Supporting Information

Tailoring the Film Morphology and Interface Band Offset of Caesium Bismuth Iodide based Pb Free Perovskite Solar Cells

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Table and Figures

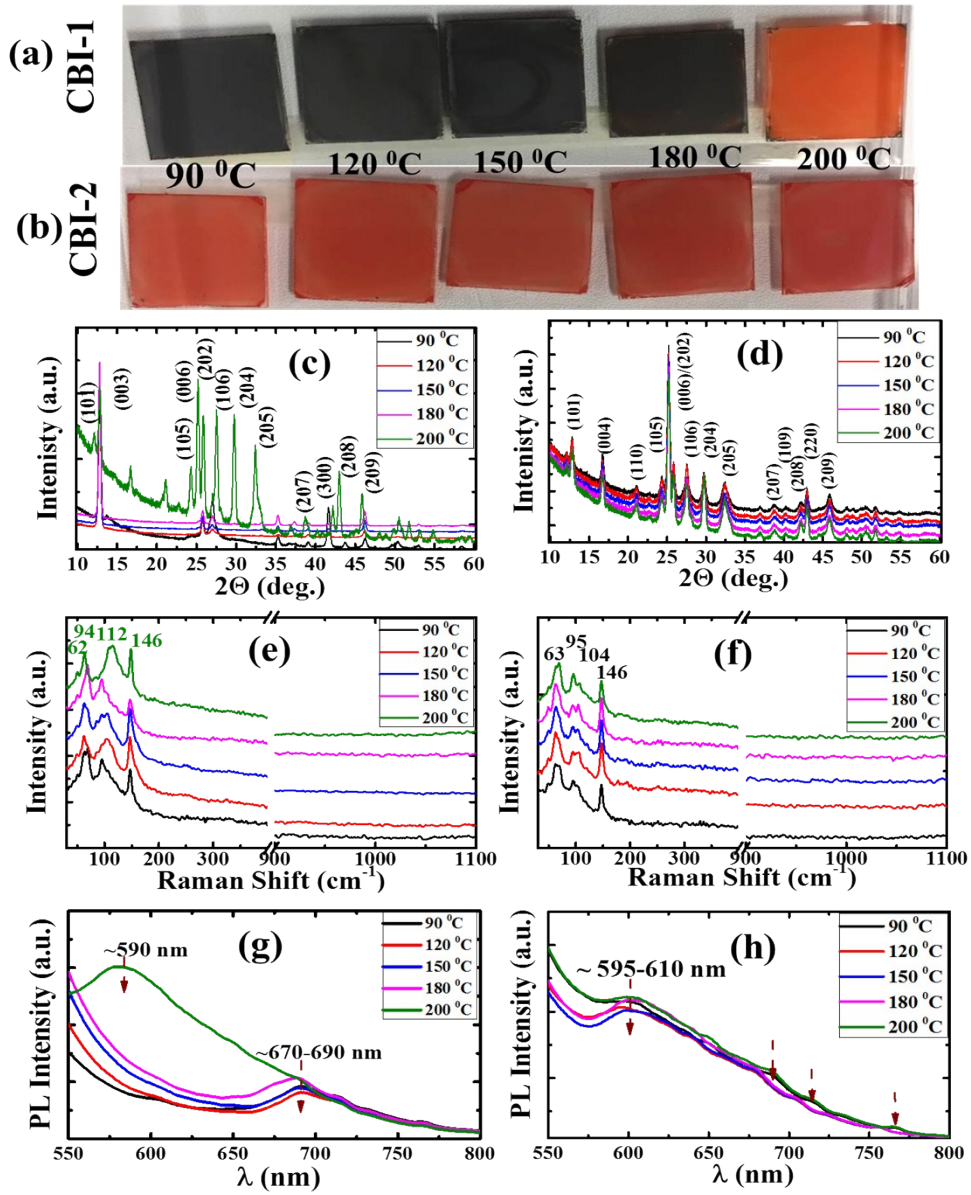

Fig. S1. Photographs of Bi-HaP films; (a) CBI-1 and (b) CBI-2 annealed at temperatures; 90, 120,150,180, and 200 °C. XRD patterns (c, d), Raman spectra (e, f) and PL spectra (g, h) of CBI-1 and CBI-2 films, respectively.

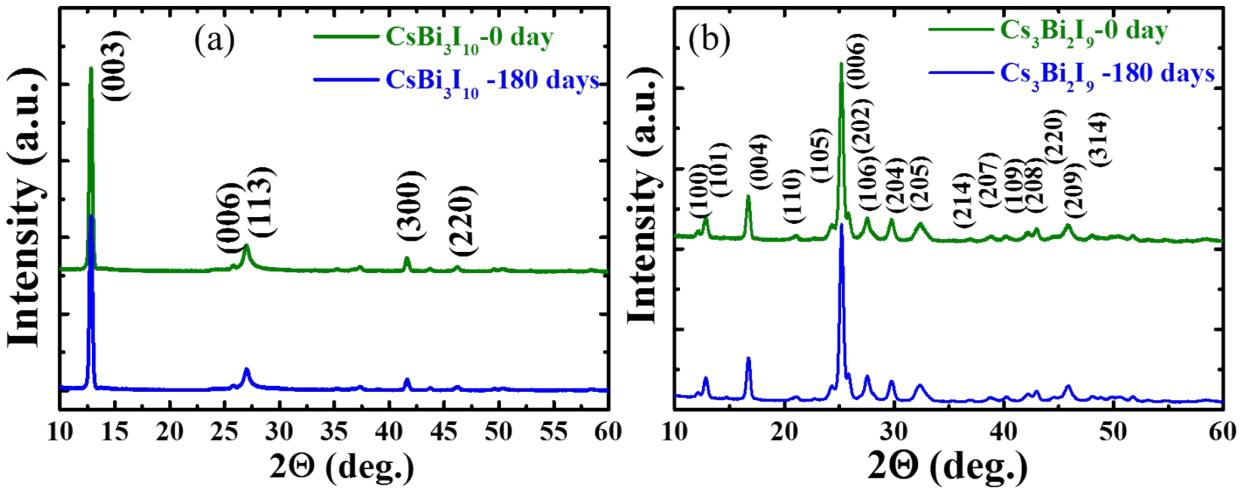

Fig. S2. The XRD patterns of fresh and aged (kept under ambient air for 180 days) Bi-HaP (CBI-1 (a) and CBI-2) (b) films.

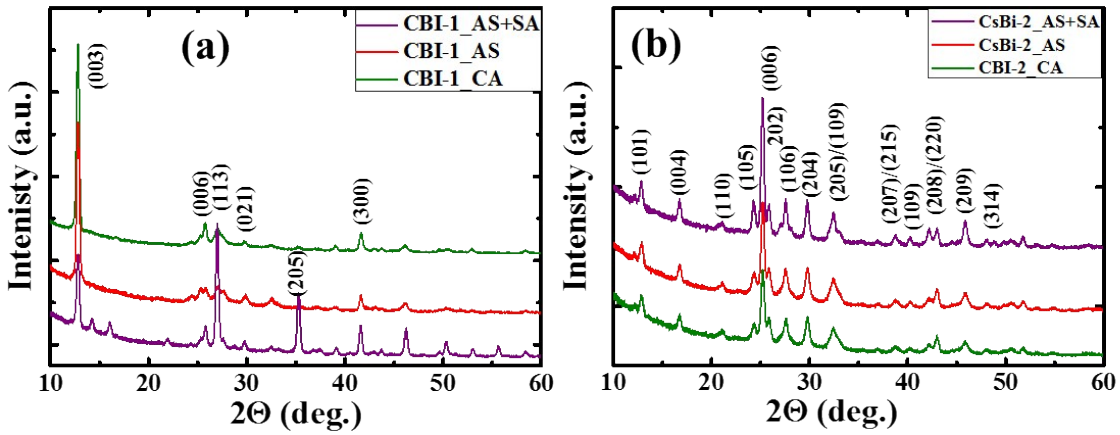

Fig. S3. XRD patterns of CBI-1 (a) and CBI-2 (b) thin films fabricated with CA, AS dripping and AS followed by SA under ambient DMF solvent vapour.

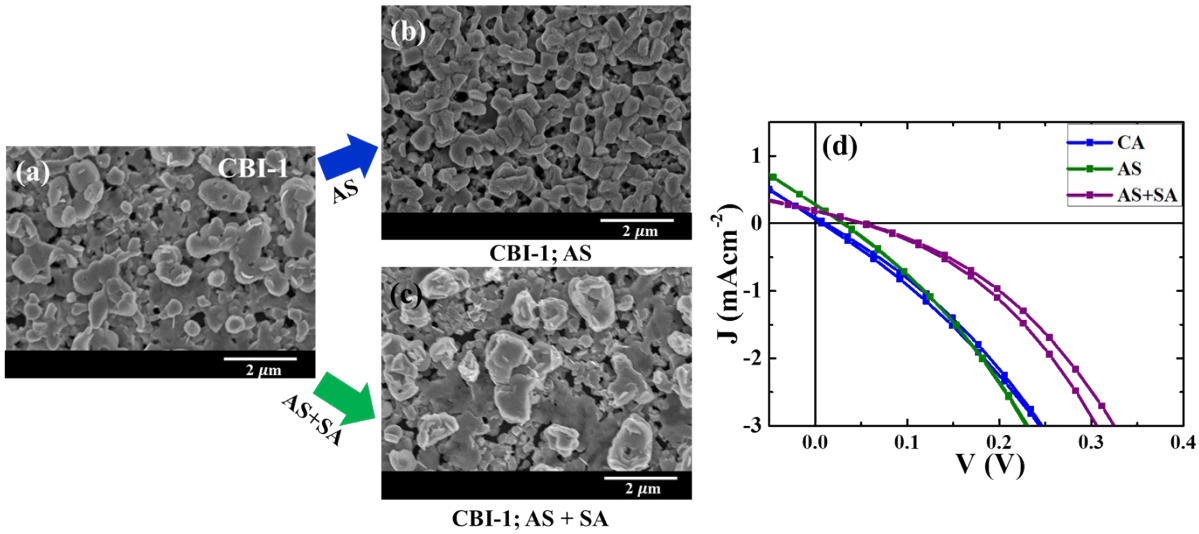

Fig. S4. SEM images of CBI-1 films fabricated at different conditions; (a) CA, (b) antisolvent (AS) dripping, (c) antisolvent dripping subsequent with solvent vapor annealing (AS+SA).

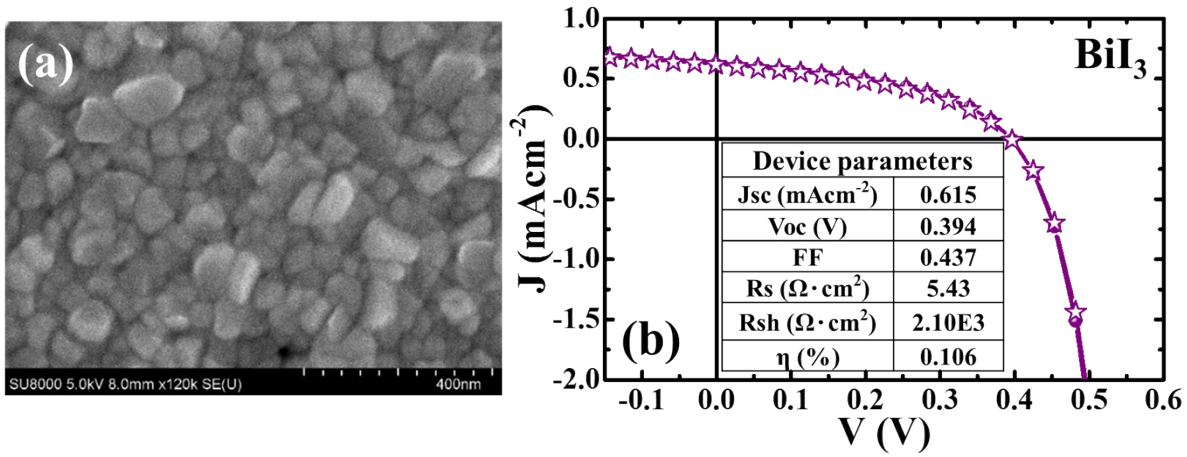

Fig. S5. Morphology of BiI3 film (a) and J-V characteristic of the BiI_3 solar cell of configuration (ITO/PTAA/BiI3/PCBM/AZO/Ag). This is much better than CBI-1 film. Here, the symbols in J-V curves stand for forward and reverse scan direction.

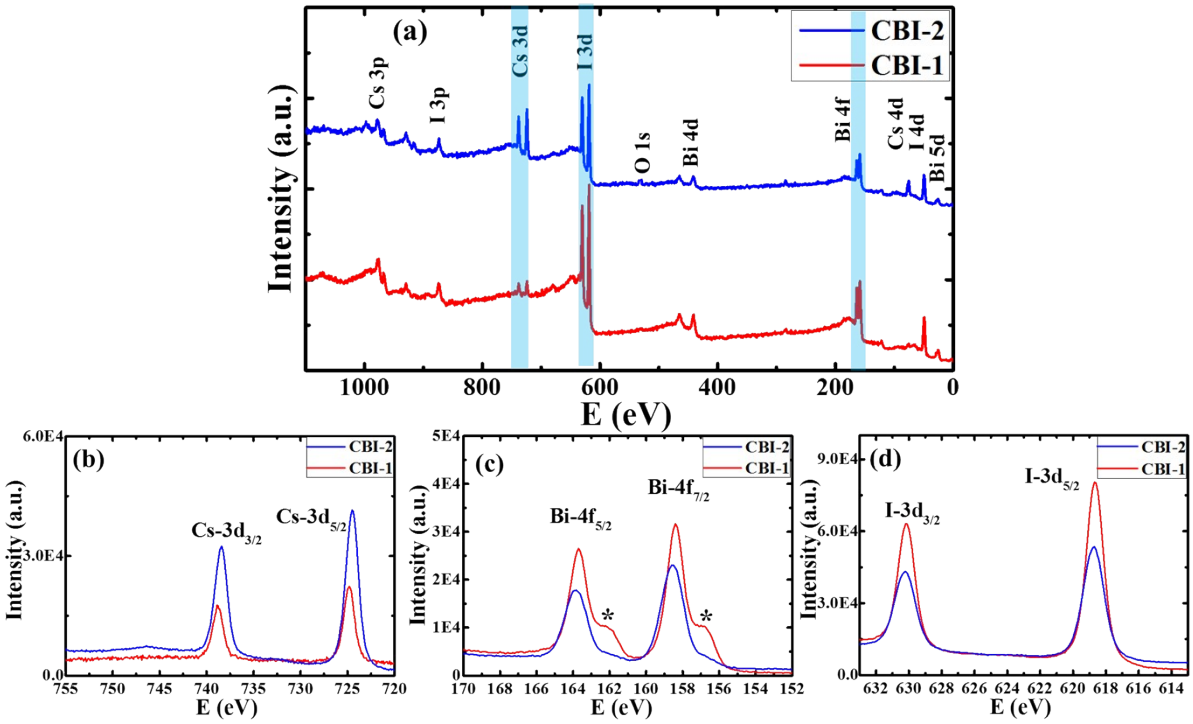

Fig. S6. XPS spectra of CBI-1 (AS) and CBI-2 (AS+SA) films (a). The core-level peak for Cs-3d (b), Bi-4f and (c) I-3d. The two steric symbols in the plot (c) at ~162 eV and 157 eV assigned for metallic Bi.

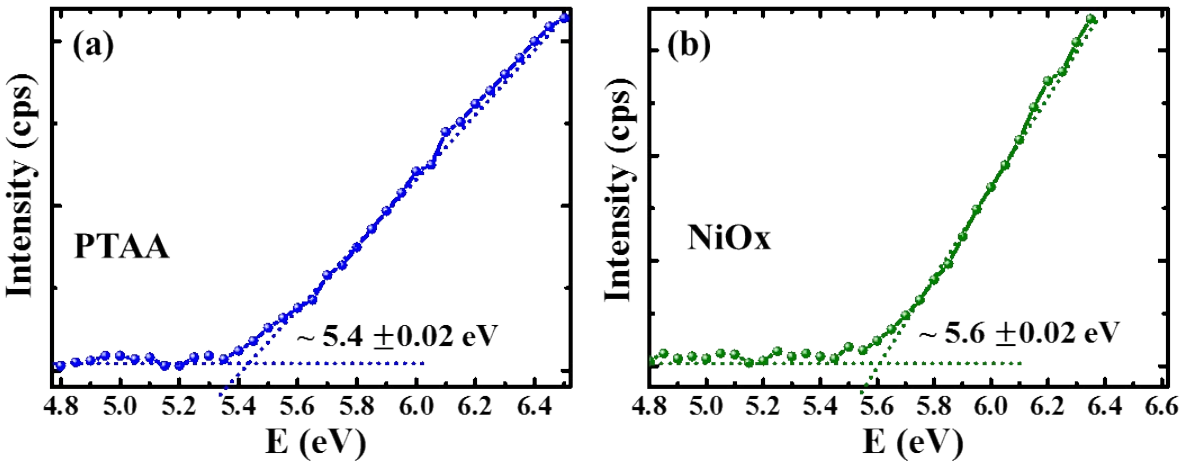

Fig. S7. Photoelectron spectra of plasma treated PTAA (a) and NiOx (b) films.