URN etd-0407109-183712-997
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Statistics This thesis had been viewed 50 times. Download 0 times.
Department
Year 2002
Semester 1
Degree Master
Type of Document Master's Thesis
Language zh-TW.Big5 Chinese
Title The Study of GaN Epitaxy Layers Grown by MOCVD System and AlGaAs/GaAs HBT
Date of Defense 0000-00-00
Page Count 56

Keyword
GaN
AlGaAs/GaAs
HBT

Abstract
In this thesis, We successfully grew un-doped GaN bulk epitaxy layer on sappgire by home-made Metal-Organic Chemical Vapor Deposition (MOCVD) system.

besides, we discussed the nitridation time and the flow rate of hydrogen in an un-doped GaN epitaxy layer. The carrier concentration and electron mobility can get optimum values by 3 minutes nitridation. Low carrier concentration and high electron mobility is trade off on the flow rate of hydrogen.

In addition, The device of the AlGaAs/GaAs Heterojunction

Bipolor Transistors (HBT). We discussed the emitter size versus current gain. The sulfide treatment will reduce the surface recombination current in base current, and improve the current gain.
Advisory Committee - advisor

- advisor

- advisor

Files No Any Full Text File.
Date of Submission 2003-09-02