S-13

Inkjet-printed Polymer Solar Cells with Nano-scale ZnO Buffer Layer

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Zinc oxide (ZnO) was used as a buffer layer in the fabrication of polymer solar cells with the configuration of ITO/PEDOT:PSS/P3HT:PCBM/ZnO/Ag, in which the Ag cathode was prepared by inkjet printing using silver ink. Due to the hydrophobic nature of the P3HT:PCBM active layer surface, the hydrophilic silver ink cannot be coated directly on the top of the P3HT:PCBM layer. To overcome this problem, ZnO particles, prepared in a simple solution method by using polyethylene glycol(PEG) surfactant molecules, were used as a buffer layer between the P3HT:PCBM layer and Ag cathode. The present study discusses and compares the performance of the solar cells with and without the ZnO buffer layer.

Keywords: Inkjet printing, Polymer solar cell, ZnO

S-14

Simulation and experimental verification of Electrostatic behavior of Drop on Demand Inkjet system for Printing Electronics

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This paper explains the behavior of the multiphysics phenomena of the Drop on Demand (DOD) electrostatic Inkjet system for printed electronics devices (like RFID). This paper explains the simulation behavior of the multi-physical model of the Drop on Demand (DOD)Electrostatic Inkjet system for printed electronics devices (like RFID) by using electric forces and the results are verified by experiments. The main focal point will be, to study the exploitation of electro forces. The Electrostatic Inkjet system has a huge number of applications in cost and time effected manufacturing of printed electronics like RFID, electronic and flexible display, solar cell, sensors etc.

This paper can be very helpful in the inkjet printing study. The objective is to simulate and verify the eclectic-o-static behavior of the inkjet printer for designing the conducting structure on a non conducting substrate. Here, two techniques are under observation and are being compared by using COMSOL® simulation and experimentally. The intent is to design positive and negative terminal using Pin to Plate interaction of electric field and in the end the better technique to be evaluated so that by changing the shape of the electric field it is possible to alter the fluid-flow pattern. The square AC electro forces are produced when the fluid absorbs energy from an applied AC electric field. Consequently the fluid experiences an effective or time-averaged volume force, which depends on the conductivity and permittivity gradients and on the field intensity. The ink is forced through a small orifice. The liquid droplets impact the substrate and wet. To be used for additive manufacturing, the liquid droplets must contain nano-particle material.

By running the simulation and experiment, following conclusions were obtained: 1) it will be easy to conclude the optimal condition for the development of printed electronics devices. 2) to get the better and focused drop shape. The Electrostatic Inkjet system has a huge number of applications in cost and time effected manufacturing of printed electronics like RFID, electronic devices and flexible display, solar cell, sensors etc. So, the future work fundamental focus will be to investigate the drop generation phenomena by applying the electrostatic forces and the behavior of the ink after in contact with the substrate.

Keywords: electrostatic, pin to plate