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Organic Photovoltaic Interfaces: Back Contact Study BRETT GURALNICK, MICHAEL MACKAY, RAUL LOBO, University of Delaware — Charge transfer between the polymer and contact greatly affects organic photovoltaics' (OPV) performance. The processing conditions are key since depositing the contact incorrectly reduces the polymer cell efficiency by up to fifty percent. The back contact, typically aluminum, is thermally evaporated onto the OPV active layer which has long been suspected to be affected by the process. To analyze this, the aluminum layer was dissolved after deposition and the resulting surface was imaged with an atomic force microscope. A fast aluminum deposition rate pitted the polymer surface creating regions of high resistivity thereby reducing cell efficiency. The addition of a LiF blocking layer between the active layer and aluminum was found to eliminate pitting allowing faster deposition. Interestingly, thermally annealing the active layer prior to aluminum deposition was also found to eliminate pitting. Neutron reflectivity experiments were used to determine that the fullerene derivative, used as the electron acceptor in the active layer, migrated to the surface during the annealing step and apparently act as a shielding layer preventing damage. With this knowledge the optimum deposition conditions were determined and has led to the highest efficiencies from OPVs.

Brett Guralnick
University of Delaware

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