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## Structural and Vibrational Properties of GaAsN Films grown by MOVPE with a Partial Nitrogen Carrier Gas

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The Metal Organic Vapor Phase Epitaxy is single crystal growth process, forming GaAsN films on GaAs (001) substrates, built up by chemical method using trimethylgallium (TMGa), dimethylhydrazine (DMHy) and tertiarybutylarsine (TBAs) as Ga, N and As, respectively. Commonly, the process is contained hydrogen ( $H_2$ ) gas, a carrier gas, to convey precursor to the reaction chamber. Alternatively, nitrogen gas ( $N_2$ ), attractive representation instead of  $H_2$  gas, is non-flammable and it is less thermal conductivity. Structural and vibrational properties of GaAsN ( $0 < N < 5\%$ ) films grown using a mixed  $N_2/H_2$  carrier gas were characterized by various laser powers of Raman spectroscopy to observe annealed effects in the meantime. To verify effect of an existing of  $N_2$  carrier gas during the MOVPE growth of GaAsN films, the growth with two different carrier gas conditions, 100% of  $H_2$  carrier gas and 50% of  $H_2$  carrier gas mixed to  $N_2$  gas were performed. The results show that the films, using a mixed carrier gas, tend to have more nitrogen content than typical one. Although the nitrogen localized vibrational mode (N-LVM) is shifted, it occurs from the other cases, for instance, the penetration depth of laser and the enlargement of lattice size are concerned. As a result, we figure out that increasing of nitrogen content relates to the decreasing of growth temperature, and in addition to laser powers of Raman spectroscopy affect to determine the nitrogen content. By the way, it is found that the laser powers of Raman spectroscopy aren't enough to arouse the interstitial nitrogen atom to be in lattice point.

Keyword: Metal organic vapor phase epitaxy (MOVPE), carrier gas, GaAsN

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