PLASTIC SOLAR CELLS MADE BY AIRBRUSH AND SPIN COATING: POWER CONVERSION EFFICIENCY AND FLEXIBILITY COMPARISON

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We report the comparison of plastic solar cells fabricated by two different methods of forming the photoactive layer: spin coating and airbrush (spray) deposition. The solar cell architecture consists of four layers: ITO-PEDOT:PSS-(P3HT:PCBM)-Al. The PEDOT:PSS layer was spun coated onto ITO anode at 5000rpm for 90 seconds, and the aluminum cathode was deposited via thermal vapor deposition onto the photoactive layer made from blend solution of poly-(3-hexyl)thiophene (P3HT) and phenyl-C61-butyric acid methyl ester (PCBM). Optimization of the solar cell performance was conducted by varying the solution concentration and device annealing temperatures. Optoelectronical characterization of the device was executed by current-voltage measurement under AM 1.5 simulated sunlight and device external quantum efficiency. Morphological characterization was conducted by, AFM measurement. The flexibility of the plastic solar cell was tested by mechanical bending. Our data show that solar cells made by airbrush deposition outperformed the one made by spin coating in every category of our characterization. Power conversion efficiency of 2.2% was achieved in a plastic solar cell by airbrush.