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## Numerical Studies on InGaP/GaAs/InGaAs Triple-Junction Solar Cells

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### Abstract

Because of the requirement of high output power, the high concentration applications in photovoltaics (PV) become more and more important in the PV market. Furthermore, the operation temperature is also a major factor for the conversion efficiency. In this article, we use the numerical analysis to investigate the effect of concentration factor and operation temperature in the GaInP/GaAs/InGaAs inverted and current matched photovoltaics. Simulation results indicate that the SRH and radiative recombination rates are sensitive to the operation temperature and thus influence the efficiency seriously. Under the situation of 40 suns and 25 °C (AM 1.5G), the photovoltaics have the best efficiency of 40.4%. In addition, the feasibility of inserting an Ag reflecting layer between the bottom cell and back contact is also investigated. The Ag layer can reflect residual light back to the bottom cell and contribute to the output power. Under this circumstance, the efficiency further increases to 41.5% under the situation of 40 suns and 25 °C (AM 1.5G).