ABSTRACT
Low-temperature liquid phase deposition (LPD) techniques have been implemented to deposit SiO2 instead of conventional thermal and plasma oxide which result in thermal effect and surface defects on device characteristics. The LPD has many advantages of high quality and faster growth rate. In LPD, the hydrofluosilicic and boric acid were mixed for different proportion and temperature was varied to control growth rate. In the fabrication of MOS, a transparent electrode of ITO was used as a gate electrode to increase absorption efficiency of semiconductor and Ohmic contact was formed by using a alloy of Ti/Al metals. An ultraviolet of 254 and 366 nm light source was illuminated on the MOS photodetector and a high photo-to-dark current ratio is achieved about 10^4 for 366nm wavelength. With photoresponsivity measurement, a Xe lamp with 360 nm is used as light source and a photoresponsivity of 1.95 A/W is obtained at reverse bias voltage of –20 V.

Keywords: GaN, liquid-phase deposition, photo-dark current ratio, ITO

Table of Contents

目錄 封面內頁 簽名頁 授權書.........................iii 中文摘要..............iv 英文摘要........................ v 致謝..............vi 目錄..........................vii 圖目錄........................ x 表目錄........................

第一章 緒論...................... 1 1.1氮化鎵的特性與應用............1 1.2二氧化矽(SiO2)之特性...............3 1.3氧化銦錫(ITO)之特性...........3 1.4論文章節介紹...................3 第二章 薄膜成長.......5 2.1氮化鎵薄膜成長之製備...............5 2.1.1簡介.............. 5 2.1.2氮化鎵薄膜製程................6 2.1.3樣品清洗............ 7 2.2氧化銦錫薄膜(ITO)之製作............. 7 2.2.1簡介............... 7 2.2.2氧化銦錫薄膜成長方式.............8 2.3液相沉積二氧化矽之製作........ 9 2.3.1簡介.....................9 2.3.2二氧化矽成長的方法...........12 2.3.3基板的清洗步驟及沉積參數.......... 13 第三章 實驗方法及量測............ 15 3.1 MOS原理簡介..................15 3.2實驗量測.............. 16 3.2.1能量分散式X射線元素分析儀......... 17 3.2.2化學分析電子儀分析or X光光電子能譜圖... 18 3.2.3 AES深度剖面圖............... 18 3.2.4原子力顯微鏡.............. 19 3.2.5穿透率量測................. 19 3.2.6響應率量率...................20 3.3 GaN MOS元件的製作流程.............20 3.3.1基板清潔.................. 20 3.3.2蒸鍍歐姆接觸之Ti/Al金屬...........21 3.3.3熱處裡.................... 22 3.3.4在GaN上成長閘極氧化層........... 23 3.3.5濺鍍ITO...................24 第四章 實驗結果與討論................. 25 4.1閘極氧化層的成長................ 25 4.2 MOS光檢測器的特性...............26 第五章 結論................... 29 參考文獻........................48