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Dissipative Mixing of Energy and Spatial Coordinates for Variable Range Hopping in Disordered Organic Semiconductors TZU-CHENG WU, DAVID H. DUNLAP, SUSAN R. ATLAS, Physics and Astronomy, University of New Mexico, STEVE VALONE, MST-8, Los Alamos National Laboratory
— Electron transport of injected charges in disorder organic semiconductor devices is often controlled by a few rate-limiting hops. These hops are facilitated by the interaction between the charge and the surrounding polarizable medium. For strong disorder, variable range hopping considerations result in mixing between the intermolecular hopping distance R and the site energy differences $\Delta\epsilon$. Here we include explicitly relaxation processes described by the Caldeira-Leggett model. We show that because the equilibration time also depends on R and $\Delta\epsilon$, there is an additional R-$\Delta\epsilon$ mixing that has not been accounted for previously, offering a possible explanation for the anomalous dependence of mobility on temperature, electric field and hopping site density seen in experiments.

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