Electronic Supplementary Information. In order to obtain the optimized parameters for fabrication of a Ag NW transparent electrode for an OSC, the effects of Ag NW coating density and post processes on the performances of reference cell with a structure of glass/Ag NW/PEDOT:PSS/photoactive layer/Al were evaluated. In the reference cell, the electron donor was poly(3-hexylthiophene) (P3HT) and the electron acceptor was phenyl-C_{61}-butyric acid methyl ester (PCBM). Three different cells were fabricated, as summarized in Table S1. Current density–voltage (*J–V*) characteristics of the reference cells were evaluated under AM 1.5G illumination (100 mW cm^{-2}), as shown in Fig. S1. R-1 cell and R-2 cell were each fabricated with a Ag NW electrode of high density (resulting in ~81–82% of transmittance) while R-3 cell was fabricated with a Ag NW electrode of low density (resulting in ~90.4% of transmittance and ~ 48.2 Ω sq^{-1} of sheet resistance). The sheet resistance of R-1 cell (~ 38.3 Ω sq^{-1}) was almost three times that of R-2 cell (~13.9 Ω sq^{-1}), while their optical transmittances had similar values of 81–82%. The power-conversion efficiency (PCE) of the R-2 cell (1.49%) was almost two times that of the R-1 cell (0.77%), indicating that the post processes were essential for better cell performances. The sheet resistance and optical transmittance of the R-3 cell were 48.2 Ω sq^{-1} and 90.4%, respectively. The R-3 cell, fabricated on the more transparent but more resistive Ag NW electrode, exhibited similar short-current density (J_{sc}) while the fill factor (FF) was only half of the R-2 cell's. This might have resulted in the low PCE of 0.72% for the R-3 cell. For OSC fabrication, we selected from the above results a sheet resistance of below ~15 Ω sq^{-1} and an optical transmittance of above ~80% as the optimized parameters of the Ag NW electrode.

Fig. S2 shows contact pads manually coated on the Ag NW electrode using commercial silver paste in order to prevent damage on the Ag NW electrode layer and poor electrical connection between the Ag NW electrode and the solar simulator probe.

Table S1. Performances of reference OSCs with a structure of glass/Ag NW/PEDOT:PSS/P3HT:PCBM/Al.

Sample No.	Process condition	R_{sh} (Ω sq^{-1})	%T (%)	V_{OC} (V)	J_{SC} (mA cm^{-2})	FF (%)	PCE (%)
R-1	High density + no P/P	38.3	81.3	0.625	5.06	24.22	0.77
R-2	High density + P/P	13.9	82.1	0.730	4.59	44.56	1.49
R-3	Low density + P/P	48.2	90.4	0.614	4.79	24.48	0.72

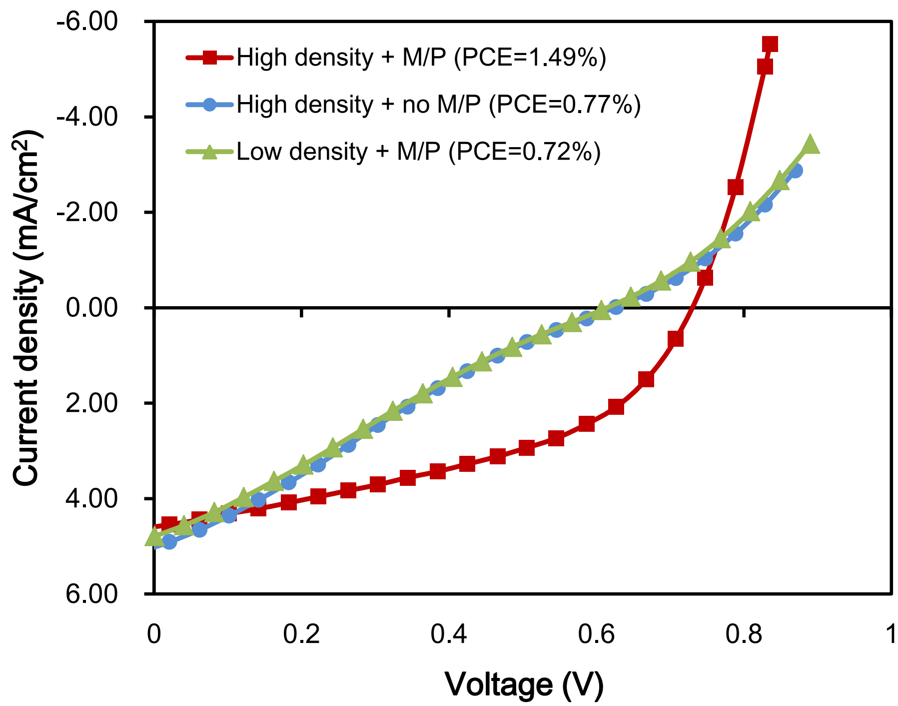
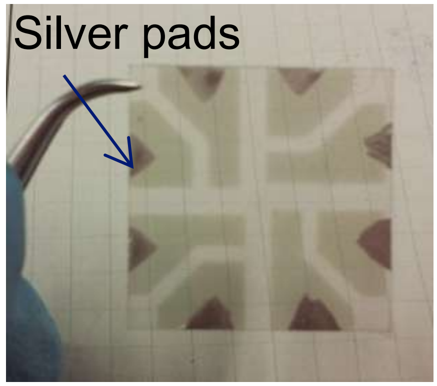


Figure S1. *J–V* curve for reference OSCs with different parameters of the Ag NW electrode.

1



2

3 **Figure S2**. Formation of contact pads on flexible Ag NW electrode (on PET) for better electrical

4 connection of the Ag NWs with the solar simulator probes.

5