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DEPOSITION OF CONDUCTING OXIDE THIN FILMS AS ANODE FOR SOLAR CELL DEVICE

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Abstract

Transparent Conducting Indium Tin Oxide (ITO) and Zinc Oxide (ZnO) thin films were deposited with Pulsed Laser Deposition PLD at 300°C. The ITO films have small grain size of 5-10 nm and a high value transmission (95%) in the wavelength range from 300 to 700 nm with a low resistivity of 2.25×10^{-4} Ω.cm., while Zinc Oxide (ZnO) films have grain size of 15 nm and a transmission of 85% with a resistivity of 2.10×10^{-2} Ω.cm. A lower resistivity and better spectra selectivity is a measurement of the quality and potential use of transparent ITO and ZnO films for the application as anode electrodes for optoelectronic devices. The optimized ITO film was then used individually as anode in a solar cell based on organic conjugated polymer BEH-co-MEH-PPV. The cell fabricated in this study with an active layer made by solution-processed polymer. It was also found that the surface roughness and work function of oxide films are very important to enhance the stability and efficiency of electrode thin films used for solar cells. The solar cell structure ITO/BEHP-co-MEH-PPV/Al has shown a photovoltaic performance with open circuit voltages (V_{OC}) of the cell being 0.45 V and power conversion efficiency of 6.4% and a fill factor of 40%.

Keywords: Thin films; nano-structured films; physical interfaces; optical coatings; solar cell; efficiency.

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