

Study of Lead-Free Perovskite Solar Cells at Elevated Temperatures and UV Irradiation

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Abstract: In the present work, the change of the electrical performance is investigated for two lead-free perovskite materials with novel iodide-based and bromide-based compositions under different exploitation conditions, such as light-induced stress, elevated temperatures and ultraviolet light exposure. The charge transport properties are studied in more detail by spectroscopic methods for the cell with the iodide layer due to its greater stability, aiming to understand the degradation mechanism. The results show that this perovskite exhibited excellent stability at UV exposure and acceptable stability at continuous illumination at 600 nm. The device is stable up to 55 °C, when the photovoltage drops. Beyond this threshold temperature, a phase change transition occurs related to traps formation and charge carriers escaping, which affects the photovoltage and it slightly increases.

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