

## Augmenting the performance and stability of perovskite solar cells by introducing cesium iodide doping into the $\text{PbI}_2$ film via a two-step deposition method

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In recent years, the perovskite solar cell has achieved over 25% of power conversion efficiency. Widely used one-step spin coating is known to have difficulty in controlling perovskite films. To overcome this problem, perovskite films were produced by using two-step spin coating. These effects of doping  $\text{PbI}_2$  solutions with cesium iodide (CsI) are studied. The Cs-doped  $\text{PbI}_2$  film was rougher than the pristine  $\text{PbI}_2$  film, which made it more absorbent to the second-step solution. Consequently, a smoother and flatter perovskite film can be produced. So, it can improve the crystallinity, grain size, and morphology of perovskite film when dopant CsI in  $\text{PbI}_2$ . And the photovoltaic performance of the device with Cs-dopant is also expected to improve. Finally, the power conversion efficiency (PCE) of the solar cell by doping 0.10M CsI in  $\text{PbI}_2$  increases from 17.45% to 20.29%, compared to the pristine device. Furthermore, the device showed excellent stability, maintaining 80% of its initial PCE after 350 h of continuous irradiation.

### Graphic Abstract

