

论文

Si (100) 衬底上Mg_{0.33}Zn_{0.67}O薄膜的结构及光学性能

刘全生¹,张希艳²

1. 长春理工大学

2. 长春理工大学材料科学与工程学院

摘要:

采用射频磁控溅射法在Si (100) 衬底上制备了Mg_{0.33}Zn_{0.67}O薄膜, 研究了Mg_{0.33}Zn_{0.67}O薄膜的结构和光学性能。结果表明, Si (100) 衬底上Mg_{0.33}Zn_{0.67}O薄膜呈六方纤锌矿结构, 薄膜沿c方向取向生长, 且c轴方向晶格增大0.03nm。薄膜呈现优异的半导体特性, 激子吸收峰位于297nm, 禁带宽度为4.3eV。薄膜平均粒径约为20nm。薄膜在深紫外激发下的荧光发射位于368nm。

关键词: Mg_{0.33}Zn_{0.67}O 薄膜 射频磁控溅射 硅衬底 紫外发光

Structure and Optical Properties of Mg_{0.33}Zn_{0.67}O Film Deposited on Si (100) Substrate

Quansheng Liu, Xiyan Zhang

School of Material Science and Engineering Changchun University of Science and Technology

Abstract:

Mg_{0.33}Zn_{0.67}O film was prepared on silicon (100) substrate by RF magnetron sputtering (RFMS) method. Structure and optical properties of Mg_{0.33}Zn_{0.67}O film were studied. Result indicates that Mg_{0.33}Zn_{0.67}O film deposited on Si substrate is hexagonal wurtzite structure. The growth orientation of the film is along c axis and the lattice of c axis orientation increases 0.03nm. The film is present superior semiconductor property. The absorption peak of exciton is at 297nm and the band gap of film is 4.3eV. The average grain diameter is about 20nm. The fluorescent emission peak is at 368nm under deep-ultraviolet excitation.

Keywords: Mg_{0.33}Zn_{0.67}O film RFMS silicon substrate ultraviolet luminescence

收稿日期 2009-03-04 修回日期 2009-05-04 网络版发布日期 2010-01-25

DOI:

基金项目:

国家自然科学基金

通讯作者: 张希艳

作者简介:

参考文献:

[1] YANG Xiao-dong, ZHANG Jing-wen, WANG Dong, *et al.* Annealing Effect on ZnO Thin Films Grown by Laser-MBE[J]. *Acta Photonica Sinica*, 2008, 37 (5): 996-1000.

杨晓东, 张景文, 王东等. L-MBE法生长ZnO薄膜的退火研究[J]. 光子学报, 2008, 37 (5): 996-1000.

[2] SONG Guo-li, SUN Kai-xia. Study on the Visible Emission Mechanism of Nanocrystalline ZnO Thin Films[J]. *Acta Photonica Sinica*, 2006, 35 (3): 389-393.

宋国利 孙凯霞. 纳米ZnO薄膜可见发射机制研究[J]. 光子学报, 2006, 35 (3): 389-393.

[3] BERGMAN L., MORRISON J. L., CHEN X. B., *et al.* Ultraviolet photoluminescence and Raman properties of MgZnO nanopowders[J]. *Appl. Phys. Lett.*, 2006, 88(2): 23103-

扩展功能

本文信息

▶ Supporting info

▶ PDF(1186KB)

▶ HTML

▶ 参考文献

服务与反馈

▶ 把本文推荐给朋友

▶ 加入我的书架

▶ 加入引用管理器

▶ 引用本文

▶ Email Alert

▶ 文章反馈

▶ 浏览反馈信息

本文关键词相关文章

▶ Mg_{0.33}Zn_{0.67}O 薄膜

▶ 射频磁控溅射

▶ 硅衬底

▶ 紫外发光

本文作者相关文章

▶ 刘全生

▶ 张希艳

- [4] VASHAEI Z., MINEGISHI T., SUZUKI H., *et al.* Structural variation of cubic and hexagonal $Mg_xZn_{1-x}O$ layers grown on $MgO(111)/c$ -sapphire[J]. *J. appl. Phys.*, 2005, 98(5):54911-54913.
- [5] YANG W., HULLAVARAD S. S., NAGARAJ B., *et al.* Compositionally-tuned epitaxial cubic $Mg_xZn_{1-x}O$ on Si(100) for deep ultraviolet photodetectors[J]. *Appl. Phys. Lett.*, 2003, 82(20):3424-3426.
- [6] YANG W., R. VISPUTE D., CHOOPUN S., *et al.* Ultraviolet photoconductive detector based on epitaxial $Mg_{0.34}Zn_{0.66}O$ thin films[J]. *Appl. Phys. Lett.*, 2001, 78(18):2787-2789.
- [7] LIAN Jie, WANG Qing-pu, ZHAO Yi-kun, *et al.* Investigation on photoluminescence characteristics of $Mg_xZn_{1-x}O$ film on silicon substrate[J]. *Journal of Optoelectronics laser*, 2006, 17(5): 554-557.
- 连洁, 王青圃, 赵懿昆等. Si衬底上 $Mg_xZn_{1-x}O$ 薄膜发光特性的研究[J]. 光电子.激光, 2006, 17(5): 554-557.
- [8] CHEN Nai-bo, WU Hui-zhen, XU Tian-ning *et al.* Effects of post-annealing treatment on the structural and optical properties of cubic $Mg_xZn_{1-x}O$ thin films grown on sapphire[J]. *Journal of Inorganic Materials*, 2006, 21(4): 993-998.
- 陈奶波, 吴惠桢, 徐天宁等. 退火对立方相 $Mg_xZn_{1-x}O$ 薄膜的结构和光学性质影响[J]. 无机材料学报, 2006, 21(4): 993-998.
- [9] PENG Xing-pin, WANG Zhi-guang, SONG Yin, *et al.* Structure and luminescence properties of ZnO films prepared by rf-reaction sputtering method[J]. *Science in China Series G*, 2007, 37(2): 218-222.
- 朋兴平, 王志光, 宋银等. 射频反应溅射制备的ZnO薄膜的结构和发光特性[J]. 中国科学G辑, 2007, 37(2): 218-222.
- [10] JUNG E. Y., LEE S. G., SOHNA S. H. *et al.* Electrical properties of plasma display panel with $Mg_{1-x}Zn_xO$ protecting thin films deposited by a radio frequency magnetron sputtering method[J]. *Appl. Phys. Lett.*, 2005, 86(15):1535031-1535033.

本刊中的类似文章

1. 朱慧群;丁瑞钦;胡怡. 氢对GaAs薄膜的钝化作用[J]. 光子学报, 2006,35(8): 1194-1198

文章评论 (请注意:本站实行文责自负, 请不要发表与学术无关的内容!评论内容不代表本站观点.)

| | | | |
|------|----------------------|------|-----------------------------------|
| 反馈人 | <input type="text"/> | 邮箱地址 | <input type="text"/> |
| 反馈标题 | <input type="text"/> | 验证码 | <input type="text" value="9865"/> |
| 反馈内容 | <input type="text"/> | | |

Copyright 2008 by 光子学报