

Fabrication and Characteristics of Organic Photoelectric Devices with CuPc-C60

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ABSTRACT

ABSTRACT We used Copper phthalocyanine (CuPc) and C60 to grow up organic solar cell on indium tin oxide (ITO) conductive glass by thermal evaporation at 10⁻⁵ torr. We also used Bathocuproine (BCP) as Exciton-blocking layer. We study the effects of CuPc and C60 thickness, mixture layer, blocking layer and different mixture layer ratio of CuPc and C60 to understand the mechanism of organic solar cells. We used x-ray diffraction to determine thin film structure and obtained the grain size from the diffraction peak. Furthermore, we used energy dispersive spectrometer (EDS) to understand mixture layer ratio, and measured I-V characteristics with HP4155 then calculated the power conversion efficiency. In the experiments, we changed the structure and various thin film thickness on organic solar cell, the CuPc and C60 thin film of the better thickness is 300 Å and 400 Å. Furthermore, when we find out the better thin film of organic solar cell with BCP exciton blocking layer is 100 Å, the efficiency is highest, which is about 0.2%. Another we varied mixture layer ratio, when the molecule more ratio of C60 to CuPc is around 1 : 2.2, we can get the best power conversion efficiency, which is about 0.26%, open circuit voltage is 0.42 V, short-circuit photocurrent is 1.19 mA, and series resistance is 4.25 kΩ. At last we find if device's series resistance is lower, the power conversion efficiency will be higher. It shows us that the series resistance will influence the power conversion efficiency, so decrease series resistance is very important.

Keywords : Organic solar cell, CuPc, C60, BCP, power conversion efficiency

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