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器件物理及器件制备技术

MoO_3作空穴注入层的绿光有机电致发光器件制备及其性能研究

史高飞[1,2], 牛红林[1,2], 鲁文武[1,2], 胡俊涛[1]

1. 特种显示技术教育部重点实验室, 特种显示技术国家工程实验室, 现代显示技术省部共建国家重点实验室培育基地, 合肥工业大学 光电技术研究院, 安徽 合肥 230009;
2. 合肥工业大学 仪器科学与光电工程学院, 安徽 合肥 230009

摘要： 用真空热蒸镀的方法制备了绿光有机电致发光器件,并对其工艺流程进行了详细的描述。器件结构为ITO/MoO_3(*x* nm)/N,N'-diphenyl-N,N'-bis(1-naphthyl)-(1,18-biphenyl)-4,4-diamine(NPB)(40 nm)/tris(8-hydroxyquinoline)aluminum(Alq_3)(60 nm)/LiF(1 nm)/Al(150 nm),其中*x*=0,5 nm。实验中,对ITO基片进行氧等离子体表面处理,能够有效减小ITO表面的接触角。通过对器件的光电性能测试,研究了MoO_3作空穴注入层对有机电致发光器件性能的影响。实验结果表明,空穴注入层MoO_3的最高占据分子轨道(HOMO)能级较好的与ITO功函数匹配,降低了空穴注入势垒,提高了器件的发光亮度和效率。当外加电压小于10 V时,器件的电流密度随外加电压的增加而增加,但变化不明显;当外加电压大于10 V时,器件的电流密度明显增强,发光色度几乎不随驱动电压的改变而改变,色坐标稳定在(0.36, 0.55)附近。

关键词： 有机电致发光器件 工艺流程 绿光 光电性能

Fabrication and Performance Research of Green Organic Light Emitting Device with MoO_3 Hole Injection Layer

SHI Gao-fei[1,2], NIU Hong-lin[1,2], LV Wen-wu[1,2], HU Jun-tao[1]

1. Key Lab of Special Display Technology, Ministry of Education, National Engineering Lab of Special Display Technology, National Key Lab of Advanced Display Technology, Academy of Opto-Electronic Technology, Hefei University of Technology, Hefei 230009, China;
2. Department of Instrument Science and Opto-Electronic Engineering, Hefei University of Technology, Hefei 230009, China

Abstract: A green organic light emitting device(OLED) with the structure of ITO/MoO_3(*x* nm)/N,N'-diphenyl-N,N'-bis(1-naphthyl)-(1,18-biphenyl)-4,4-diamine(NPB)(40 nm)/tris(8-hydroxyquinoline)aluminum(Alq_3)(60 nm)/LiF(1 nm)/Al(150 nm) have been fabricated by vacuum deposition method,*x*=0,5 nm. The detail process has been described. It was found that the treatment on the surface of ITO substrates by oxygen plasma can effectively reduce the contact angle of the ITO surface in the experiments. By measuring and analyzing the performance of luminescence and electrical of device, the influences of the hole injection layer MoO_3 on device performance was investigated. Experimental results show that HOMO level of MoO_3 can reasonably match ITO work function,which reduces the hole-injecting barrier and improves the brightness and efficiency of device. When forward voltage is less than 10 V, the current density of device does not change significantly with the voltage increases; When the voltage is more than 10 V, the current density increases significantly. The chroma of device stabilizes in green light district of(0.36, 0.55) with the changes of the driving electric voltage.

Keywords: organic light emitting devices fabrication process green light electro-optical property

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通讯作者: 胡俊涛, E-mail: jthu@ustc.edu

作者简介:

作者Email: jthu@ustc.edu

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