

Supplementary Material (ESI) for Journal of Materials Chemistry
This journal is (c) The Royal Society of Chemistry 2010

Supporting Information

Towards Optimization of P3HT:bisPCBM Composites for Highly Efficient Polymer Solar Cells

Myoung Hee Yun, Gi-Hwan Kim, Changduk Yang, and Jin Young Kim**

*Interdisciplinary School of Green Energy, Ulsan National Institute of Science and
Technology, Ulsan 689-798, South Korea. Fax: +82-52-217-2909; Tel: +82-52-217-2911;*

E-mail: jykim@unist.ac.kr, yang@unist.ac.kr

We have fabricated the BHJ devices for various ratios from 1:0.8 to 1:2.0 of P3HT:bisPCBM blends for optimization. Firstly, we carried out fabrication of the devices using various ratios without solvent annealing treatment (See Table S1. a) and Fig. S1. a)). The ratio of 1:0.8 among the various ratios has shown the best power conversion efficiency and the other solvent annealing conditions have a similar tendency. All obtained data show that the best ratio is 1:0.8 and solvent annealing time is 24h. The data are represented in Table S1 and Fig. S1.

Table S1 Photovoltaic parameters of the devices with different P3HT:bisPCBM weight ratios in accordance with various solvent annealing time (0, 24h, and 48h)

a) Without solvent annealing

P3HT:bisPCBM	Solvent annealing time	J_{sc} [mAcm ⁻²]	V_{oc} [V]	FF	PCE [%]
1:0.8	0h	6.84	0.69	0.53	2.51
1:1.2		6.89	0.71	0.46	2.25
1:1.6		7.15	0.70	0.46	2.33
1:2.0		7.57	0.69	0.43	2.23

b) 24h solvent annealing

P3HT:bisPCBM	Solvent annealing time	J_{sc} [mAcm ⁻²]	V_{oc} [V]	FF	PCE [%]
1:0.8	24h	7.97	0.71	0.67	3.75
1:1.2		0.79	0.75	0.58	3.43
1:1.6		0.80	0.74	0.52	3.09
1:2.0		0.81	0.72	0.52	3.05

c) 48h solvent annealing

P3HT:bisPCBM	Solvent annealing time	J_{sc} [mAcm ⁻²]	V_{oc} [V]	FF	PCE [%]
1:0.8	48h	7.60	0.70	0.64	3.36
1:1.2		7.67	0.67	0.58	3.00
1:1.6		7.69	0.64	0.56	2.77
1:2.0		7.69	0.63	0.55	2.67

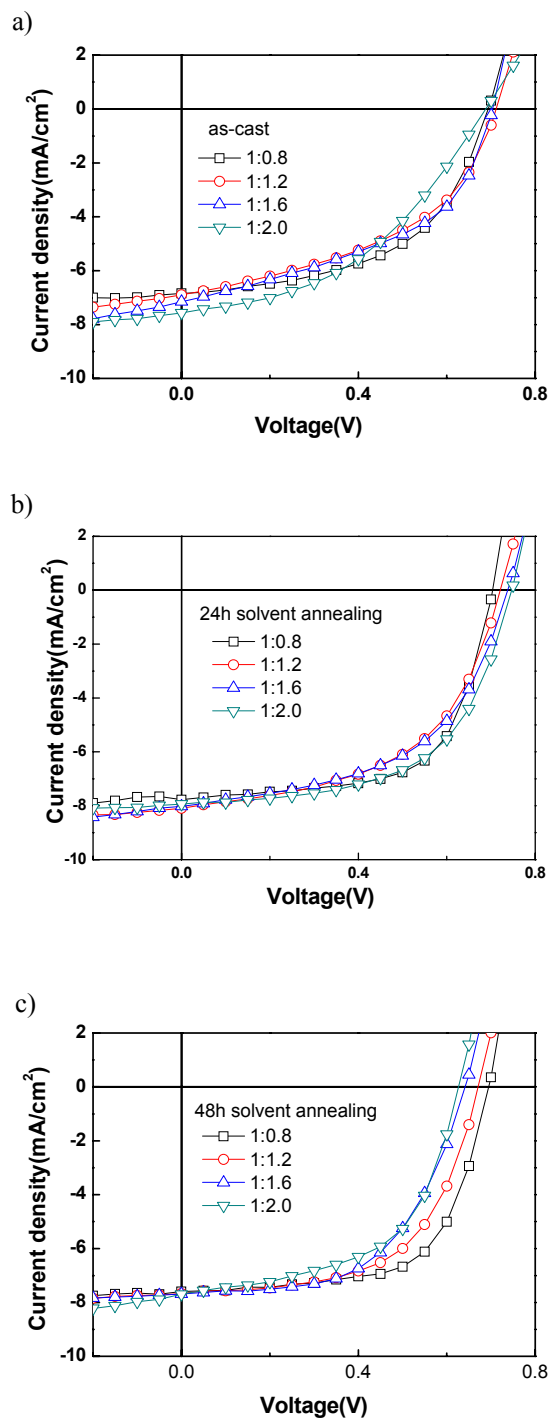


Fig. S1 Current density-voltage (*J-V*) characteristics of the P3HT:bisPCBM blend devices with different ratios 1:0.8 (\square), 1:1.2 (\circ), 1:1.6 (Δ), 1:2.0w/w (∇) and without solvent annealing for a), 24h for b), 48h for c) measured under AM1.5G illumination from a calibrated solar simulator with irradiation intensity of 100 mWcm⁻².