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Perovskite solar panel power generation efficiency



Overview

Do perovskite solar cells have high efficiency?

Since most research laboratories can now produce perovskite solar cells with ~24% PCE, there is no need to claim high efficiency every time one reports a perovskite solar cell performance. Unless it is a record efficiency, any other claim of high efficiency appears to be an unnecessary hype.

What is the record efficiency of a single-junction perovskite solar cell?

The latest certified perovskite solar cell record for a single-junction perovskite solar cell is 26.7%, set by the University of Science and Technology of China. The cell was tested and verified by the National Renewable Energy Laboratory (NREL). What Is the Record Efficiency for Perovskite-Silicon Tandem Solar Cells?

Fig. 1.

How efficient are metal halide perovskite solar cells?

Metal halide perovskite photovoltaics (PVs) have received intense research and commercialization interest over the past decade. The power conversion efficiency (PCE) of lab-scale single-junction perovskite solar cells (PSCs) has exceeded 27%, approaching the current efficiency record of crystalline silicon (c-Si) solar cells 1, 2.

Can perovskite solar cells be used for commercial use?

Despite lab-scale efficiencies surpassing 27% in perovskite solar cells, scaling up to large-area perovskite solar modules (PSMs) for commercial use remains challenging. Key obstacles include production scaling, efficiency, stability, and cost-effectiveness.

What is accurate benchmarking for perovskite solar cells?

Accurate benchmarking relies on standardized ISOS stability protocols for

perovskite devices, which define test conditions for reliability and lifetime. Compare certified record efficiencies for single-junction, tandem, and perovskite-silicon solar cells. Data from NREL, updated June 2025.

How reliable are perovskite/Si solar cells?

In addition, ensuring high module lifetimes and reliable field performance is crucial, as will be discussed below. Perovskite/Si TSCs have now achieved a certified efficiency of 34.85%, surpassing the S-Q limit of single-junction solar cells. However, stability remains a key challenge for this technology.

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