World Academy of Science, Engineering and Technology
International Journal of Nuclear and Quantum Engineering
Vol:12, No:07, 2018

Spatial Architecture Impact in Mediation Open Circuit Voltage Control of Quantum Solar Cell Recovery Systems

Authors : Moustafa Osman Mohammed

Abstract : The photocurrent generations are influencing ultra-high efficiency solar cells based on self-assembled quantum dot (QD) nanostructures. Nanocrystal quantum dots (QD) provide a great enhancement toward solar cell efficiencies through the use of quantum confinement to tune absorbance across the solar spectrum enabled multi-exciton generation. Based on theoretical predictions, QDs have potential to improve systems efficiency in approximate regular electrons excitation intensity greater than 50%. In solar cell devices, an intermediate band formed by the electron levels in quantum dot systems. The spatial architecture is exploring how can solar cell integrate and produce not only high open circuit voltage (> 1.7 eV) but also large short-circuit currents due to the efficient absorption of sub-bandgap photons. In the proposed QD system, the structure allows barrier material to absorb wavelengths below 700 nm while multi-photon processes in the used quantum dots to absorb wavelengths up to 2 µm. The assembly of the electronic model is flexible to demonstrate the atoms and molecules structure and material properties to tune control energy bandgap of the barrier quantum dot to their respective optimum values. In terms of energy virtual conversion, the efficiency and cost of the electronic structure are unified outperform a pair of multi-junction solar cell that obtained in the rigorous test to quantify the errors. The milestone toward achieving the claimed high-efficiency solar cell device is controlling the edge causes of energy bandgap between the barrier material and quantum dot systems according to the media design limits. Despite this remarkable potential for high photocurrent generation, the achievable open-circuit voltage (Voc) is fundamentally limited due to non-radiative recombination processes in QD solar cells. The orientation of voltage recovery system is compared theoretically with experimental Voc variation in mediation upper–limit obtained one diode modeling form at the cells with different bandgap (Eg) as classified in the proposed spatial architecture. The opportunity for improvement Voc is valued approximately greater than 1V by using smaller QDs through QD solar cell recovery systems as confined to other micro and nano operations states.

Keywords : nanotechnology, photovoltaic solar cell, quantum systems, renewable energy, environmental modeling
Conference Title : ICQO 2018 : International Conference on Quantum Optics
Conference Location : Zurich, Switzerland
Conference Dates : July 30-31, 2018