



材料合成及性能

Mn掺杂对ZnO: Mn薄膜结构特性的影响

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摘要： 利用射频磁控溅射方法在玻璃衬底上室温沉积了一系列不同Mn掺杂的ZnO:Mn薄膜。结合Raman光谱,XRD谱和SEM分析了ZnO:Mn薄膜的结构特性。 Raman拟合结果显示,在Mn摩尔分数从0增加到5.6%的过程中,ZnO:Mn薄膜始终保持着六角纤锌矿结构;随着Mn掺杂浓度的增大,437 cm⁻¹和527 cm⁻¹位置上的Raman散射峰出现红移现象,说明Mn掺杂量的增加导致晶格更加无序 缺陷增多。当Mn摩尔分数达到15.8%时,647 cm⁻¹处的Raman散射峰出现,暗示了MnO的产生,同时薄膜结晶质量变差。这一结论也得到了XRD和SEM结果的支持。

关键词： ZnO Mn 拉曼 稀磁半导体

Influence of Mn-doping on The Structure Properties of ZnO: Mn Thin Films

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Abstract: ZnO:Mn thin films with different Mn concentration were prepared on glass substrates at room temperature using RF magnetron sputtering method. Raman spectroscopy, X-ray diffraction spectra and SEM were used to analyze the structural characteristics of the ZnO:Mn films. The results show that ZnO:Mn thin films have significant wurtzite structure with Mn doping mole fraction from 0 up to 5.6%. The redshift of Raman peaks at 437 cm⁻¹ and 527 cm⁻¹ can be explained by the lattice defects and disorder induced by the increasing of Mn concentration. The appearance of Raman spectra at 647 cm⁻¹ indicates the formation of MnO, leading to the worse crystallization of ZnO:Mn films, which is also evidenced by XRD and SEM results.

Keywords: ZnO Mn Raman diluted magnetic semiconductors

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