

Flexible large-area polymer solar cells

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The preparation and characteristics of flexible indium tin oxide (ITO) electrodes grown on glass and flexible polyarylate (PAR) substrates using a sputtering system for use in flexible organic photovoltaics (OPVs) are described. It was found that the device performance of bulk heterojunction (BHJ) OPVs was critically dependent on the sheet resistance (R_s) of ITO electrode. With decreasing the R_s from 39 to 8.5 Ω/\square the power conversion efficiency (PCE) of the BHJ photovoltaic was improved 1.63 to 2.53 % under an AM1.5 simulated solar intensity of 100 mW/cm². Furthermore, the OPV fabricated using ITO on flexible PAR substrate exhibited a efficiency of 2.35%, which is similar to the ITO on glass. The large-area OPVs with an active area of 1×1cm² on 5×5 cm² substrates were successfully demonstrated with an relatively good efficiency of >1.0 % for glass and flexible substrates. These results are a hopeful step on the way for device up-scaling and development of processing technologies for reel to reel production of flexible organic solar cells.