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Alternate Biased Blocked Impurity Band Detectors[1] S. J. TSCHANZ, J. C. GARCIA, N. M. HAEGEL, Naval Post Graduate School — Silicon Blocked Impurity Band (BIB) detectors are state-of-the-art devices to detect light in the near to mid IR range (5-40μm). Extension of BIB wavelength coverage using either Ge or GaAs has been proposed and attempted, but not yet realized due to material growth challenges. BIBs are normally biased to collect free carriers at the blocking layer contact, from a depletion region that begins at the blocking/active layer interface (standard biasing). We propose and describe an alternate bias approach in which the depletion is initiated from the other contact. Numerical simulations, using a finite difference model, will be presented which show electric field, carrier and all current component distributions. The modeling has been applied to GaAs and Ge, as well as Si BIB detectors. Applying the alternate bias in the simulations demonstrates higher signal currents while allowing thicker blocking layers. Alternate biasing avoids significant voltage drop across the blocking layer, which generally limits blocker thickness in conventional BIB devices. The use of thicker blocking layers in alternate bias provides an option for easier fabrication of new far IR BIB detectors.

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