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Solar thin film power generation technology

Overview

Thin-film solar cells are a type of solar cell made by depositing one or more thin layers (thin films or TFs) of photovoltaic material onto a substrate, such as glass, plastic or metal. Thin-film solar cells are typically a few nanometers (nm) to a few microns (µm) thick–much thinner than the wafers used in conventional.

Early research into thin-film solar cells began in the 1970s. In 1970, team at created the first gallium arsenide (GaAs) solar cells, later winning the 2000 Nobel prize in Physics for this and.

Thin-film technologies reduce the amount of active material in a cell. The active layer may be placed on a rigid substrate made from glass, plastic, or metal or the cell may be made with a flexible substrate like cloth. Thin-film solar cells tend to be cheaper than crystalline.

With the advances in conventional (c-Si) technology in recent years, and the falling cost of the feedstock, that followed after a period of severe global shortage, pressure increased on manufacturers of commercial thin-film technologies.

In order to meet international renewable energy goals, the worldwide solar capacity must increase significantly. For example, to keep up with the goal of 4674 GW of solar capacity installed globally by 2050, significant expansion is.

In a typical solar cell, the is used to generate from sunlight. The light-absorbing or "active layer" of the solar cell is typically a material, meaning that there is a gap in its between the .

Despite initially lower efficiencies at the time of their introduction, many thin-film technologies have efficiencies comparable to conventional single-junction non-concentrator crystalline silicon solar cells which have a 26.1% maximum efficiency as of 2023. In fact, both.

One of the significant drawbacks of thin-film solar cells as compared to mono crystalline modules is their shorter lifetime, though the extent to which this is an issue varies by material with the more established thin-film materials generally having longer lifetimes.

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