

Supporting Information

Facile light exposure of zinc oxide via interfacial engineering for boosting responsivity and detectivity in organic photodetectors

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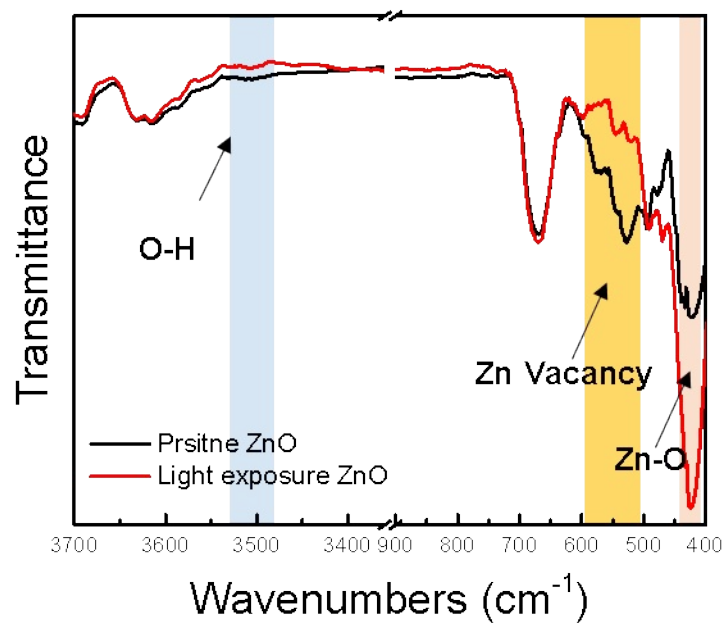


Fig. S1. FT-IR spectra of pristine ZnO film and light-exposed ZnO film

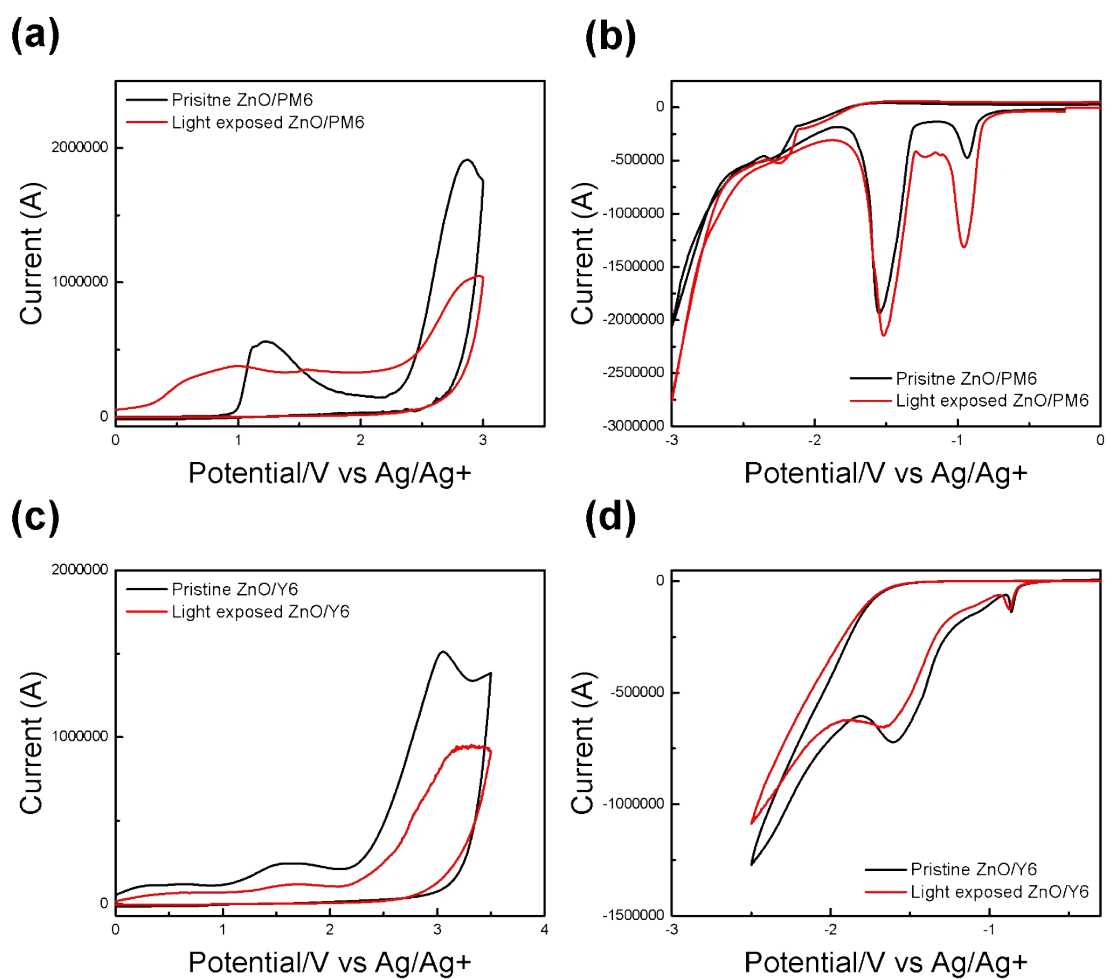


Fig. S2. CV analysis of ZnO and active materials (PM6, Y6) (a) oxidation potential range of ZnO/PM6, (b) reduction potential range of ZnO/PM6, (c) oxidation potential range of ZnO/Y6, (d) reduction potential range of ZnO/Y6

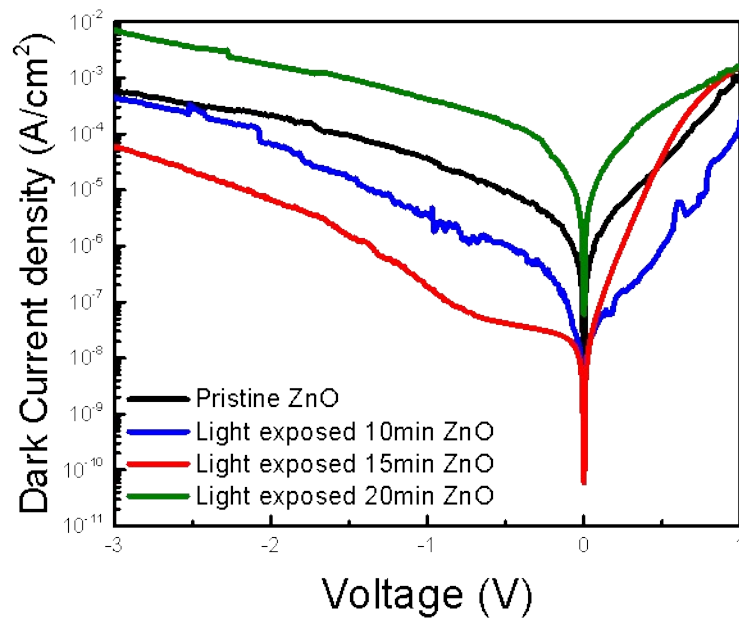


Fig. S3. Dark current density of organic photodetector according to ZnO light exposure treatment time (10, 15, 20 min).

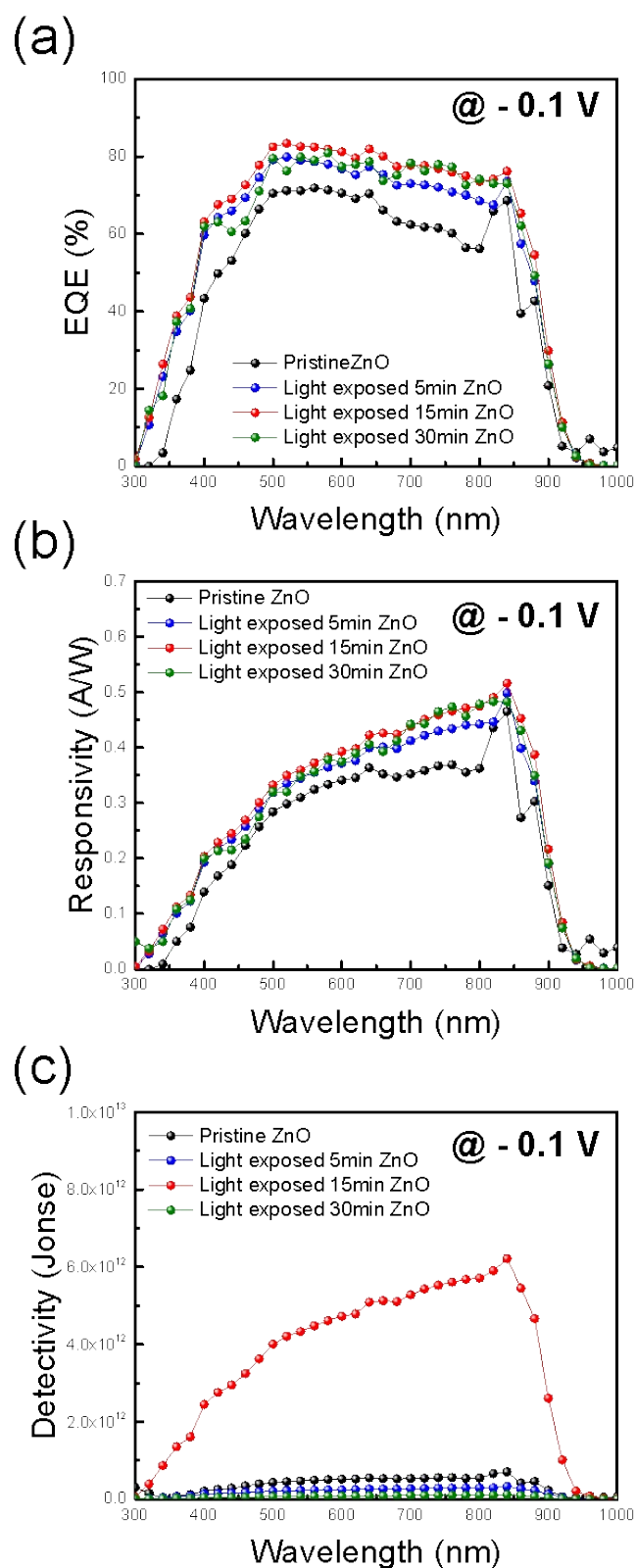


Fig. S4. (a) External quantum efficiency (EQE) analysis (b) responsivity at -0.1 V, (c) detectivity at -0.1 V of organic photodetector according to light exposure treatment time of ZnO layer (5, 15, 30 min)

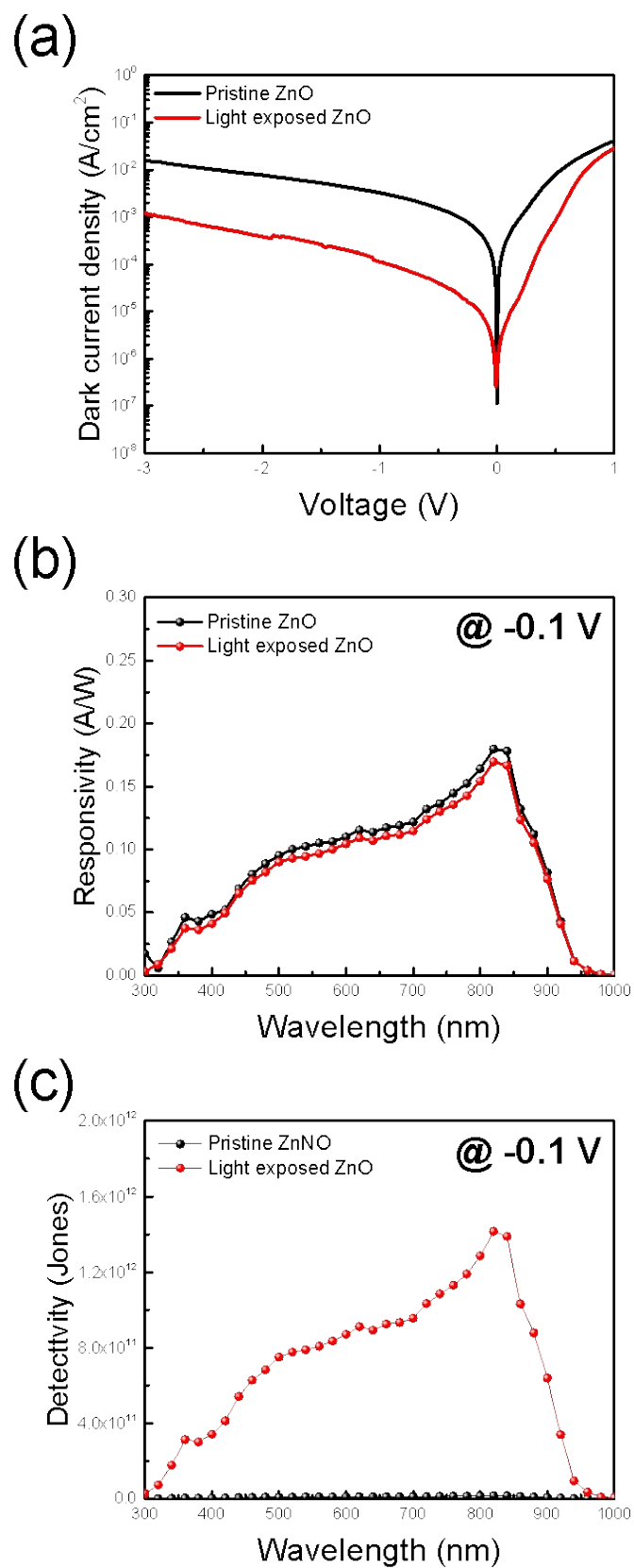


Fig. S5. (a) Dark current density, (b) responsivity at -0.1 V (C) detectivity at -0.1 V of ZnO-based organic photodetector after light exposure on whole device (15 min)

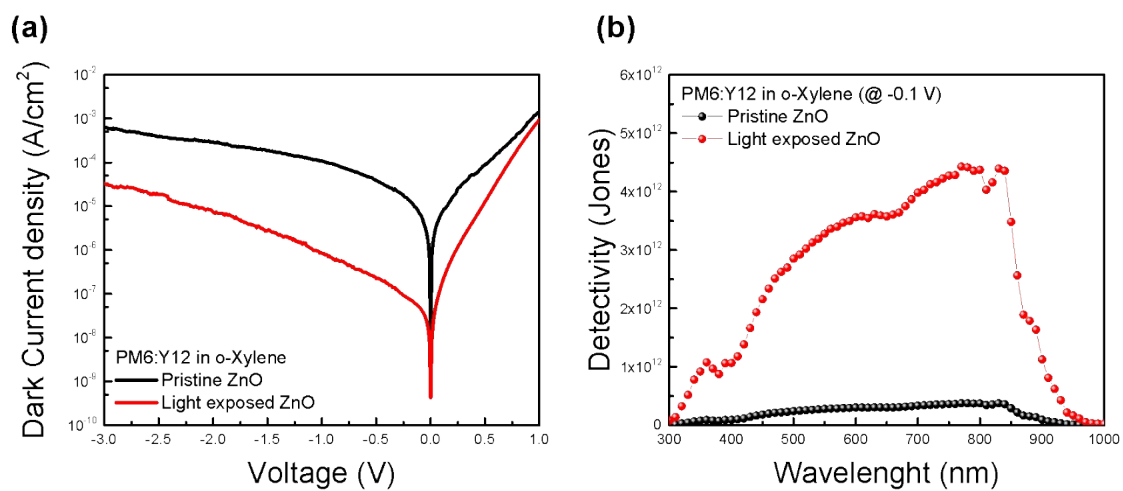


Fig. S6. (a) Dark current density, (b) detectivity at -0.1 V of PM6:Y12-based organic photodetector according to ZnO with light exposure treatment.



Fig. S7. Contact angle with DI water of PM6:Y6 film.

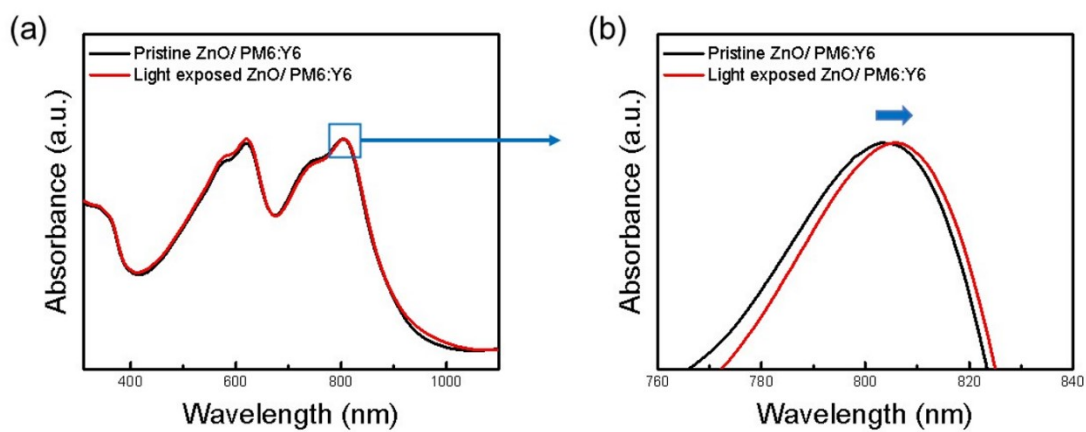


Fig. S8. UV–visible absorbance spectra of (a) pristine and light-exposed ZnO/PM6:Y6 films, (b) enlarged graph for redshift observation

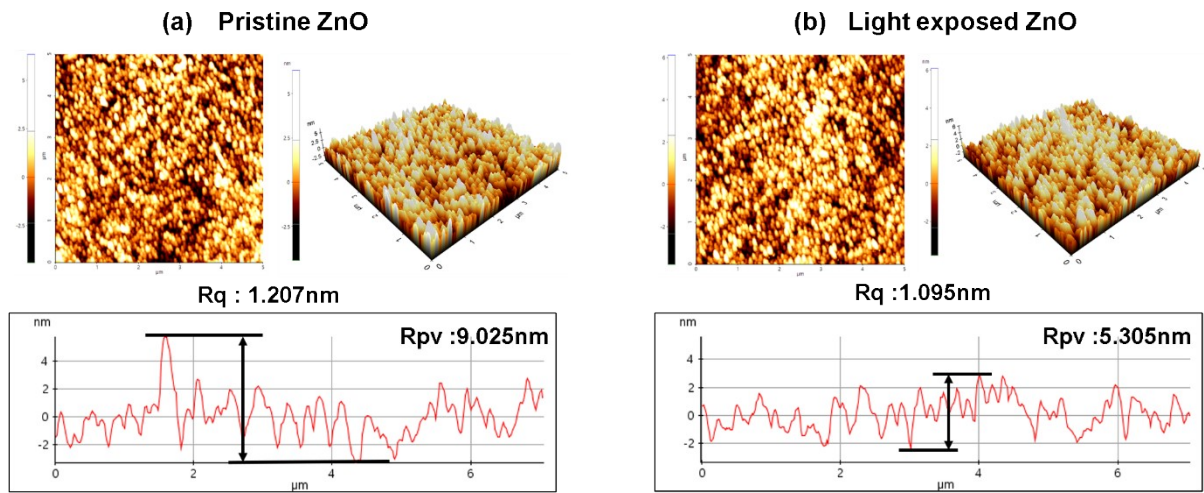


Fig. S9. 3D and 2D height AFM images of ZnO and ZnO/PM6:Y6 with light exposure treatment (a) ZnO pristine film, (b) ZnO film with light exposure treatment (15 min).

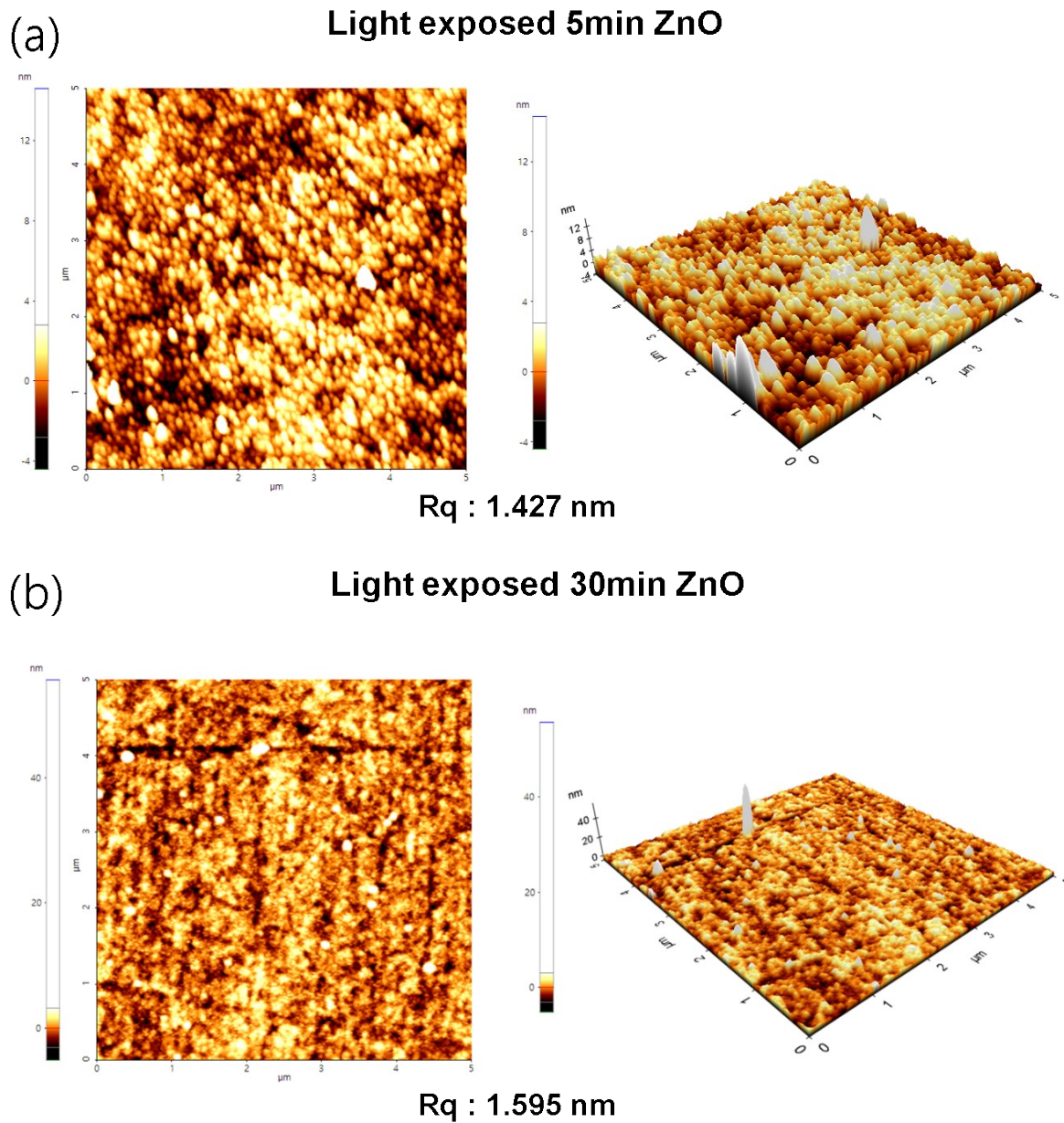


Fig. S10. The 2D and 3D height AFM images of ZnO film with light exposure treatment (a) 5min, (b) 30min.

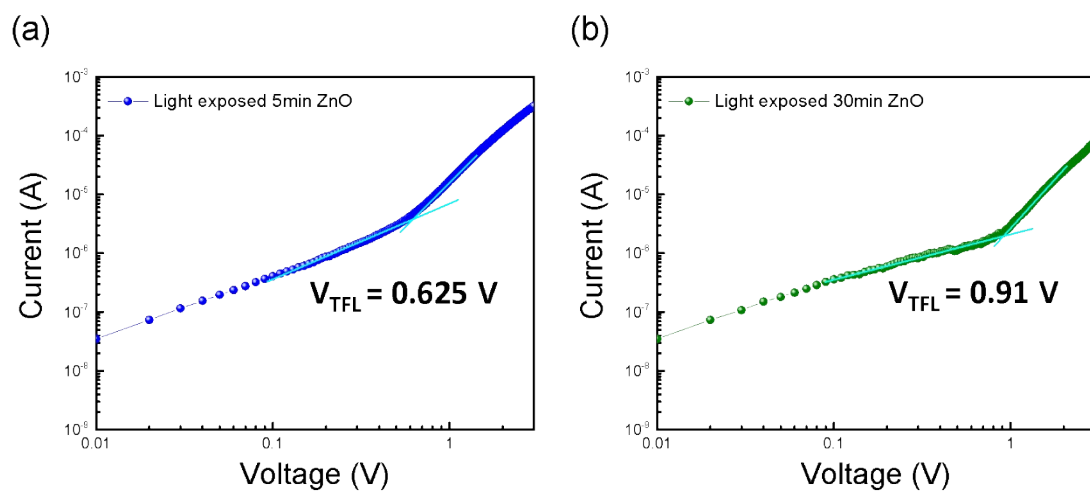


Fig. S11. Trap density analysis of ZnO with light exposure treatment (a) 5min, (b) 30min.

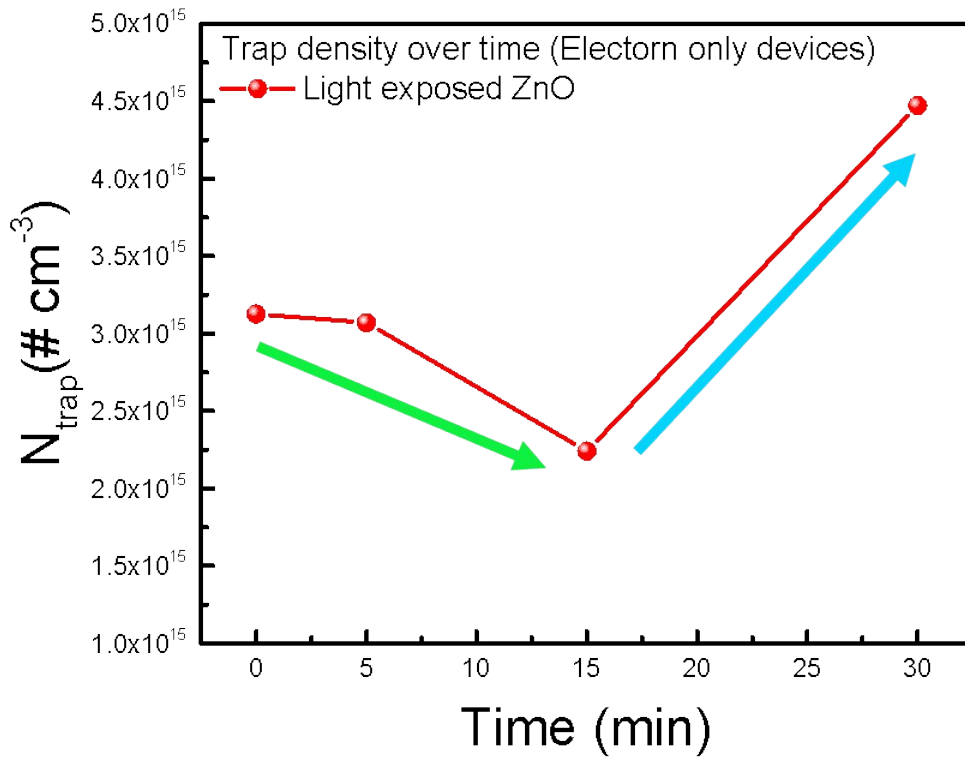


Fig. S12. Trap density change value according to ZnO light exposure treatment time.

Table S1. Contact angle and surface energy analysis of ZnO films with DI water and DIM.

	Energy	Dispersive	Polar
Pristine ZnO	59.17	37.43	21.74
Light-exposed ZnO	54.44	37.59	16.86

Table S2. Trap Density calculations for pristine ZnO and light exposure treatment ZnO-based devices.

	V_{TFL} V	N_{trap} # cm ⁻³
Pristine ZnO	0.637	3.127×10^{15}
Light exposed 5min ZnO	0.625	3.071×10^{15}
Light-exposed 15min ZnO	0.456	2.241×10^{15}
Light exposed 30min ZnO	0.910	4.471×10^{15}

Table S3. Photoresponse rate of ZnO light exposure treatment-based inverted organic device (on/off ratio at 0.1–0.9 photocurrent)

	Light on (us)	Light off (us)
Pristine ZnO	1.76	5.92
Light-exposed ZnO	0.88	3.44