

## Effect of solvents on the performance and morphology of polymer photovoltaic devices

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**Abstract** : In the polymer photovoltaic devices (PVDs), the performance of devices have been related to regioregularity, number average molecular weight and casting solvents of polymers. In this work, we fabricated p-n bulk hetero-junction PVDs based on poly(3-hexylthiophene)(P3HT) and [6,6]-phenyl-C60-butyric acid methyl ester (PCBM) using various solvents such as chloroform(CF), chlorobenzene(CB), dichlorobenzene(DCB), and mixed solvent(CF/CB, CF/DCB). Thin film of active layer with P3HT/PCBM was prepared by spin coating and thermal annealing at 150 oC with fixed thickness about 110 nm by adjusting solution concentration. We investigated the influence of various solvents on the performance of solar cells. The fast solidified active layer is taken a smooth surface, but has low crystallinity which affects strongly the photocurrents of device. The device fabricated from mixed solvent as CB/CF show the improved performances of PCE 3.7% under AM 1.5 illumination at 100mA/cm<sup>2</sup>. The different solubility and evaporation rate of the mixed solvent influence the morphological structure, which bring the improved performance to increase photocurrent and fill factor.

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