Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Dark current of organic heterostructure devices with insulating spacer layers SUN YIN, Shandong University, China, WANYI NIE, ADITYA D. MOHITE, AVADH SAXENA, DARRYL L. SMITH, Los Alamos National Lab, P. PAUL RUDEN, University of Minnesota — The dark current density at fixed voltage bias in donor/acceptor organic planar heterostructure devices can either increase or decrease when an insulating spacer layer is added between the donor and acceptor layers. The dominant current flow process in these systems involves the formation and subsequent recombination of an interfacial exciplex state. If the exciplex formation rate limits current flow, the insulating interface layer can increase dark current whereas, if the exciplex recombination rate limits current flow, the insulating interface layer decreases dark current. We present a device model to describe this behavior and illustrate it experimentally for various donor/acceptor systems, e.g. P3HT/LiF/C_{60}.

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Date submitted: 13 Nov 2014 Electronic form version 1.4