

# Solar Cell Outdoor Site Energy





## Overview

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The operational stability of perovskite solar cells is often tested in the laboratory environment but its correlation to real-world operation is still unclear. New research shows that the outdoor ageing behaviour of the devices can be modelled with temperature-dependent degradation rates from laboratory stability tests that apply both heat and light stressors. Download PDF Metal halide perovskites have attracted tremendous attention as next-generation single and tandem solar cells offering high efficiency at reasonably low production costs. The stability of the devices is also improving: extrapolated operational lifetime of 50,000 hours has been reported for solar cells operating at 35 °C under laboratory.

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Competing interests The authors declare no competing interests.

Cite this article Khenkin, M., Albrecht, S. The way to predict outdoor lifetime. Nat Energy 9, 12–13 (2024). <https://doi.org/10.1038/s41560-023-01419-0>

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Published: 19 December 2023

Issue Date: January 2024

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Are solar cells stable in outdoor operation?

Despite significant improvement of PSC stability towards light, heat, and humidity achieved over recent years, <sup>2,3</sup> this class of solar cells' stability in outdoor operation remains almost unexplored.

Can solar cells be tested outdoors?



In most outdoor testing, solar cells are maintained near the maximum power point (MPP) than being in open circuit conditions . There are procedures to conduct outdoor performance of PV modules, which can have two sections; instantaneous and long term performance measurement of PV modules under outdoor conditions.

Do perovskite solar cells perform well outdoors?

6. Outdoor performances of perovskite devices Outdoor performance reports on perovskite solar cells are limited. However, there are some reports conducted by different researchers. Bastiani et al. reported the certified PCE of bifacial tandem exceeds 25 % under outdoor conditions at AM 1.5G and illumination intensity 26 mW/cm<sup>2</sup>.

Can solar cells be stable under natural light-dark cycling?

Outdoor stability testing under natural sunlight provides the most relevant test of solar cell stability under operational conditions . Understanding perovskite-based solar cells' recovery properties under natural diurnal light-dark cycling can point to methods to extend its lifetime [2, 3].



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Perovskite Solar Cells go Outdoors: Field Testing and ...

Jul 7, 2020 · Energy yield (or energy output) is a valuable quantity of evaluating the performance of solar cells and modules under outdoor conditions, and is a very important aspect for prac ...

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Light cycling as a key to understanding the ...

Dec 1, 2023 · Forecasting the real-world stability of perovskite solar cells (PSCs) using indoor accelerated tests is a significant challenge on the ...

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One-year outdoor operation of monolithic ...

Feb 22, 2023 · One-year outdoor operation of monolithic perovskite/silicon tandem solar cells In this work, Babics et al. report the outdoor performance of a perovskite/silicon tandem solar cell ...

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Mimicking Outdoor Ion Migration in Perovskite Solar Cells: A ...

Mar 5, 2025 · Perovskite solar cells (PSCs) are expected to transform the photovoltaic market; however, their unproven operational stability requires urgent attention, particularly accelerated ...

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The way to predict outdoor lifetime , Nature Energy

Dec 19, 2023 · The operational stability of perovskite solar cells is often tested in the laboratory environment but its correlation to real-world operation is still unclear. New research shows that ...

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Six-Month Outdoor Performance Study of ...

May 12, 2024 · This study demonstrates the impressive outdoor stability of perovskite solar cells previously tested indoors. The cells are monitored ...

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Outdoor Operational Stability Testing of Perovskite Solar Cells

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The recent advancement of outdoor performance of ...

Sep 15, 2024 · As a result, it attracted great attention for future solar technology and multiple performance and stability studies have been reported in research articles. This work ...

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One-year outdoor operation of monolithic perovskite/silicon ...

Feb 15, 2023 · Overall, our results underline the promise of perovskite/silicon tandem solar cells as a future high-performance technology, yet device tailoring toward targeted deployment may ...

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