

Thin film solar cells are favorable because of their minimum material usage and rising efficiencies. The three major thin film solar cell technologies include amorphous silicon (α -Si), copper indium gallium selenide (CIGS), and cadmium telluride (CdTe).

CIGS and CdTe hold the greatest promise for the future of thin film. Longevity, reliability, consumer confidence and greater investments must be established before thin film solar cells are explored on building integrated photovoltaic systems.

1. Introduction

Thin film solar cells (TFSC) are a promising approach for terrestrial and space photovoltaics and offer a wide variety of choices in terms of the device design and fabrication.

Affordable manufacturing: The production process is less energy-intensive, which helps lower costs. **Better performance in low light:** Thin film solar cells are more efficient in dim conditions, such as cloudy weather or indoor lighting. **Aesthetic appeal:** Their sleek, thin design can blend seamlessly into buildings and other structures.

While thin film solar cells have many benefits, they also have some drawbacks. Here are the main challenges:

- Lower efficiency:** Compared to traditional silicon panels, thin film solar cells often have lower energy conversion efficiency.
- Shorter lifespan:** They typically have a shorter operational lifespan, requiring replacement sooner.

Thin-film solar cells, on the other hand, generally last 10-20 years and may degrade faster, especially in harsh weather conditions. Thin film solar cells are flexible and can be installed on uneven or curved surfaces, making them suitable for unique use cases.

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Around 90 percent of the photovoltaic systems installed worldwide operate with solar cells made of crystalline silicon. Thin film modules have ...

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