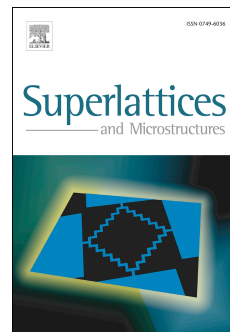


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Study on the structural, optical, and electrical properties of the yellow light-emitting diode grown on free-standing (0001) GaN substrate

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Abstract

In this paper, GaN-based yellow light-emitting diodes (LEDs) were homoepitaxially grown on free-standing (0001) GaN substrates by metal-organic chemical vapor deposition. X-ray diffraction (XRD), photoluminescence (PL), and electroluminescence (EL) measurements were conducted to investigate the structural, optical, and electrical properties of the yellow LED. The XRD measurement results showed that the InGaN/GaN multiple quantum wells (MQWs) in the LED structure have good periodicity because the distinct MQWs related higher order satellite peaks can be clearly observed from the profile of $2\theta-\omega$ XRD scan. The low temperature (10 K) and room temperature PL measurement results yield an internal quantum efficiency of 16% for the yellow LED. The EL spectra of the yellow LED present well Gaussian distribution with relatively low linewidth (47 to 55 nm), indicating the homogeneous In-content in the InGaN quantum well layers in the yellow LED structure. It is believed that this work will aid in the future development of GaN on GaN LEDs with long emission wavelength.

Keywords: GaN; light-emitting diode; MOCVD; thin film

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