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材料合成及性能

空穴传输层对有机电致发光器件性能的影响

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摘要： 制备了结构为ITO/MoO_3(40 nm)/空穴传输层/CBP:$Ir(ppy)_2acac$(8%)(30 nm)/BCP(10 nm)/Alq_3(40 nm)/LiF(1 nm)/Al(100 nm)的器件,其中$Ir(ppy)_2acac$为绿色磷光染料,空穴传输层分别为TAPC(50 nm)、TAPC(40 nm)/TCTA(10 nm)、NPB(50 nm)、NPB(40 nm)/TCTA(10 nm)。通过使用4种不同结构的空穴传输层,对器件的发光性能进行了研究。结果表明,空穴传输层对器件的发光性能有较大影响。在电压为6 V、电流密度为2 mA/cm^2的条件下,4种结构的器件的电流效率分别为52.5,67.8,35.6,56.6 cd/A。其原因是TAPC/TCTA及NPB/TCTA能级结构更有利于空穴对发光层的注入而且TAPC拥有较高的空穴迁移率;另外,TAPC及TCTA拥有较高的LUMO和三线态能量,可以有效地将电子和三线态激子束缚在发光层内,增加绿光染料的复合发光几率。所制备的器件均表现出良好的色坐标稳定性。

关键词： 有机电致发光器件 空穴传输层 阻挡层

The Electroluminescent Performance of OLED Based on Different Hole Transport Layer

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Abstract: Green phosphorescent organic light emitting diodes were fabricated utilizing $Ir(ppy)_2acac$ phosphorescent materials. The device structure was ITO/MoO_3(40 nm)/hole transport layer/CBP: $Ir(ppy)_2acac$ (8%)(30 nm)/BCP(10 nm)/Alq_3(40 nm)/LiF(1 nm)/Al(100 nm), the hole transport layers were TAPC(50 nm), TAPC(40 nm)/TCTA(10 nm), NPB(50 nm), and NPB(40 nm)/TCTA(10 nm), respectively. The electroluminescent properties were studied by using different hole transport layer. The current efficiency of these devices achieve 52.5, 67.8, 35.6, and 56.6 cd/A at 6 V, respectively. The reasons are that the stepwise holes injection layers and high hole mobility make holes inject and transport to emitting layer more easily. Moreover, the high triplet energy level blocking layers confine the carriers and excitons in emitting layer. Besides, the color coordinates of all devices are stable.

Keywords: organic light emitting diodes hole transport layer blocking layer
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