

CHARACTERISTICS OF InGaN BASED RED LED EPIWAFER

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ABSTRACT- This paper describes a preliminary work of developing InGaN based red LED using two-flow MOCVD reactor, focussing on characteristics of the LED epiwafer from the aspects of optics, surface and crystalline structure. The active region multiquantum wells (MQWs) of the LED consists of In_{0.3}Ga_{0.7}N quantum well and GaN quantum barrier, which were alternatively grown for a period of 4 with Al_{0.28}Ga_{0.72}N as a cap layer between the quantum well and the quantum barrier. From EL measurement, the LED showed a broad emission peak at 615 nm. The broad emission can be related to the presence of hexagonal pits on the LED's surface, as witnessed through SEM and AFM measurements. Despite of that, XRD measurement implied the LED has a relatively good crystalline structure with FWHM of ~234 arcsec in (002) and (102) scans. XRD-RSM measurement suggests that the MQWs are under strain. On the basis of this work, further effort on reducing the hexagonal pits is required to improve the characteristics of the LED epiwafer so that it is useful to be processed into functional devices.

Keywords: MOCVD epitaxy, InGaN-red LEDs epiwafer, hexagonal pits.