

Lower phase segregation on nanoscopically rough surface electrode for stable organic photovoltaics

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Recently, the long-term stability and high efficiency of organic solar cell devices have been two essential issues in industrial area. In this paper, etched indium-tin-oxide (ITO) nanoelectrodes are investigated to enhance power conversion efficiency and thermal stability simultaneously in poly (3hexylthiophene) (P3HT): methanofullerene (PCBM) bulk-heterojunction photovoltaic system. Simple etching process was carried out in HCl solvent at room temperature. As a result, extreme depths of tortuosity nanoelectrodes supply a convenient pathway to prevent the combination of electrons and holes in the blend. In particular, after 77hr of thermal annealing at 1500C, the etched ITO nanoelectrodes minimize the PCBM segregation with long-term thermal stability. The mechanism of patterned electrodes for advanced thermal stability was firstly developed.