Optical functions integrated onto a mid-wave infrared infrared dectector

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ABSTRACT

In the past century, optical functions were integrated onto the visible detectors. Nowadays, most of the visible detectors used for imagery are characterized by a large format, a small pixel pitch and RGB (Red-Green-Blue) filters.

In the infrared bands of interest, the mid-wave infrared range (MWIR) can be divided in two sub-bands. The wavelengths associated to the MWIR blue band are ranging from 3.6 up to 4.2 µm and the red band from 4.6 up to 5.1µm.

LYNRED is developing a new technological brick to integrate two optical functions onto a MWIR focal plane array. The objective of these optical functions is to increase the accuracy of detection minimizing the false alarms. These optical functions are realized onto the FPA like a chess board. On one hand, half of the pixels are using an antireflective coating. On the other hand, the other pixels are filtered with a high pass filter. As a consequence, the first type of pixels has the ability to detect photons in the entire MW spectral range whereas the others are able to detect in the red band only.

LYNRED presented Daphnis, its latest 10 µm pitch product family. Both Daphnis XGA and HD720 are 10µm pitch (MWIR) focal plane array. Development of small pixel pitch is opening the way to very compact products with a high spatial resolution. This new product is taking part in the HOT technology competition allowing reductions in size, weight and power of the overall package.

As a consequence, the optical functions were integrated on a Daphnis FPA. We will show that the main road block, the crosstalk, of such technology is clearly minimized thanks to the outstanding Modulation Transfert Function performance of the Daphnis 10µm pitch product. This paper presents the recent developments achieved at LYNRED to make a colored MWIR 10µm pitch HgCdTe focal plane array. A full set of characterizations is presented in order to assess the operational opportunity of this new filtered pixels technology.