Supporting Information

Air-Knife Assisted Spray Coating of Organic Solar Cells

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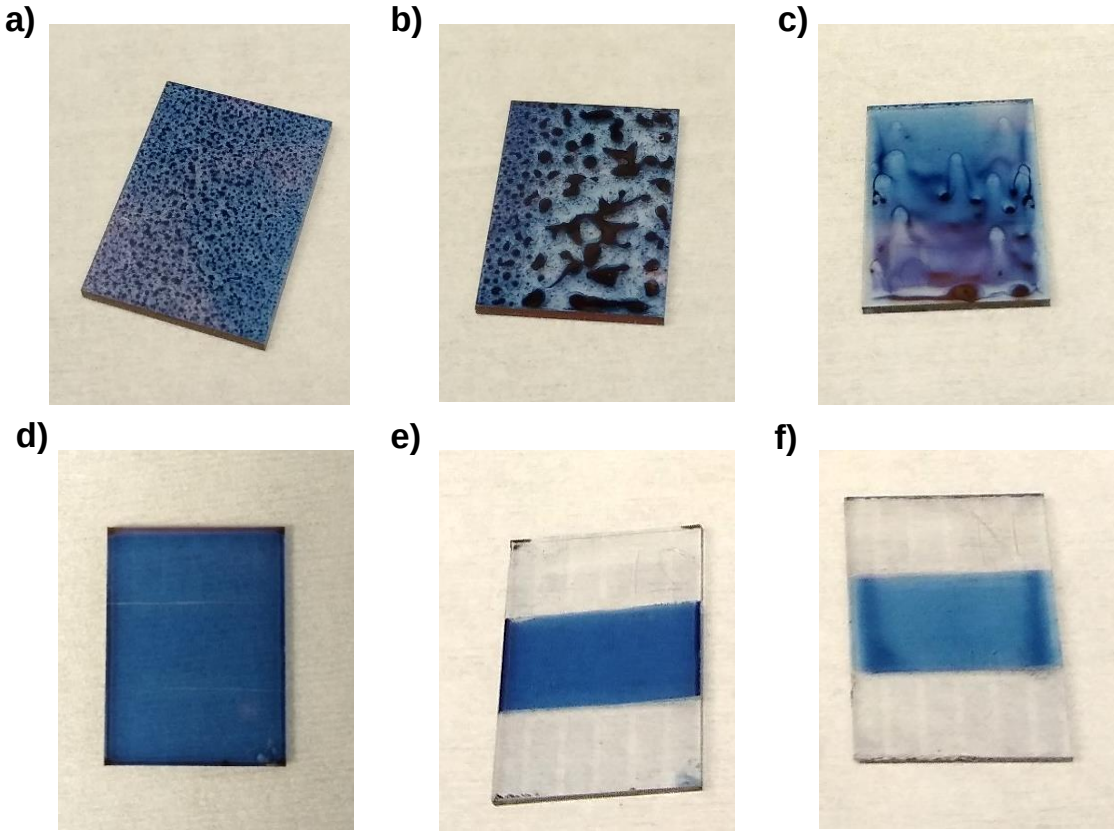

Figure S1: a) & **b)** PM6:Y6 films coated from chloroform, showing poor coalescence. **c)** PM6:DTY6 film coated from o-Xylene, with insufficient solution deposited leading to coalescence issues. A PM6:DTY6 film spin coated from *o*-Xylene **d)** before and **e)** after electrode patterning**. f)** Optimised spray coated film after patterning.

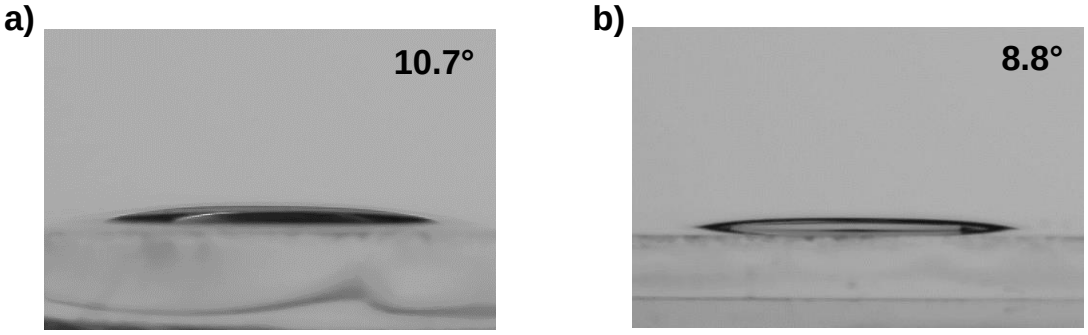

Figure S2: Contact angles of **a)** chloroform on ZnO, **b)** *o*-Xylene on ZnO.

Deposition Method	**Thickness of Film (nm)**	J_{SC} **(mA cm^{-2})**
Optimised spin coated	139 ± 5.4	22.8 ± 0.7
Spray coated- 0 second air-knife delay	70 ± 2.1	20.1 ± 0.8
Spray coated- 25 second air-knife delay	84 ± 1.7	19.1 ± 0.4
Spray coated- 50 second air-knife delay	90 ± 4.4	21.4 ± 1.0
Spray coated- 75 second air-knife delay	114 ± 3.3	21.3 ± 0.5

Table S1: Thin film thickness and corresponding J_{SC} values for each deposition condition.

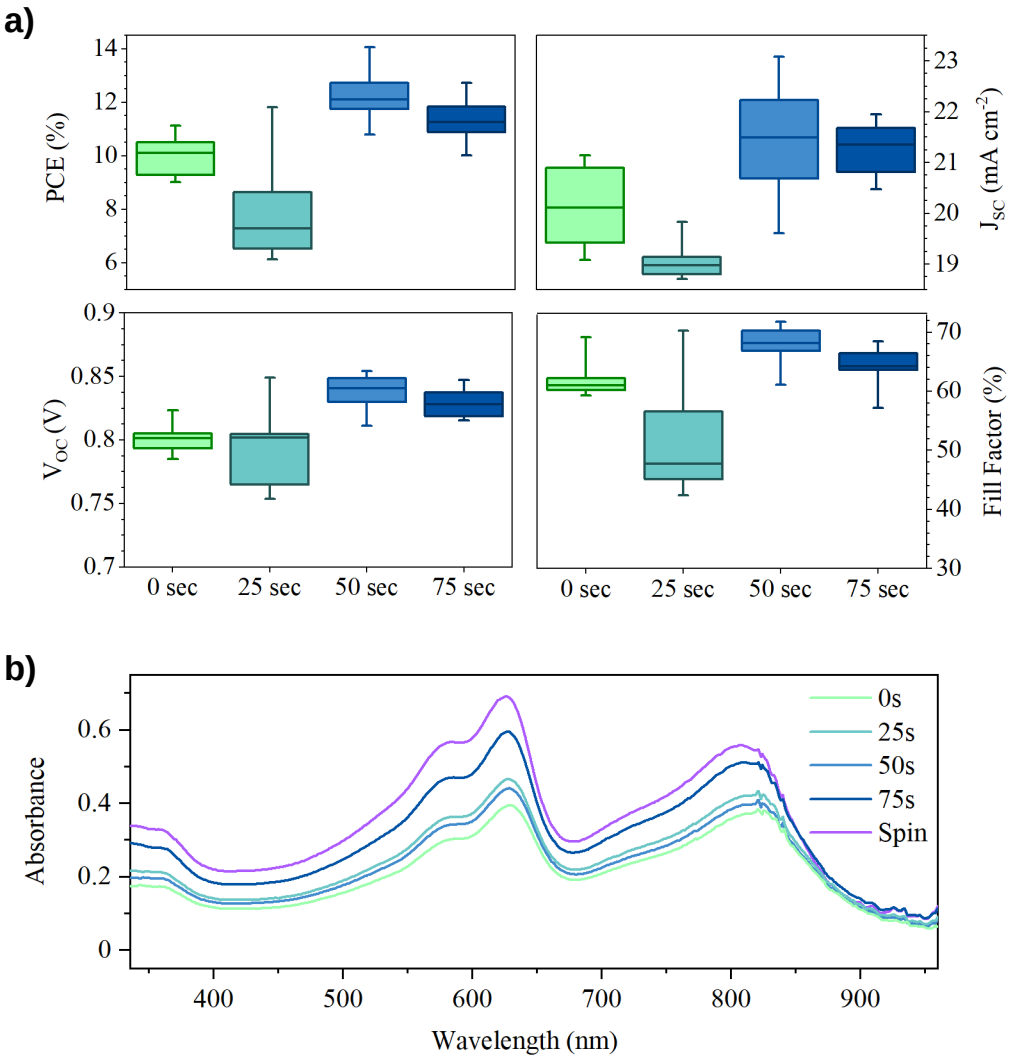

Figure S3: a) Box plots of device metrics for spray coated PM6:DTY6 devices with varying air-knife delay time. **b)** Absorbance of PM6:DTY6 thin films with varying air-knife delay time, without normalization.

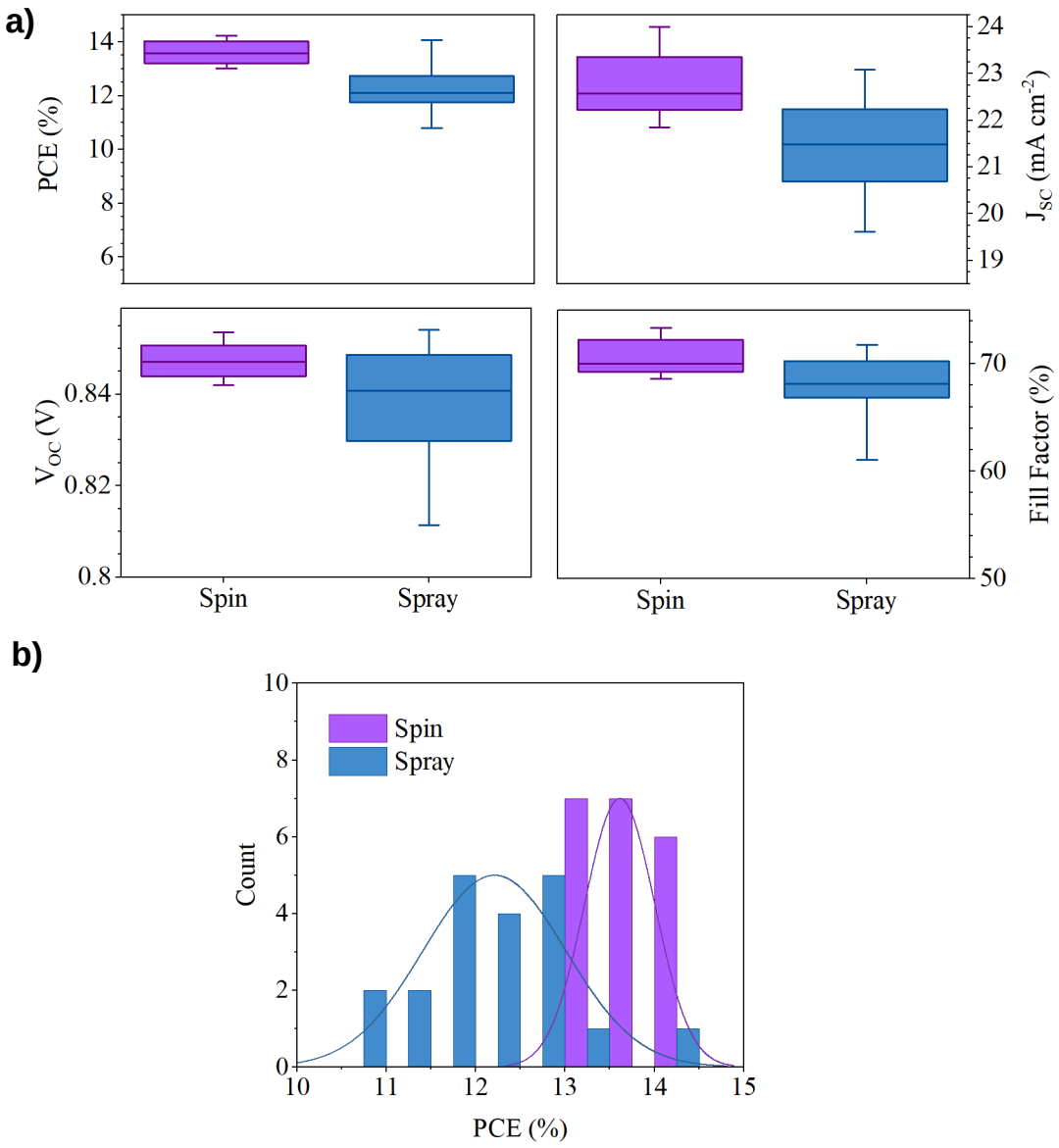

Figure S4: a) Box plots of device metrics for spin and spray coated (50 second air-knife delay time) PM6:DTY6 devices. **b)** Histogram of spin and spray device efficiencies, with 10 separate devices shown for each, but forward and reverse sweeps treated separately.

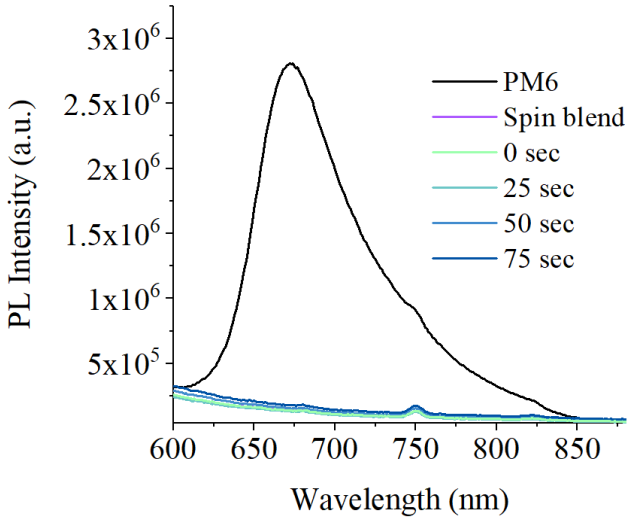

Figure S5: Photoluminescence intensity for spin and spray coating films. All films excited at 500 nm. The feature at 750 nm is attributed to an artifact of the diffraction grating.

Table S2: J_{SC} values for representative devices, compared to those achieved via integration of the EQE spectra.

Deposition Method	**Measured $J_{SC\text{-}JV}$ (mA cm^{-2})**	**Calculated $J_{SC\text{-}EQE}$ (mA cm^{-2})**	**Discrepency (%)**
Spin	23.9	21.6	9.6
Spray	20.8	20.4	1.9

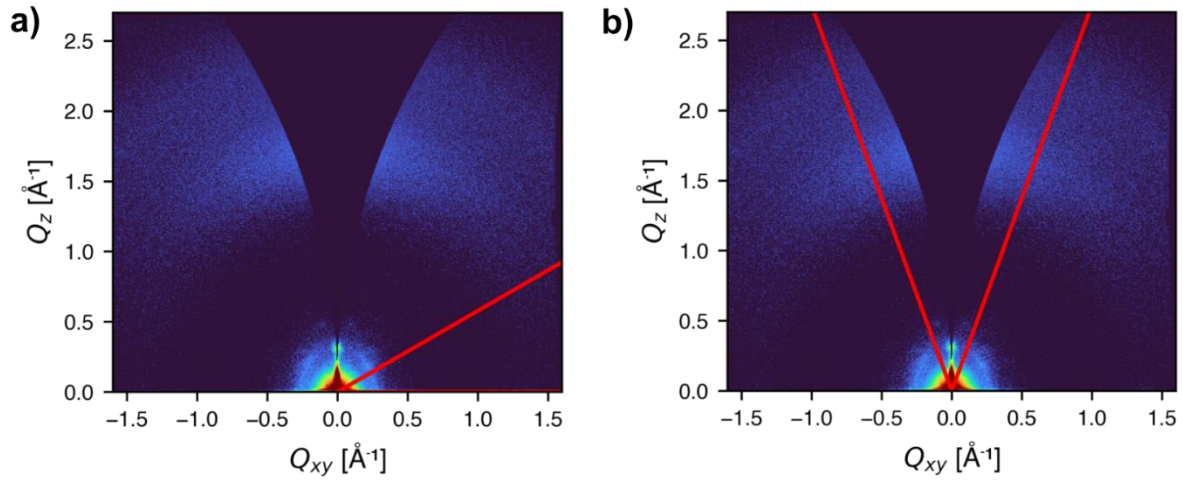

Figure S6: Cut regions for the azimuthal integrations shown Figure 6d and 6f, for **a)** in plane and **b)** out of plane regions.

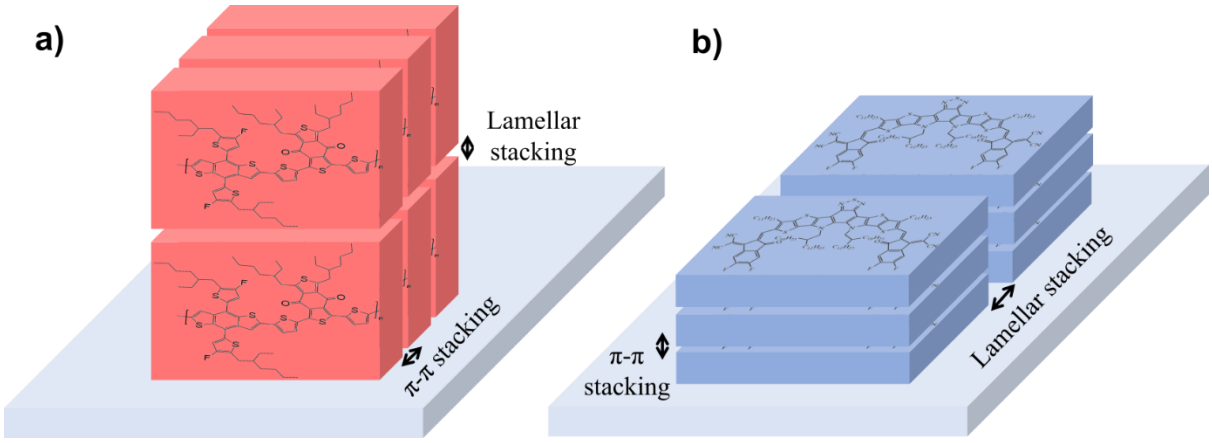

Figure S7: Illustration of stacking and relative orientations inferred from GIWAXS for **a)** PM6 (edge-on) and **b)** DTY6 (face-on).

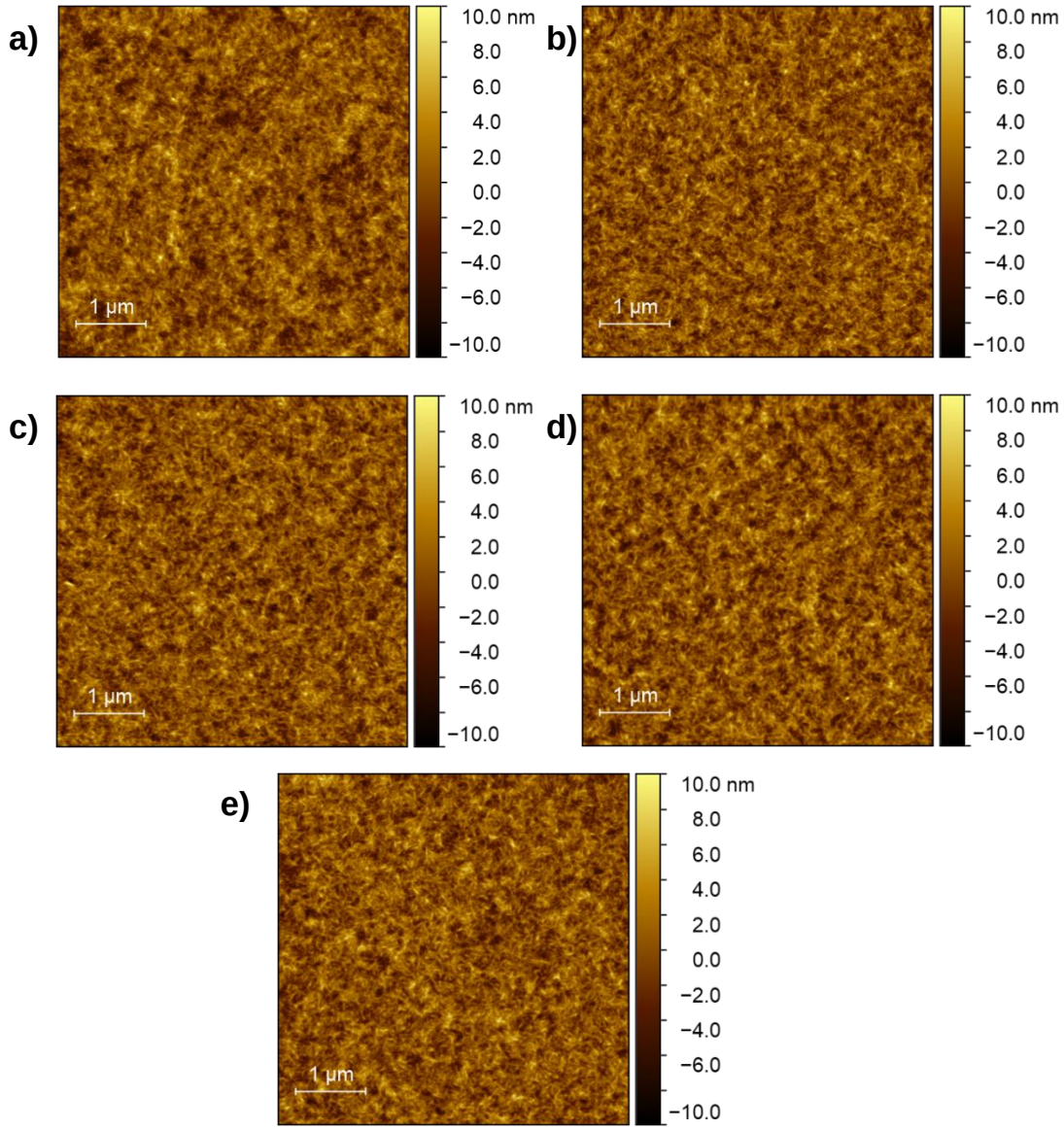

Figure S8: AFM images for **a)** Spin coated control. Spray coated films follow at **b)** 0 seconds air-knife delay time, **c)** 25 seconds, **d)** 50 seconds, **e)** 75 seconds.

Table S3: Root mean square (RMS) roughness values for each deposition condition calculated from the AFM data. Values given as an average of 3 different measurements across one film, with the error ± 1 standard deviation.

Deposition Method	RMS Roughness (nm)
Spin coated	2.11 ± 0.10
Spray coated- 0 second air-knife delay	2.06 ± 0.01
Spray coated- 25 second air-knife delay	2.08 ± 0.06
Spray coated- 50 second air-knife delay	2.09 ± 0.02
Spray coated- 75 second air-knife delay	2.06 ± 0.03