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# MOMBE로 (001) GaAs 기판위에 성장시킨 GaAsN의 구조적 특성 분석

## (Structural investigation of GaAsN grown on (001) GaAs by metalorganic molecular beam epitaxy)

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III-V-N compound semiconductor alloys such as GaNAs grown on GaAs are of technological importance because of device applications such as long-wavelength semiconductor laser diodes (LDs) suitable for optical fiber communications.

In this work, comprehensive TEM and TED studies were performed to investigate the structural properties of metalorganic molecular beam epitaxy GaAsN layers grown on (001) GaAs substrates. It is shown that lateral composition modulation is formed in the $GaAs_{1-X}N_X$ layer (X<6.75%). TEM results show that an increase of N contents leads to poor crystallinity and that the N content in excesss of 4.3% eventually results in polycrystalline layers. It is further shown that increasing Se dopant (n-type) concentration enhances N incorporation. However, the Se doping is found to deteriorate the crystallinity. AFM results show that the rms roughness increases with increasing N composition and Se concentration. It varies from 5.22 to 6.27nm as the N composition changes from 2.8 to 6.75%. For the Se doping, the roughness is 12.4nm for the layer grown with PDtBSe=$1x10^{-4}$ Torr and 13.6 for PDtBSe=$7x10^{-4}$ Torr. It is also shown that surface morphology is changed from facetted surface to island-like features with increasing N composition and Se concentration. A simple model based on the site-selective N incorporation behaviour is used to explain the formation of the lateral composition modulation in the GaAsN layers.