

Characterization of Plasma with Heating Treatment of ITO on the Efficiency of Polymer Solar Cells

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In order to enhance the efficiency of the organic solar cells, the effects of plasma surface treatment with using CF₄ and O₂ gas on the anode ITO were studied. The polymer solar cell devices were fabricated on ITO glasses an active layer of P3HT (poly-3-hexylthiophene) and PCBM ([6,6]-phenyl C61-butyric acid methyl ester) mixture, without anode buffer layer, such as PEDOT:PSS layer. The metallic electrode was formed by thermally evaporated Al.

Before the coating of organic layers, ITO surface was exposed to plasma made of CF₄ and O₂ gas, with/without heat treatment. In order to identify the effect the surface treatment, the current density and voltage characteristics were measured by solar simulator and the chemical composition of plasma treated ITO surface was analyzed by using X-ray photoelectron spectroscopy(XPS). In addition, the work function of the plasma treated ITO surface was measured by using ultraviolet photoelectron spectroscopy(UPS). The effects of plasma surface treatment can be attributed to the removal organic contaminants of the ITO surface, to the improvement of contact between ITO and buffer layer, and to the increase of work function of the ITO.