Causes of Solar Cell Hysteresis

Why is hysteresis a problem in solar cells?
The hysteresis phenomenon in the solar cell presents a challenge for determining the accurate power conversion efficiency of the device. A detailed investigation of the fundamental origin of hysteresis behavior in the device and its associated mechanisms is highly crucial.

What causes hysteresis in perovskite solar cells?
The electrical property of perovskite is controlled by its crystalline structure and compositions. It has shown that the hysteresis in perovskite solar cells is not only due to one mechanism. However,numerous factors lead to hystereses such as ferroelectricity,ion migration,charge trapping,and capacitive effects.

How does hysteresis affect photovoltaic performance?
Hysteresis has a detrimental influenceon the reliability of photovoltaic operation and long term stability of hybrid perovskite solar cells. Owing to its complex structure,it is not easy to attribute the hysteretic behavior to any one of different components,such as the bulk of the perovskite or different heterojunction interfaces.

How to alleviate J-V hysteresis in perovskite solar cells?
Various strategies to alleviate the J-V hysteresis in perovskite solar cells are summarized. Insights into hysteresis-free device are proposed. Organic-inorganic hybrid perovskite solar cell (PSC) has received widespread attention due to its high efficiency, low cost, and easy fabrication process.

Does device architecture influence hysteresis in perovskite solar cells?
Snaith et al. proposed that the specific device architecture is highly influentialto the severity of the anomalous hysteresis present in the current-voltage characteristics of perovskite solar cells .

What causes hysteresis in PSC devices?
Though numerous theories have been proposed to explain the causes of hysteresis, its origin includes slow transient capacitive current, trapping, and de-trapping process, ion migrations, and ferroelectric polarization. The remaining issues and future research required toward the understanding of hysteresis in PSC device is also discussed.

We will study the detailed transient physical processes that will cause the hysteresis of PSCs, analyze the characteristic features of hysteresis, and unveil their ...

In perovskite solar cells, a hysteresis of the current-voltage curve is often observed and is usually attributed to moving ions. However, our device modelling forecasts ...

This review discusses the internal and external factors that causes the J-V hysteresis phenomenon and presents various strategies to alleviate the J-V hysteresis in ...

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The issue of hysteresis in perovskite solar cells has now been convincingly linked to the presence of mobile ions within the perovskite layer. Here we test the limits of the ionic theory by ...

In addition to ferroelectric polarization and ion migration processes, charge trapping and de-trapping processes were sought to be one of the possible causes for ...

Perovskite solar cells have shown an impressive efficiency improvement over the past ~ 10 years achieving ~ 23% to date. However, the lifetime and instability of device ...

The presence of hysteresis in perovskite solar cells (PSCs) complicates the reliable evaluation of cell performance for practical applications. Numerous efforts have been made to figure out the ...

Perovskite solar cells show a number of internal electronic-ionic effects that produce hysteresis in the current-voltage curves and a dependence of the temporal response on the conditions of ...

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In solar cells, the inverted hysteresis is a property preferably minimized (Tress et al., 2016; Yang et al., 2017; Wu et al., 2018), while for memristors, it is amplified to permanent and reversible changes of the ...

One of the most famous causes of these inherent perovskite effects is the anomalous hysteresis, present, since early studies, in the current-voltage curves. By ... thus possibly contributing to ...

(a): Cross-sectional image of perovskite solar cell device based on mesoporous TiO 2 . (b): Diagram of charge transfer process in devices. (c)-(f): The stabilized ...

If charge carriers accumulate in the charge transport layer of a solar cell, then the transient response of the electric field that originates from these accumulated charges ...

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Ion migration has been reported to be one of the main reasons for hysteresis in the current-voltage (J-V) characteristics of perovskite solar cells. We investigate the interplay ...

The hysteresis in perovskite solar cells arises from the degradation of the perovskite structure, however, the magnitude of hysteresis can be minimized by employing ...

The causes of hysteresis in perovskite solar cells (PSCs) are multifaceted and are closely related to the device fabrication process. Among them, ion migration is considered ...

We presented one dimensional defect model to simulate hysteresis in perovskite solar cells. It can be numerically simulated in perovskite devices with p+-i-n+ configuration by ...

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