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Normal Type and Inverted Type Bulk Heterojunction Solar Cells

S. Erten-Ela[1]

[1]EgeUniversity, İzmir, Turkey

suleerten@yahoo.com
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Bulk heterojunction solar cells are fabricated as normal type and inverted type. In normal type solar cell, A low work function cathode metal electrode is generally preferred to fabricate organic bulk-heterojunction solar cells and degrades rapidly without proper encapsulation because of oxidation of the highly reactive electrode. In inverted solar cell, metal oxide layers such as ZnO, TiO_2 onto fluorine doped tin oxide (FTO) substrate as an electron collecting contact are deposited. This approach requires an inversion in the ordering of layer deposition allowing for more stable metals such as Au to be used as back hole collecting electrodes. Metal oxide layers have the additional effect of acting as a hole blocking contact, along with enhancing electron extraction. Inverted bulk heterojunction solar cell devices are shown air-stability with this solar cell configuration[1-4].

In this study, normal-type and inverted-type bulk heterojunction solar cells are fabricated using P3HT polymer material as donor and C_{60} and PCBM as acceptor. ZnO cathode electrode material is prepared for solution-processed applications. ZnO layers are spincoated onto FTO substrates. The morphology of ZnO layers are investigated by means of Atomic Force Microscopy Images. The photocurrent-voltage (I-V) and IPCE results of inverted-type bulk heterojunction solar cells are reported in FTO/ZnO/P3HT:PCBM/Au and FTO/PEDOT/P3HT:PCBM device configurations. Active layer is blended in different weight ratio. Fig. 1 shows the schematic illustration of inverted-type bulk heterojunction solar cell device configuration.

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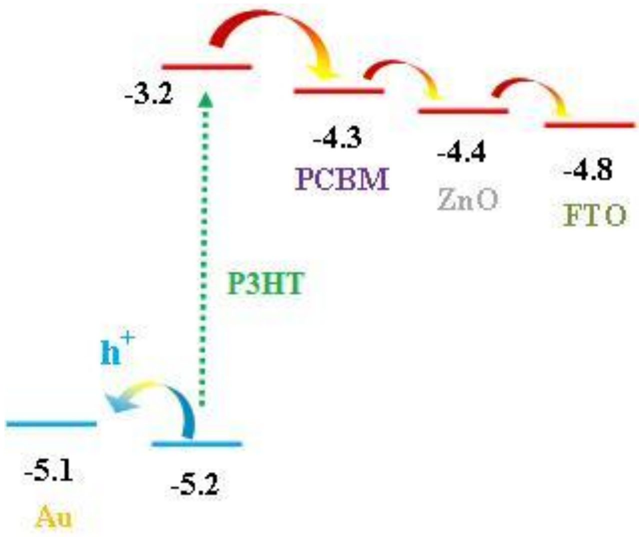

Figure 1. Inverted solar cell device structure and approximate energy level diagram**.**