# Research on ZnSe-based Ⅱ-Ⅵ compound semicondutor laser

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This paper describes the reduction of operating voltage of ZnSe-based lasers using (nll) substrates. ZnSe homoepitaxial growth, promosing technique for extending the lifetime of device, is also investigated. In addition, the primary reaults of lasers grown on ZnSe substrates are shown.

First, nitrogen-doped ZnSe films were grown on (nll) GaAs substrates. It is realized that acceptor concentration of ZnSe films on (n11) substrates is twice as large as that on a (100) substrate. In a ZnCd/ZnSe multi-quantum-well laser grown on a (711) A substrate, the built- in voltage can be reduced by 5 V from that of a laser on a (100) substrate. It is demonstrated that the use of (n11) substrates is effective method to reduc e operating voltage of lasers.

Secondlly, wet etching treatment and plasma cleaning conditionas of ZnSe substrate were optimized to reduce defect density in ZnSe homoepitaxial films. Wet etching with $K_2Cr_2O_7$-based etchant is found to result in a Se-rich ZnSe surface. By optimizing plasma cleaning conditions for ZnSe substrates treated with $K_2Cr_2O_7$-based etchant, the etch pit density of ZnSe film was reduced to $2.7\times10^4/cm^2$.

Finally, ZnSe-based lasers containing ZnMgSSe cladding layers were fabricated on semi-insulating (100) ZnSe substrates. Although these lasers need high operating voltage, they demonstrate continuous-wave oscillation at room temperature. This proves that high quality laser structure can be fabricated even on ZnSe substrates.