E2-P002

P3HT:PCBM-based on Polymer Photovoltaic Cells with PEDOT:PSS-pentacene as a Hole Conducting Layer

Hyunsoo Kim, Jongwon Hwang, Sujin Park, Hyunhee Chae and Youngson Choe

부산대학교 화학공학과 소재공학연구실

The performance of polymer photovoltaic cells based on blends of poly(3-hexylyhiophene) (P3HT) and phenyl-C61-butyric acid methyl ester (PCBM) is strongly influenced by blend composition and thickness. Polymer photovoltaic cells based on bulk-heterojunction have been fabricated with a structure of ITO/poly(3, 4-ethylenedioxythiophene)-poly(styrenesulfonate) (PEDOT:PSS)-pentacene/poly (3-hexylthiophene) (P3HT):phenyl-C61-butyric acid methyl ester (PCBM)/Al. We have prepared PEDOT:PSS by dissolving pentacene in N-methylpyrrolidine (NMP) and mixing with PEDOT:PSS. Pentacene was added a maximum concentration of approximately 5.5mg to the PEDOT:PSS solution and sonicated for 10 min. Active layer (P3HT:PCBM) (1:1) was strongly influenced by PEDOT:PSS-pentacene. We have investigated the performance of photovoltaic device with different concentration of P3HT:PCBM (1:1) 2.0wt%, 2.2wt%, 2.4wt% and 2.6wt%, respectively. The photocurrent and power conversion efficiency (PCE) showed a maximum between 2.0wt% and 2.2wt% concentration of P3HT:PCBM. This implied that both morphology and electron transport properties of the layer influenced the performance of the present photovoltaic cells. As the concentration of P3HT:PCBM blends as an active layer was increased, the power conversion efficiency was decreased. P3HT:PCBM layer and PEDOT:PSS-pentacene layer were characterized by work function, UV-visible absorption, atomic force microscopy (AFM), X-ray diffraction (XRD) and scanning electron microscope (SEM).