Block MEMS LLC

Core Business Areas/Focus:

Block is a leading development, engineering and manufacturing company focused on the commercialization of high-performance Quantum Cascade Lasers (QCLs) and FTIR spectrometers. Block has been awarded numerous government contracts over the past decade for the application of its technologies toward the detection of explosives, buried IEDs, chemical warfare agents, toxic industrial materials and chemical clouds. Block's PORTHOS™ is a person-portable, passive FTIR spectrometer system that remotely detects chemical threats as fare as three miles and provides early warning of chemical warfare agents. LaserWarn™ is a QCL-based system that is used to provide early warning against chemical attacks by establishing a "chemical trip-wire" using eye-safe laser beams. It is also used for safety, environmental, and fence-line monitoring of toxic and fugitive gases over a large area. Block's unique QCL-based analyzers include the LaserSense™ Gas Analyzer for the detection and quantification of a wide variety of gases for process control and field applications in the oil, gas and energy industries. The LaserTune™ product line of QCL-based Infrared Sources is used for corporate research and academic markets and OEM applications.

R&D Highlights/Projects:

Over the past eight years Block has been awarded over $30 million in government R&D contracts pertaining to the development and use of quantum cascade lasers. Initial contracts were SBIRs including phase 2 and several extensions. Those were followed by two $5 million+ contracts from JIEDDO for standoff explosives detection and a $2 million contract from NAVEOD for explosive detection.

Recently Block was awarded an IARPA program called "Standoff Illuminator for Measuring Absorbance and Reflectance Infrared Light Signatures" (SIMARILS); Program Manager Kristin DeWitt. The contract value is $10.7 million. The program is managed by the U.S. Air Force Research Laboratory at Wright-Patterson Air Force Base, Ohio.

About a year ago Block was chosen for Phase II of this contract in a competitive down-selection process. Block successfully demonstrated the ability to detect trace quantities of explosives and other threats on multiple surfaces at 1- and 5-meter standoff distances in a few seconds using high powered QCLs and a focal plane array. A critical achievement involves innovative chemical detection algorithms that combine powerful data processing techniques, simulations of light/material interactions, and modeling of anticipated detected signatures in order to eliminate the effect of clutter, reduce false alarm rates and improve limits of detection. This technology is particularly applicable to border security to detect drugs and explosives.

A few months ago, Block was also awarded a $3.5 million contracts as a team member for the DARPA Sigma+ program to deploy its QCL standoff detection system to detect suspicious gases on the move in an urban environment.

Technical Expertise:

Block is located in a modern office/laboratory building with a total floor space of 17,000 square feet in Southborough, MA. The building houses sales and manufacturing facilities, engineering offices, laboratory, gas mixing and testing equipment, prototype fabrication and test facilities. The equipment and facilities are specifically for the development, manufacture and sale of custom and off the shelf spectrometers and their key subsystems.

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The laboratory and protype test facilities support Block expertise in the infrared optics, calibration, and electronics, software and field test support such as full thermal environment testing. Block is the leading provider of mid infrared widely tunable quantum cascade lasers for safety and security applications.

Block is also developing sophisticated artificial intelligence deep leaning algorithms as a new technique to do chemometrics. Block has demonstrated in complex gas sensing applications the superiority of its AI algorithms versus classical partial least square techniques. The key to the use of these AI algorithms is Block's innovation in developing data augmentation techniques to feed the intensive training required by deep learning algorithms.

Block also sells a number of TRL 8-9 products including its Porthos™ man portable passive FTIR, LaserWarn™ QCL, based active standoff gas detection system and its LaserTune™ CQL laser sources for research and OEM applications.