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Interfacial Layer Optimization in Organic Photovoltaics JOSHUA LITOFSKY, Department of Physics and Astronomy, Beloit College, EVAN LAFALCE, XIAOMEI JIANG, Department of Physics, University of South Florida — Organic photovoltaic devices (OPVs) based on benchmark $\pi-$conjugated polymer polythiophene and electron acceptor PCBM are made up of a sandwich-like structure of multifunctional layers. Interfacial layers (IL) facilitate charge transport between the charge generation layer and the electrodes and enhance charge extraction. Optimizing the IL thus provides one mean of maximizing the efficiency of OPVs. Various electron transport layers such as ZnO and LiF were used, and hole transport layers included PEDOT:PSS and V_2O_5. Two different device architectures were explored: conventional structure with ITO serving as an anode and inverted structure when ITO acts as a cathode. Using various deposition techniques, we worked to optimize IL thickness and film formation methods. By analyzing device shunt and series resistances using a standard diode equation, we were able to identify the optimal parameters for device performance. The combination of thin IL with electrodes of appropriate work function yielded much better results compared to the control device with no IL. We can use these results and techniques to further optimize future OPV devices based on other novel material systems. This work was supported by the NSF REU grant # DMR-1263066: REU Site in Applied Physics at USF.

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