

Enhanced Performance of Electrospun PVP:PC71BM Nanofiber for Organic Solar Cells

ABSTRACT

The effect of electrospinning parameters on the morphology and efficiency of non-conjugated polar polymers PC₇₁BM was systematically investigated by varying the applied voltage, needle tip-to-collector distance and flow rate respectively. The best PVP:PC₇₁BM nanofiber efficiency is at applied voltage of 15kV which is about 8.75% followed by 1.0mL/hr flow rate and 10cm needle to collector distance with PCE=7.40% and 6.86% respectively. The device with applied voltage of 15kV exhibits enhanced short circuit current and fill factor by 17.60 mA cm⁻² and 69.8% respectively with uniform and consistently aligned fabricated nanofiber. This is due to the extremely organized PVP:PC₇₁BM nanofiber molecular structure that offers tightly arranged molecular chain structure and excellent chemical resistance which offers improves electron mobility and long term reliability of the device. This provides better controllability of the organic solar cell (OSC) nanofiber characteristics towards better power conversion efficiency, improved reliability and lifetime encapsulation.