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Efficiency Enhancement of Blue InGaN LEDs with Various Barriers

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Abstract

For blue InGaN MQW LEDs, the realization of high efficiency depends on the radiation recombination rate in active regions. However, the polarization effects between the quantum wells and conventional GaN barriers are so serious that cause the difficulty of carrier injection and uniformity. In this study, the efficiency enhancement of various barriers is proposed numerically. According to our simulation results, the injection efficiency of electrons and holes are enhanced markedly. The internal quantum efficiency remains relative high even under high driving current. The output power with the optimized barriers is several fold compared with the original GaN barriers. The ease of sloped band between wells and barriers dominates this phenomenon. Possible solution of the corresponding dynamics may be the reduction of effective potential height and leakage current.