

## Abstract

In this paper, we have theoretically studied the temperature dependence of the InGaN p–n junction solar cell under concentrated irradiance. The electrical parameters of the solar cell were calculated at different temperatures and irradiance concentration. The temperature dependence of the physical parameters is investigated too. The calculated temperature coefficient of the short circuit current density, the open circuit voltage, the maximum output power, the fill factor and the conversion efficiency of the  $\text{In}_{0.622}\text{Ga}_{0.378}\text{N}$  solar cell are respectively, +0.00386, -0.188, -0.253, -0.068 and -0.253%/K. The effect of the temperature and the irradiance concentration on the temperature coefficients of each electrical parameter was also studied. The calculated voltage temperature variation of the  $\text{In}_{0.622}\text{Ga}_{0.378}\text{N}$  single junction solar cell was compared with that obtained with other materials single solar cells. The excellent behavior of the  $\text{In}_{0.622}\text{Ga}_{0.378}\text{N}$  p–n junction solar cell with temperature and concentrated light intensity allows it to be a promising candidate for operating in hostile environment.