Influence of atmosphere on perovskite cells

Does the atmosphere affect the performance of perovskite solar cells?
One aspect overlooked in earlier works is the effect of the atmosphere on device performance during operation. Here we investigate the degradation mechanisms of perovskite solar cells operated under vacuum and under a nitrogen atmosphere using synchrotron radiation-based operando grazing-incidence X-ray scattering methods.

Are perovskite solar cells stable?
Provided by the Springer Nature SharedIt content-sharing initiative Extensive studies have focused on improving the operational stability of perovskite solar cells, but few have surveyed the fundamental degradation mechanisms. One aspect overlooked in earlier works is the effect of the atmosphere on device performance during operation.

Do perovskite films increase PCE of solar cells?
The existence of these phases in perovskite films was reported to boost the PCEof perovskite solar cells 19,20; however,an excessive amount of PbI 2 leads to poor device performance 21. These material properties and device efficiencies are of critical importance for this state-of-the-art research of degradation.

Do perovskite solar cells deteriorate under vacuum?
Understanding degradation mechanisms in perovskite solar cells is key to their development. Now,Guo et al. show a greater degradationof the perovskite structure and morphology for devices operated under vacuum than under nitrogen.

Does solvent vapor affect perovskite film morphology?
The results indicate the detrimental effectsof such solvent vapors on the perovskite film morphologies and properties,which result in a significant drop of device PCE from 20.01% (control) down to only ~15% (DMF-treated).

Why do perovskite solar cells lose observable loss in different air mass conditions?
The estimated observable loss in different air mass conditions for perovskite solar cells is due to their strong absorption behaviour in the visible region. The higher AM can result in a shift of photon distribution into shorter wavelength regions which affect the perovskite solar cells.

For better understanding of the perovskite solar cells performance in different atmospheric conditions on spectral variations, this article aims to analyse the individual impact ...

In the present work, pure TiO 2 and Fluorine doped TiO 2 (F-TiO 2) thin films were prepared and their effect on the photovoltaic response of perovskite solar cells was investigated.Six samples of Fluorine doping of 0, 2,

4, 6, 8, and 10 at. % were prepared using the spin coating method. The F-TiO 2 thin films were analyzed using various characterization ...

Here we investigate the degradation mechanisms of perovskite solar cells operated under vacuum and under a nitrogen atmosphere using synchrotron radiation-based ...

Unit cell efficiency of 19.17% with long-term stability was achieved through HTL and perovskite coating using SDC, and efficiency of up to 17.42% was secured in the lab cell-sized modules.

Supporting information Open Atmosphere Processed Stable Perovskite Solar Cells Using Molecular Engineered, Dopant-Free, Highly Hydrophobic Polymeric Hole Transporting Materials: Influence of Thiophene and Alkyl Chain on Power Conversion Efficiency Prem Jyoti Singh Rana, +[a] Rajendra Kumar Gunasekaran, +[a] Sung Heum Park, [b] Vellaiappillai Tamilavan, [b] ...

Solar cells incorporating perovskite films with a blend of A-site cations have gained significant attention due to their enhanced stability and high-power conversion efficiencies. However, the relationship between the microstructure, ...

Over the past few years, tremendous efforts have been made to improve the photovoltaic performance of perovskite solar cells by passivating the interfaces and minimizing the surface trap ...

Light soaking (LS) has been reported to positively influence the device performance of perovskite solar cells (PSCs), which, however, could be potentially harmful to the loaded devices due to the ...

However, the influence of atmospheric conditions during device fabrication and storage on the photovoltaic performance of perovskite solar cells has not been systematically investigated although there have been a few reports on the effect of the environment on the performance of spiro-MeOTAD, particularly in the context of DSSC [43], [44], [45].

Open atmospheric processed perovskite solar cells using dopant-free, highly hydrophobic hole-transporting materials: Influence of thiophene and selenophene p-spacers on charge transport and recombination properties. Author links open overlay panel Rajendra Kumar Gunasekaran a 1, ...

Highly efficient perovskite solar cells based on triple-cation mixed-halide perovskite (CsFAMAPbIBr) require a strictly controlled environment such as a N 2-filled glove box and/or a dry room due to the instability of formamidinium (FA) ions in humid environment.Furthermore, sufficient knowledge regarding the detailed ambient air processing ...

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