

Molecular beam epitaxial Growth of high-speed MQW electroabsorption optical modulators

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External modulation of laser has important advantages over direct modulation because chirping is low and modulation at very high frequency is possible. Currently, much attention is being paid to the multiple quantum well (MQW) electroabsorption (EA) modulators because they have high modulation efficiency among the many types of optical modulators, thus making them suitable for use in multi-gigabit optical transmission systems.

At first, the lattice matched In_{0.52}Al_{0.48}As layer was grown on InP wafer using Riber 32P MBE system. It is crucial to grow clean InAlAs epitaxial layer in order to achieve high speed EA optical modulator device. Therefore, the initial growth conditions were optimized to secure high crystalline quality of InAlAs epilayers. Then, InGaAs/InAlAs multiple quantum wells were grown on InAlAs buffer layer. The well and barrier thicknesses were optimized to achieve high extinction ratio (>10dB) and low operating voltage (<2.5V). Double crystal X-ray rocking curves and low temperature photoluminescence (PL) results will be presented. In addition, in order to obtain polarization independence, well and barrier will be strained. We use a computer simulation program to predict the polarization independence and the experimental results will be compared.

MQW EA-modulator is made according to our standard fabrication process and device test results will be introduced.