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Review—Charge Carrier Mobility of Organic Thin Film Transistor: Intrinsic and Extrinsic Influencing Factors Based on Organic Semiconducting Materials

Abstract

The use of organic thin film transistors (OTFTs) is growing rapidly as an alternative to their inorganic counterparts due to their advantageous properties, such as easy processing and flexibility. The performance of OTFTs is still undergoing improvement and taking this as a recognition, this paper reviews various factors that influence the performance of the OTFTs, primarily in terms of field-effect mobility. The influencing factors reviewed in this article are divided into intrinsic and extrinsic factors for different organic semiconducting materials (OSMs). The intrinsic factors include the OSMs' molecular orientation, OSM/dielectric interaction, and OSM/electrode interaction. The extrinsic factors are basically related to the OSM processing and OTFTs fabrication. For example, the article discusses how mixing, blending, and annealing affect the properties of the OSMs. The effect of the ambient atmosphere on OTFTs' performance is also discussed. The aim of this article is to discuss the current trends related to one of the critical figures of merit of OTFTs, which is the mobility of charge carriers.

Keywords

Carrier mobility; Field effect transistors; Molecular orientation; Thin film circuits; Thin film transistors; Thin films; Blending