Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting information

Baking soda: Ultra cheap and air stable electron injection layer for organic electron devices

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Table S1. Work Function of various bare conducting electrodes and $NaHCO_3$ deposited electrode surface, as independently measured by ACII in a pristine condition and after 8 weeks of exposure to air.

Electrode	ACII- Wf(eV)		After 8 week
	Pristine	Evaporated $NaHCO_3$ (1nm)	Evaporated $NaHCO_3$ (1nm)
ITO	4.95	4.03	4.19
PEDOT:PSS	5.23	4.36	4.47
Au	5.56	4.65	4.72
Al	4.61	3.88	4.05

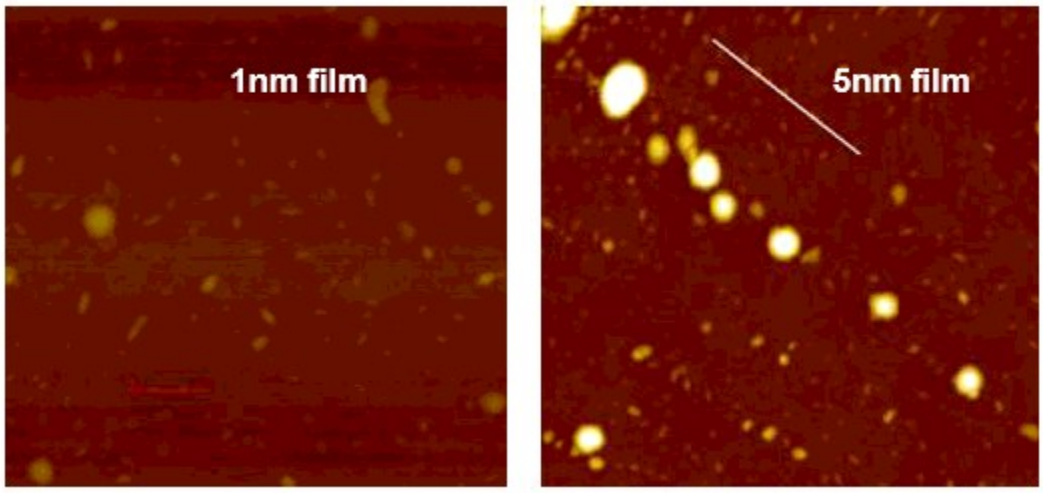


Figure S1. Atomic force microscope image of spin coated $NaHCO_3$ film with 1 nm and 5 nm thickness on ITO substrate (2 μm × 2 μm)

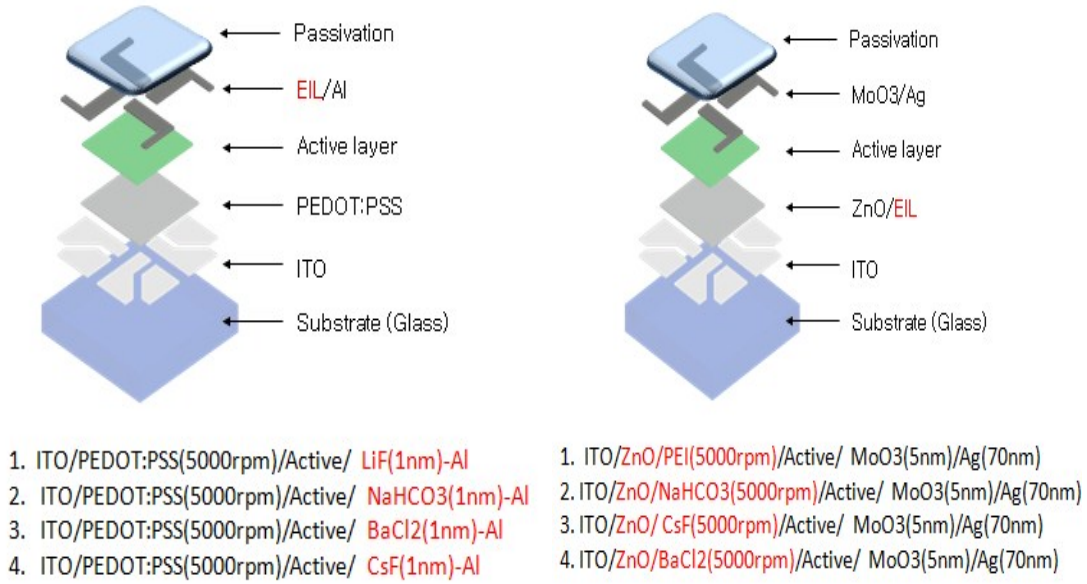
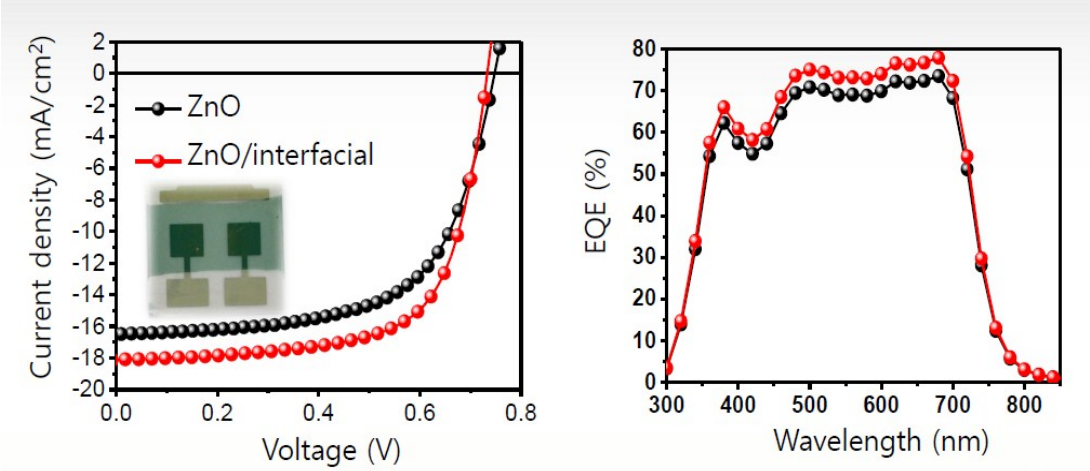


Figure S2. Conventional and inverse structures for OLED and OPD devices



Structure	Jsc (mA/cm²)	Voc (V)	FF (%)	PCE (%)
ZnO/PTB7	16.46	0.74	62.88	7.72
ZnO/interfacial/PTB7	18.10	0.73	67.68	8.98

Figure S3. Devices using ITO/ZnO with and without $NaHCO_3$ as the bottom electrode. J-V characteristics of these devices inset at low voltage.

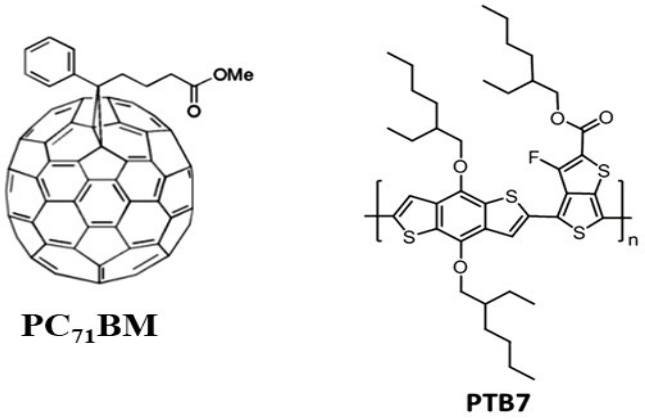


Figure S4. Structures of the acceptor and donor in bulk heterojunction organic photovoltaic cells.

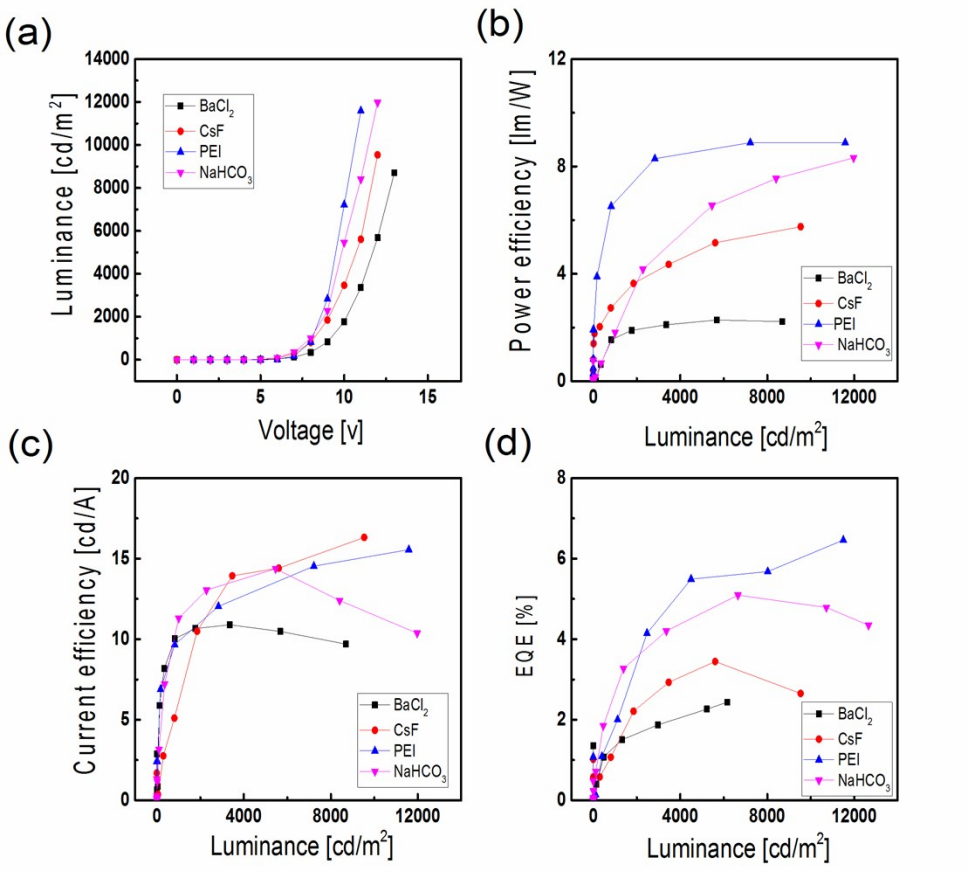


Figure S5. Performance of the $Ir(ppy)_3$-based, solution processable OLED devices using various EILs. The OLED structure was ITO/ZnO/EILs/PVK:PBD:$Ir(ppy)_3$/MoO_3/Ag.

Table S2. Summary of the performance of inverse structure OLEDs with EILs with different areal number densities. The OLED structure was ITO/ZnO/EILs/PVK:PBD:$Ir(ppy)_3$/MoO_3/Ag

Sample	Turn-on voltage (V)	Max. EQE (%)	Max. luminous efficiency(cd/A)	Max. power efficiency (lm/W)
1 ($BaCl_2$)	7.3	2.3	11.2	2.1
2 (CsF)	6.8	3.7	16.1	5.7
3 (PEI)	5.9	5.1	15.8	8.4
4 ($NaHCO_3$)	6.1	6.2	14.5	7.9

Table S3. . Summary of the performance of OPDs with EILs with low bias voltage. The inverted devices are glass/ITO/ZnO/EIL/P3HT:PC60BM/MoO_3/Ag. Conventional structure devices are glass/ITO/PEDOT:PSS/P3HT:PC60BM/EILs/Al.

Sample	J photo (A/cm^2)	J dark (A/cm^2)	R (mA/W)	SNR (a.u)	NEP (W)	D* (Jones)	EQE (%)
Inverted structure (1V)							
$BaCl_2$	5.09.E-04	3.40.E-09	50.9	1.50.E+05	1.95.E-13	1.54.E+12	10.5
CsF	9.88.E-04	4.80.E-09	98.8	2.06.E+05	1.19.E-13	2.52.E+12	20.4
PEI	2.00.E-03	3.39.E-09	200.0	5.90.E+05	4.94.E-14	6.07.E+12	41.3
$NaHCO_3$	1.82.E-03	3.25.E-09	182.2	5.61.E+05	5.31.E-14	5.65.E+12	37.7
Convectional structure (-1V)							
$BaCl_2$	1.36.E-03	7.69.E-07	135.5	1.76.E+03	1.10.E-12	2.73.E+11	28.0
CsF	1.37.E-03	4.12.E-07	136.6	3.32.E+03	7.98.E-13	3.76.E+11	28.2
LiF	1.61.E-03	9.89.E-08	161.1	1.63.E+04	3.31.E-13	9.05.E+11	33.3
$NaHCO_3$	1.74.E-03	4.58.E-08	174.4	3.81.E+04	2.08.E-13	1.44.E+12	36.1

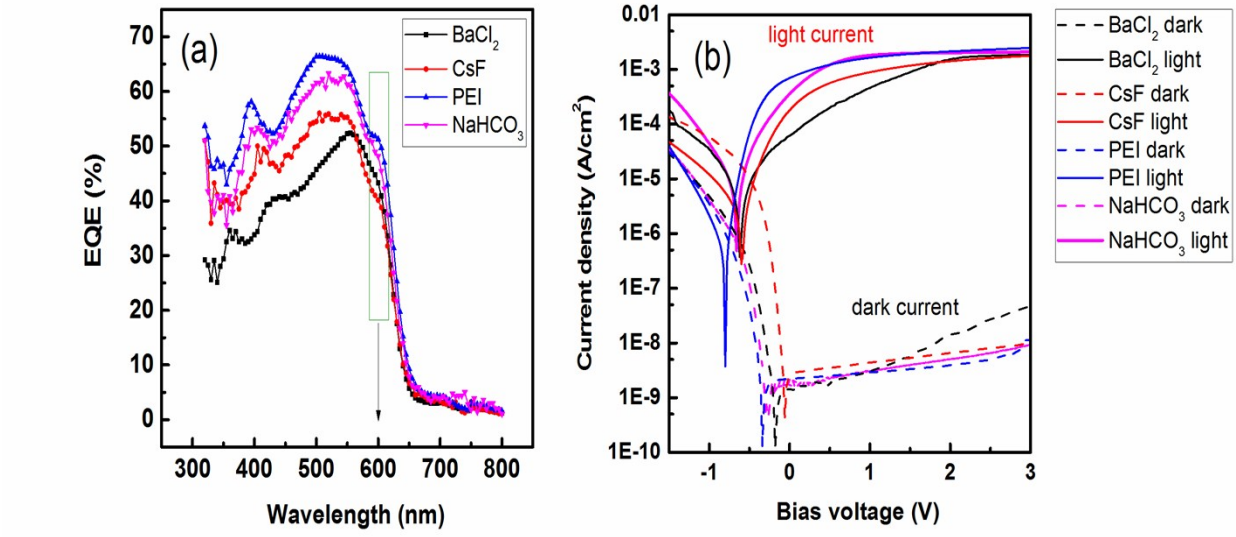


Figure S6. Current density versus applied voltage characteristics and external quantum efficiency of organic photodiode with inverted structure under darkness and illumination at 600 nm, 10 mW/cm^2 with different electron injection layers. The inverted devices are glass/ITO/ZnO/EIL/P3HT:PC60BM/MoO_3/Ag.

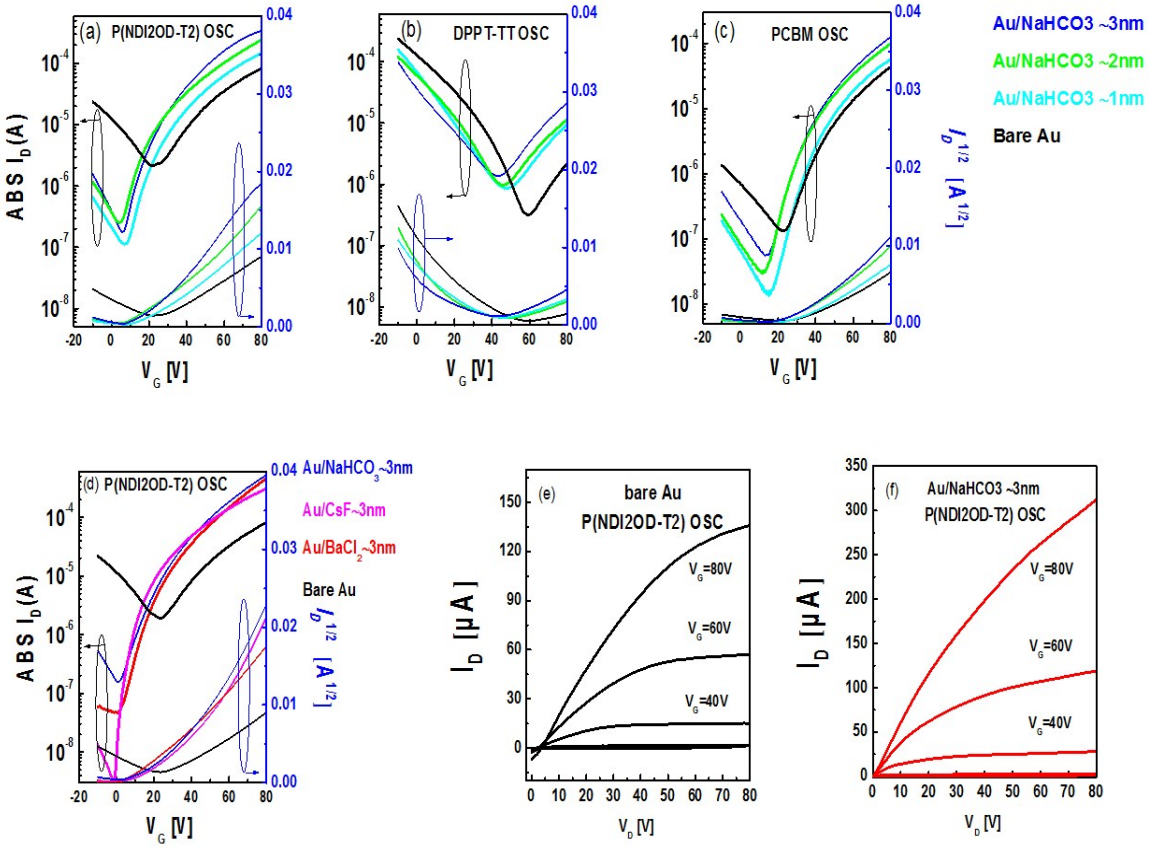


Figure S7. Transfer characteristics of (a) P(NDI2OD-T2), (b) DPPT-TT and (c) PCBM OFET devices with pristine Au and $NaHCO_3$-treated Au eBalectrode (interlayer with varying thickness levels). (d) Comparison of the effects of other interlayers on Au electrode for P(NDI2OD-T2) device. Output characteristics of P(NDI2OD-T2) OFETs device with (e) pristine Au and (f) NaHCO3-treated Au electrode.