氮化鎵厚膜之選擇性化學蝕刻特性研究

學生：曾虹諭　　指導教授：李威儀 博士

交通大學電子物理研究所

摘要

在本論文我們將研究氫化物氣相磊晶法（HVPE）成長之 GaN 厚膜其側向成長（ELOG）區域經由化學蝕刻後所顯露之特性，一般來說， GaN 不同的晶格面對蝕刻液具有不同的抵抗性，因此在蝕刻後往往顯露出特定的穩定面，有趣的是，側向成長區域在經過 Molten KOH 蝕刻之後，呈現出一排整齊而深邃的三角形隧道，經量測其斜邊屬於$\{11\bar{2}2\}$的面群。藉由蝕刻參數的改變，我們能夠輕易地製造深寬比超過五十的平直隧道，在內文中我們將針對該隧道的成因與性質予以討論。除此之外，我們將研究 Pendeo 與 ELOG 結構在蝕刻隧道形成上的差異，並觀察 Spot pattern 結構的蝕刻特性。在應用方面，我們將嘗試利用蝕刻隧道高度的方向性與縱向蝕刻速率，來達到分離氮化鎵與藍寶石基板的目標。

Selective Chemical Etching properties of GaN Thick Film

Student: Hung-Yu Zeng Advisor:Dr. Wei-I Lee

Department of Electrophysics
National Chiao Tung University

Abstract

In the present study, It is shown for the first time on GaN that well-shaped triangular micro-tunnels extended beyond hundreds of microns can be easily obtained by using wet chemical etch with molten KOH. To obtain this result, specially designed structures of GaN layers are first grown on sapphire substrates with MOCVD and subsequently HVPE techniques. The prepared samples are then chemically etched in molten KOH. With the designed structure of GaN layers, extended micro-tunnels with triangular cross sections are formed. The crystallographic planes of the triangular bevels belong to the $\{11\bar{2}2\}$ family. The etch rate of the tunnel can be as high as 10 μm/min at proper etching conditions.