Contribution ID: **22** Type: **Oral presentation (20 minute)**

Leonardo UK high performance shortwave APDs for astronomy

Tuesday, 12 March 2024 12:00 (25 minutes)

The linear-mode, avalanche photodiode array (LmAPD) based on bandgap-engineered HgCdTe, grown by Metal Organic Vapour Phase Epitaxy (MOVPE) is an important product type at Leonardo UK. High-value instruments often employ LmAPDs where the photon count is low and conventional detectors cease to be sensitive. Applications now split into three main categories. Firstly, for applications with intrinsically short integration time, such as: wavefront sensors, fringe trackers and devices for rapid-time-domain astronomy, LmAPDs arrays are established in 320x256 and 515x512 formats, with an avalanche gain of >100x at 15V bias and 80-100K operating temperature. Secondly, for free-space telecoms, LIDAR and gated arrays a GHz version of the LmAPD is available. Thirdly, there is a class of applications with very low photon arrival rates and these provide the most demanding of challenges for LmAPDs. The main field is astronomical imaging and interferometry. In a collaboration with the University of Hawaii (UH) a 1kx1k/15µm device been developed and together with a low dark current version of the LmAPD is under detailed characterisation at UH. Initial results show dark currents below 0.001ph/s/pixel and usable avalanche gain up to 10x. A 2kx2k/15µm format device funded by ESA is currently in trial manufacture. This paper provides an update on the technology and the status of our developments and collaborations.

contribution subject matter

CMOS sensors

Keywords for your contribution subject matter (this will assist SOC in accurately characterizing your contribution)

Saphira, MOVPE, LmAPDs, Leonardo, HgCdTe, avalanche gain, infrared astronomy

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