

Fabrication of nano-structured ZnO films for high performance organic photovoltaic cells

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We have researched the effect of fibrous nano-structured ZnO film as a hole conducting layer on performance of organic photovoltaic cells. ZnO films were fabricated as sol-gel process and annealed on the hot plate. By increasing the concentration of precursors, the changes of performance characteristics was observed. As the concentration of precursor is increased, ZnO nano fibrous grown up from 300 to 600 nm. The obtained ZnO films have taken the shape of maze-like structure and were characterized by UV-visible absorption, scanning electron microscope (SEM), atomic force microscope (AFM), photoluminescence (PL), and X-ray diffraction techniques. The intensity of absorption bands in the ultraviolet region were increased with increasing precursor concentration. The X-ray diffraction studies that the ZnO nano fibrous were strongly (002) oriented with increasing concentration of precursor. The bulk hetero-junction photovoltaic cells were fabricated using P3HT:ICBA as active layer and their electrical properties were investigated. The external quantum efficiency (EQE) of the fabricated device was increased with increasing precursor concentration.