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Effect of disorder on transport properties in a tight-binding model for organo-metal halide perovskites SAHEL ASHHAB, Qatar Environment and Energy Research Institute, Hamad Bin Khalifa University, Qatar Foundation, Qatar, O. VOZNYY, S. HOOGLAND, E. H. SARGENT, University of Toronto, Canada, M. E. MADJET, Qatar Environment and Energy Research Institute, Qatar — The organo-metal halide perovskite materials have recently emerged as remarkable materials for photovoltaic applications. Their strengths include good electric transport properties in spite of the disorder inherent in them. Motivated by this observation, we analyze the effects of disorder on the energy eigenstates of a tight-binding model of these materials. In particular, we analyze the spatial extension of the energy eigenstates, which is quantified by the inverse participation ratio. This parameter exhibits a gradual change towards localization as the on-site energy disorder strength is increased. However, we argue that the disorder in the organo-metal halide perovskites corresponds to a point in the regime of highly delocalized states. Our results also suggest that the form of the electronic states is not favorable for halide mixing.

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