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XPS investigations of P3HT/Al interface for the organic bulk-heterojunction solar cells BAKHTYAR ALI, Materials Science and Engineering, University of Delaware, BRIAN REINDL, University of Florida, CONAN WEILAND, ROBERT OPILA, Materials Science and Engineering, University of Delaware, SYED SHAH, Materails Science and Engineering, University of Delaware — Solution-processed organic solar cells (OSCs) have gained significant attention due to the increasing demand for the low cost power production. However, the efficiencies of these devices are still low for commercialization. One of the efficiency limiting parameters is believed to be the poor polymer/metal electrode contact interface. In our paper we discuss the X-ray Photoelectron Spectroscopy (XPS) results obtained for the poly(3-hexylthiophene) (P3HT) and Aluminum (Al) interface. Al was deposited in-situ by thermal evaporation at 10 Å/min. The study of high resolution C1s XPS peaks (binding energy$\sim$184.6 eV), S 2p (B.E$\sim$ 164 eV) and Al 2p (BE$\sim$ 79 eV) reveals the presence of Al-S bonds as well as the existence of Al-C bonds with Al evaporation. This shows the altered chemistry at the polymer/metal interface which limits the power conversion efficiency of the solar cells. The use of LiF prior to evaporation of Al results in improved performance of the devices. Our preliminary results demonstrate that Al preferentially deposit on LiF and thus providing a better contact for the carriers to be collected at the cathode.

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