Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supplementary Information

Modulating the grain size, phase and optoelectronic quality of perovskite film with cesium iodide for high performance solar cells

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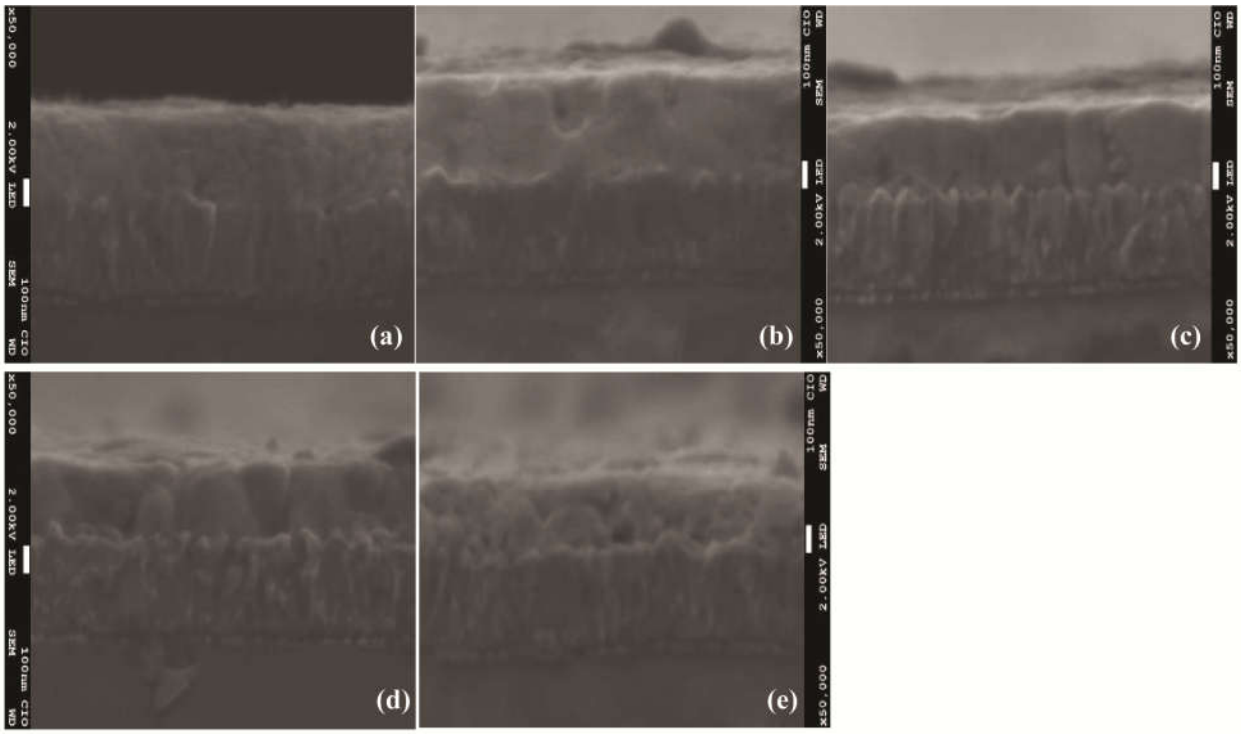

Figure S1. Cross-sectional SEM images of perovskite film fabricated by one step spin coating method with different CsI content (a) 0%, (b) 1%, (c) 3% (d) 5% and (e) 10% in $CH_3NH_3PbI_3$ solution.

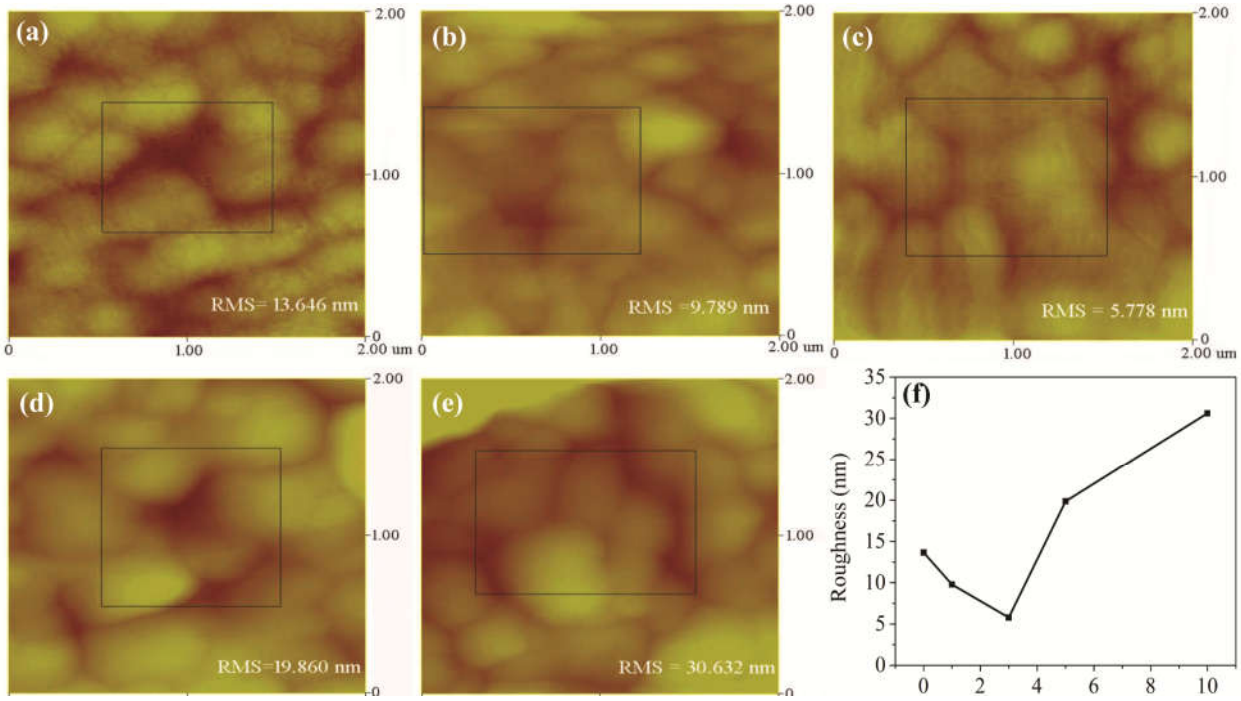

Figure S2. AFM images (2×2 µm) and RMS analysis of perovskite film fabricated by one step spin coating method with different CsI content (a) 0%, (b) 1%, (c) 3% (d) 5% and (e) 10% in $CH_3NH_3PbI_3$ solution, (f) Plot showing the variation of RMS roughness with different doping concentration of CsI in perovskite solution.

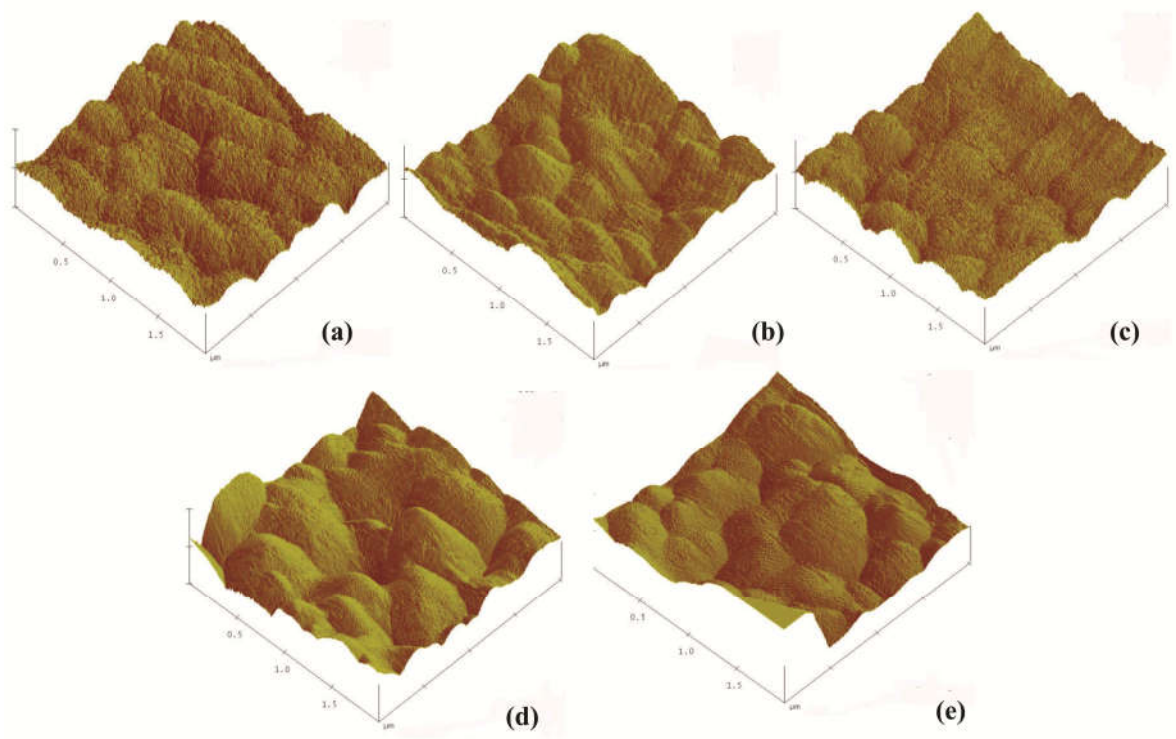

Figure. S3 3D AFM micrograph of perovskite films fabricated by one step spin coating method with different CsI content (a) 0%, (b) 1%, (c) 3% (d) 5% and (e) 10% in $CH_3NH_3PbI_3$ solution.

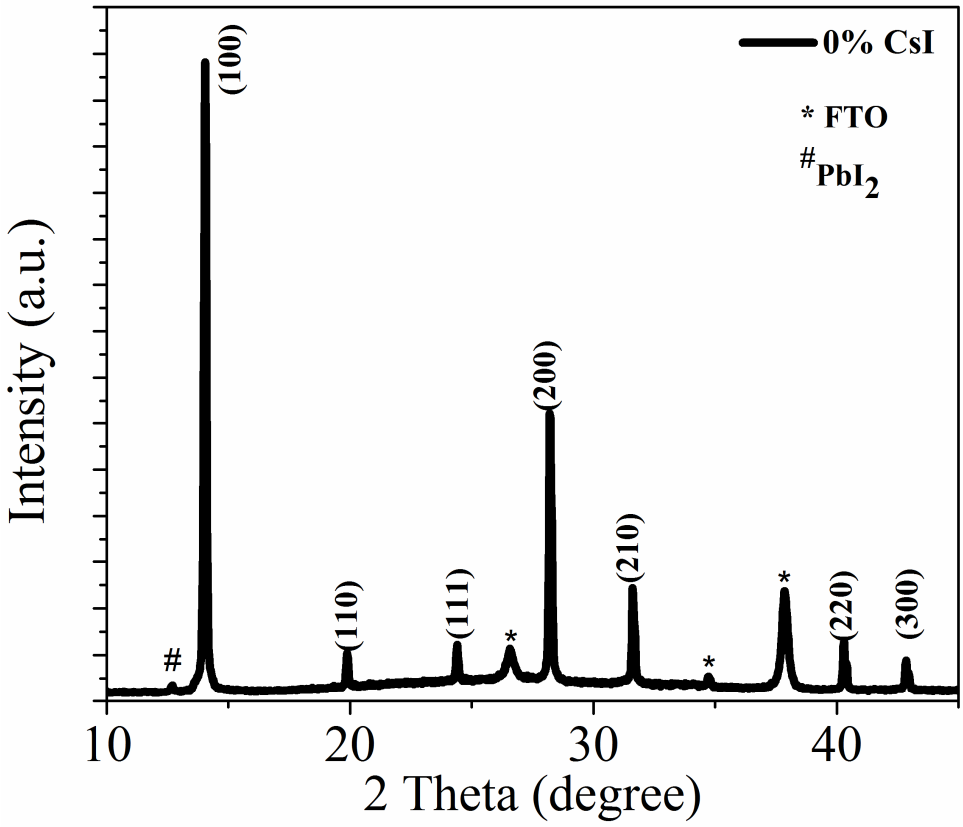

Figure. S4 The enlarged XRD spectra of perovskite film without cesium iodide, indicating the cubic crystalline structure with the appropriate diffraction planes.

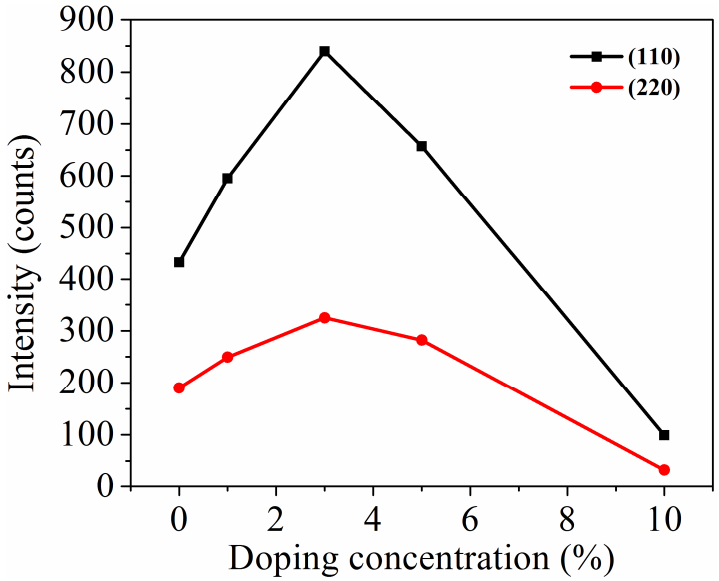

Figure S5. Plot showing the variation of diffraction peak intensity of planes (110) and (220) as a function of doping concentration.

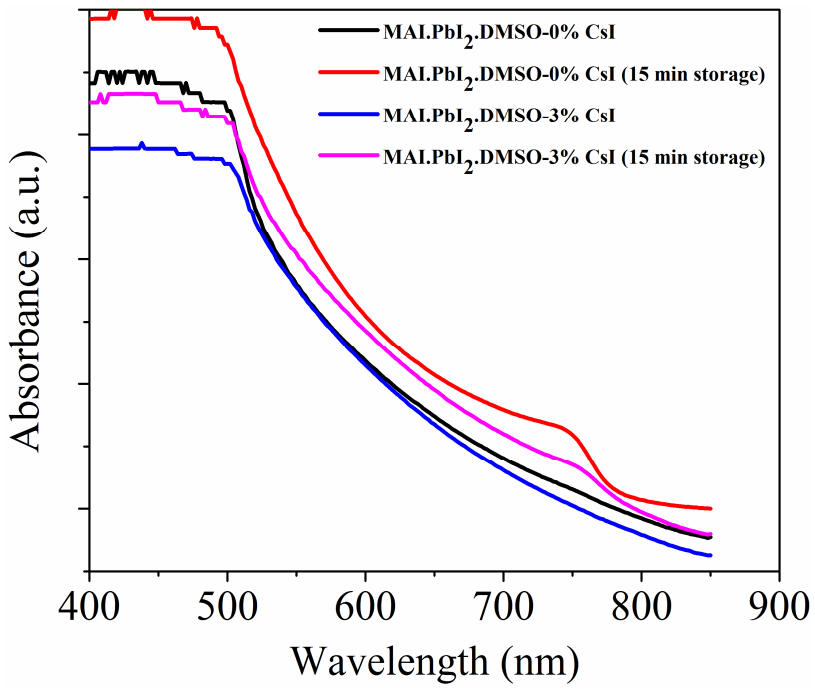

Figure S6. UV-visible absorption spectra of the MAI-PbI_2-DMSO precursor films without and with 3% CsI just after preparation and after storing for 15 min in the ambient environment.

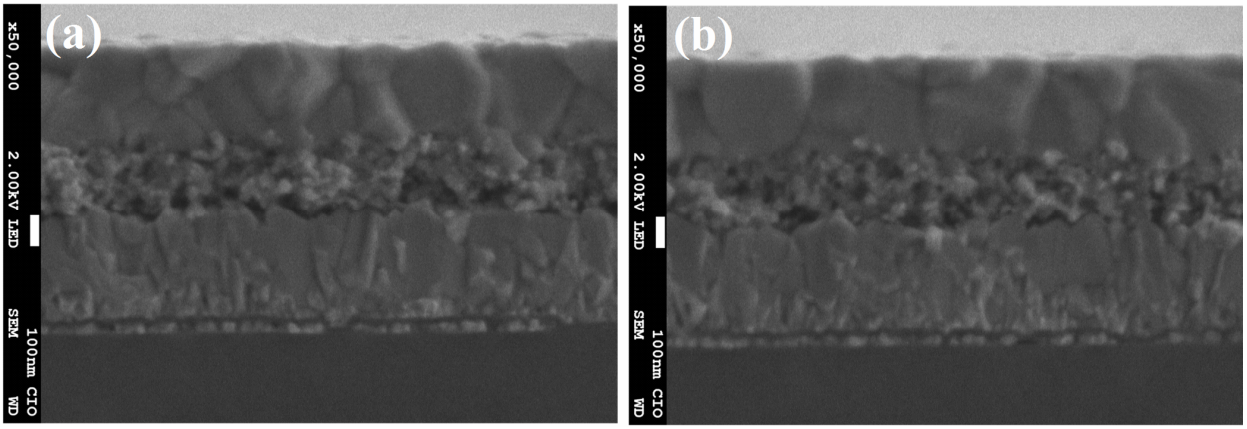

Figure S7. Cross-sectional SEM image of the perovskite film (a) without and (b) with CsI (3%) indicating the perpendicular orientation of the perovskite crystal.

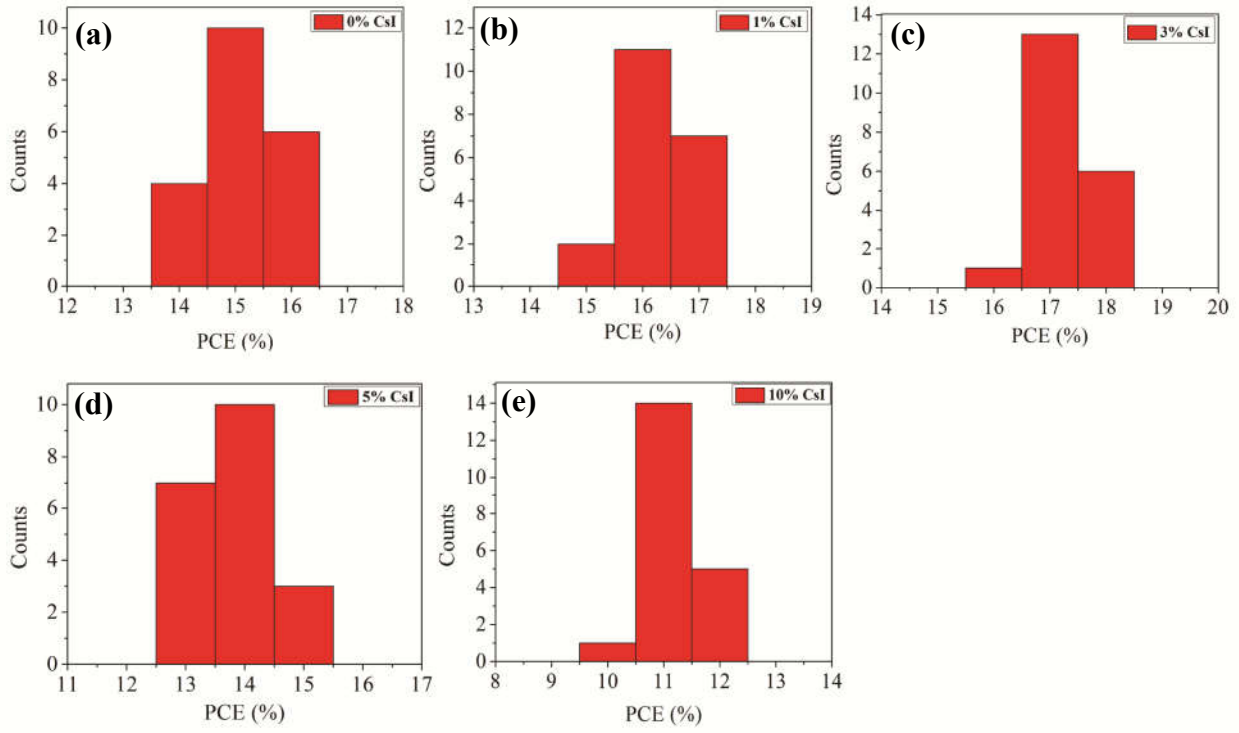

Figure S8. Plots representing the statistical analysis of perovskite devices fabricated using different concentration of CsI (a) 0%, (b) 1%, (c) 3%, (d) 5% and (e) 10%. Histogram of photo conversion efficiency for 20 cells with a structure of FTO/bl-TiO_2/meso-TiO_2/perovskite/spiro-MeOTAD/Ag. The distribution of efficiency are closer to the Gaussian distribution.

Table S1. The fitted EIS data of perovskite solar cells with different concentration of CsI.

Samples	Contact resistance (R_s)	Charge transfer resistance (R_{ct})
0% CsI	25.524	118.52
3% CsI	26.885	93.541