

## عنوان مقاله:

Effect of hydrostatic pressure on the Auger recombination rate of InGaN/GaN multiple quantum well laser diode

## محل انتشار:

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## خلاصه مقاله:

In this study, a numerical model was used to analyze the Auger recombination rate in c-plane InGaN/GaN multiple-quantum-well lasers(MQWLD) under hydrostatic pressure. Finite difference techniques were employed to acquire energy eigenvalues and their corresponding eigenfunctions of MQWLD, and the hole eigenstates were calculated via a  $6 \times 6$  k.p method under applied hydrostatic pressure. It was found that a change in pressure up to 10 GPa increases the carrier density up to  $0.75 \times 10^{19} \text{ cm}^{-3}$  and  $0.56 \times 10^{19} \text{ cm}^{-3}$  for the holes and electrons, respectively, and the effective band gap. Based on the result, it could decrease the exaction binding energy, rise the electric field rate up to  $0.77 \text{ MV/cm}$ , and decrease the Auger recombination rate up to  $0.6 \times 10^{27} \text{ cm}^{-3} \text{ s}^{-1}$  in the multiple-quantum well regions. Also, calculations demonstrated that the hole-hole-electron (CHHS) and electron-electron-hole (CCCH) Auger recombination rate had the largest contribution to the Auger recombination rate. Our studies provided more detailed insight into the origin of the Auger recombination rate drop under hydrostatic pressure in InGaN-based LEDs.

## کلمات کلیدی:

Auger Recombination, Overlap integrals, Laser diode, multi-quantum well

## لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1748755>

