

## Investigating the Effect of Adding the Window Layer and the Back Surface Field Layer of $\text{In}_x\text{Ga}_{(1-x)}\text{P}$ Material to GaAs Single Junction Solar Cell

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**Abstract :** GaAs (gallium arsenide) solar cells have gained significant attention for their use in space applications. These solar cells have the potential for efficient energy conversion and are being explored as potential power sources for electronic devices, satellites, and telecommunication equipment. In this study, the aim is to investigate the effect of adding a window layer and a back surface field (BSF) layer made of  $\text{In}_x\text{Ga}_{(1-x)}\text{P}$  material to a GaAs single junction solar cell. In this paper, we first obtain the important electrical parameters of a single-junction GaAs solar cell by utilizing a two-dimensional simulator software for virtual investigation of the solar cell; then, we analyze the impact of adding a window layer and a back surface field layer made of  $\text{In}_x\text{Ga}_{(1-x)}\text{P}$  on the solar cell. The results show that the incorporation of these layers led to enhancements in  $J_{sc}$ ,  $V_{oc}$ , FF, and the overall efficiency of the solar cell.

**Keywords :** back surface field layer, solar cell, GaAs,  $\text{In}_x\text{Ga}_{(1-x)}\text{P}$ , window layer

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