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器件制备及器件物理

碳硅共掺杂p型AlN的光电性能研究

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摘要： 在SiC衬底上生长了碳硅共掺杂p型AlN晶体,通过X射线衍射、X射线光电子能谱(XPS)、光致发光(PL)光谱、霍尔测试对碳硅共掺杂p型AlN晶体的结构、光学及电学性能进行了综合研究。通过XPS测试分析(尤其是对样品中Si 2p和C 1s的XPS谱分析)发现,样品中C替代N成为受主,而Si替代Al成为施主。样品的PL谱主要包括两个特征发射峰,分别来自于C、Si在AlN中形成的复合物V_N-C_N和C_N-Si_{Al}。

关键词： 光致发光 掺杂 p型导电 半导体材料 AlN

Photoelectrical Performance of p-type AlN Crystal Codoped by Si and C

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Abstract: p-type AlN crystals by C and Si codoping were grown on SiC substrates by the sublimation method. The structural, optical and electronic properties of the samples were investigated by XRD, XPS, PL and Hall-effect measurement. The XPS analysis, especially about binding energies of Si 2p and C 1s peaks, reveals that in AlN crystals, C replaces N as an accepter and Si replaces Al as a donor. In PL spectroscopy, two main emission peaks are observed. Combined the structure and composition of AlN and related theoretical results, the two peaks are attributed to the complexes of V_N-C_N and C_N-Si_{Al}, respectively.

Keywords: PL doping p-type conduction semiconductor materials AlN
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