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Comparison of different models of transport in organic photovoltaics PAUL HANEY, BEHRANG HAMADANI, NIKOLAI ZHITENEV, National Institute for Standards and Technology — Organic photovoltaics are relatively low-cost, easy-to-fabricate materials that can harness solar energy, and have been the subject of intense study in recent years. There is a rich array of physics which underlie the operation of these materials, and various models have been proposed to capture the most relevant mechanisms and help explain experimental results. Understanding and modeling transport in these structures is particularly difficult as they are highly disordered. We perform a critical analysis of various models currently used in the field, and in particular, consider the relevance of different models of charge transport (i.e., drift-diffusion versus hopping) to overall model behavior. We also consider the effect of a series resistance on measured current-voltage characteristics. Comparisons to experiment reveal that under high illumination, series resistance should be included in any microscopic or mesoscopic model of an organic solar cell.

Paul Haney
National Institute for Standards and Technology

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