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Perovskite Solar Cells Fabricated with Various Buffer Layers: Relationship Between Carrier Lifetime and Observed J-V Hysteresis

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Perovskite solar cells have been the subject of intensive research efforts over the past 7 years with the highest performing device having a reported efficiency of more than 20%. Despite their rapid advancement, these devices are not without issues. The current density-voltage(J-V) response of these devices has been shown to vary depending on the direction of the voltage during characterization. Voltage scan rate, and device pre-conditioning, such as exposure to light for a set period of time, or biasing the device at a set voltage for a set period of time, have also been shown to affect the J-V response of perovskite solar cells. This J-V hysteresis has posed a challenge in determining the actual efficiency of devices. It has been shown that the use of different buffer layers in perovskite devices can alter the observed hysteresis. This work seeks to investigate the effect of varying buffer layers on hysteresis in perovskite solar cells. Specifically, the relationship between the carrier lifetime and the severity of observed hysteresis is observed. Buffer layer choices which result in reduced levels of hysteresis are highlighted.

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