

급속 열처리한 GaN박막의 결정성 및 전기적 특성
(Electrical and structural properties of GaN by rapid thermal annealing)

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GaN growth on sapphire usually carried out by metal organic chemical vapor deposition (MOCVD). At present, the majority of the commercial GaN based devices use sapphire as the substrate.

But, it is quite difficult to grow high quality GaN films on sapphire substrates due to its huge lattice mismatches and thermal expansion difference. Therefore it is necessary to find the way of improving crystalline quality of GaN films.

The rapid thermal annealing (RTA) effect on GaN films grown on sapphire (0001) substrates by MOCVD was investigated. GaN films were annealed with variable times at temperature of 800, 900 and 1000 °C . After RTA, GaN epilayers were compared with not annealed GaN.

Hall measurement, double crystal X-ray diffraction (DCXRD) and Raman spectroscopy were used to monitor the changes in electrical and structural characteristics. The carrier concentration was decreased and the electron mobility increased. Also full width at half maximum (FWHM) of DCXRD was improved. The Raman spectra show the presence of the E2 (high) mode and the shift in the wavelength of this mode. This results showed the relaxation of residual stress due to lattice mismatch and thermal expansion misfit. Furthermore electrical properties of GaN were improved.

It showed that the combination of proper RTA time and temperature results in the improved properties of GaN films grown by MOCVD.