transfer of technology to industry is a significant part of NASA’s heritage and charter. We actively seek companies such as Endevo that have the ability and desire to bring NASA innovations to market.”— *Kathleen Needham, Chief, Technology Transfer and Partnership Office, NASA’s Glenn Research Center*

About Endevo

Endevo, a division of Endevo Corporation, a Meggitt Group company, is a leading designer and manufacturer of dynamic instrumentation for vibration shock and pressure measurements. In 2006, the company expanded both the size and technical capabilities of its microelectromechanical systems wafer fabrication facility in order to add controls and equipment to support advanced designs and enable high-temperature and harsh-environment products.

Technology Origins

The technologies include a packaging technique and chip fabrication method developed by a team led by Dr. Robert Okojie at Glenn for use in aircraft engine combustion chambers. SiC exhibits excellent thermal and mechanical properties at high temperature and fairly large piezoresistive coefficients, which makes it well suited for high-temperature electromechanical sensors. However, the lack of reliable device packaging methodologies for this operating environment has largely prevented the application of these devices. As a result, the anticipated introduction of SiC devices into high-temperature environments has not been achieved.

By solving the packaging issue and also developing a way to make fabrication significantly less expensive, Dr. Okojie and his team have paved the way for improved testing of jet engines and many other harsh-environment sensor applications including commercial aviation, military aviation, oil and gas drilling, missiles and fuses, space exploration, land- and sea-based vehicles, and power generation (nuclear, gas and steam turbines, geothermal, and coal gasification).

The Transfer Process

In 2000, Glenn performed experiments in collaboration with the U.S. Air Force Research Laboratory Munitions Directorate at Eglin AFB and Cornell University using an Endevo silicon-based accelerometer as the benchmark to validate the Glenn SiC high-g accelerometer. The test results showed the NASA device operated as well as the Endevo benchmark device but with the advantage of operating at much higher temperatures. This peaked Endevo’s interest and led to further discussions with Dr. Okojie about these new methods for packaging and chip fabrication. After numerous visits to Glenn to see the technology first hand, a license for three patents was signed in October of 2007.

Gearing Up for Commercialization

Okojie will continue to work with Endevo to assist in overcoming any outstanding technical issues with the licensed technologies. Endevo’s initial focus will be on the development and marketing of a high-temperature media-isolated pressure sensor. Media-isolated pressure sensors are required for critical pressure measurements in harsh applications where exposure to the pressure media can cause premature sensor failure. The sensors are incorporated in these applications to measure absolute, gauge, sealed gauge, and differential pressures.

For More Information

For more information about this and other technology licensing opportunities, please visit:

Technology Transfer and Partnership Office

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