Electronic Supplementary Material (ESI) for Materials Horizons.

Supplementary Information

Cation exchange for thin film lead iodide perovskite interconversion

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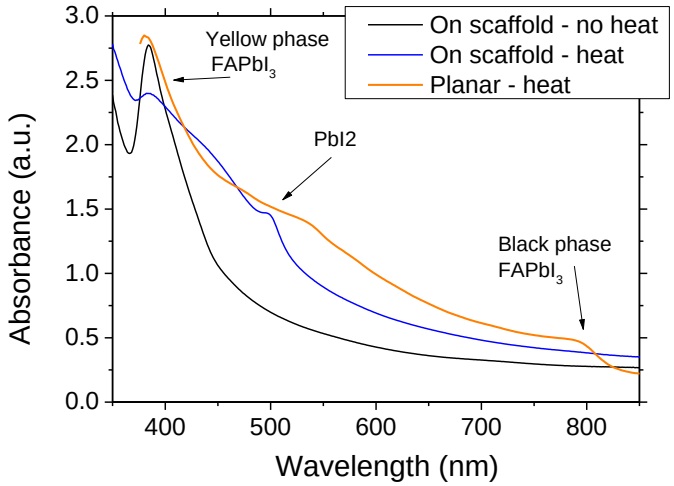


Fig. S1: UV-vis spectra showing absorption of $FAPbI_3$ when deposited on mesoporous scaffold, with and without being heated to 170°C, compared to the black phase $FAPbI_3$ on a planar substrate. We observe some PbI_2 formation when heating the yellow phase on mesoporous scaffold, but not for planar devices.

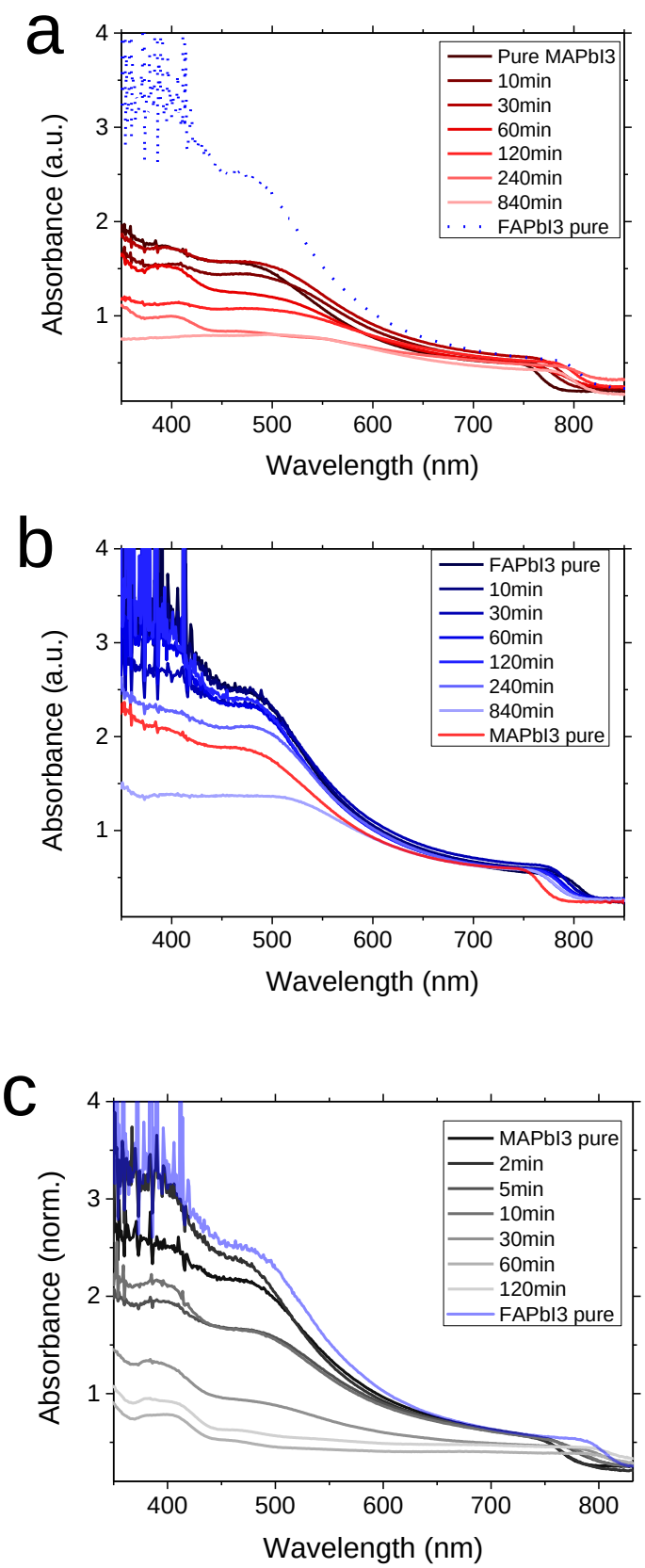
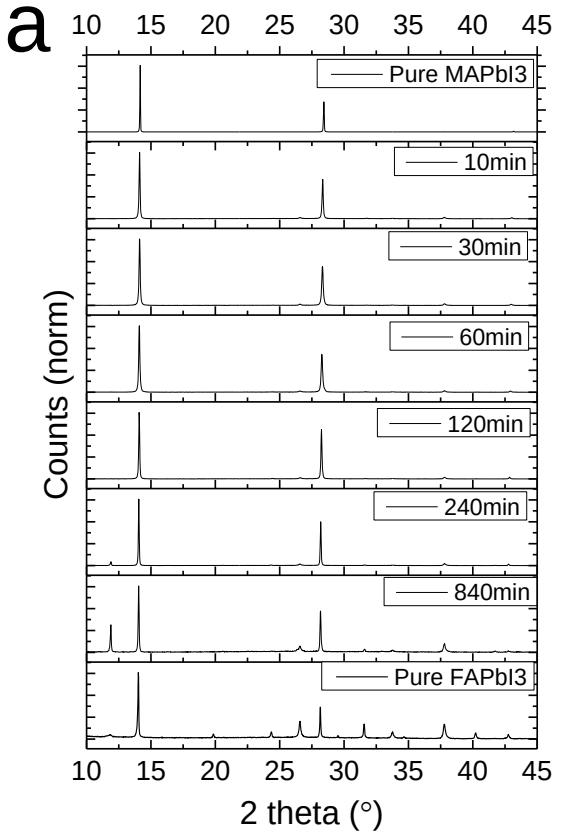
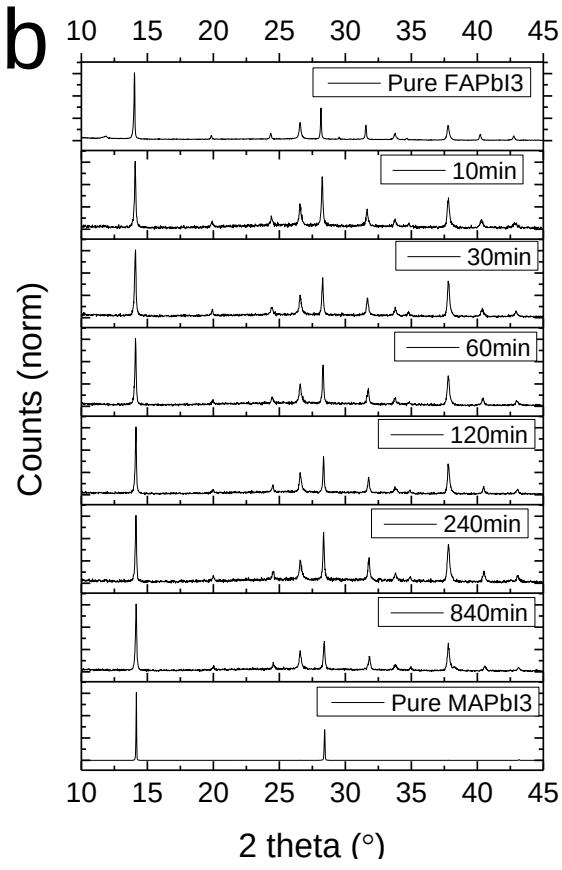


Fig. S2: Full UV-Vis spectra of the interconverted films described in main text figs 1-3. a) $MAPbI_3$ to $FAPbI_3$, b) $FAPbI_3$ to $MAPbI_3$ and c) $MAPbI_3$ in mesoporous scaffold to $FAPbI_3$.


a
10 15 20 25 30 35 40 45
Pure MAPbI3
10min
30min
60min
120min
240min
840min
Pure FAPbI3
Counts (norm)
2 theta (°)


b
10 15 20 25 30 35 40 45
Pure FAPbI3
10min
30min
60min
120min
240min
840min
Pure MAPbI3
Counts (norm)
2 theta (°)

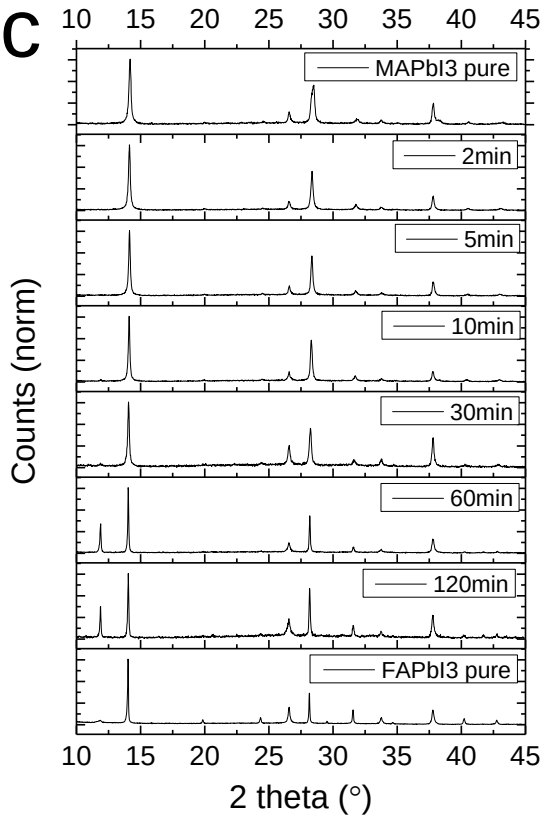


Fig. S3: X-ray diffraction spectra for the 3 interconversion reactions. a) $MAPbI_3$ to $FAPbI_3$, b) $FAPbI_3$ to $MAPbI_3$ and c) $MAPbI_3$ in mesoporous scaffold to $FAPbI_3$.

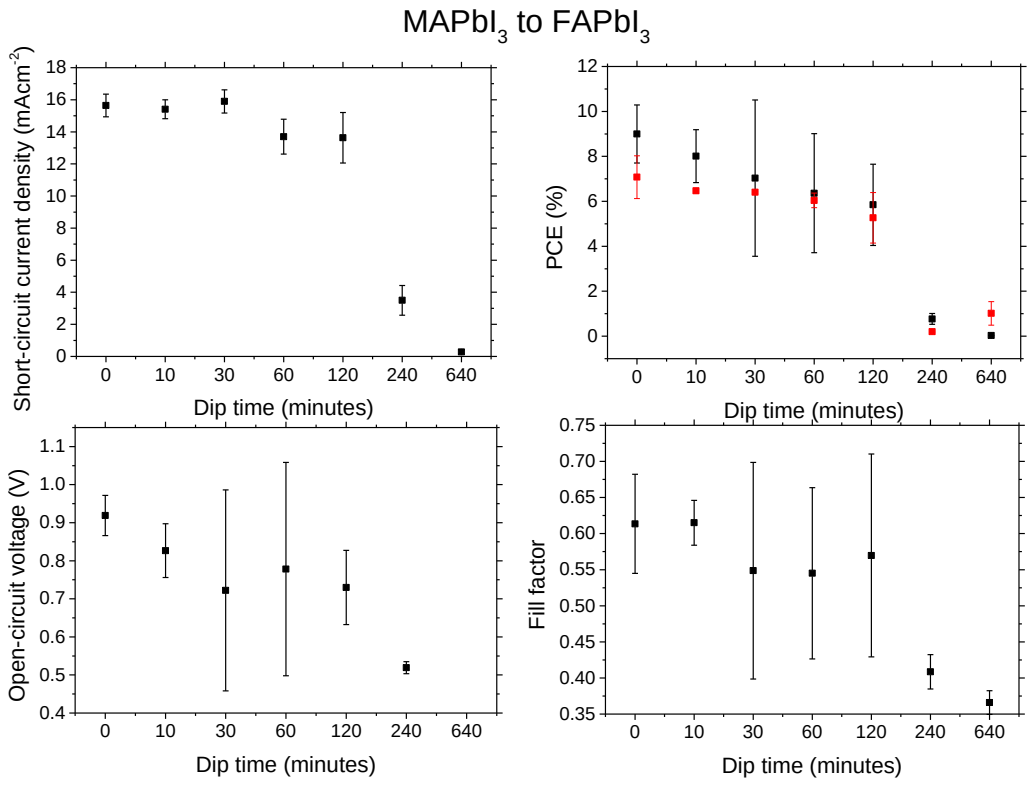


Fig. S4: Full solar cell parameter data extracted from current voltage curves measured under AM1.5 illumination, for $MAPbI_3$ to $FAPbI_3$ conversion, for at least 7 cells per point. Stabilised power measurements taken from at least 2 cells are shown on the PCE plot as red data, and are measured by holding at the maximum power point voltage as determined by the forward bias to short circuit direction fast JV scan.

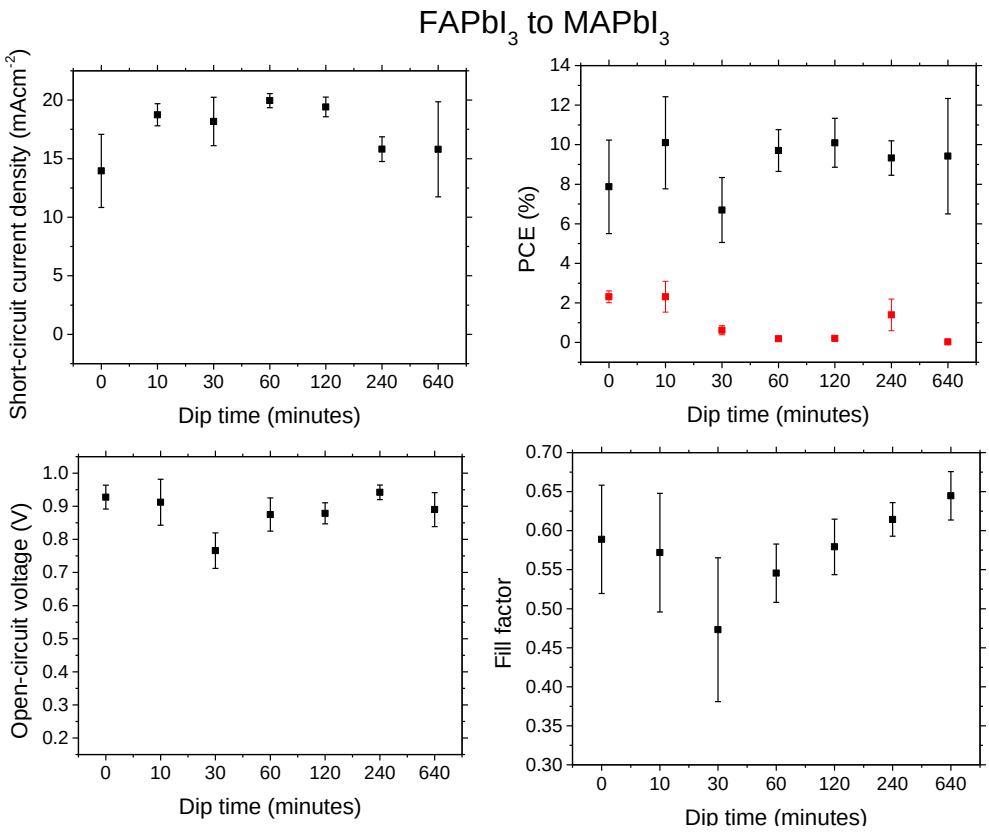


Fig. S5: Full solar cell parameter data extracted from current voltage curves measured under AM1.5 illumination, for $FAPbI_3$ to $MAPbI_3$ conversion, for at least 7 cells per point. Stabilised power measurements taken from at least 2 cells per point are shown on the PCE plot as red data, and are measured by holding at the maximum power point voltage as determined by the forward bias to short circuit direction fast JV scan.

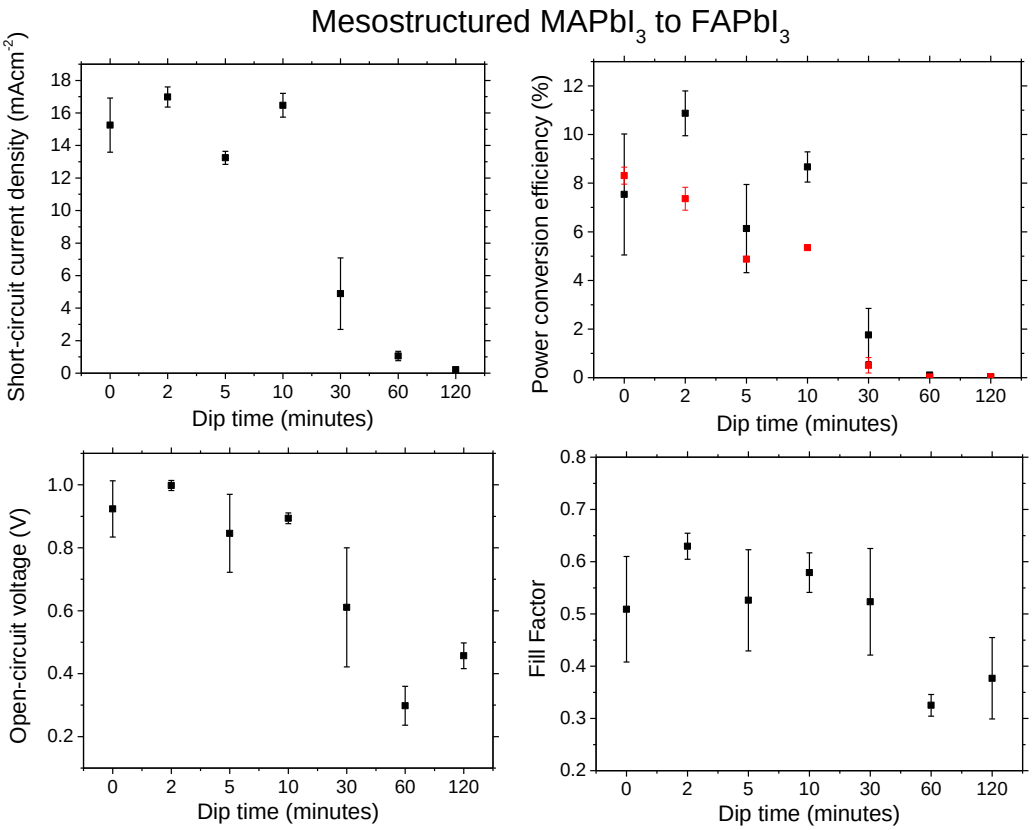


Fig. S6: Full solar cell parameter data extracted from current voltage curves measured under AM1.5 illumination, for mesostructured $MAPbI_3$ to $FAPbI_3$ conversion, for at least 7 cells per point. Stabilised power measurements taken from at least 2 cells are shown on the PCE plot as red data, and are measured by holding at the maximum power point voltage as determined by the forward bias to short circuit direction fast JV scan.