

Air Force

SBIR

Impact



Major Improvements Developed for High- Performance Infrared Focal Plane Arrays

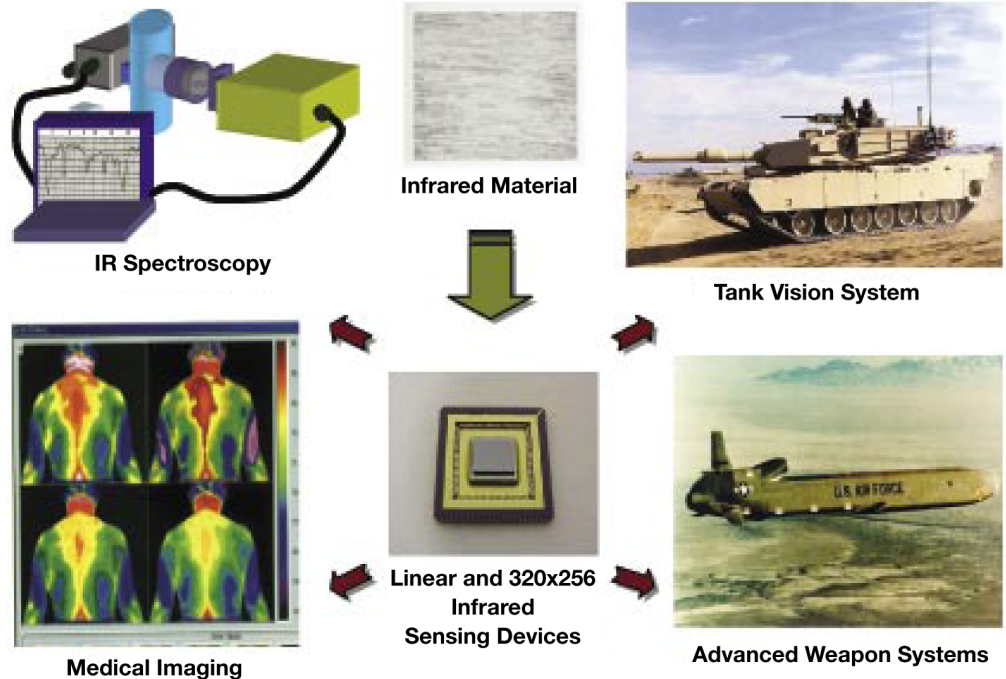
Company:
Fermionics Corporation

Location:
Simi Valley, California

Employees:
30

President:
Peter C.C. Wang

Project Officer:
Ron Bishel,
Arnold Engineering
Development Center,
Arnold AFB, TN



Air Force Requirements:

High-performance infrared Focal Plane Arrays (FPA) are vital for advanced Air Force weapon systems such as the Space-Based Infrared System (SBIRS) and for laboratory testing using spectroscopic analysis. The Air Force sought FPAs fabricated using high-quality mercury-cadmium-telluride (HgCdTe) semiconductors. After two decades of R&D efforts, the production yield of fabricating these HgCdTe infrared FPAs remains unacceptably low. As a result, the cost of an FPA is high and the delivery lead-time is too lengthy.

SBIR Technology:

Working with the Air Force under a Small Business Innovation Research (SBIR) Program Phase II, Fermionics scientists designed a program to address the material issues in order to improve the yield of producing the HgCdTe FPAs. Based on experimental data and theoretical predictions, a number of defects in the HgCdTe existing semiconductors were discovered. Company scientists then engineered a series of processes to minimize the densities of these defects. As a result, the quality of the semiconductor improved drastically.

**For more information
on this story, contact
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In three years, short-wave, mid-wave, and long-wave HgCdTe linear arrays and two-dimensional focal plane arrays in the 320x256 format have been successfully produced. At the conclusion of the contract, two cameras in different wavelength bands were delivered to the Air Force.

Company Impact:

The technology developed under this program found immediate military and civilian applications. In the military arena, the new linear long-wave HgCdTe arrays are currently used in tanks for command control, in smart bombs for identification, and in advanced missiles for searching and tracking. In the civilian application arena, the mid-wave HgCdTe detectors are used for medical imaging and the 320x256 short-wave arrays are finding their applications in paper automation machines. The combined company revenue resulting from this technology already exceeds half a million dollars. In addition to the infrared applications, the improvement in CdZnTe, a sister material of HgCdTe, allows Fermionics to enter the gamma ray detector field. The total amount of government R&D contract awards to date on the gamma ray detector is near one million dollars and the amount of pending proposals to the US government is over three million dollars.

Company Quote:

"The SBIR program has enabled us to examine closely critical parameters in HgCdTe and advance our understanding on the complex issues of defects that are important in yielding high-performance infrared focal planes. In partnership with the Air Force through the SBIR program, we have established the necessary technology base for producing improved infrared sensors and arrays. The new products will advance civilian infrared applications and also add the capability to our national defense against threats from terrorists, drug trades and other hostile activities."

Peter C.C. Wang
President
Fermionics Corporation

Air Force SBIR Project Officer Quote:

"High operability HgCdTe focal plane arrays are needed to extend the wavelength range of infrared imaging systems such as infrared cameras. These focal plane arrays have various uses within the Air Force, and in particular at AEDC, such as infrared signature measurements of threats, verification of infrared suppression technologies in military aircraft, and near ambient thermal imagery for leak detection. Ultimately, we expect to incorporate a long wavelength FPA in a hyperspectral imagery system now being developed at AEDC. This device will further Air Force capabilities to accurately acquire background subtracted infrared images of threats which is presently very difficult and time consuming."

Ron Bishel
AEDC/DOT

SBIR

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