All-Inorganic $CsPbI_2Br$-based Perovskite Solar Cells with Improved Stability via Ytterbium doping

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In the present investigation, we successfully fabricated the ytterbium (Yb^{2+}) doped $CsPbI_2Br$-based inorganic perovskite solar cells (IPVSCs). Here, we varied the concentration of Yb in the $CsPb_{1-x}Yb_xI_2Br$ (x=0-0.04) perovskite precursor solution. The optimum concentration of Yb showed improved morphology, crystal growth and photovoltaic performance. For the champion $CsPb_{0.97}Yb_{0.03}I_2Br$-based device, we achieved the highest 15.41 % power conversion efficiency (PCE) with a short circuit current density (J_{SC}) of 15.94 $mAcm^{-2}$, an open circuit voltage (V_{OC}) of 1.267 V and a fill factor (FF) of 76.35 %, which is higher than the $CsPbI_2Br$-based device. The Yb doping benefits to defect passivation and improve crystal growth and therefore, improved performance is observed. Moreover, the champion $CsPb_{0.97}Yb_{0.03}I_2Br$ device exhibits increased stability of 94 % of initial efficiency after 280 h under 85 °C thermal annealing. Our results provide a new method to rooms the performance of the photovoltaic application.