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Conductance Thin Film Model of Flexible Organic Thin Film Device using COMSOL Multiphysics CAROLYN CARRADERO-SANTIAGO, JOSEE VEDRINE-PAULUS, University of Puerto Rico at Humacao — We developed a virtual model to analyze the electrical conductivity of multilayered thin films placed above a graphene conducting and flexible polyethylene terephthalate (PET) substrate. The organic layers of poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT:PSS) as a hole conducting layer, poly(3-hexylthiophene-2,5-diyl) (P3HT), as a p-type, phenyl-C61-butyric acid methyl ester (PCBM) and as n-type, with aluminum as a top conductor. COMSOL Multiphysics was the software we used to develop the virtual model to analyze potential variations and conductivity through the thin-film layers. COMSOL Multiphysics software allows simulation and modeling of physical phenomena represented by differential equations such as heat transfer, fluid flow, electromagnetism, and structural mechanics. In this work, using the AC/DC, electric currents module we defined the geometry of the model and properties for each of the six layers: PET/graphene/PEDOT:PSS/P3HT/PCBM/aluminum. We analyzed the model with varying thicknesses of graphene and active layers (P3HT/PCBM). This simulation allowed us to analyze the electrical conductivity, and visualize the model with varying voltage potential, or bias across the plates, useful for applications in solar cell devices.

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