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MCT SWIR modules for passive and active imaging applications

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ABSTRACT

Based on AIM's state-of-the-art MCT IR technology, detector modules for the SWIR spectral range have been developed, fabricated and characterized. While LPE grown MCT FPAs with extended 2.5µm cut-off have been fabricated and integrated also MBE grown MCT on GaAs is considered for future production.
Two imaging applications have been in focus operating either in passive mode by making use of e.g. the night glow, or in active mode by laser illumination for gated viewing. Dedicated readout integrated circuits (ROIC), realized in 0.18µm Si-CMOS technology providing the required functionality for passive imaging and gated imaging, have been designed and implemented. For both designs a 640x512 15µm pitch format was chosen. The FPAs are integrated in compact dewar cooler configurations using AIM's split linear coolers. A command and control electronics (CCE) provides supply voltages, biasing, clocks, control and video digitization for easy system interfacing.

For imaging under low-light conditions a low-noise 640x512 15µm pitch ROIC with CTIA input stages and correlated double sampling was designed. The ROIC provides rolling shutter and snapshot integration. A larger format 1024x768 in a 10µm pitch is under development. The module makes use of the extended SWIR spectral cut-off up to 2.5µm.

To be used for active gated-viewing operation SWIR MCT avalanche photodiodes have been implemented and characterized on FPA level in a 640x512 15µm pitch format. The specific ROIC provides also the necessary functions for range gate control and triggering by the laser illumination.

The paper will present the development status and performance results of AIM's MCT based SWIR Modules for imaging applications.

Keywords: MCT, SWIR, FPA, LPE grown MCT, MBE grown MCT, Laser Gated Viewing