

AlInGaN – based multiple quantum well laser diodes for Blu-ray Disc application

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We developed 30 mW-AlInGaN based violet laser diodes. The fabrication procedures of the laser diodes are described as follows. Firstly, GaN layers having very low defect density were grown on sapphire substrates by lateral epitaxial overgrowth method. The typical dislocation density was about $1-3 \times 10^6/\text{cm}^2$ at the wing region. Secondly, AlInGaN laser structures were grown on LEO-GaN/sapphire substrates by MOCVD. UV activation method, instead of conventional annealing, was conducted to achieve good p-type conduction. Thirdly, ridge stripe laser structures were fabricated. The cavity mirrors were formed by cleaving method. Three pairs of SiO_2 and TiO_2 layers were deposited on the rear facet for mirror coating. Lastly, laser diode chips were mounted on AlN submount wafers by epi-down bonding method.

The lifetime of the laser diodes was over 10,000 hrs at room temperature under automatic power controlled condition. We expect the performance of the LDs to be improved by the optimization of the growth and fabrication process. The detailed characteristics and important issues of the laser diodes will be discussed at the conference.