

Supporting Information

Localized Incorporation of Cesium Ions for Improving Formamidinium Lead Iodide Layers in Perovskite Solar Cells

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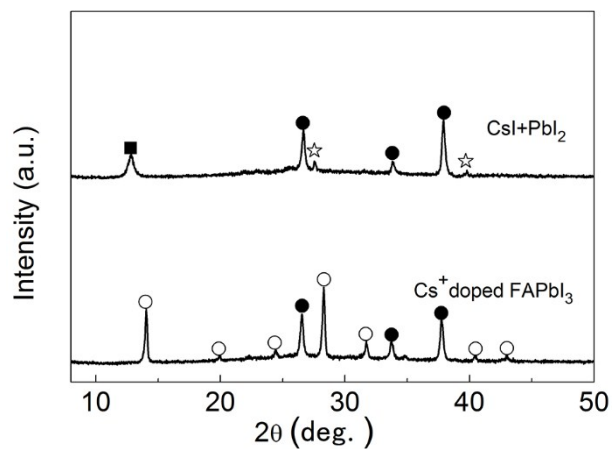


Fig. S1 X-ray diffraction patterns for the deposition process of mixed solution doping method, diffraction peaks of FTO, CsI, PbI_2 and $\alpha\text{-FAPbI}_3$ are labelled with solid circles, open asterisks, solid squares and open circles, respectively.

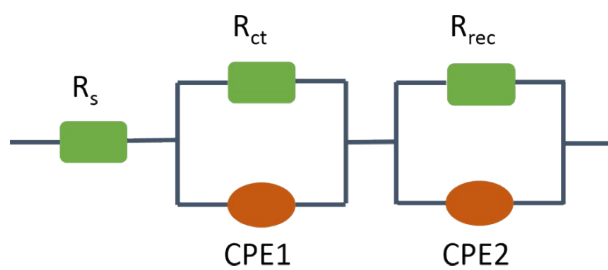


Fig. S2 The equivalent circuit for fitting impedance spectra.

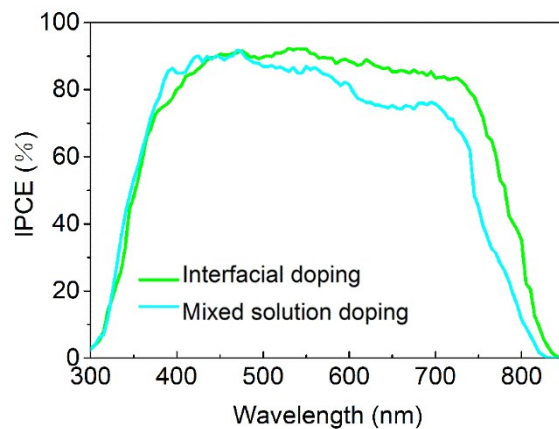


Fig. S3 The IPCE spectra of $\text{Cs}_x\text{FA}_{1-x}\text{PbI}_3$ devices fabricated by interfacial doping method and mixed solution doping method.

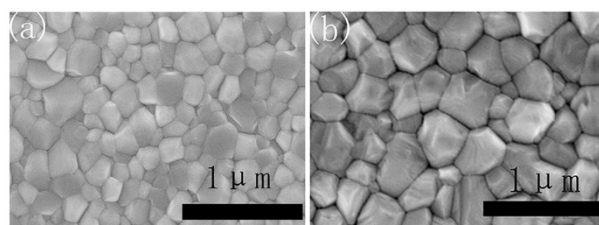


Fig. S4 The surface morphology of $\text{Cs}_x\text{FA}_{1-x}\text{PbI}_3$ layers prepared by (a) mixed solution doping method and (b) interfacial doping method.

Table S1 The photovoltaic parameters of devices prepared by interfacial doping method with different CsI doping layers.

| Devices | $J_{sc}(\text{mAcm}^{-2})$ | $V_{oc}(\text{V})$ | FF | PCE(%) |
|---------|----------------------------|--------------------|------|--------|
| W/O CsI | 20.1 | 1.01 | 0.66 | 13.4 |
| CsI50 | 23.0 | 1.05 | 0.71 | 17.1 |
| CsI100 | 19.5 | 0.98 | 0.67 | 12.7 |
| CsI200 | 17.1 | 0.90 | 0.64 | 9.8 |