Improving Stability for Organic Solar cells using a new encapsulated Architecture.

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Abstract

In this work, new inverted organic solar cells based on photoactive blends composed by the conjugated regioregular poly-(3-hexylthiophene) (P3HT) and [6,6]-phenyl-C61-butyric acid methyl ester (PC61BM) with large area of 2 cm2, are fabricated with a novel top electrode design in which the silver electrode is deposited over the whole substrate to completely cover the photoactive layer, allowing an effective protection of the entire device. Consequently, initial power conversion efficiencies of 3.2% are maintained at 90% after 15 h under standard illumination conditions in ambient atmosphere for encapsulated devises. Light beam induced photo-voltage (LBIV) maps revealed the effectiveness of the new design to prevent lateral moisture and oxygen diffusion. Light soaking test combined with LBIV data, indicates that the degradation of performance arises from dark spots [4] which reduce the active layer area for the non- encapsulated devices.

Keywords: Inverted Organic solar cells, Degradation Process, Stability, Lifetime,LBIC.