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*Calculation of miniband structure in strain-balanced type-II GaAsBi/GaAsN superlattices*

Abstract: GaAsBi/GaAsN heterojunctions have a type-II band alignment, where short period superlattices of these heterojunctions provide a means of engineering a tunable bandgap energy. Alternating layers of GaAsBi (compressive strain) and GaAsN (tensile strain) provide a means of providing an effective lattice match to GaAs. The range of effective bandgap energies for these type-II superlattices are below the bandgap energy of GaAs, and are of high technological importance to optoelectronic devices including high-efficiency multi-junction solar cells. In this work, the miniband structure of dilute GaAsBi and GaAsN superlattices that are strain-balanced to GaAs are calculated using a self-consistent solution to the Poisson and Schrodinger equation. With dilute concentration of Bi and N, from 1% to 5%, the effective bandgap of the superlattice could be tuned in the range of 0.8 ~ 1.3eV.