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INHOMOGENEITY OF AN InGaN BASED BLUE LED STUDIED BY SECONDARY ION MASS SPECTROMETRY (SIMS) AND ATOM PROBE TOMOGRAPHY (APT)

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ABSTRACT- InGaN/GaN multiquantum wells (MQWs) grown on 2-inch c-plane patterned sapphire substrate using metal-organic chemical vapor deposition was characterized by secondary ion mass spectrometry and atom probe tomography. The average In mole fraction by APT was found to be around 16% in the InGaN well which is consistent with SIMS analysis. SIMS analysis was also performed to analyze the In distribution in the InGaN well layer, where the results were found to be nonuniform in the InGaN active layer, as opposed to the results obtained from APT measurement. Further from SIMS measurement, the upper interfaces of the QWs were slightly more diffused than the lower interfaces. Meanwhile, APT measurement showed In clustering or In rich regions based on different color distributions, indicating different In concentration. The results of APT and SIMS for average In mole fracrtion were validated by XRD measurement.

Keywords: Light emitting diode, InGaN/GaN, MQWs, SIMS, APT.