

Supplementary Information

Enhancing the efficiency of the opto-electronic devices by the cathode modification

Ye Eun Ha,^a Gyeong Eun Lim,^a Mi Young Jo,^a Juyun Park,^b Yong-Cheol Kang,^b Sang-Jin Moon^c and

Joo Hyun Kim^{a,*}

^aDepartment of Polymer Engineering and ^bDepartment of Chemistry, Pukyong National University,
Busan 608-739, Korea.

^cEnergy Materials Research Center, Korea Research Institute of Chemical Technology (KRICT),
Daejeon, 305-600, Korea

*Corresponding author e-mail: jkim@pknu.ac.kr

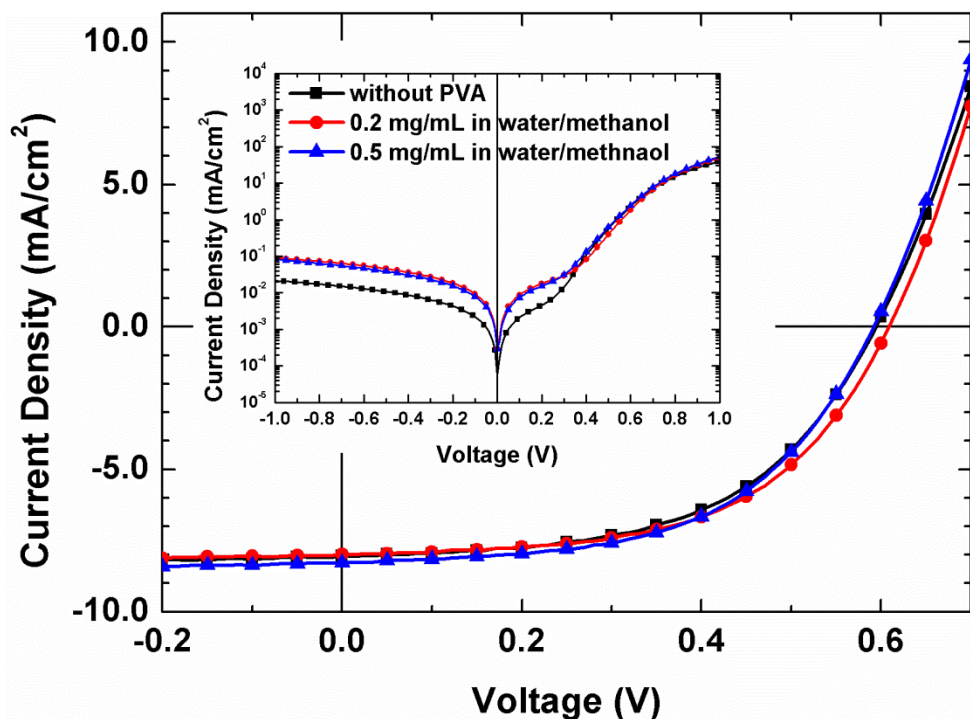


Fig. S1. Current density–voltage curves of PSCs under AM 1.5G simulated illumination with an intensity of 100 mW/cm^2 and under the dark condition (inset) without PVA (square) and with the PVA film (circle) prepared from a concentration of 0.2 mg/mL solution in water/methanol (2/8 by volume) mixed solvent, and 0.5 mg/mL solution in water/methanol (2/8 by volume) mixed solvent.

Table S1. The photovoltaic parameters of PSCs with the best PCE value. The averages for photovoltaic parameters of each device are given in parentheses with mean variation.

	V_{oc} (V)	J_{sc} (mA/cm^2)	FF (%)	PCE (%)	R_s ($\Omega \cdot \text{cm}^2$) ^a	R_p ($\text{k}\Omega \cdot \text{cm}^2$) ^b
w/o PVA	0.59 (0.59 ± 0.004)	-8.04 (-7.89 ± 0.19)	54.0 (54.7 ± 0.89)	2.58 (2.55 ± 0.03)	5.34	46.51
0.2 mg/mL^c	0.61 (0.61 ± 0.01)	-7.98 (-8.02 ± 0.05)	55.4 (55.0 ± 0.4)	2.70 (2.70 ± 0.01)	3.14	11.05
0.5 mg/mL^c	0.59 (0.59 ± 0.01)	-8.28 (-8.27 ± 0.02)	54.6 (54.1 ± 0.5)	2.67 (2.64 ± 0.03)	2.98	12.36

a: the series resistance (estimated from the device with the best PCE value).

b: the parallel resistance (estimated from the device with the best PCE value).

c: the PVA layer prepared from the solution in water/methanol (2/8 by volume).

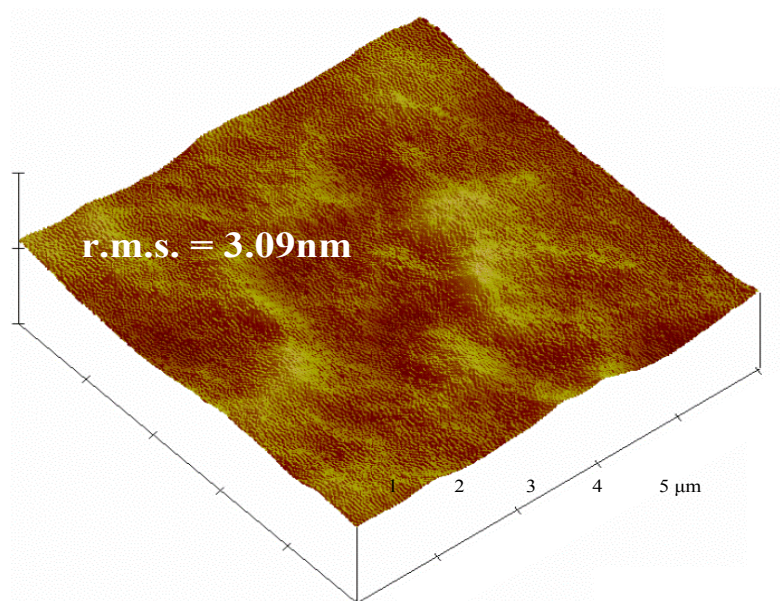


Fig. S2. AFM topography of the active layer with the PVA film spin-coated from a concentration of 0.5 mg/mL in methanol/water mixed solvent.

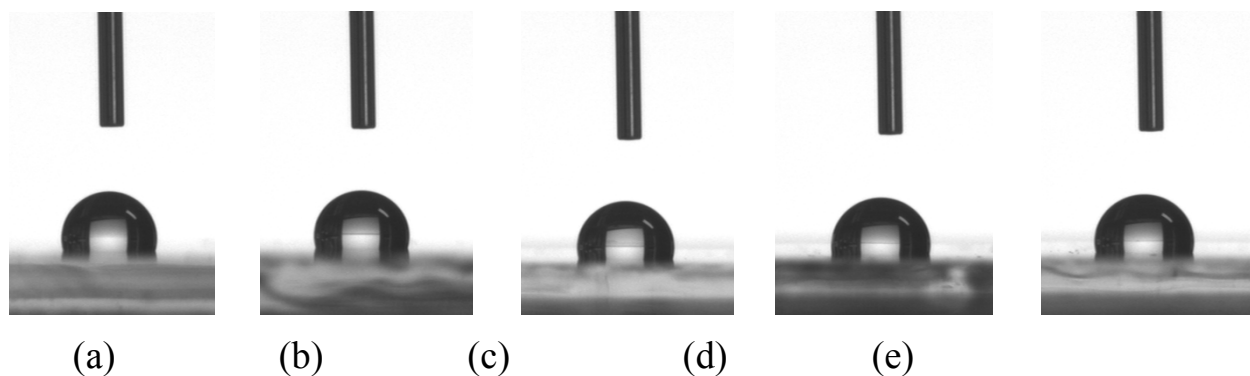


Fig. S3. The contact angle of the active layer (a) without PVA, with the PVA film prepared (b) from a concentration of 0.5 mg/mL in water/methanol (2/8 by volume) mixed solvent, (c) from a concentration of 0.2 mg/mL in DMSO/methanol (5/95 by volume) mixed solvent, (d) from a concentration of 0.5 mg/mL in DMSO/methanol (5/95 by volume) mixed solvent, and (e) from a concentration of 1.0 mg/mL in DMSO/methanol (5/95 by volume) mixed solvent.

Table S3. The summary of the surface energy of the active layer with and without the PVA film.

	without PVA	0.5 mg/ml PVA solution in water/methanol	0.2 mg/ml PVA solution in DMSO/methanol	0.5 mg/ml PVA solution in DMSO/methanol	1.0 mg/ml PVA solution in DMSO/methanol
H ₂ O drop	107.09	106.16	104.83	104.12	104.02
CH ₂ I ₂ drop	69.56	69.19	63.32	63.87	63.91
γ^d	23.43	23.43	27.14	26.62	26.62
γ^p	0.14	0.21	0.1	0.18	0.18
γ	23.6	24.0	27.2	26.8	26.8

γ^d : dispersion term of surface energy γ^p : polar term of surface energy γ : total of surface energy