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器件制备及器件物理

利用混合有机空穴传输材料提升有机薄膜晶体管场效应迁移率

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摘要： 通过采用在并五苯薄膜与源漏电极之间插入10 nm 并五苯掺杂的N，N’-二苯基-N，N’-二（3-甲基苯基）-1，1’-联苯-4，4’-二胺薄膜的方法研究了基于并五苯有源层的底栅错面型有机薄膜晶体管的电学特性。研究发现：N，N’-二苯基-N，N’-二（3-甲基苯基）-1，1’-联苯-4，4’-二胺的引入可以有效改善有源层和源漏电极接触界面的表面形貌，利于形成欧姆接触，从而改善器件性能，最终使优化器件的迁移率由（0.1±0.01）cm^2/（V•s）提升至（0.31±0.02）cm^2/（V•s），阈值电压由（−34.6±1.3）V 降至（−30.1±1.2）V。
关键词： 有机薄膜晶体管 表面形貌 迁移率 TPD

Improvement of The Field Effect Mobility of OTFT by Using Organic Hole Transport Material

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Abstract: N, N-Dipehnyl-N,N-di(m-Tolyl)benzidine (TPD) was used as buffer layer in the organic thin-film transistors (OTFTs) with bottom gate-top contact structure: ITO/PMMA (1 150 nm)/Pentacene (30 nm)/Pentacene:TPD (10 nm, 1:1)/Au. The corresponding hole mobility of the co-doped device increases from (0.1±0.01) cm^2/(V•s) to (0.31±0.02) cm^2/(V•s), which is nearly 3 times higher than that of the reference device. In addition, the threshold voltage decreases from (−34.6±1.3) V to (−30.1±1.2) V. Atomic force microscope characterization shows that the performance enhancement can be attributed to the roughness amelioration of the interface. The results indicate that TPD is an efficient buffer layer material for OTFTs.
Keywords: organic thin film transistor surface morphology mobility TPD
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