Solar cell grain boundary leakage

Is grain boundary engineering a breakthrough for high-performance polycrystalline perovskite solar cells (PSCs)?
This work reveals more possibilities on the grain boundary engineering. Due to the unpredictable composition and vulnerable nature of the grain boundaries (GBs),grain boundaries engineering with improving the order degree of perovskite GBs would be the breakthroughfor high-performance polycrystalline perovskite solar cells (PSCs).

Is grain boundary engineering a good choice for a PSC?
As a result, a champion PCE of 23.15% and enhanced thermal and operational stability are achieved. This work reveals that grain boundary engineering with the construction of grain boundary ordered structure provides more possibilities for stable and environmental-friendly PSCs.

Why do inorganic solar cells have a weakened transport?
(a) In typical inorganic solar cells (poly-Si,CdTe),the empty neutral traps at GBs and interfaces when filled with electrons result in a weakened transport due to the potential barrier(q ? B) and the nonradiative recombination between holes and trapped electrons is strong.

Why are noncompact solar cells more sensitive to trap morphology?
On the other hand,solar cells that have noncompact morphologies (open GBs,high trap density) are sensitive to the sign of the traps and hence to the preparation methods (e.g.,under/overstoichiometric routes,environmental conditions).

What causes crystallization and grain coarsening of a perovskite layer?
The crystallization and grain coarsening of the perovskite layer are mostly induced by the evaporation of solvents.

Does a filled trap affect a solar cell's performance?
Although traps at GBs and interfaces are likely to be charged (due to accumulated ionic defects) when empty and hence neutral when filled,the sign of the filled trap has little to do with the overall device performancewhen the solar cell in question is efficient,with fused GBs (low trap densities).

Silicon carbide (SiC) and silicon nitride (Si 3 N 4) are two major non-metal precipitates commonly found along grain boundaries (GBs) in cast multicrystalline silicon (mc ...

The grain surfaces (film surface and grain boundary) of polycrystalline perovskite films are vulnerable sites in solar cells since they pose a high defect density and initiate the degradation of ...

Such formed grain-boundary grooves (GBGs) invariably influence the heterointerface microstructures in perovskite solar cells (PSCs). Herein, we present a unique, focused discussion on this prominent yet rarely studied microstructure type. In this perspective, we first illustrate the fundamental theories that govern the formation of ...

Grain size and grain boundaries, as basic components of perovskite film, have a significant impact on the device performance of perovskite solar cells. Therefore, the ...

Perovskite solar cells have made significant strides in recent years. However, there are still challenges in terms of photoelectric conversion efficiency and long-term stability associated with perovskite solar cells. The ...

Neutral grain boundaries in the Cu(In,Ga)Se2 layer are predicted to be most detrimental if they are parallel to the main junction and located within the depletion region. For columnar grain boundaries with a grain size near 1 um, the effective grain-boundary recombination velocity must be <104 cm/s to allow for record-efficiency ...

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In this study, we develop a bulk doping method by diffusing small organic molecules to prepare the quality perovskite film for efficient solar cells, simultaneously with the advantages of reduced grain boundary grooves, passivated ...

This perspective elaborates the importance of grain-boundary grooves (GBGs) in perovskite solar cells (PSCs). Through exploring the uncharted microstructure-property-performance relationship of GBGs, the perspective points to a new direction for improving PSCs via grain-boundary groove engineering. The knowledge of GBGs in PSCs can be extended to ...

Very recently, the conversion efficiency of large area TOPCon solar cells (A cell = 244.51 cm 2) with in situ phosphorous doped LPCVD polysilicon and applying ADE etching for wrap-around removal has been increased to 23.3% with following electrical parameters: V OC = 702.7 mV, J SC = 40.1 mA cm -2, FF = 81.3%, ? = 23.3%, independently certified by ...

Solar cells built on polycrystalline gallium arsenide usually have very leaky reverse characteristics and low open circuit voltage. Both these problems arise from the effect of the Schottky diode made on the grain boundary, which shunts the active Schottky solar cell and deteriorates its performance characteristics. Selective ...

Due to the unpredictable composition and vulnerable nature of the grain boundaries (GBs), grain boundaries engineering with improving the order degree of perovskite GBs would be the breakthrough for high-performance polycrystalline perovskite solar cells (PSCs). However, there are rare works on the stacking structures of passivators and on their influence on ...

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Optomechanical reliability has emerged as an important criterion for evaluating the performance and commercialization potential of perovskite solar cells (PSCs) due to the mechanical-property mismatch of metal halide perovskites with other device layer. In this work, grain-boundary grooves, a rarely discussed film microstructural characteristic, are found to ...

Grain size and grain boundaries, as basic components of perovskite film, have a significant impact on the device performance of perovskite solar cells. Therefore, the statistics of perovskite microstructure properties are important for improving power conversion efficiency.

Soln.-processed organo-lead halide perovskite solar cells with deep pinholes in the perovskite layer lead to shunt-current leakage in devices. Herein, we report a facile method for improving the performance of perovskite solar cells by inserting a soln.-processed polymer layer between the perovskite layer and the hole-transporting ...

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