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Magnetic field effects in a polymer/fullerene blend photovoltaic cell HYUK-JAE JANG, JAMES I. BASHAM, DAVID J. GUNDLACH, CURT A. RICHTER, Engineering Physics Division, National Institute of Standards and Technology — Organic photovoltaic (OPV) systems based on blends of conjugated polymers and fullerene derivatives have shown great promise for low-cost and efficient photovoltaic applications. Recent findings suggest that a weak external magnetic field can disturb the spin configuration of excited states and subsequently change properties of OPV cells such as photocurrent. These changes are referred to as magnetic field effects (MFEs). In order to have a better understanding of the underlying mechanisms responsible for the MFEs in polymer/fullerene blend photovoltaic systems, we fabricated poly-3-hexylthiophene (P3HT):phenyl-C_{61}-butyric acid methyl ester ($PC_{61}BM$) cells and carried out photovoltaic device performance and impedance spectroscopy measurements with and without an externally applied magnetic field. A significant reduction in short circuit current (J_{SC}) as well as open circuit voltage (V_{OC}) was observed with an applied magnetic field of a 0.1 tesla compared to those measured without a magnetic field under the same intensity of illumination. Impedance spectroscopy data gives insights into the influence of an external magnetic field on charge generation and recombination near normal photovoltaic operating conditions.

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