

Simulation of the performance of a multilayer solar cell with emphasis on improving energy conversion efficiency

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In this study uses genetic evolutionary algorithms and particle swarm to find suitable photovoltaic cell parameters in order to achieve maximum output power. The results show that the particle swarm algorithm performs better than the genetic algorithm due to continuous space search in large space. In this project, the multilayer photovoltaic cell is tested for maximum performance compared to conventional silicon photovoltaic cells. Simulation results based on single solar cells with multiple connections shows that about 1/2 watts of power is produced, more than 2 times the power that a conventional silicon photovoltaic cell can produce. The innovation aspect of this project is that carefully examine the number of layers and the type of composite elements that are most effective in generating energy has been. In the first part, the research relationships and variables were examined. Mathematical modeling of a photovoltaic module and the mathematical relationships of a single cell were investigated, then we applied the evolutionary GA and PSO algorithms to the photovoltaic cell and then analyzed the MJSC results in the future. Two types of coding were used in this study. simulink for simulating circuits and for algorithms Genetics and particle swarm scripting have been used in MATLAB software. The challenge observed in this study was the high number of variables to optimize simulink that was averaged across the answers. The semiconductors used are the main solar cell elements that can be ed a variety of materials. Silicon has been chosen for the manufacture of devices because of its ease of access to nature, making it cheaper than other semiconductors. But the efficiency or efficiency of silicon solar cells is significantly low, so in this study, photovoltaic cell performance optimization methods have been used to reduce these defects and problems using genetic algorithm and particle swarm optimization. Data analysis was performed in

the software environment. The results and diagrams show that by optimizing the photovoltaic cell parameters and carefully examining the number of layers and the type of composite elements, a better output and higher efficiency is achieved. It is suggested that other materials optimization methods be explored with different rules and new compounds be introduced to provide better output power. It is also suggested to study the thermal model of the photovoltaic cell and calculate its effect on the output power.

Keywords : multilayer solar cell .energy conversion efficiency

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