

Passivating Defect Sites of Perovskite Materials to Improve Device Stability

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The intrinsic instability of lead halide perovskite materials in the ambient atmosphere is one of the most critical issues that impede perovskite solar cell commercialization. Defect engineering of perovskite material has been investigated to overcome this stability issue. Here we present an overall understanding of defect physics of metal halide perovskite material. Time and temperature-resolved photoluminescence technique was introduced to characterize the defect-related photophysics.

Based on the understanding, we show passivation engineering techniques to mitigate defect-assisted material degradation. Our findings correlate the optical characterization of the perovskite material with device engineering in regards to material degradation, and propose a general approach for improving the reliability of perovskite-based optoelectronic devices.