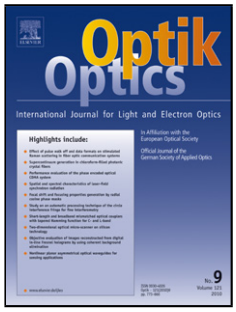

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Performance Characteristics of Deep Violet InGaN DQW Lasers Based on Different Compliance Layers

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The performance characteristics of deep violet InGaN DQW LDs by varying material and thickness of compliance layer were numerically studied by ISE TCAD software. The In composition and thickness of compliance layer directly affect the operation current, which flow in the LD structure and its active region. The simulation results show that, lower In composition of the compliance layer causes higher operation current injection that results in higher electron and hole current densities in the active region, and output power. They also indicate that the LD differential quantum efficiency (DQE) and slope efficiency are increased, whereas output power and threshold current are decreased by increasing In composition of the compliance layer. The results also show that DQE and slope efficiency are increased, output power is decreased, whereas threshold current, on the average, is increased by increasing compliance layer thickness. Decreasing total output power with increasing compliance layer thickness can also be related to the operation current injected in LD structures, as well as electron and hole current densities which flow in LD structures and are injected in the active region. Lower compliance layer thickness causes higher operation current injection, resulting in higher electron and hole current densities and output power. Meanwhile lower stimulated emission rate in the active region with decreased compliance layer thickness results in lower slope efficiency and DQE.

Keywords: InGaN, laser diode, quantum well, numerical simulation, Compliance Layer.