

GRAPHENE BLENDED ORGANIC THIN FILM TRANSISTOR FABRICATED BY ALL-INKJET-PRINTING TECHNIQUE

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ABSTRACT: Organic electronic grows up with the development of organic semiconductor materials and process techniques. By adding conductive dopant into semiconductor, we could affect the performance of the organic electronic devices. In this study, blending organic semiconductor with graphene was used to fabricate organic-thin-film-transistor (OTFT) by all-inkjet-printing process. Compared with the pristine poly(3-hexylthiophene) (P3HT), the graphene/P3HT OTFT had more than 10 times improvement in the mobility, and the on-off ratio was up to 10^5 . According to the percolation theory, the limitation concentration was analyzed. By manufacturing OTFTs in different channel lengths, the contact resistance and the channel resistance of blended OTFT were also been experimental analyzed. The graphene dopant could not only improve the mobility of organic active layer, but also lower the contact resistance between semiconductor and the conductive polymer electrodes. Blended material shows a feasible method to enhance the mobility of organic semiconductors, and improve the interface between organic semiconductor and conductive electrode. With organic semiconductor in higher mobility, organic electronic devices could be applicable in more various possibilities.

Keywords: organic thin film transistor, inkjet printing, graphene.