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**Physical and electrical models for interpreting AC and DC transport measurements in polymer solar cells** MAX MCINTYRE, MARIAN TZOLOV, RAQUEL COSSEL, SETH PEELER, Lock Haven Univ — We have fabricated and studied bulk heterojunction solar cells using a mixture of the low bandgap material PCPDTBT and PCBM-C60. Our transport studies show that the devices in dark have good rectification and they respond to AC voltage as a simple RC circuit. The illumination causes an additional contribution to the impedance, which varies with the level of illumination. One proposed model is that photo-generated charges can become trapped in potential wells. These charges then follow a Debye relaxation process, which contributes to a varying dielectric constant. Another proposed model is based on a RC circuit model with two capacitors which can describe the varying capacitance behavior. The physical mechanism for this model is that photo-generated charges become accumulated at the interface between PCPDTBT and PCBM-C60 and form an additional layer of charge. We will show that our circuit models and their analogous physical models can predict the AC and DC responses of polymer solar cells.

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