

硅基底和金刚石基底上沉积ZnO薄膜工艺研究

作者: 陈颖慧, 高杨, 席仕伟, 赵兴海

单位: 中国工程物理研究院电子工程研究所

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摘要:

采用射频磁控溅射方法分别在硅基底和金刚石基底上制备ZnO薄膜, 研究了硅和金刚石衬底的不同对ZnO薄膜生长机理的影响, 同时分析了氩氧比和退火温度这两个工艺参数对薄膜的晶格取向和表面形貌的影响。利用XRD和AFM对ZnO压电薄膜的性能进行了测试。结果显示, 金刚石基片上制备的薄膜表面状态远优于硅基片上的薄膜表面状态; 在同类型基底上生长的ZnO薄膜, 薄膜的晶格取向随着氩氧比的升高而增强; 对于硅基底上生长的ZnO薄膜, 适当的退火能够成倍地提高薄膜的c轴取向性。

关键词: 声表面波滤波器; ZnO薄膜; 金刚石; 射频磁控溅射; 氩氧比; 退火温度

TECHNIQUE STUDY ON THE DEPOSITION OF ZNO FILM ON SILICON SUBSTRATE AND DIAMOND SUBSTRATE

Author's Name:

Institution:

Abstract:

Zinc oxide (ZnO) film is deposited on Si (001) substrate and diamond substrate by radio-frequency (RF) reactive magnetron sputtering method. The effects of silicon substrate and diamond substrate on the structure of ZnO film are investigated. The effects of the ratio of Ar/O₂ and annealing temperature are analyzed as well. Crystal structures of the films are characterized by X-ray diffraction (XRD) and atomic force microscopy (AFM). The results indicate: (1) The surface morphology of the film on the diamond substrate is superior to silicon substrate; (2) On the same substrate, the crystalline orientation of ZnO film is in direct proportion to the Ar/O₂ gas ratio; (3) As to silicon substrate, proper annealing temperature is helpful to improve the crystal orientation of ZnO film.

Keywords: SAW filter; ZnO film; diamond; RF reactive magnetron sputtering; the ratio of Ar/O₂; annealing temperature

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