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Electrochemical Potentiostatic Activation & Its Application for Enhancing blue LED Efficiency

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A novel electrochemical potentiostatic method has been examined in order to enhance the hole concentration of p-type GaN thin films using KOH and HCl electrolyte.

The hole concentration was increased more than 2 times by the electric voltge apply with the mobility of 10~12cm^2/V.s.

At optimum condition of 3V apply, hole concentration was enhanced more than reference sample from 1.7X$10^{-17}$$cm^{-3}$ to 4.1X$10^{-17}$$cm^{-3}$.

Application of this activation method to blue-LED fabrication improved optical output from 18.4mW to 20.6mW, that is ~12% increase.

SIMS analysis indicates that nearly 70% of hydrogen atoms could be removed by this method.

Keywords: electrochemical, p-GaN, Activation

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Antimony Surfactant Effect on p-GaN growth by Metal Organic Chemical Vapor Deposition (MOCVD)

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An improvement in the optical and structural properties of p-GaN was obtained by using antimony (Sb) as a surfactant during p-GaN growth. Two different growth temperatures of p-GaN such as 1030ºC and 900ºC were considered. Keeping the growth conditions for p-GaN constant, Sb was introduced during p-GaN growth while varying the [Sb]/([Ga]+[Mg]) flow ratio. [Sb]/([Ga]+[Mg]) flow ratio will be denoted as SGM ratio for convenience. SGM ratio of 0, 0.015 and 0.03% were considered for high temperature p-GaN growth. SGM ratio of 0, 0.005, 0.01 and 0.02% were considered for low temperature p-GaN growth. The analysis results suggest that using the optimum SGM ratio during p-GaN growth greatly improves the optical and structural properties of the p-GaN

Keywords: P-GaN, surfactant, antimony