Infrared Imaging News

Volume 13 Issue 6 June 2007

The Status of Novel Uncooled Sensors

Uncooled infrared focal plane arrays based on vanadium oxide and amorphous silicon micro-bolometers are now well established. In addition, hybrid ferroelectric BST FPAs have been available for more than 12 years.

The success of these uncooled infrared FPAs in opening new markets and in displacing cooled sensors in less demanding applications has brought about a flurry of research activity to develop even higher performance and less expensive uncooled sensors.

More then ten groups worldwide are developing novel uncooled sensors of various types. Several of these presented their latest results at the recent SPIE Infrared Technology & Applications conference.

Multispectral Imaging, Inc., MII, Parsippany, New Jersey, reported on progress in developing bi-material microcantilever arrays whose capacitance changes due to heating by absorbed infrared radiation.

The company's most recent FPAs, 160 x 120 arrays with 25 µm pitch, were fabricated on 8" CMOS wafers at the Cornell Nanoscale Science and Technology Facility (CNF).

Operabilities ranged from 80% to over 95%. However, the company expects this to improve when it transfers the process to its partner, **Dalsa Semiconductor**, which has a much cleaner and reproducible fabrication environment.

The company demonstrated images of FPAs to which non-uniformity corrections had been applied. Row and column defects are present in around 5% of the arrays that have been examined so far.

The measured NEDTs are currently around 1K, which is worse that the 14 mK modeled NEDT. The excess noise is believed to be due to clock noise feed-through and efforts are underway to reduce it drastically.

[Editor's notes: The various programs in novel uncooled detector development vary significantly in their level of maturity. Some of the more advanced programs, such as **MII** and **Redshift** had fully expected to show operating modules with acceptable levels of performance.

The fact that this was not achieved indicates that there is still a steep learning curve in uncooled – a lesson that the original developers of VOx microbolometers remember well from the 1990s.]

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Volume 13 Issue 9 September 2007

Multispectral Imaging Improves Performance
Of Microcantilever Arrays

Multispectral Imaging, Inc., MII, Parsippany, New Jersey, is making significant progress in the performance of its uncooled bi-material microcantilever arrays.

The company recently achieved thermal sensitivities of 150 mK in its laboratory prototypes and expects to provide evaluation samples to a few customers later this fall. Later this year, the company expects to obtain manufacturing prototypes with performance in the 50 mK range.

The company's laboratory prototypes are made at the Cornell Nanoscale Science and Technology Facility (CNF) on 8" wafers.

For production, the company is transferring the laboratory process to its partner, **Dalsa Semiconductor.**

[Editor's notes: **MII** recently closed the final tranches of its series B financing, bringing the total venture capital investment in the company to a little more than $10 million. The financing included participation of all of the company's earlier investors: Battelle Ventures, Innovation Valley Partners, Spencer Trask, SAS Investors, and Rho Ventures. This investment is expected to take the company through prototypes and initial production. Additional funds will be raised early next year for volume production and company expansion.

The company's initial product is expected to be a 160 x 120 array with 25 µm pitch]

MII Note:

The company's first product will be a 160 x 120 imaging array with 50 µm pitch pixels. MII has an active development program to develop 25 µm pitch pixel arrays which is partially supported by the Army's Night Vision Labs as reported in Multispectral's presentation at the Defense Science and Technology Symposium earlier this year. (The published paper from this presentation can be found on the company web site.)