Contribution ID: **379** Type: **Poster**

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

Thursday 25 May 2017 17:45 (15 minutes)

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

Authors: Mr LAPSIRIVATKUL, Teerapat (Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand); Mr SANORPIM, Sakuntam (Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand); Mr ONABE, Kentaro (Department of Advanced Materials Science, the University of Tokyo, Kashiwanoha, Kashiwa, Chiba 277-8561, Japan)

Presenter: Mr LAPSIRIVATKUL, Teerapat (Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand)

Session Classification: Poster Presentation II

Track Classification: Material Physics and Functional Materials