

Modeling and simulation of $\text{Zn}_x\text{Cd}_{1-x}\text{Te}/\text{ZnTe}$ quantum well structure for laser applications

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Abstract: In this work, we modeled and simulated a $\text{Zn}_x\text{Cd}_{1-x}\text{Te}/\text{ZnTe}$ based single quantum well structure. We have taken into account the effect of carrier density, alloy composition, temperature and wells width on the optical gain as well as threshold current density. The use of ZnTe as a barrier leads to the improvement of the carrier confinement such as Q_c (83%)/ Q_v (17%). Then, we have optimized the quantum well structure that allows obtaining a threshold current density $J_{th} = 500 \text{ A/cm}^2$. This study allowed us to achieve laser diodes VCSEL quantum well reliable and emitting around $0.740 \text{ }\mu\text{m}$.

Keywords : Quantum well Semiconductor laser Gain ZnCdTe Optoelectronics