Arsine Flow Rate Effect on the Low Growth Rate Epitaxial InGaAs Layers

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Effect of arsine (AsH_3) flow rate on epitaxially grown unintentionally doped and low-growth rate InGaAs layer by using metalorganic organic vapor phase epitaxy at growth temperature (640°C) are investigated. While all other sources and parameters are kept constant during growth, the AsH_3 flow rate in InGaAs layer is increased from 20 to 120 sccm. The epitaxial grown InGaAs layers have been characterized by optical microscopy, X-ray diffraction, photoluminescence, and Hall effect. It is found that the mobility of carriers increases from 3780 to 7043 cm^2/Vs, sheet carrier density decreases from $7.74 \cdot 10^{11}$ to $4.01 \cdot 10^{11}$ cm^{-2}, PL intensity of emission increases from 1.1 to 8.6 V by increasing the AsH_3 flow rate from 20 to 40 scvm. Moreover, the same trend of improvement is observed on the crystalline quality of InGaAs layers with changing of AsH_3 flow rate. The changing of AsH_3 flow rate between 20 and 120 sccm is found to have strong effect on properties of epitaxial InGaAs alloys.

Keywords: InGaAs, metal organic vapor phase epitaxy, arsine, V/III ratio, thin film.

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