Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Developing a voltage tunable two-color corrugated QWIP focal plane array KWONG-KIT CHOI, CARLOS MONROY, U. S. Army Research Laboratory, THEODOR TAMIR, MING LEUNG, Polytechnic University, JINJIN LI, DANIEL TSUI, Princeton University — Single color quantum well infrared photodetector focal plane array (QWIP FPA) has been fully developed. The trend is toward FPAs with spectral analysis and target discrimination capabilities. The challenges of achieving a two-color QWIP FPA are the identification of an effective coupling scheme for both wavelengths and a voltage tunable QWIP material. The former is needed to ensure high sensitivity in both wavelengths and the latter is needed in high resolution FPAs where only one external connection per pixel may be permissible. In this talk, we will discuss the detector parameters needed for high performance infrared imaging, the corrugated light coupling scheme, and the voltage tunable two-color QWIP materials based on superlattices (SLs). In the coupling design, one approach is to use Fabry-Perot oscillations in the triangular cavities to enhance both incident intensities. In the material design, the focus is on the electron energy relaxation rate in the energy relaxation layers (ERL) lying between the active SL periods. By computing the hot-electron distribution after traversing through the ERL layer, one can determine the doping required to eliminate cross-talk between the two colors.

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Date submitted: 15 Nov 2005 Electronic form version 1.4