515/E1

Polymer photovoltaic devices by blending with ionic solid electrolyte

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Organic solar cells show great promise as a low cost alternative to inorganic semiconductor-based photovoltaic devises. Though they give very small currents these too come in handy for devices such as small calculators, clocks, thermometers etc., where the only obstacle will be the lifetime. In this paper we describe results obtained from a systematic study of polymer photovoltaics based on blends composed of poly[(2-methoxy-5-ethylhexyloxy)-1,4-phenylenevinylene] (MEH-PPV) and [6,6]-phenyl-C_{61}-butyric acid methyl ester (PCBM), poly(3-hexylthiophene) (P3HT) and PCBM bulk-heterojunction cells sandwiched between a polymer electrolyte made of either Polyacrylonitrile (PAN), or Polyethylene oxide (PEO), having different compositions together with a Pt counter electrode. Changes in device performance with the addition of acetonitrile to the electrolyte have also been discussed, and their values taken in to consideration herein.

The current-voltage characteristics in the dark, under white light illumination, absorbance parameters of the respective films in the 1:4 blend concentrations, and the best IPCE% of the device with the best combination were studied. The life time of these devices were also studied. An open circuit voltage of 448 mV with a 0.063 mA/cm^2 short circuit current was obtained for the device containing P3HT in the blend and (PAN) with acetonitrile in the electrolyte. Where an open circuit voltage of 449.3 mV with a 0.056 mA/cm^2 was obtained to the device having the same electrolyte but MEH-PPV as the polymer in the blend.

Acknowledgment: The authors would like to thank National Science Foundation of Sri Lanka for financial assistance (Research Grant RG/2004/P/04) and The Academy of Sciences for the Developing World, Italy (TWAS grant No. 05-042 RG/PHYS/AS).

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