Supporting Information

Optimization of the zinc oxide electron transport layer in P3HT:PC61BM based organic solar cells by annealing and yttrium doping

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TABLE 1 Device parameters of ZnO based inverted organic solar cells under illumination

ZnO anneal Temperature (°C)	V_{oc} (V)	J_{sc} (mA/cm^2)	FF(%)
50	0.59 ± 0.02	7.78 ± 0.13	27.8 ±0.31
150	0.60 ± 0.01	8.72 ± 0.17	41.7 ±0.24
300	0.60 ± 0.01	8.76 ± 0.09	32.9 ±0.11
450	0.48 ± 0.03	6.64 ±0.12	31.4 ±0.27

TABLE 2 Device parameters of Y doped ZnO based inverted organic solar cells under illumination

ETL	V_{oc} (V)	J_{sc} (mA/cm^2)	FF(%)
ZnO	0.60 ± 0.01	8.72± 0.17	41.7± 0.24
0.5%YZO	0.59 ± 0.01	9.19± 0.09	49.2± 0.17
1.0%YZO	0.59± 0.01	9.81± 0.12	49.3± 0.21
1.5%YZO	0.60± 0.01	8.98± 0.18	51.5± 0.26
2.0%YZO	0.60± 0.01	8.99± 0.21	50.3± 0.34

Series Resistance (R_s) and shunt resistance (R_{sh}) are evaluated from the following equations:

$$R_S = \left(\frac{dV}{dJ} \right)_{V=V_{OC}}$$

$$R_{sh} = \left(\frac{dV}{dJ} \right)_{J=J_{SC}}$$