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Thin Film Morphology Control of P3HT:PCBM Organic Solar Cells Using Electrospray Deposition Process

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Polymer solar cells are fabricated using electrospray (e-spray) deposition process. It shows comparable performance with reference devices, and has different characteristics according to the thickness of the active layer: In the case of the devices with higher fill factor, it shows relatively lower current density, and vice versa. These films are characterized by atomic force microscopy measurement. The results indicate that the comparable power conversion efficiency made by e-spray results from the 'solvent annealing effect' by process conditions and the different thin film property is caused by the degree of self-organization of the polymer.

Keywords: Organic solar cells, Electrospray, Thin film morphology

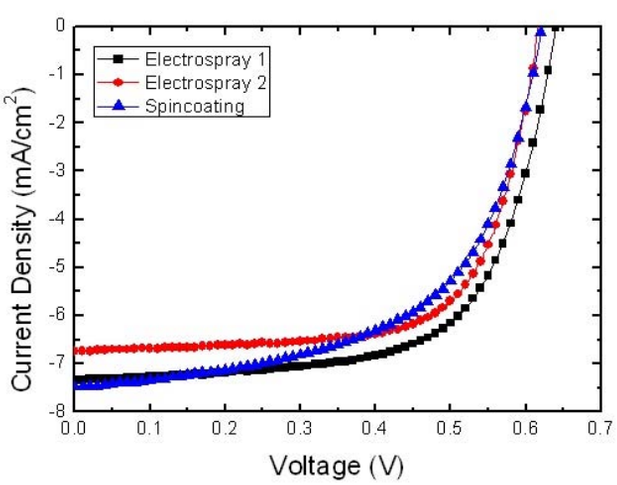

Fig. 1

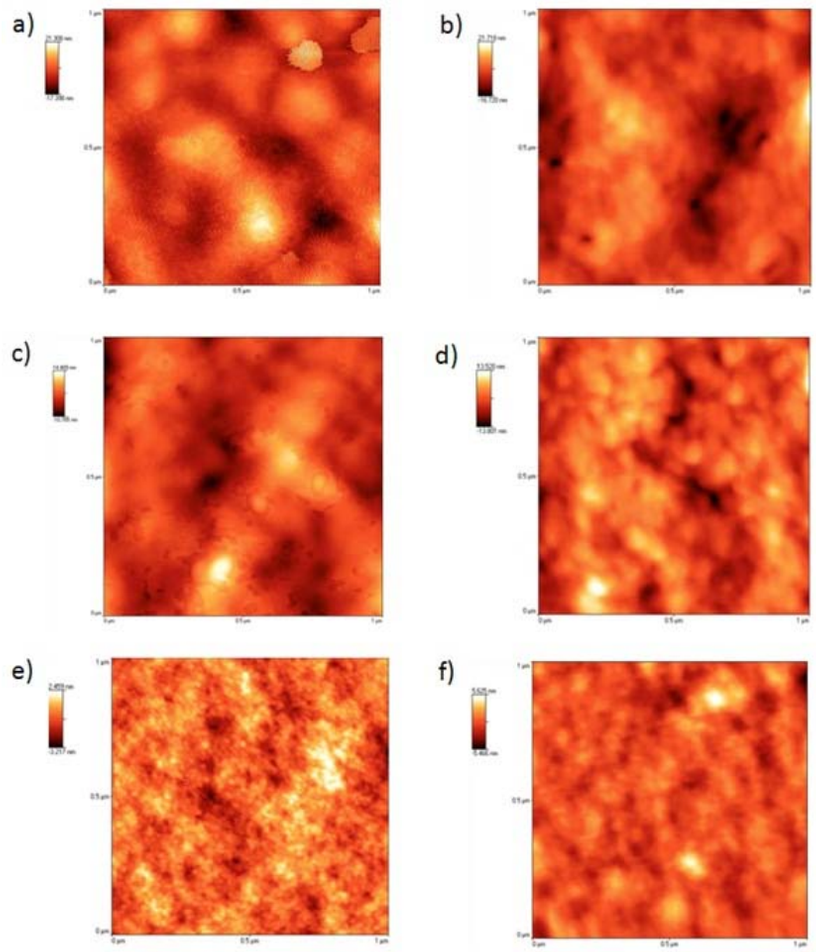

Fig. 2

▪ **Table 1 Photovoltaic Performances of the BHJ Polymer Solar Cells with Different Coating Process and Conditions**

Sample	Jsc(mA/cm^2)	Voc (V)	Fill factor	PCE (%)
E-spray 1 (~ 140nm)	7.50	0.63	0.59	2.82
E-spray 2 (~ 100nm)	6.60	0.61	0.70	2.88
Spin-coating (~ 90nm)	7.49	0.61	0.58	2.65

* () means thickness of the active layer at devices.