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Influence of built-in polarization on electronic blocking layers for InGaN quantum-well lasers

Lee, Chung-Hsien; Chen, Jun-Rong; Kuo, Yen-Kuang;
Chang, Shu-Hsuan; Liou, Bo-Ting

Abstract

The influence of built-in polarization on electronic blocking layer for InGaN quantum-well lasers is numerically studied by employing an advanced device simulation program. The simulation results indicate that electron overflow of InGaN quantum-well laser can be reduced by using the AlInGaN electronic blocking layer. When the aluminum and indium compositions in AlInGaN electronic blocking layer are appropriately designed, the built-in charge density at the interface between InGaN barrier and AlInGaN electronic blocking layer can be reduced. Consequently, the electron leakage and threshold current can be decreased when the built-in polarization is taken into account in our simulation. Furthermore, higher quantum-well optical confinement factor can be obtained by using the AlInGaN electronic blocking layer.

Key words: Built-in polarization; Numerical simulation;
III-V semiconductor; Semiconductor laser