Proceedings of SPIE, 4078: 595-602
SPIE--The International Society for Optical Engineering.
July 2000

Experimental and Numerical Study on the Optical Properties of Yellow-green AlGaInP Light-emitting Diodes

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Abstract

AlGaInP LEDs with emission wavelengths near 570 nm are important in liquid crystal display backlight application. However, high brightness in this spectral region is difficult to achieve due to the reduction of the radiation efficiency in the high-aluminum-containing active region and the smaller band offset between the active and the cladding region. In order to improve the performance of the 570-nm AlGaInP LEDs, we have grown several wafers with different structure designs and studied the optical properties as functions of the device temperature and the excitation power experimentally with a photoluminescence measurement system and numerically with a commercial Latsip simulation program. Specifically, important factors such as the barrier height in quantum wells, the tensile strain barrier cladding next to the MQW region, the compensated strain in MQW, and the disturbed Bragg reflector are investigated. Good agreement between the experimental and numerical results is observed.