Abstract

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Efficiency Enhancement of GaAs Solar Cell using Si3N4 Anti-reflection Coating

The objective of this work is to improve the conversion efficiency of the single junction GaAs solar cell by reduce the front surface reflectivity. For the first time Si?N? will be used as an ARC with GaAs substrate. Compared with MgO, silicon nitride has the properties of low density, high temperature strength, high fracture toughness and high hardness. The thickness of silicon nitride film was optimized for minimum reflectivity, the results show that the efficiency of GaAs solar cell with ARC is increased to 27.16% at emitter doping and base doping equal $1 \times 10^{18}$, emitter thickness and base thickness equal 0.4 um and 2um, respectively and Si?N? ARC thickness equals 75 nm. Also it has been realized that by using saw tooth in the surface layer of the solar cell structure and optimizing its textured angle and depth, the efficiency will be increased to 29.57%. The simulation that has been utilized in this work is PC1D.