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FABRICATION OF DEEP GREEN LIGHT EMITTING DIODE ON BULK GALLIUM NITRIDE SUBSTRATE

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ABSTRACT- The indium composition in $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$ multi-quantum well structure (MQW) is crucial because lower indium composition will shift the wavelength towards ultraviolet region. Nevertheless, at certain indium content in MQW, it will out diffuse from the MQW resulting in the wavelength shift from green to much shorter wavelength, after the annealing process for p-type activation. In this study, we had grown a full Light Emitting Diode device with the MQW layer at a relative high temperature for green LED with indium pre-flow at the top of n-type layer just beneath the MQW using Metal Organic Chemical Vapor Deposition (MOCVD). Transmission Electron Microscopy (TEM) image of the MQW prior and post the activation of p-type had been observed, which resulted in good contrast, showing the abruptness of the MQW layer of the device. Homogenous layers of $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$ has been observed. We also managed to reduce the wavelength shift of the device significantly. The optical, crystal properties of grown devices had been studied.

Keywords: green LED, MQW, MOCVD, epitaxy, indium pre-flow, indium out diffuse.