Air Force SBIR/STTR

Innovation

Air Force SBIR/STTR Innovation Story

SBIR Topic Number:
AF06-267

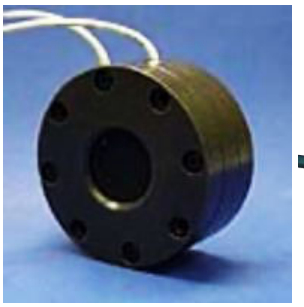
SBIR Title:
Tunable Spectral Response in Space-Based Systems

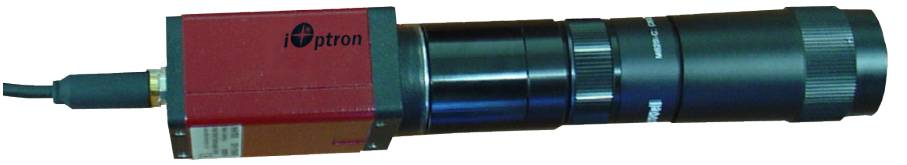
Contract Number:
FA9453-07-C-0047

SBIR Company Name:
Boston Applied Technologies, Inc., Woburn, MA

Technical Project Office:
AFRL Space Vehicles Directorate, Kirtland AFB, NM

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR/STTR technology that met topic requirements and has outstanding potential for Air Force and DoD.





Left: Hyperspectral filter. Right: Camera with BATi's tunable filter.

Focal Plane Array with Arbitrary Tunable Spectral Response

- The Air Force needs a focal plane array with a spectral response tunable across a broad range of selected wavebands, with different sets of simultaneous wavebands emphasized for different target and scene spectra
- Boston Applied Technologies, Inc. (BATi) developed, built, and tested a composite focal plane array (FPA) device with an arbitrary tunable spectral response, which is capable of covering the whole midwave infrared (MWIR) range
- The developed device, with its capability of arbitrary tunable spectral response, can be used for target detection and reduced false alarm rate
- For both military and commercial applications, remote sensing of chemical and biological signatures (for weapons detection or environmental monitoring) would benefit greatly from a detector with a tunable spectral response

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Air Force Requirement

The Air Force is looking for technologies that make a sensor system reconfigure itself to exploit signals across a broad wavelength range from visible to longer infrared with a single detector or detector array in order to have substantial savings in cost, weight, and power consumption.

The system could support space situational awareness missions such as space object detection and identification, target discrimination, target status determination, or surveillance missions such as plume-to-hard-body handover, surveillance through clouds, chemical/biological weapons detection, and would be assured of operation 24 hours/day, 7 days/week, in all weather conditions and at very long distances.

SBIR Technology

Boston Applied Technologies, Inc. (BATi) developed, built, and tested a composite focal plane array (FPA) device with an arbitrary tunable spectral response, which is capable of covering the whole midwave infrared (MWIR) range. The key component is a large aperture electro-optical tunable filter that is made from a transparent OptoCeramic® (OC) material. The tunable filters can perform very fast (sub-millisecond) reconfiguration on spectral response.

Filters with aperture from millimeters to inches are available for U.S. customers. These filters can work with many FPA devices for rapid reconfiguration of spectral response. The working range covers from visible to MWIR up to 7-microns.

Potential Air Force Application

The developed device, with its capability of arbitrary tunable spectral response, can be used for target detection and reduced false alarm rate. In particular, spectral regions where the background scene is bright relative to the target could be excluded. In its most simple two-waveband embodiment, a tunable spectral response could be configured to emphasize different grayscale temperatures, thereby providing useful remote temperature probes for critical applications that run the commercial gamut from detecting heated brake systems (trucking and railroad industries) to heat sources caused by defective circuitry in semiconductor manufacturing.

In addition, for both military and commercial applications, remote sensing of chemical and biological signatures (for weapons detection or environmental monitoring) would benefit greatly from a detector with a tunable spectral response.

Company Impact

The tunable optical filters developed in this SBIR program extended the application of BATi's electro-optic ceramic materials technology to MWIR. The company is structured and organized to commercialize successful product concepts. BATi is ready to produce and market the high speed tunable optical filters and related technologies.

BATi was formed in 2002 by the key management and technical team formerly with Corning Applied Technologies (CAT), a subsidiary of Corning Incorporated. The mission of BATI is to develop and manufacture novel materials-based devices for emerging photonic/electronic markets.

U.S. AIR FORCE

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