
T-04

Position dependence of Si delta doped layer in the barrier of InGaN/GaN single quantum well

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Recently, we reported that the insertion of delta doping layer in the barrier of MQW can improve the efficiency of InGaN/GaN UV LED ⁽¹⁾. With the use of delta doping in the middle of barrier of MQW, photoluminescence (PL) intensity of MQW and output power of UV LED was improved. In this work, the effect of position of Si delta-doped layer in GaN barrier of single quantum well (SQW) on the optical properties of InGaN/GaN ultraviolet SQW was studied. When the Si delta-doped layer is too close to the QW layer, potential well of Si delta-doped layer is overlapped with the QW potential, resulting in the reduction of PL intensity. On the other hand, when the Si delta-doped layer is too far away from the QW layer, the carrier injection from Si delta-doped layer into QW layer is difficult, resulting in a decrease in PL intensity. An optimum distance of a Si delta doped layer in a GaN barrier of SQW was found to be 12 nm from the QW.

[참고문헌]

1. M. Kwon, et al., J. Appl. Phys. VOL. 97, 106109 (2005)