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Triple and quadruple junctions thermophotovoltaic devices using short-period strain-balanced $\mathbf{GaAs_{1-x}N_x}$ / $\mathbf{InAs_{1-x}N_x}$ superlattices lattice-matched to InP(001) L. BHUSAL, A. FREUNDLICH, Physics Department and Photovoltaics and Nanostructures Group, University of Houston — Power conversion in thermophotovoltaic (TPV) or any other photovoltaic device can be increased by implementing monolithically series connected multi-bandgap structure. The main concern for the optimal operation of the multiband gap device is the availability of different band gaps and lattice matching to the available substrat. Based on the recent work, GaAsN/InAsN superlattice (SL) lattice matched to InP has shown the potential of achieving band gaps in the range of 0.7-0.4eV, which is technologically important range for the TPV structure due to the availability of the photon energies in this range from the heat source. In this work, we will present the calculation details and results to find the maximum power generated by the multi-bandgap monolithically series connected devices utilizing the appropriate bandgaps of the SL. Optimized band gaps for well-behaved $p-i$(SL)-n junction subcells were estimated by finding the optimal current to provide the maximum power through the series-connected multi junction cells for given blackbody radiation as an incident flux.

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