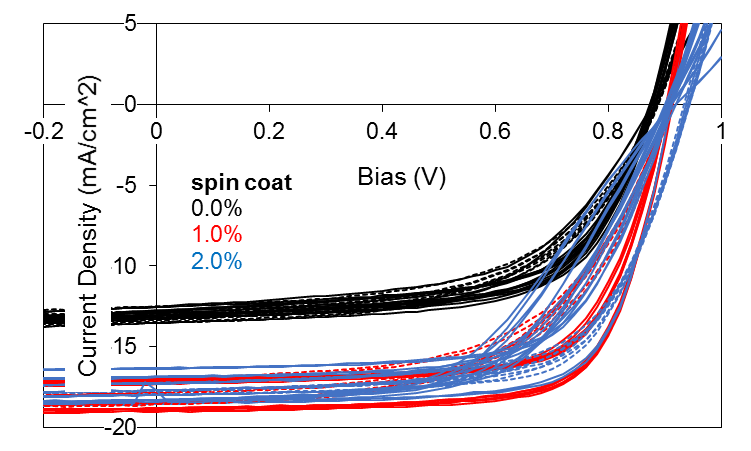
((Supporting Information can be included here using this template))

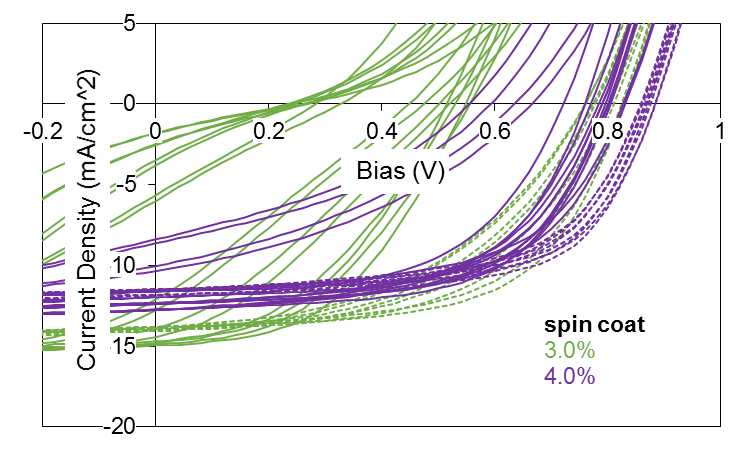
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Supporting Information

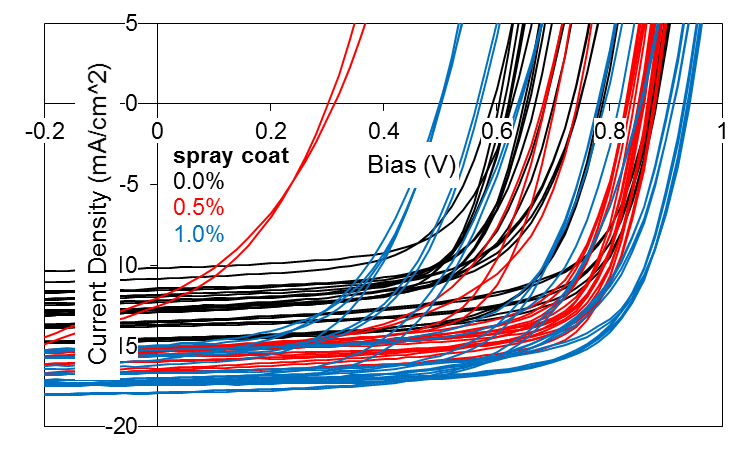
Spray-cast multilayer organometal perovskite solar cells fabricated in air

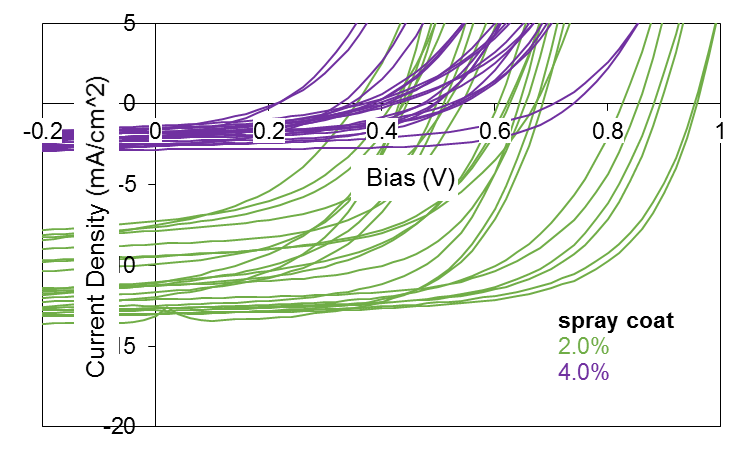
Author(s), and Corresponding Author(s)\* David. K. Mohamad, Jonathon Griffin, Christopher Bracher, Alexander T. Barrows and David G. Lidzey\*





**Figure S1** - The effect of HI concentration in spin-coated PSCs. PEDOT:PSS and PCBM layers are spin-coated. Solar cell J-V traces measured under 1Sun AM1.5G irradiation whilst cycling applied bias from -1V to +1V and back again.

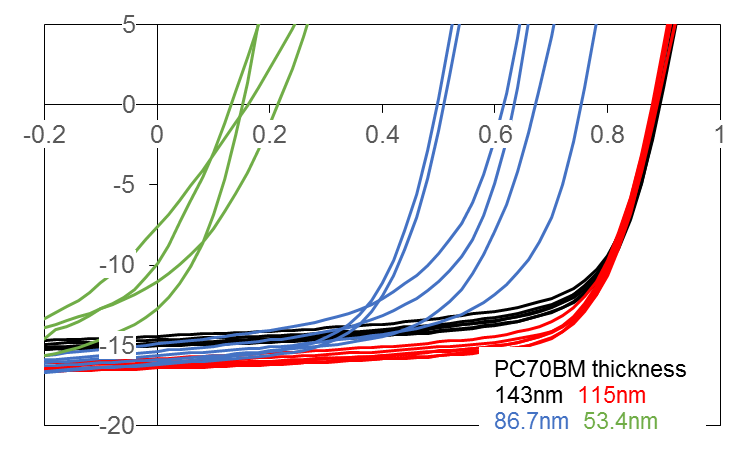




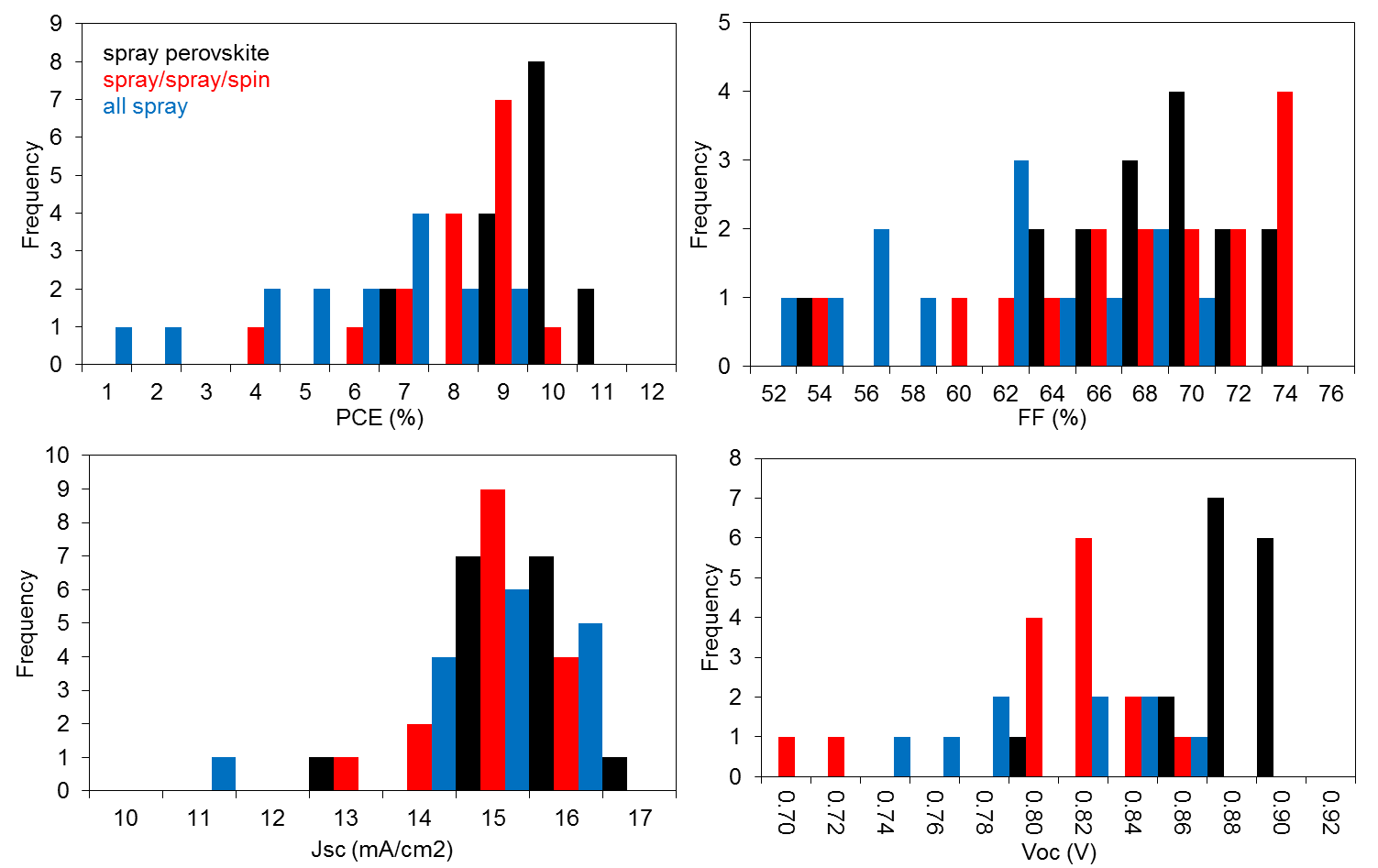
**Figure S2** - The effect of HI concentration in spray-coated PSCs. PEDOT:PSS and PCBM layers are spin-coated. Solar cell J-V traces measured under 1Sun AM1.5G irradiation whilst cycling applied bias from -1V to +1V and back again.

|  |  |  |
| --- | --- | --- |
| Condition | **Low Humidity (30%)** | **High Humidity (55%)** |
| PCE (%) | **10.7** (10.3±0.5) | **8.2** (9.2±0.7) |
| FF (%) | **67** (66±2) | **60** (59±5) |
| Jsc (mA/cm2) | **17.3** (16.8±0.8) | **16.0** (15.3±0.8) |
| Voc (V) | **0.93** (0.93±0.01) | **0.96** (0.92±0.04) |

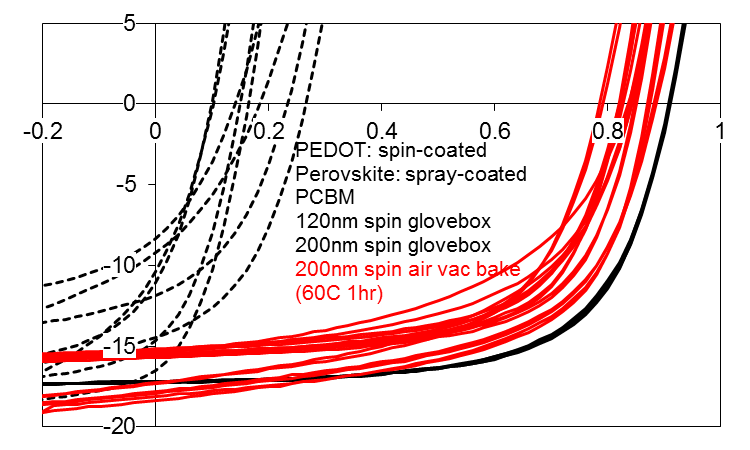
**Table S1** – Performance metrics of perovskite solar cells (Device C) prepared at low and high-humidity. Perovskite precursor has been prepared by spray-casting but PCBM and PEDOT:PSS and PCBM layers have been spin-cast. Champion cell data is shown in bold. Average and standard deviations are displayed in parenthesis



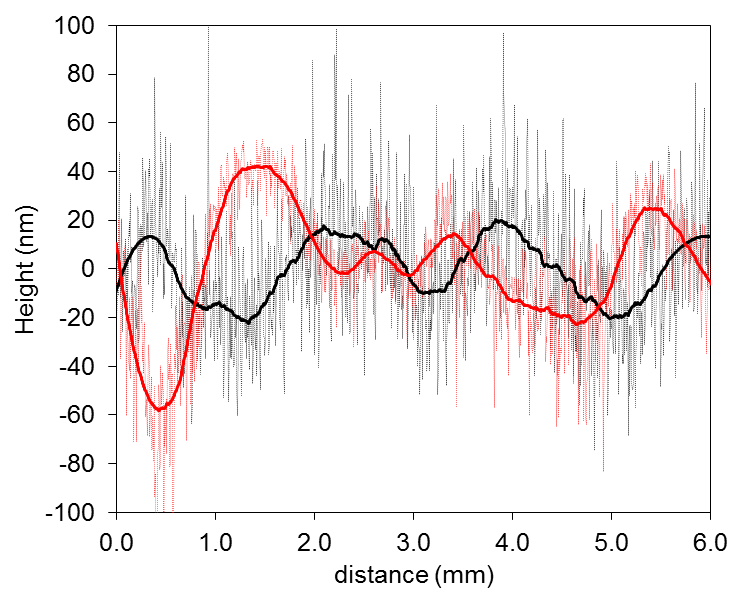
**Figure S3** – The effect of spin-coated PCBM thickness in all-spin cast PSCs. Solar cell J-V traces measured under 1Sun AM1.5G irradiation whilst cycling applied bias from -1V to +1V and back again.



**Figure S4** – Histograms of performance metrics from Devices C to E measured from +1 to -1V J-V sweeps under 1 Sun simulated AM1.5G irradiation.

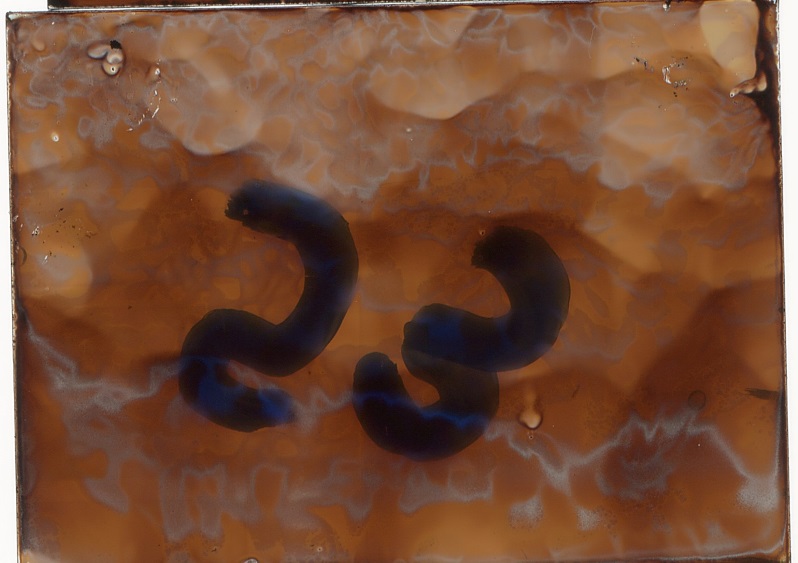


**Figure S5** – The effect of spin-coated PCBM thickness in PSCs containing spray-cast MAPbI3-xClx. PEDOT:PSS layers are spin-coated. Solar cell J-V traces measured under 1Sun AM1.5G irradiation whilst cycling applied bias from -1V to +1V.



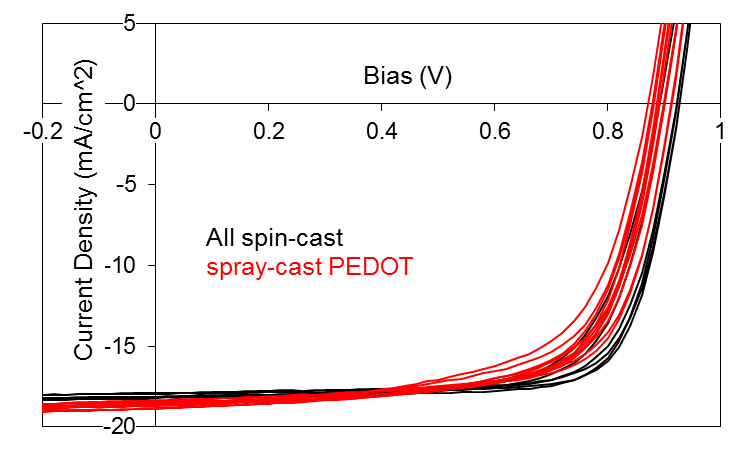
**Figure S6** – Surface profiles of spin-coated Device A (black lines) and spray-coated Device C (red lines). Raw data is plotted with thin dotted-lines and filtered data with thick solid-lines.



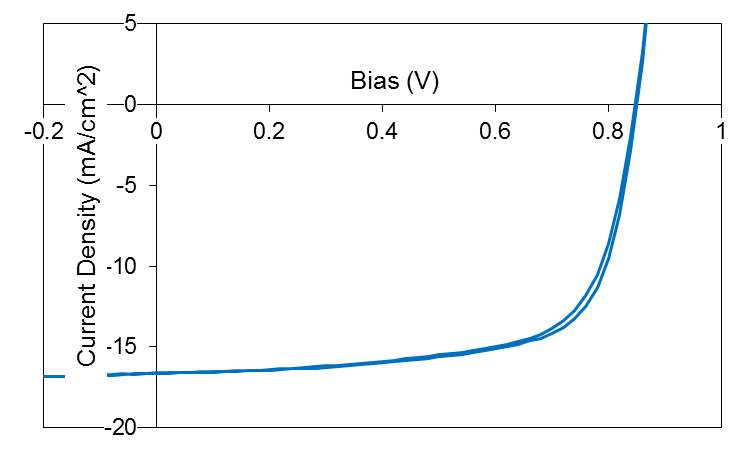




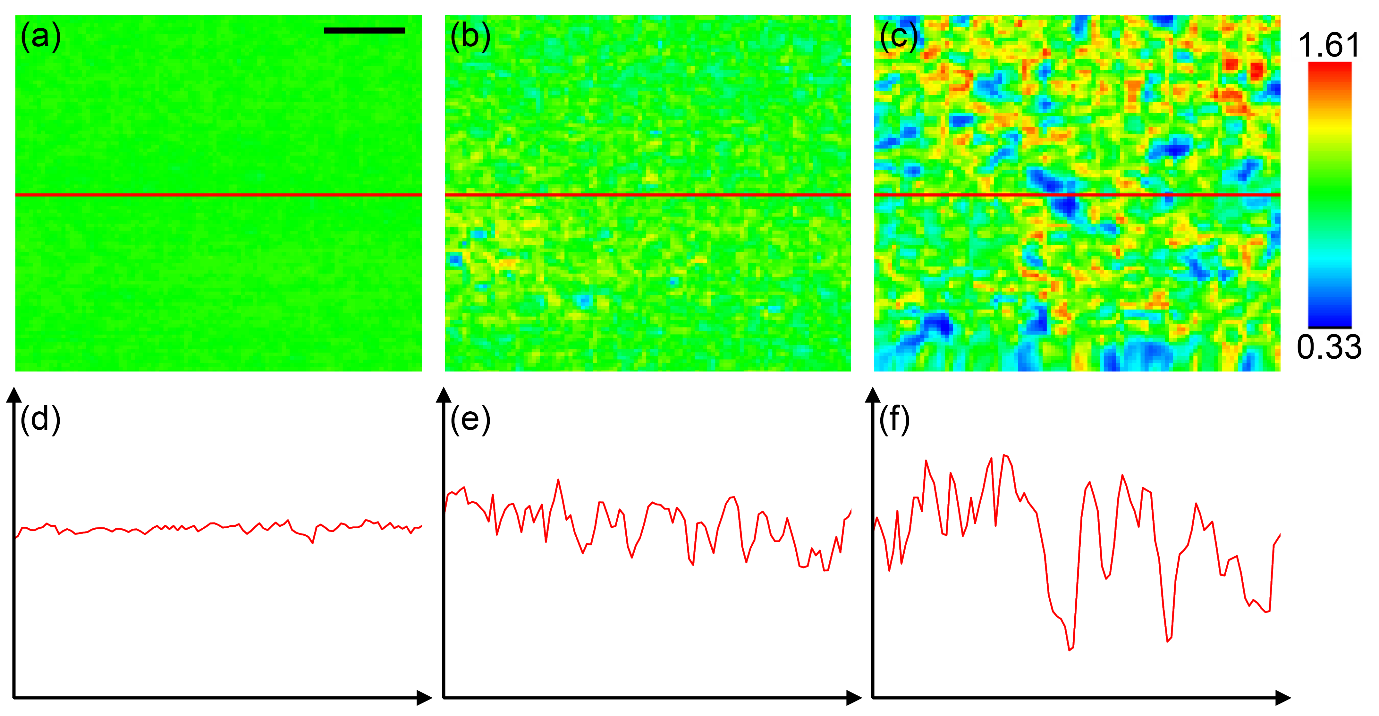
**Figure S7** – (from top to bottom) Transmission images of PEDOT:PSS(spin)/MAPbI3-xClx(spin), PEDOT:PSS(spin)/MAPbI3-xClx(spray) and spray-cast PCBM of ITO glass recorded with a flatbed scanner (Substrates have dimensions of 20x15mm).



**Figure S8** - Demonstration of spray-coated PEDOT:PSS. Solar cell J-V traces measured under 1 Sun AM1.5G irradiation whilst cycling applied bias from -1V to +1V and back again. Device A (black lines) and Device B (red lines). Perovskite precursor and PC70BM layers have been spin-coated.



**Figure S9** – The effect of hysteresis on the all-sprayed. Solar cell J-V traces measured under 1Sun AM1.5G irradiation whilst cycling applied bias from -1V to +1V and back again (0.4 Vs-1)



**Figure S10** – LBIC images with corresponding horizontal sections from spin-cast Device A (a & d), spray-cast Device C Area 1 (b & e) and Area 2 (c & f). 20um scale bar inset. Section and image data are plotted on matching scales.