SPIE Defense + Security, Conference 9819
Infrared Technology and Applications XLII
Monday - Thursday 18 - 21 April 2016
Paper 9819-35

State of the art of AIM LWIR and VLWIR MCT 2D focal plane detector arrays for higher operating temperatures

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Abstract

Cryogenically cooled $Hg_{(1-x)}Cd_xTe$ (MCT) quantum detectors are unequalled for applications requiring high imaging as well as high radiometric performance in the infrared spectral range. Compared with other technologies they provide several advantages, such as the highest quantum efficiency, lower power dissipation compared to photoconductive devices and fast response times, hence outperforming micro-bolometer arrays. However, achieving an excellent MCT detector performance at long (LWIR) and very long (VLWIR) infrared wavelengths is challenging due to the exponential increase in the thermally generated photodiode dark current with increasing cut-off wavelength and operating temperature. Dark current is a critical design driver, especially for LWIR / VLWIR applications. Therefore, low dark current technologies are the prerequisite for serving higher operating temperature (HOT) applications.

AIM will present its latest results on both n-on-p and p-on-n low dark current planar MCT photodiode technology LWIR and VLWIR two-dimensional focal plane detector arrays with a cut-off wavelength >11µm at 80K and a 640x512 pixel format at a 20µm pitch. Dark currents significantly reduced as compared to ‘Tennant’s Rule 07’ at yet good detection efficiency >60% as well as results from electro-optical detector performance characterization will be presented, pacing the way for a new generation of HOT LWIR FPA with excellent NETD performance

Keywords: FPA, LWIR, VLWIR, HOT