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Development of GaAs blocked-impurity-band detectors for the far-infrared LOTHAR A. REICHERTZ, JEFFREY W. BEEMAN, REINHARD KATTERLOHER, NANCY M. HAEGEL, EUGENE E. HALLER — The far-infrared (or THz) region of the electromagnetic spectrum requires improved photon detectors, especially for large array formats for highly sensitive imaging in astronomy. For wavelengths greater than 120 μm stressed Ge photoconductors are currently being used with a cut off at 210 μm. GaAs is a promising material to overcome this limitation due to its lower donor binding energy. The problem of high dark currents in GaAs can be solved by using a multilayered blocked-impurity-band (BIB) detector concept. This allows for a more heavily doped infrared active layer which enables a thinner device and a further extension of the long wavelength cut off. Such a planar structure allows lithographic processes for much larger array formats than currently possible in stressed Ge technology. Although BIB technology is well established in Si, its transfer to other materials has proven difficult. Only recently is GaAs approaching the needed levels of purity and interface control. We have demonstrated spectral response in a multi layer GaAs BIB structure extending to 500 μm, using material grown through vapor phase epitaxial techniques. The test structures were grown on 4 inch wafers, demonstrating feasibility for a 32 x 32 (and ultimately larger) array.

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