

How does space debris impact a solar cell?

The discharge can make noticeable mechanical damage on the surface of solar cells. Space debris impact with spacecraft at an average velocity of ~ 10 km/s and thus induce high-density plasma [1,2]. The characters of high-velocity impact inducing plasma have been studied in Lee's experiment.

How does space-debris impact a solar array?

The space-debris impacts on solar array cause not only mechanical damage but also electrical damage such as solar-array arcing initiated by local high-density plasma created by hypervelocity impact. The formation of plasma can lead to arcing between the solar cells or the cell and the substrate on the solar array.

Does space debris impact a solar array?

Thus, the solar array with a larger area and higher voltage is more sensitive to space debris impact inducing discharge. Mengu Cho's work suggested that the impact of space debris larger than 1 mm can induce sustain arc and secondary discharge on high voltage solar array ...

Can solar arrays be impacted by meteoroids or space debris?

As solar arrays have the largest exposed to the space area, their probability to be impacted by meteoroids or space debris is high. From the inspection of the retrieved HST array, for instance, the whole wing suffered between 5000 and 6000 micrometeoroid impacts in its 4-year life.

What happens when a solar cell is discharged?

During the discharge, the voltage between the solar cells decreases. The voltages after different discharges vary from -36 V to -17.6 V, which indicates that the minimum voltage for maintaining the discharge is 17.6 V. When the voltage difference between the solar cells is 36 V, no discharge is triggered.

How are solar cells insulated?

Between the solar cells and solar panel, a layer of polyimide film is pasted to insulate the solar cell electrodes and conductive substrate. The cover glasses that are used to provide protection for the cells against radiation and microparticles impact damage are made usually of cerium-doped glass 0.01 cm thick.

This paper discusses the hypervelocity impacts of micrometeoroids and orbital debris (MMODs) on inverted metamorphic triple-junction (IMM3J) and perovskite solar cells, which are much thinner...

Solar cells (SCs) are the most ubiquitous and reliable energy generation systems for aerospace applications. Nowadays, III-V multijunction solar cells (MJSCs) represent the standard commercial ...

Numerous technologies have been studied for removing unwanted objects in space. Our approach uses a short wavelength laser stationed in orbit to vaporize these small objects. This ...

Determination of the frequency and importance of impacts by space debris and micrometeoroids of below 1mm in size is best achieved by examining spacecraft surfaces that have been exposed in the near-Earth orbital environment.

A study of micrometeoroid and orbital debris (MMOD) long-term effects on solar cell samples of solar panels returned from the space station "MIR" has been carried out. Five samples from the solar array, which spent over 10 years in space, have been studied with the help of optical microscopes with magnification up to 1000.

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DOI: 10.1360/972009-2509 Corpus ID: 62371108; Evaluation method of surface damage on solar cells by small space debris impact @inproceedings{Li2010EvaluationMO, title={Evaluation method of surface damage on solar cells by small space debris impact}, author={Hongwei Li and Jianguo Huang and Jianwei Han and Minghui Cai and Xiaoying Li and Zhuxiu Gao}, ...

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