SBIR/STTR SUCCESS

The STJ X-ray Spectrometer is the culmination of several SBIR awards through the Department of Energy.

STAR CRYOELECTRONICS

X-ray spectroscopy is a widely used experimental technique for studying the composition and chemistry of materials and is used across a broad range of scientific fields including condensed matter physics, materials science, chemistry and biology. Through a current Phase IIB grant with the Department of Energy, STAR Cryoelectronics is developing a complete, turnkey X-ray spectrometer that will be easy to use by researchers at synchrotron facilities, both in the U.S. and abroad, for X-ray absorption spectroscopy (XAS).

PHASE III SUCCESS
$6 million through commercial and government contracts; customer base is approximately 60% commercial and 40% government

AGENCIES
DOE, NASA, DOC (NIST)

SNAPSHOT
New Mexico-based STAR Cryoelectronics has branched out from developing superconducting sensors for NASA to assisting the Department of Energy with the development of a high-resolution X-ray spectrometer for use by researchers at synchrotron facilities in the U.S. and overseas.

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The company has also developed a second type of spectrometer through SBIR grants with the Department of Commerce for X-ray microanalysis in conjunction with a scanning electron microscope. This machine combines the ease of use of conventional energy dispersive spectrometers with the high-energy resolution of wavelength dispersive spectrometers into one instrument, allowing researchers to more efficiently and more accurately analyze samples on a nanometer scale. This new 2-in-1 X-ray spectrometer, named the MICA-1600, will meet compelling needs for improved tools for X-ray microanalysis, in particular for the semiconductor industry.

“We got our start in 1999 with the help of several SBIRs from NASA to develop our superconducting sensors and related control electronics products,” said Dr. Robin Cantor, President and Founder of STAR Cryoelectronics. “Over the years, with the help of the SBIR program, we have branched out beyond our core technology infrastructure and leveraged that infrastructure to develop full turnkey systems.”

When Cantor decided to start the company, not many others shared his vision at the time. Cantor worked for Conductus Inc., a California company that specialized in superconducting electronics applications including SQUIDs – Superconducting Quantum Interference Devices. As the Manager of the SQUID Technology Group, Cantor was passionate about his work, but corporate officials decided to focus on more mainstream application areas that had much larger perceived market potential, and ultimately dropped the SQUID division from its platform. Cantor took a job as a technical staff member at the Los Alamos National Laboratory (LANL), but never lost sight of his goals. A year later, Cantor decided to buy that defunct division from Conductus, knowing there would be a customer base for the products, and believing that he could grow the business. Seventeen years later, the supply chain has matured and Cantor and STAR are selling devices and offering custom services to customers around the world.

STAR Cryoelectronics' MICA-1600 installed on a scanning electron microscope.

The ultra-sensitive SQUID sensors available from STAR Cryoelectronics are based on Low-Temperature Superconductor and High-Temperature Superconductor technologies. An extensive range of standard and custom SQUID sensors and packaging options is available for applications in biomedical imaging, non-destructive testing of materials, geophysical exploration, and basic research. The company's dc SQUIDs and advanced PC-based SQUID control electronics products – sold under the name pcSQUID™ - are in use at major universities, government and corporate research laboratories in the U.S., Europe, Asia and Australia for a variety of basic and applied research applications.

Supplementing this technology is Mr. SQUID®, the Educational Demonstration System for Superconductivity, which has been sold to over 300 colleges and universities worldwide.

Although the company does have a handful of competitors around the globe, Cantor attributes the success and competitive advantage of the company to the SBIR program and the company's location.

"We are fortunate enough to be located right by two of the best national laboratories in the country – Sandia National Laboratories and Los Alamos National Lab; both of which have small business assistance programs that we have relied on over the years for technical support and assistance," adds Cantor. "As a small company, we can't afford to develop the infrastructure that is available at these labs, so having these small business assistance programs has been invaluable to us – we would not have been able to compete in the world market otherwise."

Cantor adds that many of his overseas competitors also have national labs in their home countries, and they use these labs for commercial production. Having access to the expertise at LANL and Sandia helps level the playing field.

In the commercial marketplace, STAR continues to sell superconducting sensor components, readout electronics and various accessories that were all developed under its original SBIR projects with NASA. The company is also doing business in the biomedical imaging industry, providing thousands of sensors for sophisticated brain imaging systems to record and localize the magnetic signals associated with neuronal activity in the human brain. This magnetoencephalography system is an essential tool for mapping functional brain activity and may be superposed with MRI data in order to correlate the localized activity in the brain with anatomical information, providing doctors with essential data for pre-operative surgical planning.

STAR currently employs seven individuals at its headquarters in Santa Fe, and all final assembly, testing, and system integration are done in-house. With the application range for sensing products quite large, STAR Cryoelectronics has a busy few years ahead in developing new types of sensors and continually improving its component product line. With a collaboration with the University of New Mexico to develop a new class of X-ray detectors and ultra-high resolution cryogenic thermometers, STAR is an exemplary small business success, both in the state of New Mexico, and far beyond its borders.