

## Saturation Misbehavior and Field Activation of the Mobility in Polymer-Based OTFTs

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**Abstract :** In this paper we intend to give a comprehensive view of the saturation misbehavior of thin film transistors (TFTs) based on disordered semiconductors, such as most organic TFTs, and its link to the field activation of the mobility. Experimental evidence of the field activation of the mobility is given for disordered semiconductor based TFTs, when reducing the gate length. Saturation misbehavior is observed simultaneously. Advanced transport models have been implemented in a quasi-2D numerical TFT simulation software. From the numerical simulations it is clearly established that field activation of the mobility alone cannot explain the saturation misbehavior. Evidence is given that high longitudinal field gradient at the drain end of the channel is responsible for an excess charge accumulation, preventing saturation. The two combined effects allow reproducing the experimental output characteristics of short channel TFTs, with S-shaped characteristics and saturation failure.

**Keywords :** mobility field activation, numerical simulation, OTFT, saturation failure

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