

FABRICATION AND CHARACTERIZATION OF  
640X484 **GaAs** BASED QUANTUM WELL  
INFRARED PHOTODETECTOR (**QWIP**)  
SNAP-SHOT CAMERA

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A long wavelength infrared (**LWIR**) 648x484 pixel GaAs based Quantum Well Infrared Photodetector (**QWIP**) focal plane array imaging camera has been demonstrated, The spectral **responsivity** of the detectors in the focal plane array were peaked at 8.3  $\mu\text{m}$  and the peak **responsivity** ( $R_p$ ) of the detectors were 300 **mA/W** at bias  $V_B = -3$  V. The spectral width and the cutoff wavelength were  $\Delta\lambda/\lambda = 10\%$  and  $\lambda_c = 8.7$   $\mu\text{m}$  respectively. The peak quantum efficiency was 6.9% at bias  $V_B = -1$  V for a 45° double pass. Two dimensional grating structure was fabricated on the detectors for efficient light coupling. **Indium** bumps were then evaporated on top of the detectors for Si readout circuit (**ROC**) hybridization. A single QWIP FPA was chosen and hybridized (via iridium **bump-bonding** process) to a 640x484 CMOS multiplexer (Amber **AE-181**) and biased at  $V_B = -2.0$  v.

Video images were taken at a **frame** rate of 60 Hz at temperatures as high as  $T = 70$  K, using a integration capacitor having a charge capacity of  $9 \times 10^6$  electrons. Excellent imagery, with a low noise equivalent **differential** temperature and minimum resolvable temperature have been achieved. In this presentation, we discuss the development of very sensitive **LWIR** quantum well inbred photodetectors (**QWIPs**), fabrication of large area **QWIP focal** plane arrays, hybridization with CMOS readout electronics, focal plane array thinning, and imaging with 640x484 focal plane array using a 100 mm **focal** length **LWIR** lens.

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#### **References**

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