

EPITAXIAL GROWTH AND AMPHOTERIC DOPING ON GaAs (n11)A-ORIENTED SUBSTRATES

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Abstract

Silicon is widely used as an n-type dopant in GaAs growth by molecular beam epitaxy. However, silicon atoms can be incorporated as acceptors when the substrate is GaAs (n11)A-oriented and $n \leq 3$. Moreover, the conduction type can be controlled by adjusting substrate temperature and V/III flux ratio during the growth. Lateral p-n junctions formed at the intersection of different surface orientations can be obtained on patterned substrates. Surface orientations and crystal growth dynamics show a complex interplay that determines the properties of the junctions. Various types of devices based on these lateral p-n junctions, such as light emitting diodes, laser diodes, photodetectors, tunnel diodes and transistors have been proposed and realized. These devices show many peculiarities, and some of them could be advantageous as compared to conventional structures.