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**Unifying high- and low-temperture transport in organic semiconductors in large electric fields** JEFF WORNE, DOUGLAS NATELSON, Rice University, JOHN ANTHONY, University of Kentucky — As organic semiconductors become more prevalent in solar cells and consumer electronics, developing a clear understanding of carrier transport within organic semiconductors becomes important. Recent work has shown that analyzing transport data over broad temperature ranges can be challenging and one must be careful in selecting a model to explain the data. We have selected two chemically unique organic semiconductors, poly(3-hexylthiophene) (P3HT) and triisopropylsilylethnyl (TIPS) pentacene, in order to make a general statement about bulk transport under large source-drain (10MV/m) and gate (400MV/m) biases from 4K to 300K. With these large carrier concentrations, we observe that charge carrier behavior evolves from Poole-Frenkel activation hopping at high temperatures to temperature-independent field emission hopping at low temperatures in both P3HT and TIPS-pentacene systems, fitting in well with the current understanding of high-temperature transport. This result illustrates the common behavior between these different systems and helps develop a unified picture of charge carrier transport within disordered organic semiconductors.

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