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Quantum Dot and Quantum Well Photodetectors for Multi-spectral Imaging[1] G. ARIYAWANSA, V. APALKOV, A.G.U. PERERA[2], Dept of Physics and Astronomy, Georgia State University, G. HUANG, P. BHATTACHARYA, Solid State Electronics Laboratory, University of Michigan, M. BUCHANAN, Z.R. WASILEWSKI, H.C. LIU, Institute for Microstructural Sciences, National Research Council, Canada — Multi-color infrared detection has become an important tool for identification of targets in complex backgrounds, aiding to effective target recognition. While detectors capable of sensing all the spatial, spectral, and polarimetric information from a scene are identified as the third generation infrared detectors, here, focus is on the development of multi-color detectors with wavelength selection capability based on the applied bias voltage. A superlattice quantum dot infrared photodetector (SL-QDIP) structure consisting of two quantum dot superlattices (QDs embedded in a GaAs/AlGaAs superlattice) separated by a graded barrier will be presented. This device structure enables photocurrent generation only in one superlattice depending on the applied voltage polarity. Two response peaks at 4.9 and 7.3 μm were observed under -1 V and 0.5 V, respectively. The specific detectivity values at 80 K are 4×10^{10} and 8×10^{9} Jones for the 4.9 μm (at -1 V) and 7.3 μm (at 0.5 V) peaks, respectively. Moreover, several quantum well designs will also be discussed as potential alternatives.

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