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Optimization of the Performances of a Silicon Solar cell using a Non-uniform Doping Distribution

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Despite several techniques of optimization of the yield of a solar cell, we remark that the use of a non-uniform doping distribution has not yet been explored. This work studies the effect of a non-uniform doping profile, on the output electrical power of a silicon solar cell. The uniform doping profile commonly used in conventional solar cells is replaced by a Gaussian doping distribution. The new doping profile leads to a nonlinear continuity equation that is solved using the Tri Diagonal Matrix Algorithm (TDMA). The simulations made under standard test conditions on the output electrical parameters reveal that, the Gaussian doping profile increases the leakage photocurrent at the edge of the solar cell and reduces the photogeneration process of the minority carriers in the solar cell. Additionally, by varing the doping concentration at the top surface and back contact of the solar cell, to vary the parameters of the Gaussian profile, the solar cell achieve an electrical power and efficiency of about 50 mW/cm2 and 50% respectively.

Apply to be considered for a student ; award (Yes / No)?

N/A

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