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Monte Carlo Simulation of Carrier Dynamics in an Organic Field Effect Transistor DHARMENDAR REDDY PALLE, LEONARD REGISTER, ANANTH DODABALAPUR, The University of Texas at Austin — We demonstrate here for the first time a self consistent Monte Carlo Simulation [MCS] of carrier dynamics under high charge densities in an Organic Field Effect Transistor (OFET). Given the stochastic nature of carrier transport in organic semiconductors, MCS is ideally suited for simulating the carrier dynamics in these systems. Previous work on MCS of carrier transport in organic devices has been limited to two terminal device configurations with low carrier densities. Also, a modified Miller Abrahams hopping rate is introduced to account for the anisotropy of hopping events between molecules with different spatial orientation. The semiconductor is modeled as a polycrystalline region with a Gaussian density of states. Injection and transport have been modeled as hopping events with different hopping rates. Comparison of measured and simulated transient and steady state current voltage [I-V] characteristics of Pentacene FETs will be presented. The effect of various parameters such as interface barriers, grain boundaries, and temperature on simulated transient and steady state I-V characteristics of Pentacene FETs with channel lengths varying from a few hundred nano-meters to a micron based on Kinetic MCS will be discussed.

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