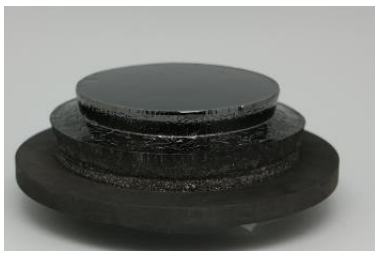
寬能隙半導體射頻/功率元件技術與應用
WBG-Semiconductor RF/Power Device Critical Techniques and It's Applications

簡介(中/英)

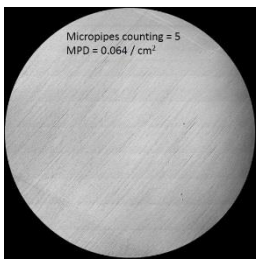
具有鐵摻雜之氮化鎵磊晶層可做為半導體元件之絕緣層，可有效降低高遷移率電晶體(HEMTs)漏電流現象，達到高崩潰電壓之要求，藉由調控成長條件下(例如:溫度、壓力)，進行不同鐵摻雜濃度之氮化鎵磊晶層成長。碳化矽與氮化鎵等寬能隙材料可用於高功率通訊模組研發，可用於第五代(5G)行動通訊所需之基地台用無線射頻頭端設備等基礎通訊建設。

Iron-doped gallium nitride (GaN) epitaxial layers can be used as the semi-insulating layers for high electron mobility transistors (HEMTs) to prevent leakage current and achieve high breakdown voltage. The different levels of iron doping in GaN epitaxial layers were accomplished by tuning growth conditions, such as temperatures and pressures. For 5G mobile communication systems, GaN and SiC devices can be used as the High power RF HEMT in remote radio head (RRH) for cellular phone base transceiver station (BTS).

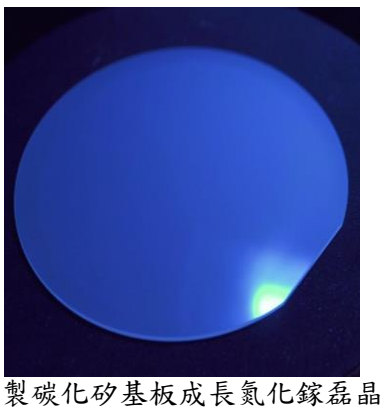
規格(中/英)



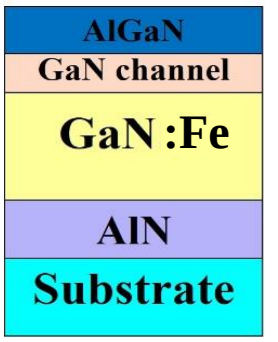
碳化矽晶體(SiC Crystal)



高阻值碳化矽晶圓(SI SiC wafer)



於自製碳化矽基板成長氮化鎵磊晶片
(GaN on SiC Epitaxy)



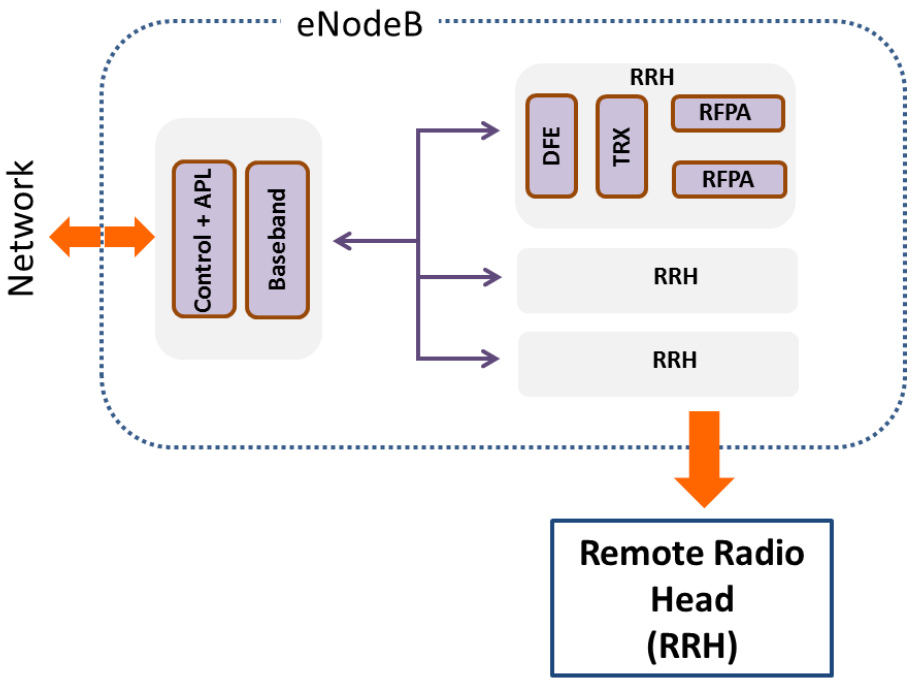
氮化鎵磊晶結構

規格:

- 4吋 4H SiC (4inch 4H SiC)
- 電阻率(Resistivity)>10^5ohm-cm
- MPD<0.1/cm^2

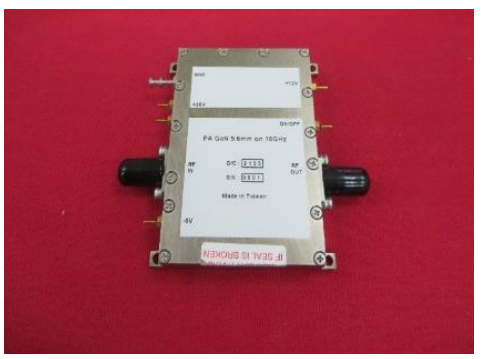
Sheet Resistance (ohms/sq)	Mobility (cm^2/Vs)	Carrier density (cm^{-2})
280	2,030	$1.16x10^{13}$

研發成果及應用(中/英)



半絕緣碳化矽長晶及鐵摻雜氮化鎵磊晶技術可用於第五代(5G)行動通訊所需之基地台等基礎通訊建設，透過寬能隙材料散熱性及高轉換效率特性，有助於5G行動通訊基地台微縮化及普及化，結合物聯網(IOT)應用，達成高速/大流量之通訊需求。

Semi-insulating Silicon Carbide single crystal growth and iron-doped GaN epitaxy technologies can be used in cellular phone base transceiver station (BTS) for 5G mobile communication systems, in addition, its size, weight, and cost can be reduced under high efficiency and high temperature operation with the characteristics of the wide band gap materials.



氮化鎵功率放大器 (GaN PA)

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