# SiGe/Si 異質結構光電特性的探索


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**摘 要**

本實驗中將利用具高能隙、高阻值及高吸收係數的非晶矽半導體材料覆蓋在矽鍺上，並探討其光電特性，首先是利用非晶矽半導體在矽鍺表面的保護層作用，降低表面缺陷所製作而成的平面式金屬-半導體-金屬結構的光檢測器，藉由此設計來降低暗電流，提高其光暗電流比，並比較其有/無非晶矽氫保護層結構與電漿增強化學氣相沈積氧化層結構的光電特性。在此我們發現具有非晶矽保護層的矽鍺光檢測器暗電流為1.27 × 10-8 A與不具非晶矽氫保護層的矽鍺光檢測器其暗電流為2.14 × 10-3 A，而具氧化物保護層的暗電流為2.5 × 10-3 A，其具非晶矽氫與不具非晶矽氫的暗電流相差五個數量級，由此可知非晶矽氫是一個很好的保護層，能藉由非晶矽氫覆蓋在矽鍺表面降低缺陷的特性應用在矽鍺光檢測器上達到有效降低暗電流的目的。 在另一方面我們將沿用上述所發現的特性，製作成非晶矽氫/矽鍺/矽異質結構光電晶體。我們利用850nm波長的光源，改變其入射光功率，比較對於不同電極的光電特性，由實驗結果得知具銦錫氧化物電極的光增益較好。透過電晶體的作用，光電晶體可以有較高的電流增益，因此採用異質結構來製作光電晶體，異質結構光電晶體的能帶間隙差異會使得注入效率增大，提高電流增益。



關鍵詞 : 金屬-半導體-金屬 ; 光檢測器 ; 非晶矽氫 ; 矽鍺 ; 暗電流 ; 光電晶體


**目錄**



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