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Split-off band infrared detectors with Graded Barriers[1] P.K.D.D.P. PITIGALA, Y.F. LAO, A.G.U. PERERA, Georgia State University, Atlanta GA, L.H. LI, E.H. LINFIELD, University of Leeds, Leeds, UK, H.C. LIU, Shanghai Jiao Tong University, Shanghai, China — One approach to develop uncooed infrared detectors is to use the light/heavy hole and the split-off band transitions to produce an enhanced response [1]. These detectors are called split-off band detectors. We demonstrate results of GaAs/AlGaAs based split-off band detector with a graded barrier replacing the traditional flat barrier. Devices are tested with graded barrier grown by digital alloying techniques [2], and graded barrier grown with gradually varying the aluminum fractions. The device with digital alloyed graded barrier had a responsivity 80 μA/W with a D*=1.4x10^8 Jones at 78 K under 1V bias, at peak response wavelength 2.7 μm. This is an improvement of 25 times in responsivity over the device without graded barrier, and 2 times improvement than the device with gradually increasing graded barrier. The enhancement is due to improved carrier transport by digital alloying, and the low recapture rate enabled by reduced distance to image-forces-potential peak due the barrier's gradient. The device performance could be further improved by implementing modifications to the digital alloying growth formula. [1] Jayaweera et. al., Infrared Phys. & Technol., 50, 279, 2007. [2] Mathine et. al., J. Appl. Phys. 75, 4551, 1994.

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