

Mixed P3HT/PCBM Organic Thin-Film Transistors: Relation between Morphology and Electrical Characteristics

ABSTRACT

The mixed P3HT (poly(3-hexylthiophene)) and [6,6]-PCBM (phenyl C61-butyric acid methyl ester) organic thin films were investigated for electronic structure using UV-Vis spectrophotometer and PESA (photo-electron spectroscopy in air). Furthermore, ESR (electron spin resonance) and AFM (atomic force microscopy) were used to investigate the surface morphology and molecular orientation, respectively. ESR analysis indicated the molecular orientation of the P3HT crystalline in the blend thin films, which the crystalline oriented normal to the substrate with distribution of 35°. AFM images indicated that the surface morphology of P3HT film was affected by the presence of PCBM nanoparticles. Solution-processed OTFTs (organic thin-film transistors) based on P3HT/PCBM blend thin film in a top source-drain contact structure was fabricated, and the electrical characteristics of the devices were also investigated. A unipolar property with p-channel characteristics were obtained in glove box measurement.