SPIE Defense + Commercial Sensing, Baltimore 2019

MCT SWIR modules for active imaging

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ABSTRACT

For improved long-range reconnaissance applications a SWIR module for active imaging was developed at AIM. Using laser illumination together with gating viewing (GV) capability reduces noise, amount of background clutter and path radiance and helps e.g. to see through smoke obscuration.

Based on AIM's MCT technology a 2D SWIR electron avalanche photodiode (eAPD) array was developed. A 640x512 15µm pitch format was chosen to allow imaging with the desired resolution. The APD arrays have been designed and fabricated by liquid phase epitaxy (LPE) growth of MCT layers for a 2.5µm cut-off on lattice-matched CdZnTe substrates. Also a specific ROIC was designed to enable the GV capability of the module. In GV operating mode, the gate can be controlled by an external trigger signal or by internal timing parameters. The gate-delay and integration can be programmed precisely. Focal Plane Arrays (FPAs) have been fabricated and integrated into a dewar/cooler assembly. A dedicated command and control electronics has been designed providing the system interface including power supply, triggering and digital video data.

To demonstrate long-range reconnaissance capability of SWIR GV a field camera demonstrator was developed. The demonstrator incorporates the SWIR GV camera, a thermal camera with a WFOV for detection and the laser illuminator. A user interface was implemented to operate the demonstrator in the field, having easy access to the gating capability.

The paper will present the latest performance results of the SWIR GV module including results of field trials with the demonstrator.

Keywords: SWIR, MCT, LPE, FPA, APD, Laser Gated Viewing