Solar cell radiation effect

How does irradiation affect the lifetime of a solar cell?
Effects of displacement defectsThe main importance of the displacement defects produced by the irradiation ofsilicon solar cells is in their effect on the minority carrier lifetime of thesilicon. In particular,the lifetime in the bulk p-type of an n/p solar cell isthe major radiation sensitive parameter.

How does space radiation affect solar cells?
The space radiation environment causes gradual solar cells performance degradation,thus limiting the lifetime of the solar array. In planning a space mission,engineers need to know the expected cell degradation in the space radiation environment,so a degradation model is required to predict the behaviors of solar cells in space.

How does radiation affect solar cell array materials?
Radiation may affect solar cell array materials by several ionisation relatedeffects. The reduction of transmittance in solar cell cover glasses is animportant effect of ionising radiation. The darkening is caused by theformation of colour centres in glass or oxide materials.

How do solar cells behave in a radiation environment?
The behaviour of solar cells in a radiation environment can be described interms of the changes in the engineering output parametersof the devices. Thisapproach limits the understanding of the physical changes which occur in thedevice.

What are the irradiation experimental results of solar cells?
In this chapter, the irradiation experimental results were presented about silicon, single-junction and triple-junction GaAs solar cells, and thin film solar cells to compare radiation effects of electrons and protons on these solar cells, and also to provide experimental data for predictions of the cell performances.

What causes radiation induced degradation of solar cells?
The radiation-induced degradation of PV-cells is due to the defects created by ions or nuclei particles that strike the solar cells' wafers. The striking particles modify the crystal structure of the semiconductors by ionization or atomic displacements,see Fig. 2 - (a).

Radiation Effects in Silicon Solar Cells Abstract: Calculations have been performed to estimate the number of atoms displaced from normal sites by Compton Electrons from Co60 gamma rays and by slow and fast neutrons. The resultant change in carrier lifetimes and mobilities are used to predict the performance of a silicon solar cell under gamma and ...

The two approaches give similar results for GaAs/Ge solar cells, for which a large database exists. Because the NRL method requires far less experimental data than the JPL method, it is more readily applied to emerging ...

Solar cell radiation effect

The experiments of the GaInP/GaAs/Ge triple junction solar cells (3JSCs) irradiated by 1MeV and 10 MeV electrons at the electron accelerator facility were presented. ...

Radiation may affect solar cell array materials by several ionisation related effects. The reduction of transmittance in solar cell cover glasses is an important effect of ionising radiation. The darkening is caused by the formation of colour centres in glass or oxide materials. The colour centres form when ionising radiation excites an orbital ...

Ultra-thin solar cells are of significant interest for use in space due to their intrinsic radiation tolerance, which may allow them to be used in particularly harsh radiation environments, where thicker cells would degrade ...

The report includes an overview of the physical fundamentals of radiation-induced degradation mechanism of GaAs-based PV-cells, experimental techniques for characterization of the cells, and the radiation effects, among others.

The resultant change in carrier lifetimes and mobilities are used to predict the performance of a silicon solar cell under gamma and neutron irradiation. The effect of annealing of defects is considered, and from these computations an estimate is made to show the minimum flux necessary to produce noticeable damage. Data are presented showing ...

Radiation Effects of Space Solar Cells Xin Gao, Sheng-sheng Yang, and Zhan-zu Feng Abstract Photovoltaic solar arrays are preferably used as primary power source for majority of spacecraft today. The space radiation environment causes gradual solar cells performance degradation, thus limiting the lifetime of the solar array. In planning a space mission, engineers need to know the ...

Abstract : In this research, Silvaco ATLAS, an advanced virtual wafer fabrication tool, was used to model the effects of radiation on a triple junction InGaP/GaAs/Ge solar cell. A Silvaco ATLAS model of a triple junction InGaP/GaAs/Ge cell was created by first creating individual models for solar cells composed of each material. Realistic doping levels were used ...

The resultant change in carrier lifetimes and mobilities are used to predict the performance of a silicon solar cell under gamma and neutron irradiation. The effect of ...

Electric orbit raising (EOR) radiation-induced coverglass (CG) damage reduces the amount of light that reaches underlying solar cells and decreases photoconversion efficiency. This article ...

The photovoltaic effect is a process that generates voltage or electric current in a photovoltaic cell when it is exposed to sunlight. It is this effect that makes solar panels useful, as it is how the cells within the panel convert sunlight to electrical energy. The photovoltaic effect was first discovered in 1839 by Edmond Becquerel.

Solar cell radiation effect

The GaInP/GaAs/Ge triple-junction solar cells (3JSCs) can efficiently absorb the broad spectrum of sunlight, and have been widely used in aerospace as the long-term power resource for their high photoelectric conversion efficiency, light weight, stable structures, and low cost [1], [2], [3].However, the performances of GaInP/GaAs/Ge 3JSCs operated in orbits will ...

This special issue reveals recent developments in the vastly undertaken investigations concerning radiation effects in various optoelectronic devices (solar cells, ...

In this chapter, the irradiation experimental results were presented about silicon, single-junction and triple-junction GaAs solar cells, and thin film solar cells to compare ...

This special issue reveals recent developments in the vastly undertaken investigations concerning radiation effects in various optoelectronic devices (solar cells, photodiodes, phototransistors, insulating layers, memories, dosimeters, etc.). Each paper was reviewed by at least two reviewers (mostly three) and presents the most recent ...

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