Fabrication of Vertical Resonant Cavity InGaN LEDs by a Laser Lift-off Technique

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ABSTRACT

We present the state-of-the-art resonant-cavity light-emitting diode (RCLED) application to short-haul communication system on plastic optical fiber. The RCLED structure composed of an InGaN/GaN multiple-quantum-well active layer has been grown by metal organic chemical vapor deposition, between the top (5-pairs) and bottom (7.5-pairs) dielectric TiO2/SiO2 distributed Bragg reflectors with optical reflectance of 85 and 99.9%, respectively with a larger stopband of 100 nm. It was found that the emission peak (around 525 nm) of RCLED shows more stability and lesser joule heating effect induced red shift were measured with increasing the injection current density. The mode cavity of the RCLED shows a linewidth of 5.5 nm at a main emission peak at 525 nm, while the emission directionality was rather improved than that of the conventional LED. The emission full width at half maximum can decrease from 48 to 35 nm and a quality factor for the structure of approximately Q~100.These results indicated that the EL spectrum of the RCLED was found to be modulated strongly due to the effect of the resonant cavity. Nevertheless, the improvement in emission directionality is attributed to the as evidenced by the angle-resolved electroluminescence measurements.

Keywords : GaN、InGaN、Resonant-Cavity Light-Emitting Diode (RCLED)

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