

Modeling of InGaN / GaAs Photovoltaic Tandem with GaAs/AlAs Bragg Mirror Rear Surface Reflector

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Abstract: In this work, a parametric study of a dual junction tandem based on In_{0.53}Ga_{0.47}N on GaAs has been carried. In order to obtain reflection of unabsorbed photons from the bottom of the device, Bragg reflectors (BR) composed of GaAs/AlAs, with appropriate thicknesses, was placed in the rear surface of the GaAs sub-cell. With this intention, the current-voltage curves are calculated for different front recombination velocities and the influence of the bottom cell thickness on efficiency has been studied. The results of simulation show that the structure's efficiency can attain 29% under 1-sun AM1.5 illumination, for a front recombination velocity value of 1e3cm/s and 10²m bottom cell thickness. This efficiency will decrease with increasing the operating temperature.

Keywords : Bragg Reflector, Carrier Lifetimes, Recombination Velocity, Efficiency, Temperature