

Abstract Submitted
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All Electronic Time of Flight Mobility Measurements in Pentacene Organic Field Effect Transistors LAWRENCE DUNN, University of Texas at Austin and Institute of Materials Research and Engineering, Singapore, DEBARSHI BASU, LIANG WANG, ANANTH DODABALAPUR, University of Texas at Austin — One of the most important figures of merit for an organic semiconductor is its mobility, which is the proportionality constant relating the velocity of charge carriers to the electric field in the material. We present an all-electronic time of flight method for measuring the in-plane mobility of charge carriers using a voltage pulse (rise time <60 ns) applied to the source of an OFET at temperatures between 300 K and 77 K. The transit time mobilities extracted at all temperatures are compared with the DC mobilities extracted from the OFET transfer characteristics. We observe significantly higher transit time mobilities at higher temperatures that merge with the DC mobilities at lower temperatures. This is noteworthy because the transit time technique measures the mobility of the fastest carriers, which at higher temperatures seems to be uninfluenced by the interaction of charge carriers with deep traps, and also before the bias stress effect influences transport. By comparing the DC and transit time mobilities at varying temperatures we may gain an understanding of the time scale of the charge carriers' interaction with traps in the semiconducting material.

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