

Enhanced efficiency of inverted polymer solar cells with graphene oxide-doped zinc oxide

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To improve the power conversion efficiency(PCE) of inverted polymer solar cells, graphene oxide(GO)-doped ZnO was prepared as an electron transfer material. The structure of the device was as follows: ITO/GO-ZnO/P3HT:PCBM/PEDOT:PSS/Ag (Device 1). The GO-ZnO film was prepared by spin-coating precursor solution. The weight ratio of GO solution in ZnO solution was controlled in the range of 0-10wt%. Compared with the device using pristine ZnO, the PCE was increasing with the adding GO solution until 5wt%. The device with 5wt% of GO solution showed the highest efficiency of 1.69%, which corresponds to a 40% improvement. To improve of the PCE by the surface property and control of conductivity, we introduced carbon nanotube(CNT) on devices with 5wt% of GO solution. The structure of device was as follows: ITO/GO(5wt%)-ZnO/P3HT:PCBM/PEDOT:PSS:CNT/Ag (Device 2) and ITO/GO(5wt%)-ZnO/P3HT:PCBM / CNT/PEDOT:PSS/ Ag (Device 3).