[an error occurred while processing this directive]

发光学报
CHINESE JOURNAL OF LUMINESCENCE
中文核心期刊
主管：中国科学院
主办：中国科学院长春光学精密机械与物理研究所
中国物理学会发光分会
主编：申德振

发光学报 2013, 34(12) 1572-1578 ISSN: 1000-7032 CN: 22-1116/O4

材料合成及性能

激发波长和带宽对Ce/Tb/Eu共掺发光玻璃发光性质的影响

任林娇, 雷小华, 陈伟民, 杜晓晴, 冯永安, 金雷
重庆大学光电工程学院 光电技术与系统教育部重点实验室, 重庆 400044

PDF 下载 引用本文

摘要： 采用双高斯函数拟合不同中心波长和带宽的LED芯片光谱，并根据荧光分光光度计的测量结果推算不同LED芯片激发下的Ce/Tb/Eu共掺发光玻璃的发射光谱和色温。结果表明，当芯片带宽不变，中心波长从370 nm右移到378 nm时，Ce/Tb/Eu共掺发光玻璃色温逐渐下降。当芯片中心波长不变，带宽从10 nm增加到25 nm时，Ce/Tb/Eu共掺发光玻璃的色温变化与中心波长有关。在芯片发光稳定的前提下，带宽变化对Ce/Tb/Eu共掺发光玻璃色温的影响小于中心波长改变的影响，故当Ce/Tb/Eu共掺发光玻璃应用于LED发光时，需优先选择芯片的中心波长。

关键词： 发光玻璃 LED芯片 激发波长 带宽

Effect of Excitation Wavelength and Bandwidth on Luminescent Properties of Ce/Tb/Eu Co-doped Luminescence Glass

REN Lin-jiao, LEI Xiao-hua, CHEN Wei-min, DU Xiao-qing, FENG Yong-an, JIN Lei
The Key Laboratory for Optoelectronic Technology & Systems of Ministry of Education, Department of Opto-Electronic Engineering, Chongqing University, Chongqing 400044, China

Abstract: Double Gaussian functions with different center wavelengths or bandwidths were used to fit LED chips' spectra. Emission spectra and correlated color temperatures (CCTs) of Ce/Tb/Eu co-doped glasses excited by different LED chips were calculated by experimental results of fluorescence spectrophotometer. When the bandwidths of chips keep unchanged, CCTs of Ce/Tb/Eu co-doped glasses decrease with the red shift of center wavelength from 370 nm to 378 nm. When center wavelength of chips keeps unchanged and bandwidth increases from 10 nm to 25 nm, CCTs of Ce/Tb/Eu co-doped glasses depend on the center wavelengths of LED chips. When the emissions of LED chips are stable, the effect of bandwidth on CCTs of Ce/Tb/Eu co-doped glasses is less than that of center wavelength. So for the application of LED, we should give preference to the center wavelength of LED chips.

Keywords: luminescence glass LED chip excitation wavelength bandwidth
收稿日期 2013-07-29 修回日期 2013-09-25 网络版发布日期
基金项目:
国家自然科学基金（61007030）；重庆市自然科学基金（cstc2013jcyjA1060）资助项目

通讯作者: 雷小华，E-mail：xhlei@cqu.edu.cn
作者简介: 任林娇（1987- ），女，河南济源人，博士研究生，主要从事发光材料的研究。E-mail：84951829@qq.com，Tel：（023）65106601
作者Email: xhlei@cqu.edu.cn

参考文献：

[1] Ren L J, Du X Q, Lei X H, *et al.* Effect of Eu_2O_3 concentration on luminescent properties of Ce/Tb/Eu co-doped calcium borosilicate glass for white LED[J]. *J. Lumin.,* 2013, 142:150-154.

[2] Zhu Z F, Zhang Y B, Qiao Y P, *et al.* Full color and tunable white emitting in ternary Ce/Tb/Sm co-doped CaO-B_2O_3-SiO_2 glasses[J]. *J. Non-Cryst. Solids,* 2012, 358(12-13):1550-1553.

[3] Qiao Y P, Zhu Z F, Zhang Y B, *et al.* Tunable white emitting in ternary Ce/Tb/Sm codoped CaO-B_2O_3-SiO_2 glasses[J]. *Acta Physico-Chimica Sinica (物理化学学报),* 2012, 28(3):706-710 (in Chinese).

[4] Liu Z J, Yang L Y, Dai N L, *et al.* Tri-color luminescence glass under long-wavelength ultrviolet excitation[J]. *Acta Phys. Sinica (物理学报),* 2011, 60(4):047806-1-6 (in Chinese).

[5] Yu Y, Liu Z J, Dai N L, *et al.* Ce-Tb-Mn co-doped white light emitting glasses suitable for long-wavelength UV excitation[J]. *Opt. Exp.,* 2011, 19(20):19473-19479.

[6] Zorenko Y, Gorbenko V, Voznyak T, *et al.* Luminescence and Tb^{3+}-Ce^{3+}-Eu^{3+} ion energy transfer in single-crystalline films of $Tb_3Al_5O_{12}$:Ce, Eu garnet[J]. *J. Lumin.,* 2008, 128(4):652-660.

[7] Fu H Y, Qiao X S, Cui S, *et al.* Tunable white light emission from glass-ceramics containing Eu^{2+}, Tb^{3+}, Eu^{3+} co-doped $SrLaF_5$ nanocrystals[J]. *Mater. Lett.,* 2012, 71(5):15-17.

[8] Rocha A C P, Andrade L H C, Lima S M, *et al.* Tunable color temperature of Ce^{3+}/$Eu^{2+,\ 3+}$ co-doped low silica aluminosilicate glasses for white lighting[J]. *Opt. Exp.,* 2012, 20(9):1034-1041.

[9] Xu B H. Influence of gamma, color temperature and brightness on display effect[J]. *Chin. J. Liq. Cryst.*

本刊中的类似文章

1. 可调白光发射的Ce-Tb-Eu共掺钙硼硅酸盐发光玻璃[J]. 2013,34(3): 303-307
2. TiO_2禁带宽度和光吸收系数对其光催化性能的影响[J]. 2012,33(12): 1329-1334
3. Dy^{3+}含量对Eu^{2+}, Dy^{3+}共掺高硅氧发光玻璃发光性能的影响[J]. 2012,(11): 1161-1165
4. 1,8-萘酰亚胺荧光单体的合成及光谱的量子化学研究[J]. 2011,32(5): 505-513
5. CaO-SiO_2绿光玻璃陶瓷荧光体的沉积组织结构对发光性质的影响[J]. 2011,32(12): 1251-1256
6. 970nm反射式垂直腔半导体光放大器的设计与制作[J]. 2011,32(1): 53-57
7. 温度对长余辉发光玻璃发光性能的影响[J]. 2009,30(4): 554-558
8. 溶胶-凝胶法制备$Zn_{1-x}Mg_xO$薄膜及其发光性质[J]. 2008,29(6): 1036-1040
9. Holstein极化子能带和有效质量的温度依赖性[J]. 2006,27(4): 447-451
10. Eu,Dy共掺铝硼硅酸盐的长余辉发光玻璃[J]. 2005,26(6): 819-822
11. $CaTiO_3$：Pr^{3+}长余辉玻璃的制备与发光性能[J] 2005,26(4): 493-496
12. 用紧束缚理论研究压力对固体能带结构的影响[J] 2005,26(2): 153-158

Disp.(液晶与显示), 2012, 27(1):51-55 (in Chinese).

[10] Yuji U, Tsunemasa T. Lighting theory and luminous characteristics of white light-emitting diodes[J]. *Opt. Eng.,* 2005, 44(12):124001-1-3.

[11] Zhu Z M. *Physical Optics* [M]. Wuhan: Huazhong University of Science and Technology Press, 2009:68-70 (in Chinese).

[12] Peng C, Shang M M, Li G G, *et al.* Electrospinning synthesis and luminescence properties of one-dimensional $La_{9.33}(SiO_4)6O_2$:Ln^{3+}(*Ln*=Ce, Eu, Tb) microfibers[J]. *Dalton Transactions,* 2012, 41(16):4780-4788.

[13] Mao Z Y, Zhu Y C, Gan L, *et al.* Tricolor emission $Ca_3Si_2O_7$:*Ln* (*Ln*=Ce, Tb, Eu) phosphors for near-UV white light-emitting-diode[J]. *J. Lumin.,* 2013, 134:148-153.

[14] Dexter D L. A theory of sensitized luminescence in solid[J]. *J. Chem. Phys.,* 1953, 21(5):836-850.