Electronic Supplementary Information

Air-processed active-layer of organic solar cells investigated by conducting AFM for precise defects detection

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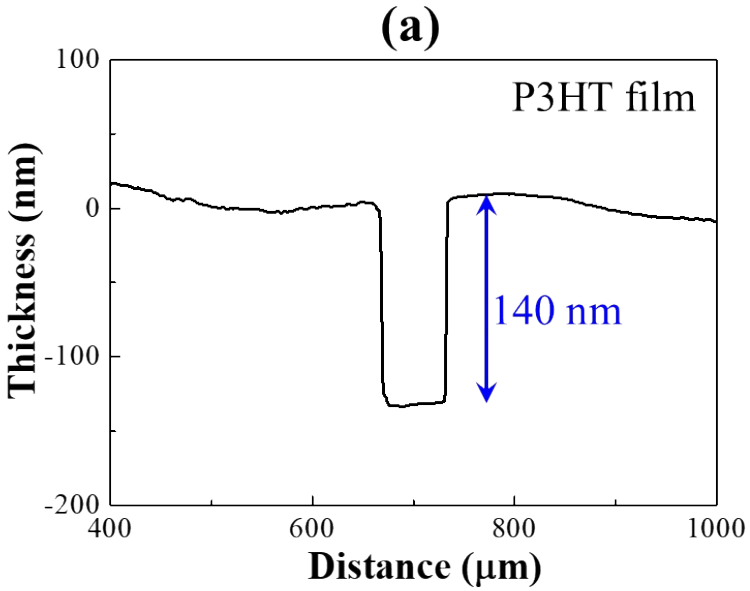

Fig. S1 Thickness of active layer P3HT:$PC_{61}BM$ thin film measured with profilometer (KLA Tencor D-600).

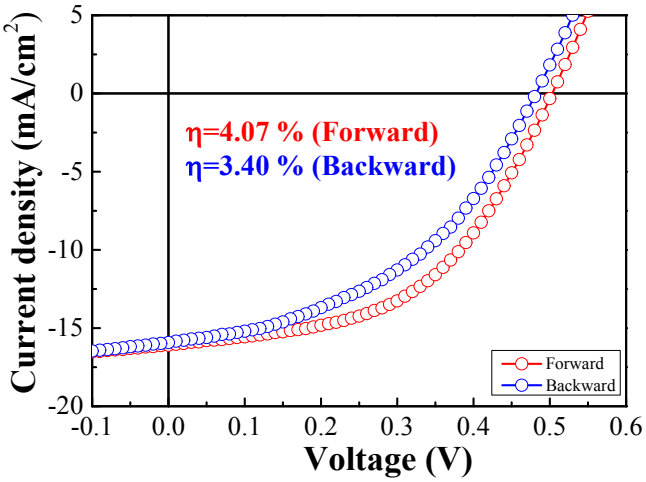

Fig. S2 *J-V* characteristics recorded for both forward and backward voltage sweep direction of a solar cell device under light illumination of intensity 1 SUN (100 mW/cm^2).

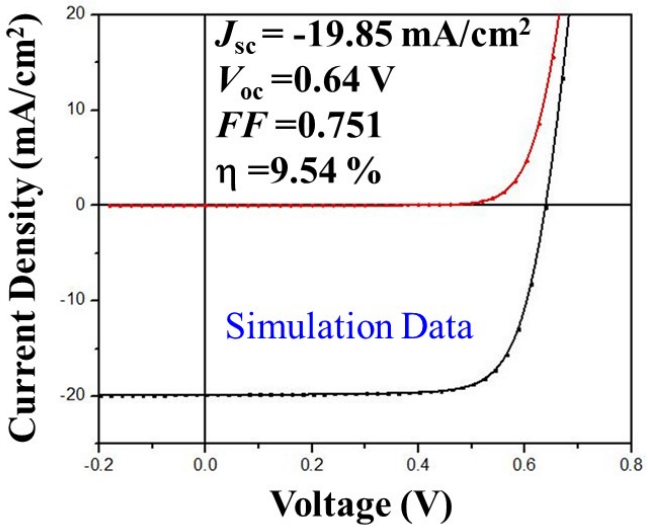

Fig. S3 *J-V* curves of similar device structure of main text except thickness (100 nm) in dark and light are produced using solar cell device simulation tool GPVDM which also shows high short-circuit current density (J_{SC}).

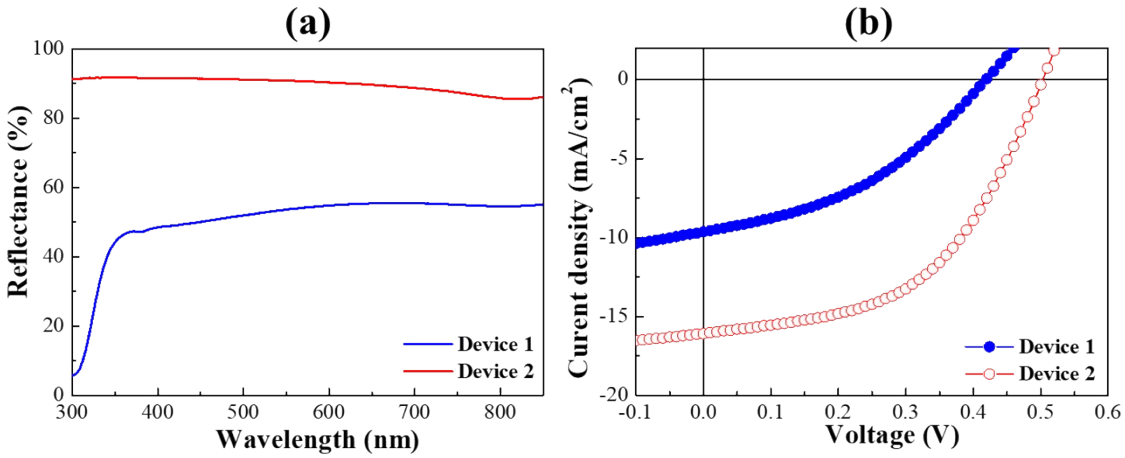

Fig. S4 (a) Reflectance of two back aluminum electrodes which are deposited using two different PVD system, such as KJLC PVD 75 Proline (red line) and home built customize PVD system (blue line). (b) Typical *I-V* characteristics of the solar cells under illumination of these two solar cells.

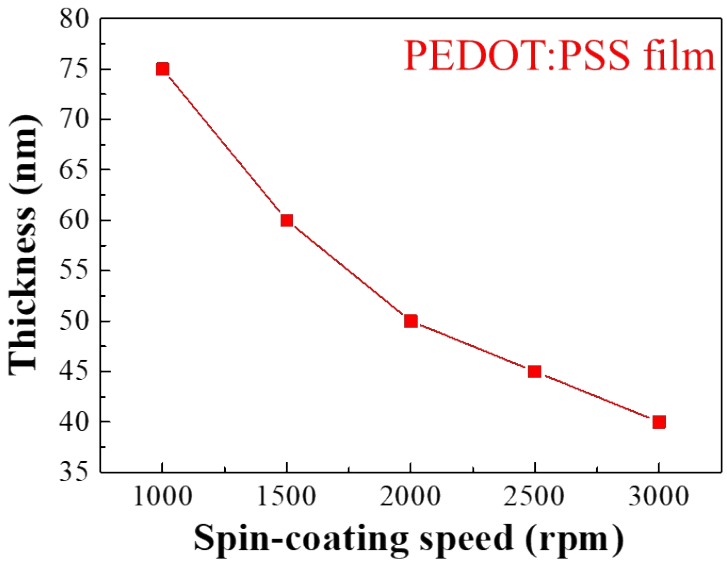

Fig. S5 Thickness of PEDOT:PSS layer at different spin coating speed measured with profilometer (KLA Tencor D-600).

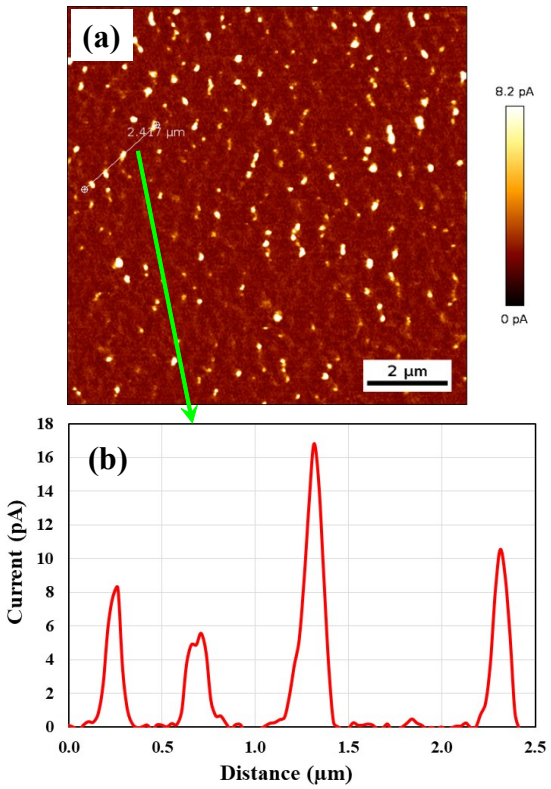

Fig. S6 (a) Current image with the line drawn for getting cross-sectional profile. (b) Cross-sectional line profile of current image of photoactive layer which shows high current regions of diameter 100 nm to 500 nm which are basically electrical defects like pinholes.