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Charge Energy Transport in Hopping Systems with Rapidly Decreasing Density of States DAN MENDELS, Technion, ORGANIC ELECTRONICS GROUP TECHNION TEAM — An accurate description of the carrier hopping topology in the energy domain of hopping systems incorporating a rapidly decreasing density of states and the subsequent energetic position of these systems' so called effective conduction band is crucial for rationalizing and quantifying these systems' thermo-electric properties, doping related phenomena and carrier gradient effects such as the emergence of the General Einstein Relation under degenerate conditions. Additionally, as will be shown, the 'mobile' carriers propagating through the system can have excess energies reaching 0.3eV above the system quasi-Fermi energy. Hence, since these mobile carriers are most prone to reach systems interfaces and interact with oppositely charged carriers, their excess energy should be considered in determining the efficiencies of energy dependent processes such as carrier recombination and exciton dissociation. In light of the stated motivations, a comprehensive numerical and analytical study of the topology of hopping in the energetic density of such systems (i.e. the statistics regarding which energy values carriers visit most and in what manner) was implemented and the main statistical features of the hopping process that determine the position in energy of the system's effective conduction band were distilled. The obtained results also help shed light on yet to be elucidated discrepancies between predictions given by the widely employed transport energy concept and Monte Carlo simulations.

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