

Effects of Solvent on Polymer Solar Cells based on P3HT and PCBM

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Recent reports on polymer solar cells have demonstrated a 6% power conversion efficiency (PCE).

Even though it has lower efficiency than inorganic solar cells, but polymer solar cells getting attention due to its low cost solar cells by simple fabrication processes. Flexible polymer solar cells have the advantage of a easy to carry due to light weight and compactness. In this work, effects of solvent on polymer solar cells were investigated. The layers structures of [glass or flexible substrate]/ ITO / PEDOT:PSS / P3HT:PCBM / Al structure was fabricated in this work. Indium tin oxide (ITO) coated polyethylene naphthalate (PEN) substrates was used as the flexible substrate and (PEDOT):poly(3,4-ethylenedioxythiophene)(PSS)poly(styrenesulfonate) layer was formed as hole transfer layer. For the active layer, 1:1 ratio of poly-3-hexylthiophene (P3HT) and [6,6]-phenyl C61-butyric acid methyl ester (PCBM) mixture was applied. Before the coated PEDOT:PSS, we have a O₂ plasma treatment for the ITO substrates. The P3HT/PCBM blend is spon coated onto the substrates and the thickness of the polymer films is controlled by changing the spin speeds. Finally the cathode, made of 80nm of Al, was thermally evaporated. We investigated the effects of solvent with chlorform, chlorbenzen, and dichlorobenzen on the solar cell efficiency. We also characterized the thickness effect.