

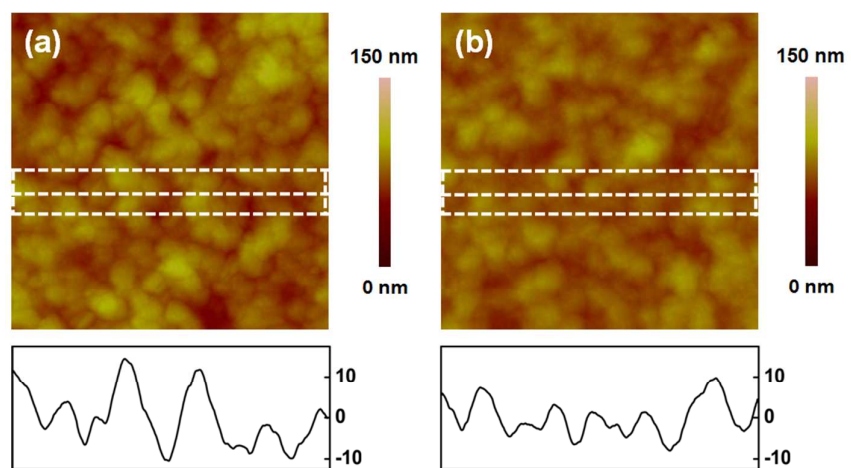
# Supporting Information

## **Interface Modification of ZnO-based Inverted PTB7:PC<sub>71</sub>BM Organic Solar Cells by Cesium Stearate and Simultaneous Enhancement of Device Parameters**

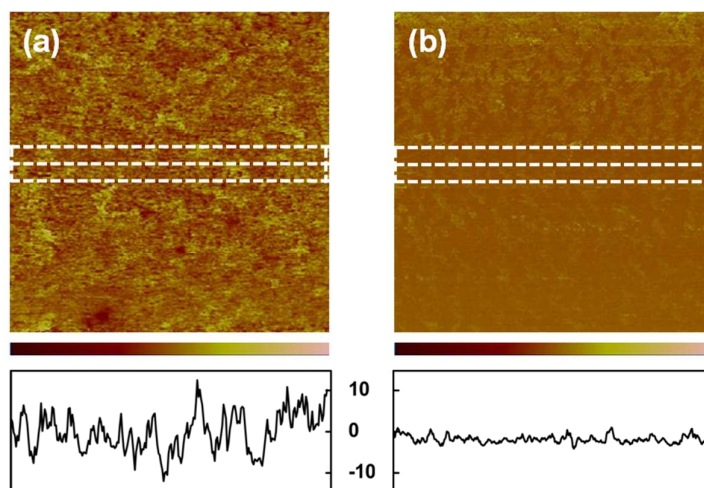
*Guojie Wang,<sup>†,‡</sup> Tonggang Jiu,<sup>\*†</sup> Jun Li,<sup>†</sup> Pandeng Li,<sup>†</sup> Xiaojin Song,<sup>‡</sup> Fushen Lu,<sup>‡</sup> and Junfeng Fang<sup>\*†</sup>*

<sup>†</sup> Institute of New Energy Technology, Ningbo Institute of Material Technology and Engineering (NIMTE), Chinese Academy of Science (CAS), Ningbo, Zhejiang, 315201, P. R. China. E-mail: jiutonggang@nimte.ac.cn; fangjf@nimte.ac.cn

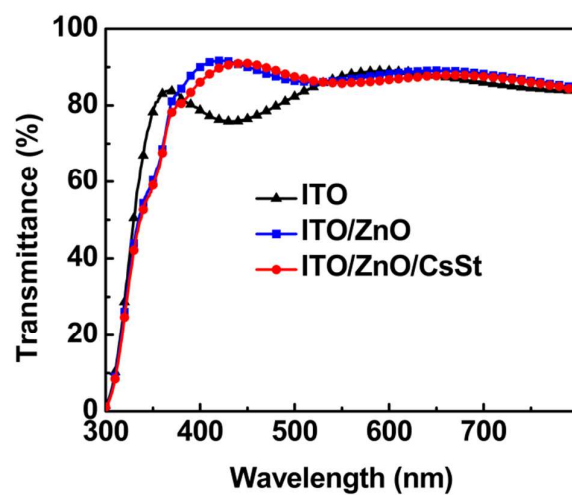
<sup>‡</sup> Department of Chemistry, College of Science, Shantou University, Shantou, Guangdong, 515063, P. R. China.



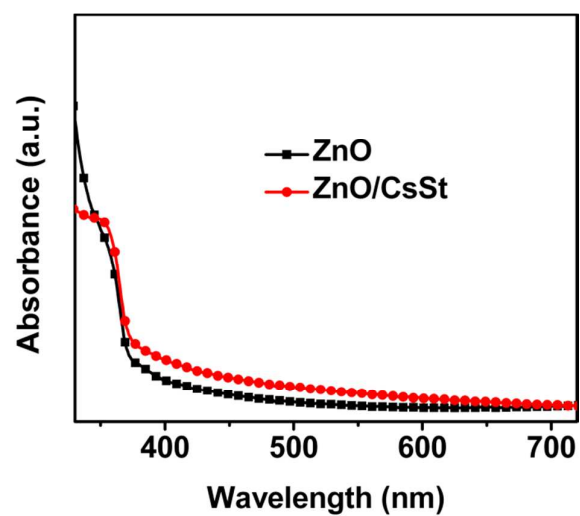
**Figure S1.** AFM height images and surface profiles of PTB7:PC<sub>71</sub>BM active layer on the (a) ZnO and (b) ZnO/CsSt interfacial layer with a scan size of 5 μm × 5 μm.



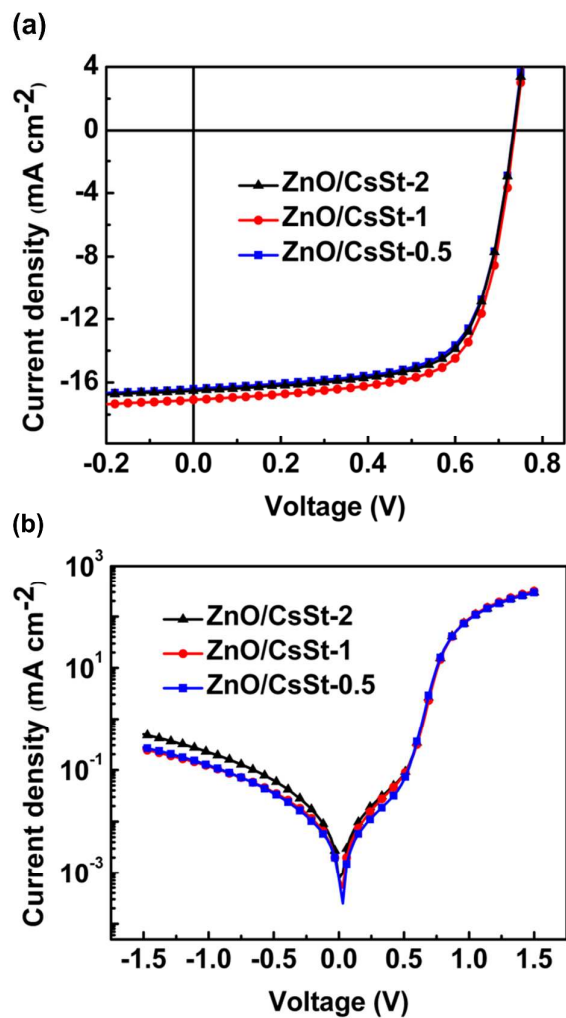
**Figure S2.** Conductive AFM images of (a) ZnO and (b) ZnO/CsSt interfacial layer with a scan size of  $5\ \mu\text{m} \times 5\ \mu\text{m}$ .



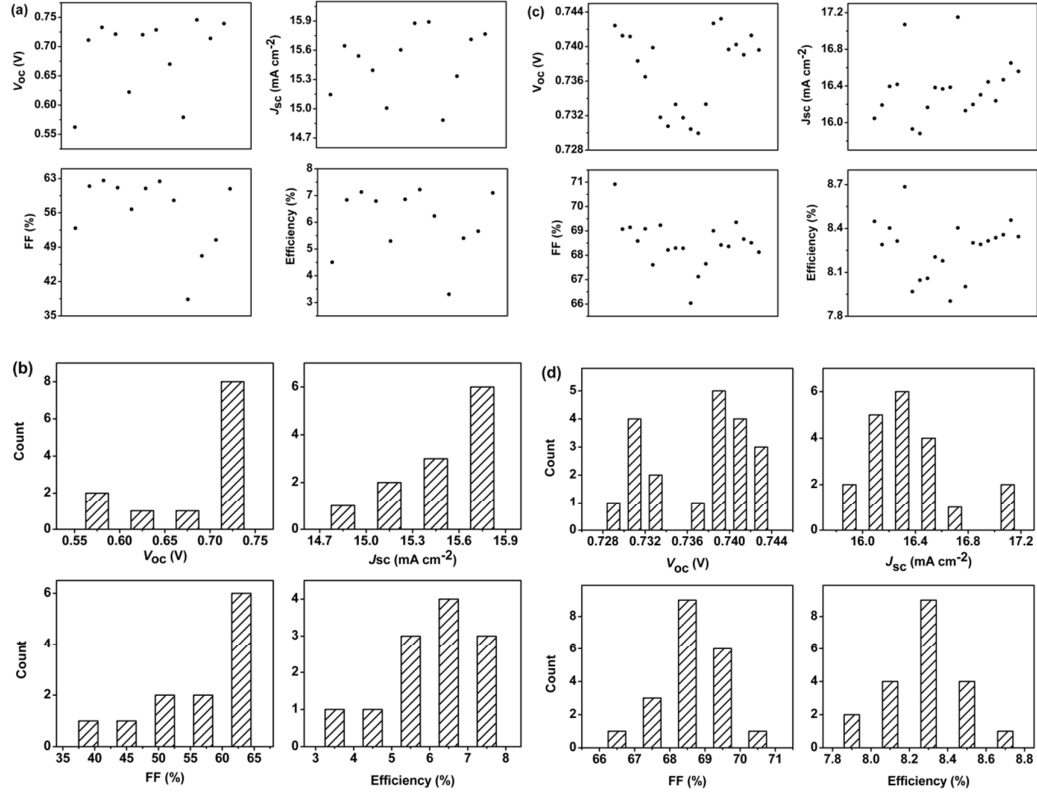
**Figure S3.** Transmission spectra of ZnO and ZnO/CsSt film on ITO glass substrates.



**Figure S4.** UV-vis absorption spectra of ZnO and ZnO/CsSt on quartz.



**Figure S5.** Current density-voltage ( $J-V$ ) characteristics of the devices with different concentration (0.5, 1 and 2 mg mL<sup>-1</sup>) of CsSt spin-coated on ZnO film as interfacial layer (a) under illumination, and (b) in the dark.



**Figure S6.** (a) Distribution of  $V_{oc}$ ,  $J_{sc}$ , FF and PCE of devices based on ZnO and (c) ZnO/CsSt as interfacial layer. (b) Statistical analysis of the devices parameters in part (a) and (d) in part (b).

**Table S1.** The energy level of ZnO and ZnO/CsSt on ITO substrates measured by UPS.

sample	HOMO level (eV)	LUMO level (eV) <sup>a</sup>
ITO/ZnO	7.37	4.07
ITO/ZnO/CsSt	7.17	3.87

<sup>a</sup> LUMO level was determined by the relation: LUMO level=HOMO level-optical band gap. Optical band gap was determined from UV-vis absorption spectra (Figure S4).

**Table S2.**  $V_{oc}$ ,  $J_{sc}$ , FF and PCE of the devices with different concentration (from 0.5 to 2 mg mL<sup>-1</sup>) of CsSt spin-coated on ZnO film as interfacial layer.

devices	$V_{oc}$ (V)	$J_{sc}$ (mA cm <sup>-2</sup> )	FF (%)	PCE (%)	
				best	average
ZnO/CsSt-2	0.734	16.49	68.9	8.34	8.25
ZnO/CsSt-1	0.736	17.07	69.1	8.69	8.46
ZnO/CsSt-0.5	0.733	16.38	68.3	8.21	8.13