

# **High efficiency silicon space solar cells**





## Overview

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Innovators at NASA's Glenn Research Center have developed a high-efficiency multi-junction solar cell that uses a thin interlayer of selenium as the bonding material between wafers. Selenium is a unique semiconductor in that it is transparent to light at photon energies below the band gap (infrared).

In the last five years silicon solar cells have undergone significant evolution resulting in greatly improved efficiencies. As an illustration, Figure 4.1 plots the highest reported silicon concentrator cell efficiency versus year. Also shown for comparison are gallium-arsenide concentrator cells.

Since the photoconversion efficiency  $\eta$  of the silicon-based solar cells (SCs) under laboratory conditions is approaching the theoretical fundamental limit, further improvement of their performance requires theoretical modeling and/or numerical simulation to optimize the SCs parameters and design.

The efficiency of a PV cell is simply the amount of electrical power coming out of the cell compared to the energy from the light shining on it, which indicates how effective the cell is at converting energy from one form to the other. The amount of electricity produced from PV cells depends on the.

Solar panel efficiency is the amount of sunlight (solar irradiance) that falls on the surface of a solar panel and is converted into electricity. Due to the many advances in photovoltaic technology over the last decade, the average panel conversion efficiency has increased from 15% to over 24%.



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### Development of high efficiency silicon space solar cells

The cell design and manufacturing process for the high efficiency thin silicon space solar cells (call NRS/LBSF cell) were finalized and their characteristics were qualified. The 100 /spl mu/n ...

### Silicon heterojunction solar cells achieving 26.6

This research showcases the progress in pushing the boundaries of silicon solar cell technology, achieving an efficiency record of 26.6% on commercial-size p-type wafer. The lifetime of the gallium-doped ...



### High-Efficiency Solar Cell , T2 Portal

This high-efficiency solar technology takes advantage of inexpensive silicon wafers and provides a more robust design for next-generation solar cells in space. For terrestrial applications, it can provide unprecedented efficiencies for ...

### High-Efficiency Solar Cells

As part of the effort to increase the contribution of solar cells (photovoltaics) to our energy mix, this book addresses three main areas: making existing technology cheaper, promoting



advanced technologies based on new architectural ...



### Solar Photovoltaic Cell Basics

Solar cells made out of silicon currently provide a combination of high efficiency, low cost, and long lifetime. Modules are expected to last for 25 years or more, still producing more than 80% of their original power after this time.



### Emitter design for high-efficiency silicon solar cells. Part 2: Space

High-efficiency cells, including cells of above 20% Air Mass 0 efficiency were exposed to 1 MeV of electron irradiation. Although the relative performance loss was higher, the cells gave higher ...



### [Space-Qualified Solar Cells: SHARP CORPORATION](#)

Our standard triple-junction space cells are lattice matching on a germanium base with a typical beginning-of-life (BOL) efficiency of 28.7% under AM-0 conditions. These cells have extensive space heritage, having been deployed in a wide ...





### Characterization and optimization of high-efficiency ...

The existing numerical approaches to modeling and optimizing the key parameters of high-efficiency solar cells based on monocrystalline silicon, the dominant material in photovoltaics, are described.



### Solving Long Lead Times and the High Cost of Space Solar ...

Abstract Solestial is developing 100% US made solar cells and blankets with >18% BOL efficiency, over 10 years lifespan, <3% annual degradation rate, <400 g/m<sup>2</sup> specific mass, >10 ...

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