

# The study of silicon germanium material on photodetectors = 矽鍺材料應用於光檢測器之研究

張文澤、黃俊達

E-mail: 9700694@mail.dyu.edu.tw

## 摘要

由於應變矽鍺材料具有較矽塊材高的電子與電洞遷移率，從0.8微米至1.8微米近紅外光可調變的波長檢測範圍，以及易與現有矽製程技術整合等優勢，為著矽基光子元件成為下一代晶片技術的需求，而被廣泛的研究。這些年來，許多種以矽鍺為基礎的光電元件被提出作為研究的對象。在我們的研究中，我們只要在矽鍺薄膜上覆蓋厚度60奈米的非晶矽，便可得到具有波長濾波特性的光檢測器。相較於對稱式結構，我們使用鎳、金、鉻等金屬製作非對稱式金屬-半導體-金屬的矽鍺-矽異質界面光檢測器，能有效地抑制暗電流，而保有相同的光電流。更進一步地，我們觀察透明的銻錫氧化物與具矽覆蓋層和不具矽覆蓋層的矽鍺薄膜的歐姆接觸特性，在攝氏600度退火後，其特徵接觸電阻值分別為 $2.78 \times 10^{-2} \text{ } \Omega\text{-cm}^2$ 和 $2.26 \times 10^{-5} \text{ } \Omega\text{-cm}^2$ 。接著，我們應用銻錫氧化物與矽鍺薄膜的接觸特性，以銻錫氧化物與矽鍺的金屬-半導體-金屬結構，製成一個由電壓控制的波長近紅外光檢測器。

關鍵詞：矽鍺；異質結構；光檢測器；近紅外光

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