

Modelling the transfer curves of sexithiophene thin film transistors

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Abstract

In standard field-effect transistors, the current is proportional to the gate voltage in the linear region and proportional to the quadratic gate voltage in the saturation region. However, many organic semiconductors show currents rising faster than this. There exist models in literature to describe these supra-linear currents by assuming a distribution of trap states. These models, the variable-range hopping (VRH) and multi-trap and release (MTR) thus predict an as-measured mobility that is depending on the gate voltage. In the current work, these two models, very similar in nature, are subjected to a test using FETs of sexithiophene of different dimensions, including one with sub-micron gate length. The conclusion is that the as-measured mobility strongly depends on the gate voltage, but not in the way as predicted by the VRH/MTR model.

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