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器件制备及器件物理

TCTA对红绿磷光有机电致发光器件发光层激子的调控作用

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摘要： 制备了结构为ITO/MoO_3(50 nm)/NPB(40 nm)/TCTA(10 nm)/CBP:14%GIr1(30 nm)/TCTA(*x*)/CBP:2%R-4B(10 nm)/BCP(10 nm)/Alq_3(40 nm)/LiF(1 nm)/Al(100 nm)的红绿磷光有机电致发光器件,GIr1和R-4B分别为红、绿磷光染料。通过在红绿间插入较薄间隔层TCTA的方法,调节载流子、激子在红绿发光层中的分布,并结合TCTA和BCP对发光层内载流子和激子的有效阻挡作用,研究了载流子调控层TCTA在不同厚度下对器件发光性能的影响。结果表明,TCTA为1 nm时,器件的发光性能得到了很好的提升。电 压为6 V时,TCTA为1 nm器件的电流密度、亮度、最大电流效率分别为0.509 mA/cm^2、69.91 cd/m^2和13.72 cd/A,而TCTA为0 nm器件的电流密度、亮度、最大电流效率分别为1.848 mA/cm^2、215.7 cd/m^2和11.67 cd/A。
关键词： 有机电致发光器件 磷光 阻挡层 间隔层

Effect of TCTA Layer on Exciton Positions of Red and Green Phosphorescent Organic Light Emitting Diodes

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Abstract: Red and green phosphorescent organic light emitting diodes were fabricated, utilizing GIr1 and R-4B (novel red and green) phosphorescent materials. Device structure was ITO/MoO_3(50 nm)/NPB(40 nm)/TCTA(10 nm)/CBP:14%GIr1(30 nm)/TCTA(*x*)/CBP:2%R-4B(10 nm)/BCP(10 nm)/Alq_3 (40 nm)/LiF(1 nm)/Al(100 nm). The luminescent properties were studied by inserting different thickness of TCTA (regulation of carrier) spacer layer between red and green emitting layer to adjust the distribution of carriers and excitons. The results showed that the optimum performance of OLED was achieved when the thickness of TCTA spacer layer is 1 nm. The maximum the device performance reached 13.72 cd/A, 0.509 mA/cm^2 and 69.91 cd/m^2 at 6 V. While for 0 nm (none spacer), the device performance reached 11.67 cd/A, 1.848 mA/cm^2 and 215.7 cd/m^2 at 6 V.
Keywords: organic light emitting diodes phosphorescence blocking layer spacer
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