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器件制备及器件物理

有机/有机界面污染对有机电致发光器件稳定性的影响

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摘要： 有机电致发光器件的稳定性是其实用化面临的主要难题之一。为了研究有机/有机界面性质对有机电致发光器件稳定性的影响,采用溶液旋涂的NPB(NPB_{SC})作为器件的空穴传输层制备了两种异质结电致发光器件:ITO/NPB_{SC}/Alq_3/LiF/Al和ITO/NPB_{SC}/NPB/Alq_3/LiF/Al,对比研究了器件的发光性能和工作稳定性。研究结果表明:完全使用NPB_{SC}作为空穴传输层的器件性能和稳定性都较差,这归因于不稳定的NPB_{SC}/Alq_3界面,在空气中旋涂制备NPB层时,空气中的水蒸气和氧气分子会粘附在空穴传输层表面,这样就会引起界面处Alq_3分子的发光猝灭。插入10 nm真空蒸镀的NPB层可以显著地提高器件的发光性能和稳定性,10 nm的NPB层把污染界面与激子复合区界面分开,避免了水蒸气和氧气分子对Alq_3分子的发光猝灭,器件的效率增加了1.15 cd/A,半衰期寿命提高了4倍。

关键词： 有机电致发光器件 有机/有机界面 稳定性

Effect of Contaminated Organic/Organic Interface on The Stability of Organic Light-emitting Devices

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Abstract: Two types of organic light-emitting devices were fabricated using a spin-coated N,N'-di(naphth-1-yl)-N,N'-diphenyl-benzidine (NPB_{SC}) film as hole-transport layer (HTL): ITO/NPB_{SC}/Alq_3/LiF/Al,ITO/NPB_{SC}/NPB/Alq_3/LiF/Al. The effect of air contaminated NPB_{SC}/organic interface on the stability of organic light-emitting devices was investigated. It is found that the device using a NPB_{SC} film as HTL exhibited the poorer stability, which is attributed to the instability of NPB_{SC}/Alq_3 interface that contaminated by moisture and oxygen from the NPB_{SC} layer. A vacuum-deposited NPB film (10 nm) inserted between NPB_{SC} layer and Alq_3 layer can greatly improve the stability of device by blocking the recombination zone from contamination of moisture and oxygen.

Keywords: organic light-emitting devices organic/organic interface stability

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